SFA GARDENS ANNUAL REPORT

JAN – DEC 2021

Magnolia X "Woodsman X Gold Star'

SFA Gardens
2900 Raguet Street
Pineywoods Native Plant Center
Nacogdoches, TX 75965

SFA GARDENS

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SFA GARDENS AS A UNIVERSITY RESOURCE

SFA Gardens remains a recognized and valued Center within Stephen F. Austin State University, Nacogdoches, Texas, USA. SFA Gardens is a multi-faceted public garden developed within SFA's Arthur Temple College of Forestry and Agriculture. SFA Gardens covers 128 acres on the SFA campus with 10 acres in the Mast Arboretum and Jim and Beth Kingham Children's Garden, eight acres in the Ruby M. Mize Azalea Garden, eight acres in the Gayla Mize Garden, and 42 acres in the Pineywoods Native Plant Center and Jimmy Hinds Park. In addition, with ATCOFA and Physical Plant Support, SFA Gardens is responsible for the maintenance and development of the 60-acre SFA's Recreational Trails and Gardens, which is adjacent to the Gayla Mize Garden. SFA Gardens is an umbrella for projects in the gardens, city and in collaborative research endeavors across the Gulf South. In addition, SFA Gardens is responsible for regional outreach projects including pollinator prairie studies on private and public lands, salinity studies at Moody Gardens, Galveston Island, Kiwifruit studies with six farmer-cooperators, and numerous plant materials collaborations and exchanges with Texas nurseries and southern USA plant professionals. This report documents activities January 1, 2021 - December 31, 2021.

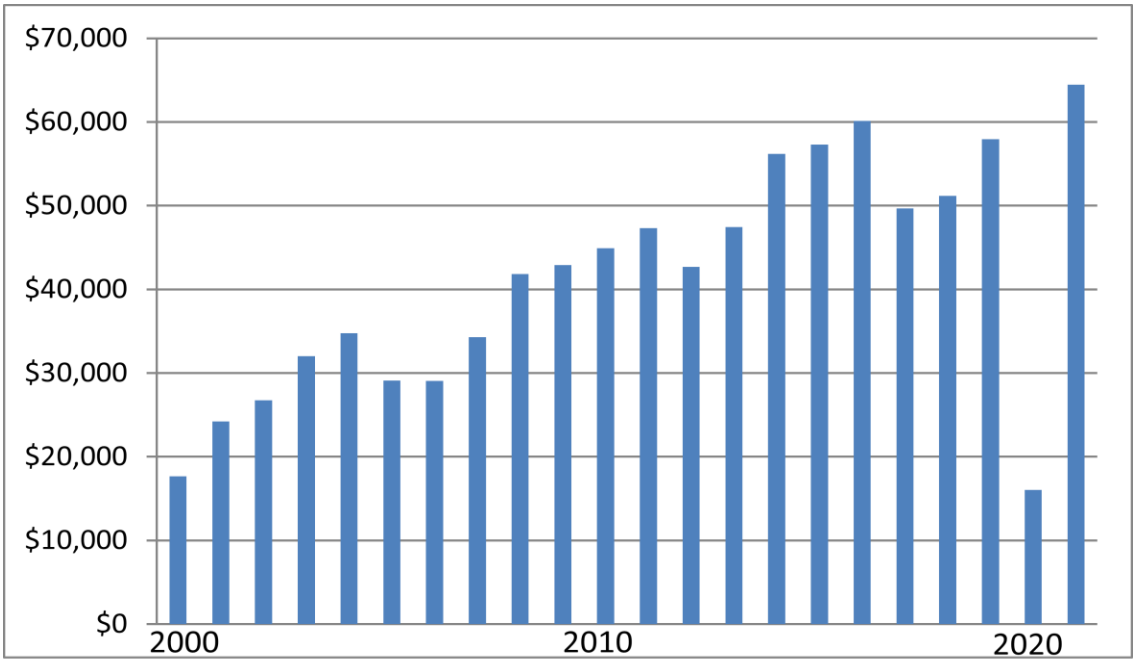
THE PANDEMIC JUST WON'T END

In the 2020 annual report I projected that the pandemic would end, the weather would be kind, our two lost positions would return and all would be well in the Pineywoods. I was wrong. For a little history, when the Covid19 pandemic entered the American scene in March 2020, everything was turned upside down. By mid-March 2020, the University was shut down and students sent home to enter what I call the Zoom era of their education. The SFA Gardens staff was deemed essential. For a while, personnel took on masks, social distancing and hand washing. It didn't take long to realize that the gardens income from outside the University sources was set way back. OK, on its way to zero. The Les Reeves lecture series, seminars, workshops, meetings, weddings and other events were cancelled.

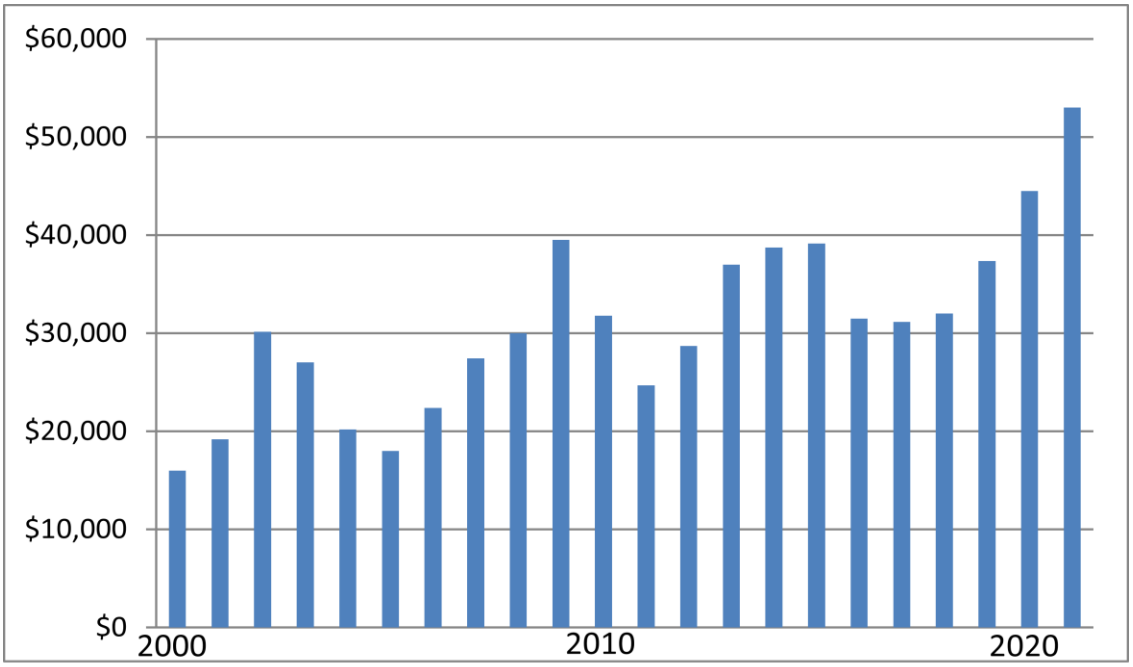
The impact on the two SFA Gardens plant sales is interesting. Rules and guidelines was the name of the game in 2020. That spring 2020 dip in income reveals a garden caught totally by surprise. We managed, survived barely, but it wasn't easy. However, let it be known far and wide that Dawn and Jordan thought it through, adjusted gracefully and the Fall 2020 sale was a great success. Graphs don't lie. The vernacular for that day became bubbles, registering on line for a 2 hr spot, filling 400 spots, and running the sale over many days to keep the numbers of humans down to a reasonable number. Essentially, the 2020 plant sales were extended over many weeks to deal with the rules/protocols in place. With things returning to a kind of normal, the 2021 plant sales evolved into a two day event which allowed the two plant sales to reach record levels: $64,449 spring sale (7 day sale – hybrid, limited by online reservation); $53,800 – Fall Sale (2 day sale, open).

PLANT SALE INCOME SINCE 2000

Coupling Texas tough landscape plants with a public that actually needs them after the freeze is good timing.



Spring Plant Sales



Fall Plant Sales

THE SFA GARDENS ENVIRONMENTAL EDUCATION PROGRAM

One of the great success stories at SFA Gardens is Environmental Education, no doubt based on the fine work of the Coordinator, Elyce Rodewald. After twenty years, Elyce retired in early spring, 2020, as the Environmental Education Coordinator. Unfortunately, Covid19 hit in March, 2020, and the request to fill this state-funded position in the summer of 2020 was denied. This made sense then. Replacing this state funded position was a major goal for our program in 2021 and it was based on an audience wanting to get it going again. In 2019, the SFA Gardens Environmental Education program reached over 11,000 in a broad spectrum of programs for ages K-adult. In 2020, the program essentially went to zero in March, 2020. No kids, no program.

In 2020, a Texas Parks and Wildlife Department grant funded a ½ time assistant coordinator position, Jocelyn Moore. While the pandemic put a real hardship on the last seven months of the program, we can report that all of the deliverables were met, mostly because of events and activities accomplished before the pandemic arrived. With the end of the grant, and no return to normalcy, that position was lost and environmental education at SFA was now down to zero staffing, zero budget. This was not acceptable.

The centerpiece of the SFA Gardens Environmental Education program remains the Ina Brundrett Conservation Education Building (CEB) at the Pineywoods Native Plant Center. The building was dedicated at the PNPC in 2014 after a successful campaign to raise about one million dollars. The solar panel array at the CEB provides over 75% of the annual the annual energy needs of the facility. In 2019, the Ina Brundrett Conservation Education Building was the central location for 77 events, meetings, workshops, seminars and the Les Reeves Lecture series. In 2020, that didn't happen. The CEB was turned into a classroom for classes in Forestry. With the pandemic, the ability to spread students out and keep them masked has been the mantra. We continue to proclaim the building as a great teaching example of environmentally sensitive methods of construction and operation. When the fall of 2021 arrived, the CEB was returned to our use and we have seen a significant increase in usage by university and community interests.

Most important, as the result of external support this past Fall 2021, we were able to hire Dr. Alan Sowards as a 1/2 time Environmental Education Programs Coordinator. Alan was a very fortunate hire, the perfect picture of right person, right place, right time. Alan was retired, a College of Education professor who has stepped up to be the life raft this important program needs. No one knows what this teaching resource is all about more than Alan. He worked closely with Elyce Rodewald over many years, knows the school districts, and he is a perfect fit for the noble effort to bring outdoor education back to school children who need it.

THE RECORD FREEZE OF WINTER STORM URI

In the last forty years, three freeze events stand out in Texas; December 1983, December 1989 and February 2021. The most recent event, winter storm Uri, set many all-time low temperature records across the state. Besides the human pain and billions in infrastructure losses, the winter storm emergency left a mark on the Texas landscape that will be long in the healing. In Nacogdoches, Texas, temperatures dropped to -20^{o}C (-4^{o}F) on February 16, 2021. After plant damage revealed itself, an accounting of freeze impact was made on a wide range of plant materials at SFA Gardens. A 1-6 damage rating scale was created and period cruises through the collections has amassed a large data set with comments. For instance, over three hundred varieties of Rhododendron were assessed, with damage varying from dead to unaffected. Appendix I is an overall assessment by various major genera in the SFA Gardens collection, an evaluation we will complete in 2022.

SOME SERIOUS STAFF CHANGES

Dawn Stover

After twenty-two years at SFA Gardens as the Research Associate, Dawn accepted a wonderful position in late Fall 2021 with the National Resources Conservation Service. She will be based at the East Texas Plant Materials Center. I have to admit when Dawn first told me this was going to happen, I said no, I'm so sorry, I won't allow it. Well, that didn't work out and the more money/less stress/great job/exciting-new-challenges won out. OK, I can understand that. Still, I have totally mixed feelings on this change. One side knows this is a terrific job with opportunity for big impact on mega landscapes in the Pineywoods. After all, protecting ecosystems and native plant communities is a noble goal. Dawn is a perfect fit. On the other side of the coin, there's zero doubt the greenhouses, nurseries, landscapes and our garden community at SFA Gardens will miss her shadow.

It seems just like yesterday when Dawn was a Horticulture graduate assistant sitting on a stool in the Forestry greenhouse, knocking out data *on Camptotheca acuminata,* the Happy Tree of China. She had recently graduated with a B.S. in Biology from West Texas A & M University and landed here for an MS. She received that in 1999, and it was a hop, skip and a jump to being immersed in this garden adventure. Dawn was here when eight acres was it, the pre Mast Arboretum days. She was here when the gardens expanded into four theme gardens and a LaNana creek corridor. She's been growing nursery and greenhouse crops and nurturing landscapes for over 22 years. After forty plus fall and spring plant sales under her charge, she's set a high bar for organization, plant numbers, plant quality and plant happy people. However, I suspect it's her work at SFA Gardens with the rare and precious plants of the Pineywoods that truly prepares her for the work ahead at the NRCS.

I ran a search on an old external hard drive to see my first saved correspondence to Dawn and came up with a May 1997 document, an old Garden Warriors “to do” list. It’s particularly poignant. “Dawn, plant the *Spigellia marilandica* in the Arb Shade garden, west side of the deck – colony on 1’ centers - little sun ok but make sure they’re near a sprinkler! We can make this a stock block for future work. Also, dig, divide and then plant the Spigellia under the oakleaf hydrangea in the bog, they need more sun.” Indian pink remains one our favorite shade loving natives. If it’s in bloom, it sells.

What makes Dawn perfect for her new charge is a long history working with the rare, threatened and endangered plants of the Pineywoods and studying the ecosystems they call home. We’ve long held an interest in so many interesting natives that find themselves on the edge of extirpation from the Pineywoods. Dawn was here when the gardens had a focus on *Hibiscus dasycalyx*, *Phlox nivalis* ssp*. texensis*, *Gaillardia aestivalis* var. winklerii, *Stewartia malacodendron* and others. We called our program the “SFA Arboretum’s Three R’s: Rescue, Research and Reintroduction.” We hosted some great Cullowhee Lone Star Regional Native Plant Conferences and produced a fine Proceedings. We created and sold some great T shirts. Pulling off a big mult-day conference is no easy chore. Dawn was the behind the scenes stabilizing force bringing calm to moments that were actually less than orderly.

By most yardsticks, there are about fifty native plants in the Pineywoods struggling to call this place home. Some have relatives to the east or west and while not endangered, their numbers are small and their genetic resilience questionable. The rarest plants may exist in only a few spots. Some are rather beautiful; we referred to them as the megacharismatics. They’re rare, yet charming enough to find a place in any east Texas garden. All were worthy of study, not just for their precarious numbers in the wild, but for what they can add to the health of our natural urban ecology. Her work led to connections with the fine folks in the state and federal agencies charged with protecting the Pineywoods. She connected with the resident native plant geeks, civic groups and landowners in east Texas. For many years, her footprints have been all over the special places that make the Pinewoods unique. Her work with Gaillardia seedling selections led to a fine introduction, ‘Grape Sensation’. For that work, she received the Lynn Lowrey Memorial Award in 2015 from the Native Plant Society of Texas. SFA is purple, you know.

Combining horticulture with plant conservation efforts is a natural union. Jim Affolter, Director of Horticulture at the State Botanical Garden of Georgia, wrote in 1997, that, “Although there is general agreement that long term survival of endangered species is best assured by preserving natural habitat, off-site activities involving horticultural technology often provide an essential stepping stone on the path to recovery”, **HortScience** 32(1): 29-34. Simply stated, Jim underscores the truth that marrying the skills of horticulturists with the needs of rare plant conservation is critical to the success

of a plant conservation program. Dawn brought that to the table here and she's taking it with her to a brand-new adventure in life. We wish her the very best.

Malcolm Turner

Malcolm resigned in August to take a fine position with Twinwood Farms, Simonton, Texas, one of our kiwifruit cooperators. Malcolm will be sorely missed but he will still be applying his hopes, dreams and talents to the kiwifruit industry we may see someday in Texas. Our paths will continue to cross. Malcolm wore several hats at SFA Gardens including being the steward of our fruit effort (kiwifruit, muscadine grapes, figs, blueberries, and some alternative fruits we are testing).

Anne Sullivan

Anne Sullivan retired as the ½ time program specialist. Anne did a masterful job as Conservation Education Building event manager prior to the shutdown in March of 2020. Juggling the intricacies and details of budgets and account management is difficult at a University and she did a fine job keeping us above water. With external support, we were able to hire Amanda Romig for the position.

Alan Sowards

Dr. Alan Sowards was hired as a casual hire ½ time to take on the task of bringing the Environmental Education program at SFA Gardens for kids back to its former glory. Hiring Dr. Sowards is a huge step forward on the path to normalcy.

CHANGE IN OUR FISCAL REALITY:

The pandemic had a serious impact on the SFA Gardens staffing and budget. At the start of 2020, the program enjoyed ten staff. At the end of 2021, the program was down to seven. When the dust settled, SFA Gardens had lost $116K in the state salary line which is about ½ of previous allotment.

Hopefully, this pain to the program is temporary. Besides the loss in state funding, the SFA Gardens lost also about $110K in normal outside the university income (plants sales, seminars, workshops, etc.) and about $15K in income via the Ina Brundrett Conservation Education Building (weddings, meetings, events). Our best estimate is the net loss to our previous operating budgets exceeded $180,000. With the pandemic in March 2020, the Ina Brundrett Conservation Education Building was converted into a University classroom. Events were cancelled and our numbers took a beating. In 2019, the CEB hosted over 90 events; in 2020 that number fell to 11, all in January and February 2020 before the shutdown.

Community support is provided by a "Friends of SFA Gardens" group with about 136 members and the SFA Gardens Advisory Board, which met quarterly prior to the pandemic. Historically, SFA Gardens enjoys a great corps of volunteers. For a reference point pre-Covid19, the total volunteer hours for the SFA Gardens set a record

in 2019 with 2449.2 hours' worth $57,458. In 2020, we had 474 volunteer hours' worth $11,120, most of which came in January and February, 2020. The situation has definitely improved in 2021 but it's been slow progress returning to the numbers we enjoyed before the pandemic hit.

MICKEY ELLIOTT FAMILY FOUNDATION GIFT

In 2019, we received word that the Micky Elliott Family Foundation awarded the SFA Gardens a gift that will allow the gardens to move to the next level. We hired two new staff, Thomas Dimmitt and Devin Theisen, just prior to the mid-March 2020 closing of the University. Thomas and Devin have provided the absolutely critical on the ground staff dedicated to new garden projects and landscape maintenance (planting, mulching, fertilizing, pruning, pest management and irrigation). Thomas's territory is at the SFA Mast Arboretum and Devin is in charge of keeping the Ruby Mize Azalea Garden in tip top shape. Duke Pittman is our long time landscape manager is in charge of getting chores done. In the history of this garden, this award will be recognized as one that literally allowed the garden to survive. Without it, there's no doubt the gardens would have lost even the most modest level of maintenance. This gift will be ongoing based on achieving our deliverables. We intend to do just that.

GARDEN COLLECTIONS

What still separates SFA Gardens from so many university gardens is the scale of work with numerous taxa, the sheer diversity of the collection. The gardens are a treasure trove of interesting plants. Japanese maples and other Acer species, camellias and azaleas are, by any yardstick, very large collections. The SFA Gardens bald cypress evaluation and improvement program is perhaps the largest in the nation. Our work with Mexico oaks and other western species is recognized by the nursery and landscape industry. Our work with the Mexico mountain sugar maple, *Acer skutchii*, has allowed this interesting drought and alkalinity tolerant species to make waves in the nursery and landscape industry of the Gulf South. In the past year we added a Ginkgo collection to the Gayla Mize Garden and an interesting circle of sweet olive, *Osmanthus fragrans* seedlings, which are not easy to get. Besides being a classy evergreen, this species survived the record February 2021 freeze. The reason for the success of SFA Gardens is simple. We have a long history of connecting and sharing plant materials with arboretums and botanical Gardens across the nation, with other academic institutions, nurserymen and plant enthusiasts. As for the garden, we have good AutoCAD maps and databases that provide basic tracking of hundreds of new accessions each year. The most serious deficit in terms of tracking plants and visitor education is the lack of good labels and plant markers which we intend to address in the years ahead.

MOODY GARDENS PROJECT

SFA Gardens has a fascinating project at Moody Gardens on Galveston Island. In 2016, the Moody Foundation funded a study for a three-year period. The research project involves about two acres of nursery near the Offatt Bayou, a spot challenged by aerial and soil salt issues and almost incessant wind. At the end of the three years, a request by the Director of Horticulture at Moody Gardens, Mr. John Zendt, led to the approval of another three year project (initiated in October 2020). The recent grant also supports the work of two graduate students, under the direction of Drs. Ken Farrish, Environmental Science, and Steve Wagner, Biology. The plots are yielding all kinds of surprises in terms of species performance, some growing vigorously while others have succumbed to the harsh condition of the site.

FRUIT RESEARCH

While most of the garden is dedicated to woody and herbaceous ornamentals, a significant fruit research platform is in place. Since 1978, the SFA Horticulture program has enjoyed a history of blueberry research. We are well connected with the small fruit researchers and extension faculty across the Gulf South. The SFA Gardens blueberry germplasm evaluation effort includes over 114 cultivars and advanced selections, typically three of each. A muscadine grape vineyard was established in Jimmy Hinds Park in 2014 and includes over 72 cultivars and advanced selections. A fig variety planting was established in 2014 that includes over 59 varieties.

KIWIFRUIT EVALUATION PROJECT

A kiwifruit project has been supported by Texas Department of Agriculture, USDA Specialty Crop Block Grant for the last four years. This external funding ended in December 2021 but I can report the project will survive with a grant by our international cooperation with TopFruit in South Africa and Miko Asia in New Zealand. The first Kiwifruit varietal trial was planted in 2010 at SFA. This resulted in a first-in-Texas crop of golden kiwifruit, *Actinidia chinensis*, in 2014. Our plots have enjoyed six good to average crops out of the last eight years. That's commendable when compared to other fruit crops. This project is a collaboration with Dr. Tim Hartmann, Texas Agrilife Extension Specialist, College Station, Texas. Judging from consumer evaluations, the fruit is given high marks in taste, texture and having an edible skin. Pests have not been an issue but that may change in the future with several new insects on the horizon and coming this way. Vine vigor has been as good as anywhere in the world. Still, there remain numerous horticultural challenges to overcome (primarily, variety selection, pollination issues, tolerance to alkalinity, hard freezes on young plants and issues associated with chilling requirement). With the end of the TDA Specialty Crops Block grant in December 2021, I am pleased to report we have received external funding via KiwiKo in South Africa. With six farmer cooperators working with the project, we will soon have a better understanding of the economic potential of green and gold kiwifruit in the Gulf South.

JIMMY HINDS PARK

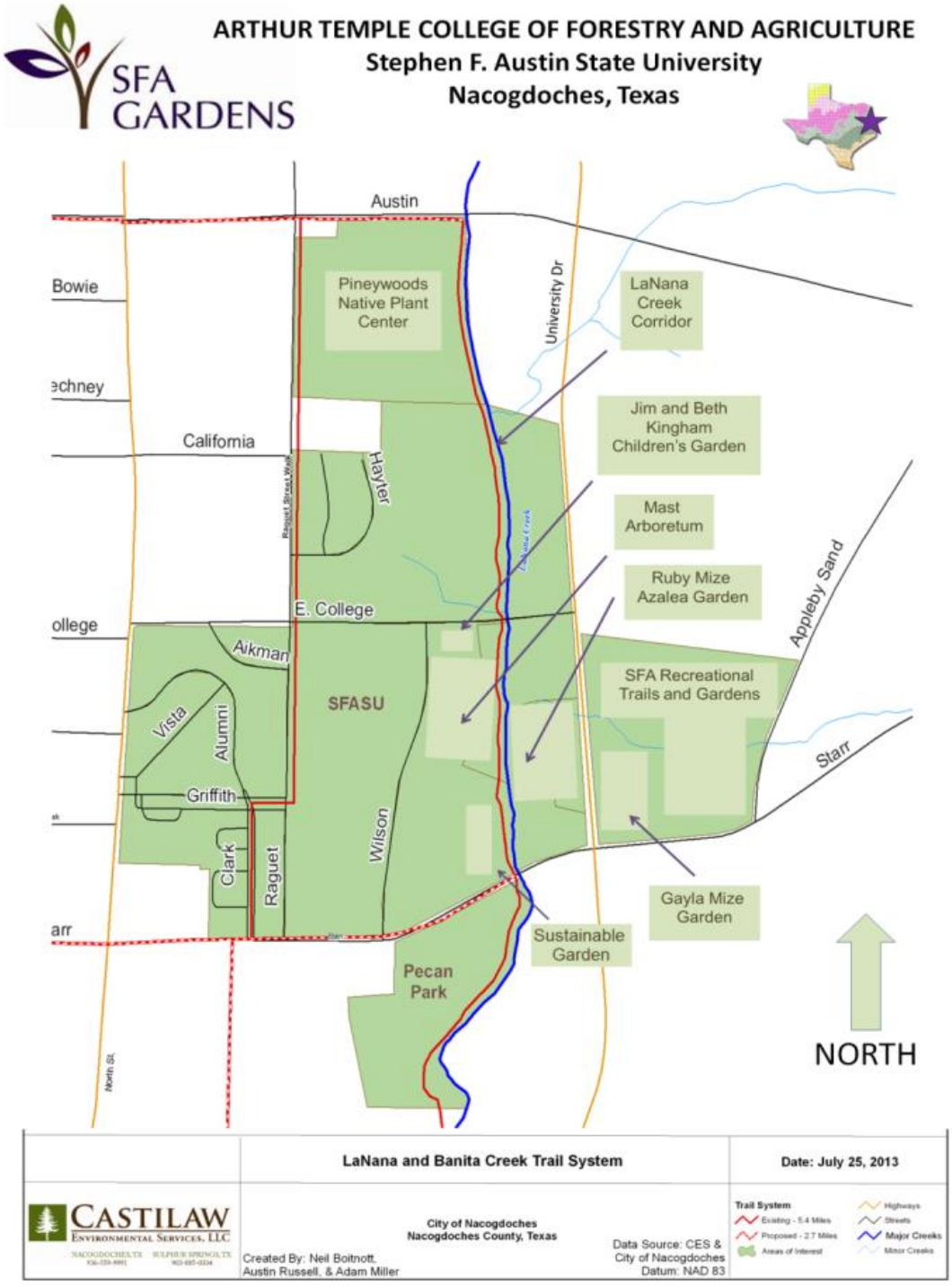
This special 2-acre stretch of LaNana Creek bottomland lies at the North end of the Pineywoods Native Plant Center, adjacent to Austin Street. This two acre patch was a gift by Barbara Finney to the University, and she funded the garden development over a good number of years. She passed away July 2, 2020. Barbara enjoyed a sharp wit and was never prone to mince words. Barbara is survived by her daughter Vicki Chamberlain and sister Patricia Spearman. I met her many years ago and Barbara had much to do with spreading horticultural cheer here and at other institutions of higher learning. Her father was the very first Agriculture Instructor at SFA almost 100 years ago. The park is home to a fine muscadine vineyard which includes over 60 varieties and a sizeable kiwifruit nursery plot is in place, which has also served as a collaborative research platform with my colleague Dr. Tim Hartman, Texas Agrilife Extension Program Specialist. The park is also home to a collection of Taxodium (Baldcypress) cultivars which includes the popular 72'-wide treehenge-like circle of weeping bald cypress, 'Cascade Falls'. In the coming year, new plantings will capitalize on the sunlight and rich bottomland soils of this special spot along LaNana creek.

CONCLUSIONS:

Since March 2020, things haven't been the same. Everyone can say that. For SFA Gardens, the Covid19 pandemic and associated disasters of epic proportions have been a hard blow. Add up the mega freeze in February, state budget cuts and the difficulties going from pandemic to endemic, well, it's still a mess. Still, if you're a serious gardener, you understand the word stubborn. Henry Mitchell said it best.

> "Wherever humans garden magnificently, there are magnificent heartbreaks.... I never see a great garden, (even in my mind's eye, which is the best place to see great gardens around here), but I think of the calamities that have visited it, unsuspected by the delighted gardener who supposes, "It must be nice to garden there." It is not nice to garden anywhere. Everywhere there are startling winds, once in every five centuries floods....Now the gardener is the one who has seen everything ruined so many times that, even as his pain increases with each loss, he comprehends, truly knows, that where there was a garden once there can be again." — Henry Mitchell, The Writer in the Garden

The positive side of things is that the gardens are not just surviving, they're thriving. I think it's kind of a rebirth. We are in the trenches with several exciting research projects. The gardens are returning to great health. The diversity of our research work remains surprising. Increasing traffic, wonderful garden features, eye-opening collections, staff that care, cheerful volunteers returning to the fold, and a tribe of great student assistants making all kinds of things happen. Let's keep planting.


SFA GARDENS
ARTHUR TEMPLE COLLEGE OF FORESTRY AND AGRICULTURE
Stephen F. Austin State University
Nacogdoches, Texas
Austin
Bowie
California
E. College
Aikman
Hayter
Raguet
Wilson
Clark
Griffith
Vista
Alumni
SFASU
University Dr
Appleby Sand
Starr
Pineywoods Native Plant Center
LaNana Creek Corridor
Jim and Beth Kingham Children's Garden
Mast Arboretum
Ruby Mize Azalea Garden
SFA Recreational Trails and Gardens
Gayla Mize Garden
Sustainable Garden
Pecan Park
NORTH
LaNana and Banita Creek Trail System
Date: July 25, 2013
CASTILAW ENVIRONMENTAL SERVICES, LLC
City of Nacogdoches
Nacogdoches County, Texas
Created By: Neil Boitnott,
Austin Russell, & Adam Miller
Data Source: CES &
City of Nacogdoches
Datum: NAD 83
Trail System
Existing - 5.4 Miles
Proposed - 2.7 Miles
Areas of Interest
Highways
Streets
Major Creeks
Minor Creeks

David Creech, Director

Creech, David. 2021 Silver Award Winner at SFASU for grantsmanship.

Creech, David. 2021. Lifetime Membership Award from the Louisiana State Horticulture Society for contributions over many years to Louisiana Horticulture.

Creech, David. 2021. Virtual tour of SFA Gardens for the annual conference of the Texas Master Gardeners conference. May 19, 2021. Pre-recorded and then a live 45 minute Q and A. 640 online

Creech, David. SFA Azalea Gardens: Keynote talk: Past, Present and Future. Azalea Society of America Annual Conference (virtual), Live powerpoint presentation and live q and a. May 22, 2021. 186 online

January 19-22, 2021. Creech, David. 2021. Texas Tough Trees and Shrubs for a 21st Century Climate. Zoom presentation for the Association of Water Board Directors, June 9, 2021. 126 online participants.

The Southern Region American Society for Horticultural Science conference to be held in Mobile, Alabama, was cancelled due to Covid, and did not proceed as virtual. I had one paper accepted and was coauthor on two others.

Creech, David. 2021. Virtual. Two presentations: 1) Propagation Tips and Tricks, and 2) Are Redbuds the Next Crape Myrtle? Oklahoma State University Shackleford Lecture Series, June 17, 2021. 120 online

Creech, David. 2021. Two presentations: 1) Woody Ornamental Trees and Shrubs at SFA Gardens, and the keynote: 2) Fruit Work at SFA Gardens. Louisiana State Horticulture Society Conference, Lake Charles, Louisiana. June 30, 2021. 45 in attendance.

Creech, David. 2021. Texas Landscapes for the 21st Century. Zoom presentation for the Texas Association of Water Board Directors. July 9, 2021. 145 participants. Tara Klein was contact.

Creech, David. 2021. Azaleas, Camellia, Japanese maples and More; Lessons Learned after the February Mega Freeze. Presentation to the Anderson County Master Gardeners, Palestine, TX. Sept 21, 2021. 24 in attendance.

Creech, David. 2021. Using Natives in the Landscape; Less chemicals, More Pollinators. Zoom Presentation to the Woodlands Township, Oct 2, 2021. TerrilynMacArthur contact. 81 on line.

Creech, David. 2021. The New Fruit Frontier: Alternatives and Possibilities for Texas Growers. Presentation to the tenth annual Texas Fruit Growers Conference, New Braunfels, Texas. Oct 11-12, 2021. 130 attendees.

Creech, David. 2021. Figs: Past, Present and Future. Presentation to the tenth annual Texas Fruit Growers Conference, New Braunfels, Texas. Oct 11-12, 2021. 130 attendees.

Koonce, A., Bush, E. and Creech, D. The Effect of Sodium Chloride on Hybrid Taxodium Selections. **Journal of Environmental Protection**, 11, 408-420. https://doi.org/10.4236/jep.2020.115024

Lais Machado thesis defense. Nov 30, 3021. Assessing Freezing Effect on Kiwifruit Cultivars and Mapping Suitable Areas for Growing the Crop in East Texas. Dave Kulhavy, Advisor, and SFA Gardens provided additional support via the TDA Kiwifruit grant.

de Oliveira Machado, Lais, "ASSESSING FREEZING EFFECT ON KIWIFRUIT CULTIVARS AND MAPPING SUITABLE AREAS FOR GROWING THE CROP IN EASTERN TEXAS" (2021). Electronic Theses and Dissertations. 431. https://scholarworks.sfasu.edu/etds/431

Covid shut down the Les Reeves Lecture Series in March 2020. With some hope that the pandemic had lessened we made the decision to bring the Les Reeves Lecture Series back which we kicked off in Sept 2021. Attendance has been half of pre-covid times.

Creech, David. 2021. SFA Gardens – The People, Plants and Planning for the Challenges Ahead. Les Reeves Lecture Series. Dec 9, 2021. 39 in attendance.

Creech, David. 2021. Are Redbuds the Next Crape Myrtle? **Texas Gardener** Vol. XL (3): 20-25.

Creech, David. 2021. Going Bald is Beautiful. **Texas Gardener** Vol. XL (4): 30-33.

Creech, David. 2021. Ice, Ice, Baby. **Texas Gardener** Vol. XL (5): 16-20.

Creech, David. 2021. Get More with Less. **Texas Gardener** Vol XL (6): 19-21.

Creech, David. 2021. Trouble-free Fruits for Surviving the Apocalypse. **Texas Gardener** Vol. XLI (1): 20-23.

After twenty years, I am still collaborating on bald cypress research with Professor Yin Yunlong, a colleague and good friend at Nanjing Forestry University, Nanjing, China:

Yuhong Zheng [1]*, Da Wang [2], Xiaolong Li [2], Ziyang Wang [1], Qingwei Zhou [2], Li Fu [2],*, Yunlong Yin [1] and David Creech [3]. Biometric Identification of Taxodium spp. and Their Hybrid Progenies by Electrochemical Fingerprints. **Biosensors** 2021, 11, 403. https://doi.org/10.3390/bios11100403. [1]Jiangsu Engineering Research Center for Taxodium Rich, Germplasm Innovation and Propagation, Institute of Botany, Jiangsu Province and Chinese Academy of Sciences, Nanjing Botanical Garden, Memorial Sun Yat-Sen, Nanjing 210014, China; wangziyang@cnbg.net (Z.W.); ylyin@cnbg.net (Y.Y.); [2] College of Materials and Environmental Engineering, Hangzhou Dianzi University,Hangzhou 310018, China; wangda@hdu.edu.cn(D.W.); lxlr@hdu.edu.cn (X.L.); zhouqw@hdu.edu.cn (Q.Z.); [3] Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75962, USA; dcreech@sfasu.edu

Lei Xuan[1], Jianfeng Hua[1], Fan Zhang[1], Zhiquan Wang[1], Xiaoxiao Pei[1],Ying Yang[1], Yunlong Yin[1] and David L. Creech[2]. 2021. Identification and Functional Analysis of ThADH1 and ThADH4 Genes Involved in Tolerance to Waterlogging Stress in Taxodium hybrid 'Zhongshanshan 406'. **Genes** 2021, 12(2), 225; https://doi.org/10.3390/genes12020225. [1]Jiangsu Province Engineering Research Center of Taxodium Rich. Germplasm Innovation and Propagation, Institute of Botany, Jiangsu Province and Chinese Academy of Sciences (Nanjing Botanical Garden Mem, Sun Yat-Sen), Nanjing 210037, China; [2]Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75962, USA

Jordan Cunningham

Greenhouse Technician

Presentations:

September 9, 2021. Teresa and Less Reeves lecture: Plant Sale preview with Dawn Stove and Jordan Cunningham “Fabulous Fall Festival: The Warm Colors” 35 in attendance

Conferences:

May 18th - 19th Invited speaker at the Texas Master Gardener Virtual Conference with over 300 in attendance

September 14th and 16th attended Gardening for Monarchs virtual conference

October 1st attended the Fall gardening program hosted by the Flora Garden Club, Master Gardeners of Nacogdoches, and the Texas AgriLife Extension office with guest speaker Steven Chamblee

Garden events:

Plant sales:

April 10th - 14th Garden Gala Plant sale

October 9th and 10th Fabulous Fall Festival Plant Sale total

Lunch bunches:

September 15th Pant Sale preview with Dawn Stove and Jordan Cunningham 18 in attendance

October 20th Fall Floral Design 6 in attendance

November 17th Tree planting and care with Thomas D. 20 in attendance

December 15th Preparing for an Unexpected Freeze 9 in attendance

Seminars:

Deck the halls seminar December 12th 24 in attendance

Volunteer events:

Volunteer workday October 29th 4 in attendance

Volunteers weeding day November 12th 4 in attendance

Volunteers cleanup day June 25th 10 in attendance

Plantings:

November 5th Arbor day Planting

November 19th Ab's Park Planting

November 2nd Regents academy garden planting day

Numbers:

2 New Students hired on the greenhouse team

30 register volunteers

5 new volunteers

1,540 Logged Volunteer hours

Dr. Alan Sowards – Environmental Education Program Coordinator

Dr. Alan Sowards was hired September 1, 2021 by SFA Gardens to re-establish partnerships that are supportive of the mission to bring back SFA students/faculty, public/private school students and their teachers, and all other outdoor enthusiasts to the SFA Gardens. He was hired on a "casual hire" basis for a ½ time position.

Another key component is to reconnect with individuals and organizations to support the education programs of the SFA Gardens, which include the College of Education, and other colleges at the University (ie. College of Agriculture and Forestry, College of Science and Math). It is also important to engage and partner with local, regional, and state agencies that promote environmental education.

Education Programs offered in October and November 2021

WILD About Science

35 SFA elementary and middle school science interns participated in 3 training sessions held at the Ina Brundrett Conservation Education building and the Pineywoods Native Plant Center, on October 1, 2021, November 8 and November 10, 2021.

Dr. Alan Sowards, SFA Gardens Environmental Education Coordinator and Mr. Ted Stephens, Education Director, Texas Forestry Association (and Co-Coordinator of Texas Project Learn Tree, PLT) lead the WILD About Science workshops, which included 3 PLT science activities. These science activities were replicated and taught by the SFA students at the MAST Arboretum for elementary students from the East Texas region.

Dr. Tonya Jeffery, Assistant Professor of Elementary Science and Dr. Leah Kahn, Associate professor of Middle School science participated with their students in these science field investigation.

Other Collaborating Partners for WILD About Science

Ms. Jacey Tosh, Texas A&M Forest Service, Conservation Education Coordinator, College Station
Mr. John Boyette, SFA Forestry faculty, and past state PLT Co-Coordinator
Dr. Cheryl Boyette, consultant specializing in curriculum and program evaluation
Mr. Logan Ivy, Resource Specialist 1, Texas A&M Forest Service, Nacogdoches

WILD About Science Field Investigation Implementation

The first WILD About Science field investigation was held October 8, 2021 at the MAST Arboretum from 9:00 AM – 12:00 PM. **97** students (4th and 5th grade) from Garrison ISD participated in 3 PLT science lessons lasting 45 minutes each. These activities were hands-on, minds-on, inquiry-based lessons.

The second WILD About Science field investigation was held November 17, 2021 at the MAST Arboretum from 9:00 AM – 12:00 PM. **400** elementary students and teacher (4th and 5th grade) from SFA Charter School, Brooks Quinn Jones (Nacogdoches ISD), Mt Enterprise ISD, Woden ISD, Fredonia Hill Baptist Academy, and Christ Episcopal School participated in 3 science activities.

These two events provided SFA students an opportunity to transfer the educational theories, content knowledge, and teaching strategies learned in their educational courses to practice in an outdoor learning environment.

Christ Episcopal School, Nacogdoches Four Raised Garden Project

In September 2021 Dr. Alan Sowards, SFA Gardens, wrote and was awarded a $2,100 HERO Grant from Lowe's to construct 4 raised gardens on the Christ Episcopal School's campus.

The purpose of these gardens is to incorporate different content areas in different grade levels with authentic learning experiences that emphasizes the importance of nutritious eating habits through encouraging healthy food choices. This was accomplished by the selective plants grown in the gardens

The main goal for teachers, parents and students involved in this "school garden laboratory" is to meet the educational needs of all students, recognizing diversity in our student populations.

86 Kindergarten - 5th grade students from Christ Episcopal School participated in the construction and planting of 4 raised "Lasagna" gardens on their school's campus.

November 19, 2021 students from the school enjoyed the fruits – or more appropriately the vegetables – of their labor as they harvested lettuce and herbs from the school's grant-funded garden for the first time. All 86 students and their teachers enjoyed a fresh salad from their gardens. "If they plant it – They will eat it."

Lowe's HEROES Community Grant Volunteers – "Improving our Communities"

Daniel Phelps, Assistant Store Manager, Nacogdoches Lowe's submitted the grant. 8 Lowe's employees assisted with delivery of materials, construction of storage shed, and provided the tools to help 5th grade students build the 4 raised gardens. Lowe's garden center also provided plant to grow.

List of Lowe's employee volunteers

Leasa Lunford
Kecia Mitchell
Stephanie Luna
Marty Booths
Dustin Mobley
Wes Cook
Willis Murray
Jonathon Pratt

East Texas Adventure Project, Texas Parks and Wildlife Departments CO-OP grant September 24, 2021

The SFA Gardens Environmental Education Program Coordinator wrote a letter of support to partner with SFA College of Education for a grant request to TPWD CO-OP. This grant would support their East Texas Adventures Project.

The goal of the Texas Adventure Project is to target historically underserved female middle school students in the Nacogdoches ISD. The project focuses on STEM, with special attention on environmental science, mentorship and youth empowerment.

If the proposal is funded, on behalf of the SFA Gardens we agree to:

1. Provide water sampling opportunities for the students to determine water quality base on chemical testing.
2. Determine water quality by identifying living organisms found in water samples (bio-assay). Utilize Naturalist Bioblitz resources to identify macro-organisms.
3. Explore and discuss the importance of trees/forest/plants (how they affect watersheds, water quality, and conservation efforts).
4. Engage students in data collection and nature journaling.

Students would meet at the Ina Brundrett Conservation Education Building for an introduction of the days activities and proceed to explore the Pineywoods Native Plant Center/Lanana Creek to collect and record the data.

SFA professors submitting the TPWD CO-OP Grant
Dr. Tonya Jeffery, and Dr. Sarah Straub, Department of Education Studies.

Duke Pittman – Landscape Manager

I have been on staff since 2009. I'm an SFA Horticulture Graduate, Class of 2008. I grew up in Mexia, Texas and had a love for gardening before graduating high school. Most of my duties are associated with garden maintenance and managing a number of projects. In spite of the pandemic, we made some terrific progress on the ground in 2021. Weed control has been improved with more mulching and the timely use of a lower impact herbicide, glufosinate. With deer an increasing problem, we I assisted Malcolm Turner with the construction of the Kiwifruit steel superstructure. This doubles the footprint of the vineyard. I assisted Malcolm with a time consuming trunk wrap research project for kiwifruit. A big step forward, we now have finished a terrace wall and beds at the Elking Environment. I supervised the deep proof net fence that surrounds the blueberry patch at the PNPC. Deer and pigs are a huge problem in Nacogdoches along this creek. I am in charge of switching the irrigation system at the Gayla Mize Garden from drip to mini-sprinklers. It has to be done. Deer, pigs, squirrels, rabbits, raccoons and possums have made short work of our drip system.

GOALS: 1) Finish the Gayla Mize Garden irrigation system change over, 2) Assist with the renovation of all the bridges, boardwalks and decks at the PNPC.

Thomas Dimmitt - Landscape Technician

The primary focus of Thomas Dimmitt's responsibilities lies in the SFASU Mast Arboretum, a 10-acre diverse and rare collection of woody and herbaceous plants. Due to the extreme weather in winter of 2021 projects of high focus for this year were tree and brush removal. Additionally, a focus was placed on clearing powerline of woody species that were hazardous.

2020 Goals Update

The Elking Environment has been successfully planted with a hardy xeric species including an interesting collection of Dyckias that survived the big freeze in February. Everything has been mapped and mulched utilizing pine straw and leaf debris. Furthermore, to reduce the erosion near concrete apron spillway adjacent to the alternative fruit collection, bald cypresses (Taxodium distichum) were planted along the stream banks. These cypresses help tie together the Lanana Creek cypress collection and were hand water weekly to help ensure survival through summer and drought periods.

Powerlines Clearance.

Objective (2021):

to remove trees and limbs next to powerlines to prevent electrical hazards. The powerline within the conifer collection were trimmed by Drewery Construction Co. due to the fact that the trees were well within the powerlines at these locations. However, the powerlines next to the color garden had Southern magnolias (Magnolia grandiflora) growing under them and were not already in the powerlines. These magnolias were able to be pollard by the SFA Gardens Crew as preventative maintenance.

Goals (2022):

Replant the conifer collection with lower growing conifers such as some dwarf Thujas and monitor the magnolias as the resprout.

Freeze Damage & Tree Removals.

Objective (2021):

Unfortunately, a lot of trees and other plant material died during the freeze experienced this winter. Some of the notable mortality from the Arboretum includes saw-tooth oak, our large lady banks rose growing over the Ag. pergola, and varoious large (+20”) loblolly pines, water oaks, and southern red oaks. Removal of all this woody material took place over the course of the whole year and is still continuing in some small, isolated spots.

Goal (2022):

To remove what is left of the large woody debris and plant trees to place the deceased. Planting has been occurring through the fall and winter currently we have planted redbuds (Cercis canadensis) ‘Flamethrower’, Jalisco juniper (Juniperus jaliscana), dwarf gingkos (Gingko biloba), Thuja ‘Harvest Moon’, Scotch Elm (Ulmus glabra), Viburnums, and *Myrcianthes fragrans* ‘Variegata’. All have been mulched and established near a irrigation source.

Pergolas & Kiosks

Objective (2021):

The freeze also damaged several pergolas and kiosks within the arboretum. When the lady banks rose died from the freeze its removal from the pergola damaged the shingles. Furthermore, the pergola, adjacent to the Wilson Drive was struck by a pine limb that fell during the storm.

Goal (2022):

We plan to acquire the materials to repair and replace the damage to the kiosks and pergolas during the storm. Currently we are considering using tin to replace the roofs.

Overall Arboretum

Continued objectives and goals: Maintenance as necessary to perpetuate the beauty and splendor of the Mast Arboretum. Essentially, staying on top of mulching, irrigation, weeding, hedging, blowing, trail maintenance, planting new plant material, and other miscellaneous gardening tasks.

Devin Stage – Landscape Technician

As an employee of the SFA Gardens, the Ruby Mize Azalea Garden is my main area of responsibility. In this annual report, a number of projects are described. Areas of concern include trail maintenance, plant installation and maintenance, and Art instillation.

The list below applies to the tasks that were completed during the 2021-2022 year.

This year was set off with a hard hit to the tree canopy within the gardens. As a result of snow and ice loads, many trees were damaged. The plants located beneath trees affected by this storm were consequently hurt as they were in the impact zone of falling debris. The cleanup process of removing woody debris lasted much of the year. Many days were spent cutting up dead trees and fallen limbs. Essential equipment used for this task included chain saw, tractor, skid steer, grapple, and truck.

The process of the storm cleanup was laborious and seemed to be without end. This was due to the timely process of returning to zones repeatedly as trees slowly showed increasing damage due to the storm. The issues were addressed, debris removed, and then plants damaged were cut back and mulched as needed.

As the cleanup process demanded the use of heavy equipment the trails then suffered. The equipment used to lift and transit heavy tree logs left the trail systems in poor condition. The edges crumbled, resulting in pathways being unsafe for passage. Much of the tail system within the Ruby Mize Azalea Garden has been addressed. This task is not yet complete, yet the trails integrity grows as the edges are tended to regularly. Crushed reclaimed roofing rock has been applied to the trail edges to decrease the elevation of drop from the trail edge to the ground beneath. This results in a safer path for pedestrians to travel. Red iron ore is applied lightly to the surface of the gravel, providing stability as the course material locks together with the fine. Equipment needed for this task includes a tractor, skid steer, truck, flat head shovel and rake.

Signs displaying maps of the trails of the garden, species content and tail blockades were all damaged from falling trees and debris. Salvageable signs have been re-erected

and blockades have been restored. This being accomplished fastening signs and building with all reclaimed materials. Equipment includes a tractor, truck, drill gun, and circular saw.

Replanting of garden beds that suffered high mortality took place. Soil was brought in to build up the bed as well as increase soil productivity. Selected plants were then planted, followed by the dressing of the bed with fresh mulch. A large planting event took place along both sides of the Lanana Creek edge. Taxodiums were along the edges starting at the north side of the cypress tunnel, stretching to E. College St. The trees were protected from Beaver disturbance utilizing a ring of chicken wire and T-post per tree. Equipment used includes tractor and truck.

A mural depicting letters S, F, and A, each letter cutout and 4’X8’ in size. These were funded by Dr. David Creech personally. Dr. Creech funded this mural as he saw the educational benefit of having art within the garden. This mural is three-dimensional and on the front display's flora and fauna from all over Texas. The S reflects the ecological systems relating to swamps, the F relating to forests, and the A relates to the states arid regions. The back of the mural depicts landmarks from around the town of Nacogdoches, where Stephen F. Austin State University resides. This installation is thought of by AZG technician Devin Stage. Many rocks were salvaged from the landscape of the gardens to accent and stabilize this piece of work. Equipment used for the installation process includes truck, tractor, skid steer, auger, grapple.

The year to follow shall include further amendments to signage and trials. Garden beds will be maintained with continued mulch and fertilizers while optimizing the plant collections with increased planting. The garden would like to extend its canvas to the department of the arts as the public and youth appreciate the beauty of works currently of display within the gardens. May the following year bring less devastation from severe weather and exponential growth.

Amanda Romig - **Program Associate**

The program associate position was created in May, 2016 for the support and expansion of existing programs at SFA Gardens including:

Membership- 124 memberships to date for 2021-22: Membership mailout and marketplace orders- September through December

Event booking, scheduling and management at the Brundrett Conservation Education Building including university and Community events- 10 events through July 2021-December 2021.

Editing of the SFA Gardens Quarterly Newsletter for members - 4 issues annually

Contract management, press releases, and reservations for guest speakers

Staff travel- as needed

Theresa and Les Reeves Lecture Speaker arrangements- held monthly- 3

Garden Memorials

Fall Plant Sale- assisted with check out receipts

Trainings completed in 2021

Ethics, Security Awareness

Risks of social Media sharing

Receipts and deposits

P-Card refresher

EEO Laws and discrimination Prevention

APPENDIX I - WINTER STORM URI IMPACT

Past Record Freezes in Texas

The February 14-17, 1895 snowstorm is still referred to as the Valentine's Day freeze, an event known for record snowfall on the Texas coast. Galveston reported snowfall over 15" with Houston, Orange, Stafford, and Columbus all reporting twenty inches. Even Brownsville at the southern tip of Texas received five inches and the huge "winter garden" vegetable industry was destroyed. To add to the wound, only a few years later, one of the worst winter storms ever in Texas struck Feb. 11–13, 1899. The entire state was impacted and newspapers then described it as the worst freeze ever known in the state. To this day, 1899 holds the record low for many Texas locations. There are other epic freezes in Texas history, of course. My Dad spoke of the 1929 freeze when ponds froze and it was bitterly cold for weeks. Yes, 1947 and 1951 brought serious low temperatures and 1960 brought record snowfalls. 2011 had a single digit cold snap and in January 2018, Nacogdoches dipped to 10^{o}F for two nights in a row. However, in more recent history, there are two mega events that stand out. The December 1983 freeze event had statewide impact and lasted over two weeks. Six years later, the December 1989 freeze lasted two weeks with lows in the single digits and damage was everywhere. Ponds froze over, cattle and crops suffered and the zonal denial of the 1980s came to an end. It has been over thirty years since a really big freeze headline made the news. For many nurserymen and landscapers those events are only distant memories. While the February 2021 freeze lasted only a week, the record lows meant one thing. Texas has a brand-new benchmark for cold.

Documenting Freeze Damage

In the spring, a small group of horticulturists began a line of discussion that quickly concluded there should be an collaborative effort to gather freeze damage ratings for a wide range of ornamentals. After all, this was a 100-year freeze. We felt it would be prudent to put together a tome, one that describes the immediate and long-term impact of winter storm Uri on the landscape in Texas. Recording a list of plants that thrived, survived or died would be useful to future landscape planners. While the common commodities would be recorded, the focus would be on ornamentals rarely encountered. SFA Gardens is a perfect platform to deliver interesting freeze data simply because it's a collector's garden. Hundreds of new plants are added to the landscape each year, the perfect crucible to test a wide variety of ornamentals in a freeze event. For the purposes of this annual report, the focus is limited to a few select genera, particularly those with good numbers at SFA Gardens. The damage rating scale is rather simple:

FREEZE DAMAGE RATING SYSTEM FOR WOODY TREES AND SHRUBS

1: no damage

2: minor foliar damage/partial defoliation, buds/stem survive

3: near total foliar damage/defoliation, buds/stem push new growth

4: Outer branches dead, inner branches/main stem survive, likely to recover in 1-2 seasons without aesthetic disfigurement.

5: Major branches/main trunk damage, buds break usually from trunk, may have permanent aesthetic disfigurement

6: Total death

At its most basic, this project will identify the location, genus, species, variety, damage rating and comments. In the midst of death and destruction, there's data. For the botanical garden community, this is an opportunity to create a reference point document for characterizing ornamentals for Texas with freeze tolerance in mind. There is nothing like a record breaker to define the field.

Observations on Freeze Impact on Select Genera at SFA Gardens

Abelia – 16 cultivars, no damage – *A. chinensis*, no damage.

Acer species – The SFA Gardens Japanese maple collection is one of best in south and there's a good representation of rarely encountered Asian species. In general, most of the Acers suffered zero damage. Over 300 Japanese maples appeared to have emerged unscathed. However, the evergreen maples including *A. fabri*, *A. cinnamomifolium* and *A. oblongum* generally rated a 4 or 5 on the damage scale and are recovering. *Acer saccharum* ssp. s*kutchi*, the Mexico mountain sugar maple suffered very little damage.

Actinidia – SFA Gardens and Texas A&M Agrilife have cooperated on a kiwifruit evaluation project for a number of years. For the most part, golden kiwifruit survived the freeze better than green, and young plants fared worse than older vines. A trunk protection study happened to be in place with temperature dataloggers and the conclusion of our study was little to no benefit.

Berberis – mostly *B. thunbergii* varieties, no damage

Callicarpa – varieties and genotypes of *C. americana* suffered no damage. *C. rubella* and *C. dichotoma* damaged trunks and branches. *C. salicifolia* and *C. longissimia* froze to ground but both recovered.

Camellia – 200 plus cultivars with a wide range of damage ratings. Most survived though many badly damaged. 'Frank Hauser, a favorite here, was killed outright in a number of locations. 'Yuletide' branches and tops died back on some, on others less. For many Camellia species, it was common to have the top alive with unthrifty new growth with considerable sprouting from base and lower trunk and branches. Many straight Asian species died to near ground. *C. yuhsienensis* fared well.

Conifers – In general, good survivability over a wide range of genera including Taxus, Cephalotaxus, Thuja, Thujopsis, Cunninghammia, and Juniperus. Some damage on our three Keteleeria species and some nomenclature debate on our collection. A large *K. evelyniana* was killed back to trunk and a few major banches. A very large *Araucaria araucana* var. *angustifolia* (40' survived with some damage and new growth sprouting from trunk and the crown appears unaffected. *Cunninghammia unicanaliculata* (botanically challenged as a subspecies of *C. lanceolata*), weathered severe ice load and rebounded to good form without damage.

Gardenias – wide collection of varieties, froze to ground or near ground and recovered.

Hydrangeas – *H. quercifolia* and *H. paniculata* were unaffected. All *H. macrophylla* varieties froze to ground but returned vigorously. Dichroa survived from under snow cover.

Ilex – a large holly collection, unaffected for the most part. *I. rotunda* damaged. *I. vietnamensis* froze back.

Illicium – extensive collection. All native derived varieties seem to survive well, even the variegated and golden foliage clones. Surprisingly, *I. mexicanum* was unaffected. *I. anisatum* damaged. *I. verum* killed.

Lagerstroemia – 136 varieties, good survival but some varieties showing dieback and unthrifty growth, verdict not in.

Lauraceae – a record large *Cinammomum chekiangensis* was unaffected, a surprise. *Phoebe shearei* killed. *Phoebe chekiangensis* froze to near ground.

Loropetalum – a surprise, with major damage on a wide range of varieties, most to ground.

Magnolia – an extensive collection of varieties. *M. grandiflora*, *M. acuminata*, *M. pyramidata*, *M. virginiana*, and *M. macrophylla*, no freeze damage. However, some damage from snow/ice load. Many Asian magnolias suffered. The two banana shrubs, *M. figo* and *M. skinneriana* damaged, with *M. figo* frozen to ground. Surprisingly, a *Parakmeria yunnanensis* was unaffected.

Osmanthus – an extensive collection of *O. fragrans*. Most survived well. 'Fudingzhu' and 'Apricot echo' damaged but 'Aurantiacus' was not. Three variegated forms damaged but recovered from low in the shrub. *Osmanthus yunnanensis* taken to ground.

Pittosporum – all *P. tobira* varieties froze to ground but are returning. Both the green and variegated *P. heterophylla* froze to ground, sprouting from base and from underground roots, an aggravation. Some rarely encountered Asian Pittosporum species all froze to ground but have returned from base.

Podocarpus – the collection of varieties at SFA Gardens varied from major damage to little.

Quercus – an extensive collection of species. Damage to post oaks and live oaks in the region, but quite random. Some trees affected, other not. Most Mexico oaks in our collection survived in the landscape and in containers. Exceptions included *Q. germana* which suffered limb die back and unthrifty growth. *Q. tarahumara* froze back to main trunk and some side limbs. *Q. insignis* froze to near ground but has returned. *Q. rysophylla*, *Q. polymorpha*, *Q. canbyi*, three somewhat common in the Texas trade, all survived. A very large *Q. acutissima* died with no attempt at resprouting.

Raphiolepis – mainly *R. indica* varieties, most froze to ground. Indian hawthorns are a commodity in Texas landscapes and were badly damaged or killed all the way into Houston. *R. umbellata* survived with minor damage.

Rhododendron – With four hundred azalea varieties, selections or genotypes represented in SFA Gardens, Sherry Randall and Barbara Stump, both with long term involvement in the Azalea Society of America and the Texas chapter, made on-the ground evaluation in late spring. Esssentially no damage on native deciduous azaleas, Aromi hybrids, and other genetics in that arena. On *R. indicas*, it was typical to see alive but unthrifty tops with sprouting from base of plants. Encores in general were unaffected. 'Koromo shikibu', a signature azalea at SFA Gardens was unaffected. Badly damaged varieties were cut to a few feet above ground, fertilized and they have rebounded. Tables 1 and 2 present an example of the database used, sorted alphabetically by variety and by damage rating.

Schima – In the Theaceae, several species are now lumped into *S. wallichi.* Large tree at SFA Gardens that came to us as *S. superba* has damaged outer limbs, returned from trunk. Large *S. remotoseratta* died to ground but returned from base.

Styrax – The snowbells did well here. *Styrax japonica* varietries took the cold in stride, as did other Asian species, many rarely encountered. For example, *Styrax tonkinensis* was unscathed. A very large *Styrax formosanus* var. *formosanus* was killed to ground but vigorously sprouted from low on the trunks and from the root system. A large *Huodendendron tibeticum* (never flowered but grew well) was killed outright.

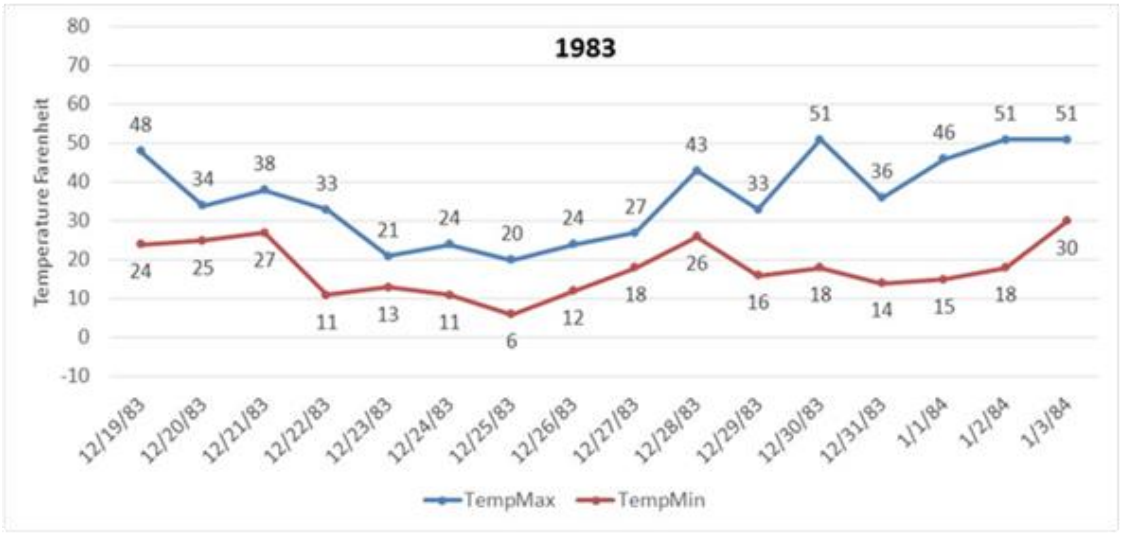
Taxodium – very large collection representing varieties and selection material of bald cypress, pond cypress, Monezuma cypress and the bald X Montezuma hybrids from the Nanjing Botanical Gardens Taxodium Breeding and Improvement program. No damage. This was a critical test of pure Montezuma genetics involving southern Mexico genotypes.

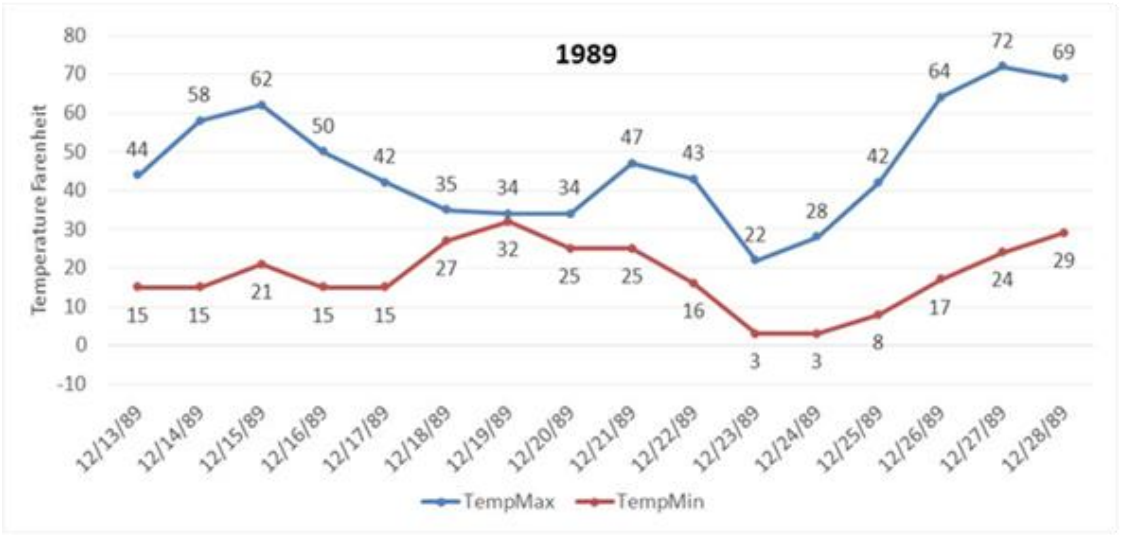
Ulmus parvifolia – Most Ulmus species were unaffected. However, in Texas, some large *U. parvifolia* trees were severely damaged with major limbs and trunk cracks.

CONCLUSIONS

Evaluating woody ornamentals for tolerance to a hard freeze event is more complicated than we originally envisioned. A few conclusions at this point can be made:

1. Patience is the rule. The impact of a freeze on a woody ornamental can take years to run its course. We have observed trees appear only modestly affected to observe them collapse.
2. With six inches of snow cover, many plants were protected and rebounded from below the snow line. A similar freeze without snow cover would have different results.
3. There's considerable variation in the data when multiple plants are involved. Whether seedlings or clones, there was obvious plant to plant variation. Assessing a variety's freeze tolerance on only a few plants may not be valid.
4. Numerous commodities need to be reconsidered. Loropetalum was introduced after the 1989 freeze, planted extensively in Texas and was badly damaged by the February 2021 freeze. While the species generally resprouted from the base, robust sprouts from the root system are a maintenance aggravation.





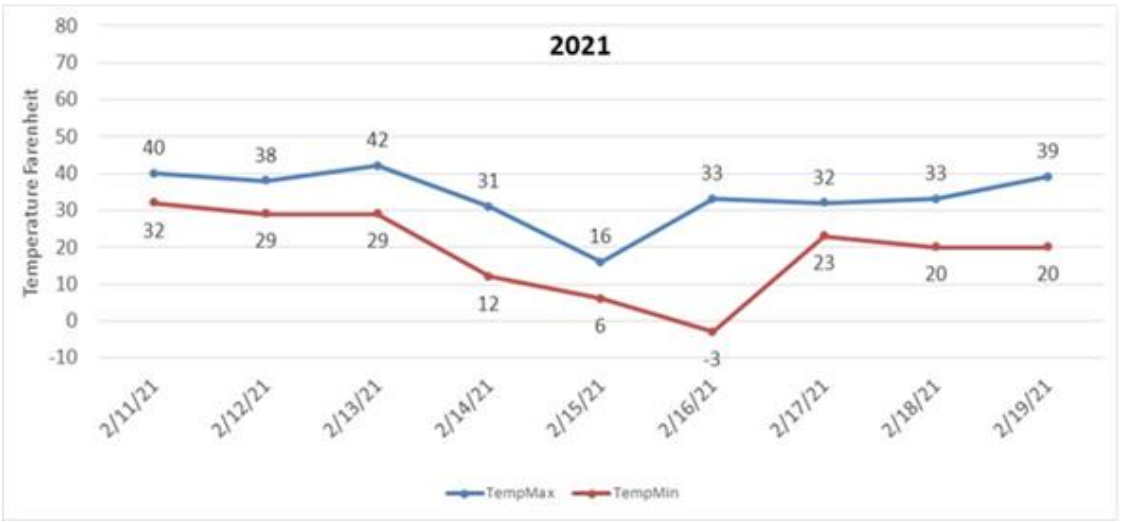


Fig. 1. Comparing the three mega freezes in the last forty years

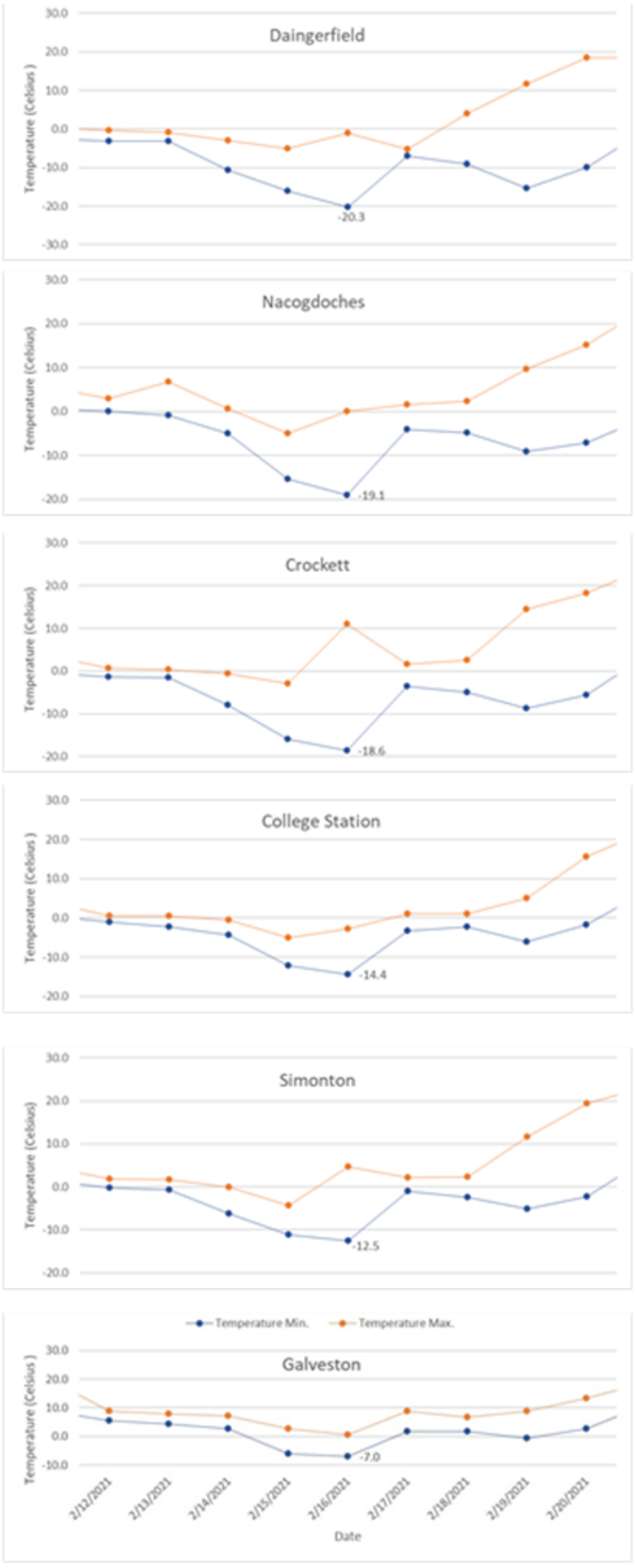


Fig. 2. Low temperatures encountered at our cooperator locations in Texas (degrees in Celsius)

APPENDIX 2: A 2021 PICTORIAL HISTORY

SFA Gardens is all about people, plants and plans. In spite of a year of ups and downs, this garden remains poised to make a strong contribution to the fabric of this university and the region. It's all about the collections, the way they're put together and the staff, students and volunteers that provide the care and culture. SFA Gardens is more than just plants; it's about educating, entertaining and enlightening students, the university community, and visitors from near and far.

DAWN STOVER LEAVES THE GARDEN

After 22 years as Research Associate, Dawn Stover took a fine position with the National Resources Conservation Service (NRCS) in late 2021. Her contributions to the growth of our programming have been enormous. Add in plant growing skills, marketing savvy, and over forty successful plant sales under her bonnet, she had it down. We will miss her.

THE EPIC NEVER SEEN BEFORE MEGA FREEZE OF FEB 2021

Snow, ice and a record low temperature of -4F in the February freeze led to tree and branch falls, and many woody species damaged

Cornus wilsoniana

Euonymus chibae

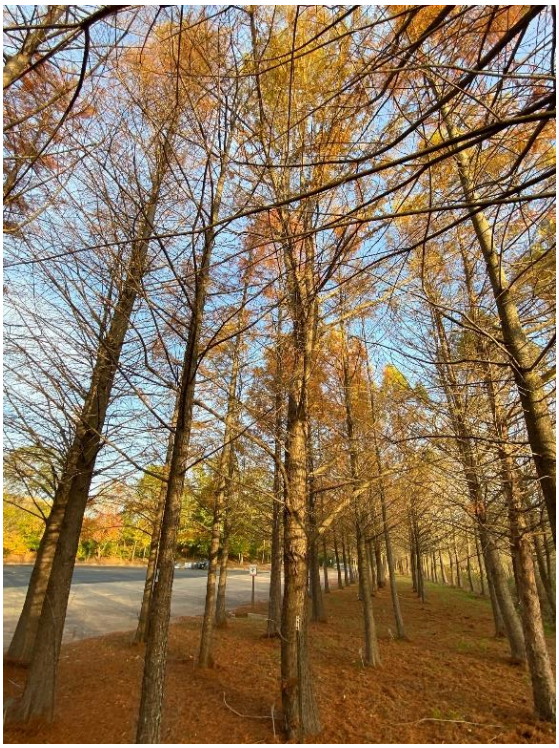
Last known image of a Camellia ‘Frank Houser’ in the garden, one of those varieties that said goodbye forever when temperatures reached below zero in February 2021. Michellia figo dead to the ground.

Sabal causarinum survived. Nearly all *Lagerstroemia indica* were undamaged, a very few impacted

PLANT COLLECTIONS AND GARDEN FEATURES

The SFA Gardens Crapemyrtle collection is rather extensive. In recent years, crapemyrtle bark scale is an increasing problem in East Texas. We are collaborating with Dr. Mengmeng Gu, Texas Agrilife Extension Service, to find a cultural and light touch chemical strategy to control this pest.

Taxodium plots along LaNana creek, SFA campus, and in other spots in the garden represent the single largest collection of the diversity of this wonderful native genus in the United States. Known provenance genotypes, named varieties and selection material.



From Top left, clockwise. *Callicarpa americana* ‘Lowrey’s Ghost’; Perennial evaluation at the Children’s Garden Pavilion on College Avenue; Staff and student assistants with a trailer load of ‘Kay Parris’ Magnolias; Thomas Dimmitt and Duke Pittman in the trialing garden at the Mast Arboretum.

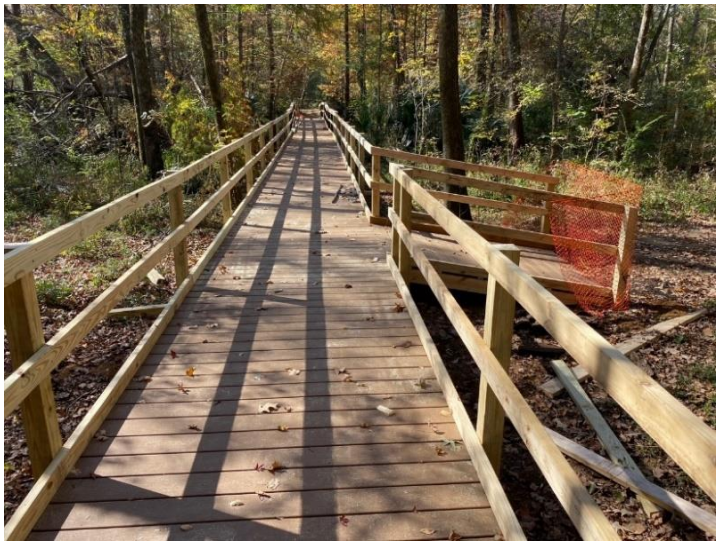
From upper left, clockwise: Jordan with Perennial Hibiscus; Flamethrower redbud: *Parrotia subaequalis*; and a sport found on ‘Koromo shikibu’ this past summer.

The labyrinth at the Gayla Mize Gardens has proven to be a popular spot. It takes 4.5 minutes to stroll slowly to the middle. Visitors are encouraged to sit in the middle and meditate on the state of the world, before strolling back out.

Liquidambar styraciflua ‘Slender Silhouette’ circles the labyrinth at the Gayla Mize Garden and there’s another outer circle of Asian evergreen magnolia seedlings under evaluation, many of which suffered in the February 2021 freeze

A few years ago (Oct 2017), but this is a classic photo of Charlie Parkinson, Lancaster Farms, Virginia, a revered nurseryman who was quite impressed with this interesting feature.

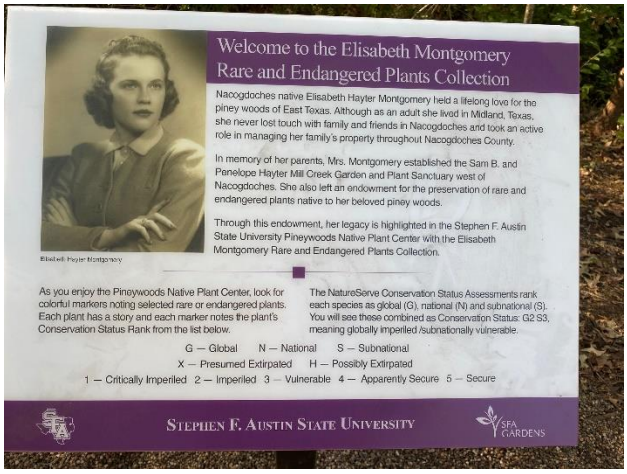
BRIGHT FOUNDATION AWARD RENOVATES THE BRIDGE, BOARDWALKS AND TRAILS AT THE PINEYWOODS NATIVE PLANT CENTER

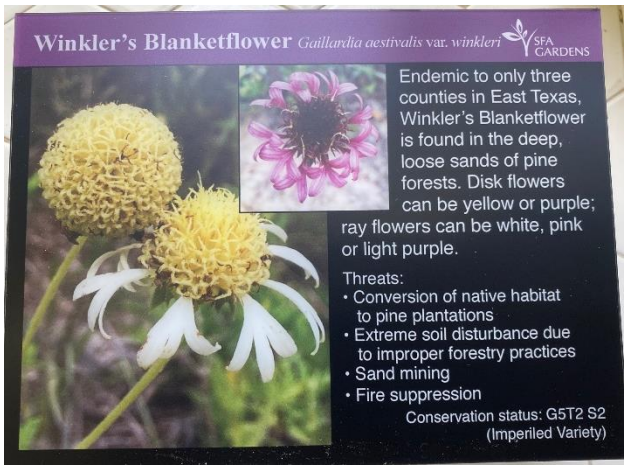


In 2021, after 20 years, our PNPC trail infrastructure was falling apart and the trails were on the verge of being shut down. A proposal was presented to the Bright Foundation by Keep Nacogdoches Beautiful and it was miraculously awarded. This grant literally saved this University resource. Two boardwalks, two bridges and a 150' stretch of eroded trail renovated. Anderson Landscape contracted for the project to renovate our crossings with flooring made of Trex, a long-life composite of good reputation.

ELISABETH MONTGOMERY RARE AND ENDANGERED PLANTS COLLECTION

One of Dawn Stover's last contributions at the gardens was bringing in signage and interpretation for an endangered plants collection. Honoring Elisabeth Montgomery's love of the forests and prairies of the Pineywoods, we will be adding plants and signage in the years ahead. The project will utilize the wet stream sides, mesic midslopes and drier upland habitats at the Pineywoods Native Plant Center.

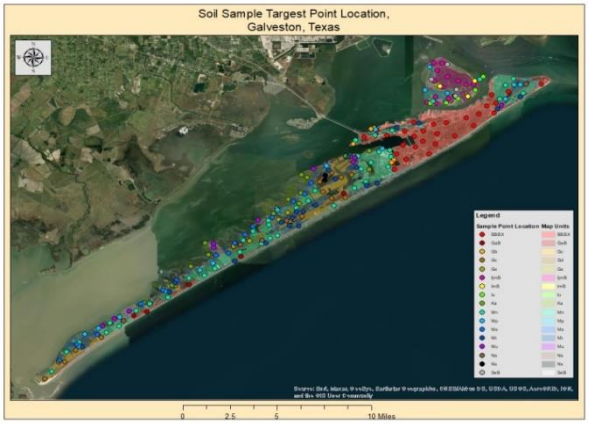




MOODY GARDENS PROJECT ON GALVESTON ISLAND, TEXAS

Elif Ilhan, mycorrhiza study with three genotypes of Taxodium

Rachel Murray, soil salinity survey Galveston Island



Many of the proven performers ended up being moved to other spots on the island the Galveston Dog Park, San Jacinto Park, and other school and city parks. Kudoes to Donita Brannon, Moody Gardens, and Priscilla Files, Galveston Island Tree Conservancy for making it happen.

SAN JACINTO PARK

KIWIFRUIT 2021 WAS ANOTHER GOOD CROP (AFTER A RECORD FEBRUARY FREEZE!)

Dr. Tim Hartman, Texas Agrilife Extension Specialist, is our partner on the Kiwifruit project.

Sixth Crop out of 8, a successful field day, survived the February freeze, cooperator fields encouraging, new opportunities for additional plantings in east Texas.

Clockwise, starting at top left: Alan and David Burnie, Virginia, potential investors, at TAMU; September 2021 harvest; Tim Hartmann at TAMU plots; Harvest Day at SFA plots; ‘Gulf Coast’ harvest; New trellis system at plots on Starr Avenue.

OTHER FRUIT AND NUT PROJECTS AT SFA GARDENS

From upper left, clockwise. Muscadine grape vineyard, Blueberry evaluation plots at the North end of the Pineywoods Native Plant Center, Pecan variety trial at the City's Pecan Acres Park (trees a gift from Sam Pollard, Texas Pecan Nursery), and the fig collection south side of the Mast Arboretum. Also some trialing with other lesser known alternative fruits: *Cornus angustata*, *Elaegnus multiflora*, *Myrica rubra,* and others

ENVIRONMENTAL EDUCATION RETURNS TO SFA GARDENS!

Saturday & Sunday, November 20-21, 2021

The Daily Sentinel

House of Stephen F. Austin State University

NACOGDOCHES, TEXAS

TRANSPORTATION

Flyover construction to move to after dark

BY NICOLE BRADFORD

On the web

How their garden grows

Josh Edwards/The Daily Sentinel

A first grade student, left, and a second grader, pick lettuce from the school's new garden with the help of Dr. Alan Sowards, environmental education coordinator for Stephen F. Austin State University SFA Gardens program.

Elementary students make first harvest

BY JOSH EDWARDS

Josh Edwards/The Daily Sentinel

Second grade students at Christ Episcopal School assemble a salad with vegetables harvested from the school garden on Friday.

Harvest • 4A

CRIME

More than a pound of meth seized

BY VALERIE BECKWELL

Meth • 4A

LOCAL GOVERNMENT

Council looks at options for redistricting

BY NICOLE BRADFORD

Bringing back the SFA Gardens Environmental Education Program after the Pandemic may be the one most important aspect of SFA Gardens 2021 history.

Two Awards in 2021

In 2021, Dave Creech received the SFA Silver Award for Grantsmanship and the Life Membership Award from the Louisiana State Horticulture Society.

Dr. David Creech
Director, SFA Gardens
Stephen F. Austin State University
Nacogdoches, TEXAS
Email: dcreech@sfasu.edu

Website: Website: https://www.sfasu.edu/academics/colleges/forestry-agriculture/research-outreach/sfa-gardens

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