HOUSTON WILDERNESS ANNUAL REPORT 2023

HOUSTON
WILDERNESS
It's Our Nature

HOUSTON WILDERNESS

MISSION

Houston Wilderness works with a variety of business, environmental and government interests to protect and promote the 10 diverse ecoregions of the 13+ county area around Greater Houston, Galveston Bay, and the Gulf of Mexico, including coastal prairies, forests, wetlands, and waterways.

Houston Wilderness connects people to the 10 ecoregions in multiple counties around Greater Houston through large-scale environmental policy initiatives, including facilitation of key programs including: 1) an 8-county Regional Conservation Plan, 2) a Texas Monarch Flyway Strategy, 3) a Port of Houston TREES Program and 4) a Collaborative Grant Organizing Program – all which ensure that relevant stakeholders are at the table and collaborative solutions are supported and implemented.

Convening various groups to promote, protect and preserve the biodiversity in our 10 ecoregions

• Collaborative Grant Organizing Program • The Texas Monarch Flyway Strategy
• Access and Advocacy • Super Trees for Sustainability Initiative

Providing collaborative opportunities on critical environmental issues

Problem Solving

• Gulf-Houston Regional Conservation Plan
• Houston Ship Channel TREES • Riverine TUBs Program
• Regional Access to Native Seed Mix (RANSM) Coalition Initiative

Educating the public on the many exciting outdoor opportunities in the Greater Houston Region and the health benefits associated with nature

• Great Green Quest • Wilderness Passport •
• Ecosystem Services Primer • Multiple Resource Educational Documents

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2023 Recap

from Chairperson,
Matt Stahman

I grew up enjoying our unique corner of Texas, an area where 10 ecoregions converge in a way unlike any other place on the planet. From bayous to forests to prairies to marshes, I've come to appreciate how special this 15-county area is that we all call home. As chairperson of Houston Wilderness in 2022, I've also come to appreciate this awesome organization whose mission it is protect and promote our incredible natural diversity; an organization known for passionately connecting people with nature.

In 2023, our programs continued to grow and serve our local communities. These programs include planning and advocacy of the Gulf-Houston Regional Conservation Plan (RCP) which now promotes protecting and preserving 16% of land within our 15-county region, up from 15.6% in 2022. They also include facilitating state-wide efforts, like the Texas Monarch Butterfly Flyway Strategy, now up to 80 partner locations for monarch habitat around our great State of Texas (including one on my own family farm). HW began facilitating the *Regional Access to Native Seed Mix* (RANSM) Coalition to assists in providing large numbers of NSM to large and small landowners in our region. I look forward to seeing where the RANSM Coalition goes over the next few years in moving this critical issue forward. In addition, our ever-popular Great Green Quest program continued distribution of over 35,000 of our Wilderness Passports to schools, YMCA centers, community centers, libraries and various groups, promoting kids and their families to learn more about, and to visit in person, each of our 10 ecoregions.

But my absolute favorite programs, where people and passion connect on the ground and in the dirt, are our Riverine Targeted-Use-of-Buyouts (TUBs) and the Houston Ship Channel TREES efforts. Born out of a desire to help City of Houston's Resilient Houston Goal of planting 4.6 million new native trees by 2030, these programs mobilize volunteers to plant "super" trees (those native species with the highest environmental benefits) in our industrialized areas and in neighborhoods along our bayous to improve the quality of life for all Houstonians, enhancing valuable greenspace for wildlife and our own outdoor enjoyment.

But I think it goes even deeper than even that. The Greeks said, "when people plant trees under which they will never sit, then you know civilization has come to that land." I witnessed that firsthand in 2022 at several of our volunteer tree planting events, watching children, moms, dads, grandparents, students, teachers, scout leaders, nurses, etc. from all walks of life enjoy the simple of planting a tree. I watched them connect with nature in a win-win scenario, simultaneously helping the land and helping one another. And Houston Wilderness' passionate staff, accompanied by our new mascot Hoppi, were there to help them along the way, enabling over 10,000 new trees to be planted in 2023, the same amount as 2022 and well on our way to contributing to the millions planted for our region.

I am truly proud of Houston Wilderness and what it has become. The year 2023 was another watershed year for this organization. As I pass the torch to incoming Chair, Graciela Gilardoni, I am thankful for the opportunity to serve HW in this position for the past two years and watch the progress being made by HW and its many collaborative partners in the region.

The word "protect" has become an important word in environmental circles – from biodiversity to biosphere – there is a growing awareness of the need to protect our natural world. For Houston Wilderness, "protect" has been a part of our mission statement for over 20 years. It's a big part of what HW was created to do – supporting protection of natural areas for the animals, plants and people that call the Gulf-Houston Region home, for the health of our water and soil and for the enjoyment of those who keep nature close to their hearts. In 2022, as Houston Wilderness (HW) was preparing to celebrate its 20th Anniversary in 2023, the HW Board and staff highlighted the 10 distinct ecoregion during the 2022 Annual Luncheon, and we continued to collaborate on pioneering environmental issues for our region, and regional resilience efforts in the 15+ county region in and around Houston/Harris County. Some highlights of the 2022 year include:

A. Access & Advocacy Program - 1) **HCFCD Native Seed Mix Project** (begun in 2020) – HW is working with partners to finalize development and promotion of a commercially-available and regionally-adapted native seed mixture options for use within floodwater conveyance channel, stormwater detention basin, and roadway rights-of-way where mowing is not required on a frequent basis; and 2) **Regional Assessments of Wildlife Along Riparian Corridors (RAWARC) Program** - HW worked with Board members & NGO partners around the region to assess wildlife species through camera monitoring along riparian corridors in the region, including species presence, absence and distribution, relative population abundance, and natural/man-made factors that influence population trends and dynamics. A Regional Wildlife Fact Sheet is being widely distributed in late 2022 through 2023.

B. Gulf-Houston Regional Conservation Plan (RCP) (created & begun in 2014) - HW continues to work with a network of environmental, governmental, and business groups in the 8-county region to facilitate the implementation of three key goals: (1) Increasing the current 15.6% in protected/preserved land in the eight-county region to 24% by 2040, (2) Increasing and supporting the region-wide land management efforts to install nature-based stabilization techniques on 50% of land coverage by 2040, and (3) providing research and advocacy for an increase of 4‰ annually in carbon sequestration in native soils through planting of native trees, grasses and oyster reefs. (https://houstonwilderness.org/gulf-houston-regional-conservation-plan)

C. Houston Ship Channel T.R.E.E.S Program (created & begun in 2018) –a multi-year, collaborative program by HW, Houston Health Department, Buffalo Bayou Partnership, and multiple private/public landowners along the HSC that focuses on enhanced ecosystem services through targeted large-scale tree plantings using 14 scientifically-chosen native Super Tree species that are ranked in priority based on their respective levels of air pollution and water absorption, carbon sequestration, and canopy benefits.

D. Collaborative Grant-Organizing (CGO) Program (created in 2013) – HW works with multiple stakeholders and federal/state agencies on collaborative grant proposals and funded projects, often in "pioneering" areas of environmental planning and resilience in the Greater Gulf-Houston Region. To date, HW and a variety of different regional partners have received funding from multiple CGO grant proposals totaling over $2.9 million in additional funds to the region for land and water conservation efforts. Sometimes these awarded proposals become established programs at HW. (https://houstonwilderness.org/cgo-program)

E. Regional Riverine Targeted Use of Buyouts (Regional Riverine TUBs) Program (created & begun in 2020) – In partnership with the Institute for a Disaster Resilient Texas (IDRT), and Texas A&M University-Galveston, the TUBS Program creates riverine resilience by installing nature-based stabilization techniques on county/city buyout properties that are adjacent to parks and other public open space. HW is excited about the interest and involvement of multiple partners in this important pioneering program. (https://houstonwilderness.org/riverinetubs)

Houston Wilderness Accomplishments
2013-2023

I.Eco-Region Advocacy through Convening & Problem-Solving

Creation of the Vision of the Major Eco-regions of Greater Houston and surrounding counties *(2003)*
> Houston Wilderness (HW) led the creation and facilitation of the first-ever recognition of ten (10) connective eco-regions in the multi-county area surrounding Houston. http://houstonwilderness.org/about-ecoregions/

Houston Atlas of Biodiversity (published in 2007)
> Written and Produced by HW, the Houston Atlas of Biodiversity is a major publication that focuses on the ten major eco-regions of the greater Houston area including Big Thicket, Coastal Marshes, Coastal Prairies, Columbia Bottomlands, Piney Woods, Post Oak Savannah, Trinity Bottomlands, Bays, Estuaries and Bayou Wilderness. The Atlas continues to serve as a regional resource. (http://www.greatgreenquest.org/resources/HW%20Biodiversity%20Atlas.pdf)

Gulf-Houston Regional Conservation Plan (Gulf-Houston RCP) (created & begun in 2014)
> HW works with a network of environmental, governmental, and business groups in the 8-county region to facilitate the implementation of three key goals: (1) Increasing the current 15.25% in protected/preserved land in the eight-county region to 24% by 2040, (2) Increasing and supporting the region-wide land management efforts to install nature-based stabilization techniques on 50% of land coverage by 2040, and (3) providing research and advocacy for an increase of 4‰ annually in carbon sequestration in native soils through planting of native trees, grasses and oyster reefs. (www.GulfHoustonRCP.org)

Texas Monarch Flyway Strategy (Texas MFS) (created & begun in 2016)
> A statewide effort by HW to restore, increase and enhance Monarch habitat across the state, as critical link in the Monarch's journey along the Central Flyway from Canada to Mexico and back every year. The MFS is facilitated by HW with over 100 public/private partner/landowners. The Texas MFS also serves to protect habitat for other pollinators that are crucial to local ecosystems and agriculture.(http://houstonwilderness.org/mfs)

Access & Advocacy Program (begun in 2013)
> Over the years, HW has expanded its network of private/public partners to over 175 in the region, working with them to preserve, protect and promote sustainable land, water and wildlife by providing problem-solving assistance and facilitation of various environmental policy issues that benefit various parts of 10 diverse ecoregions. These projects generally last between 1-3 years:

> > **Lower Trinity River Project** (2017-19) – Actively spearheaded by the five county judges of the counties that make up the Lower Trinity River, this group meets, as needed, to work on advocacy needs of the Lower Trinity River. HW facilitates the meetings and agendas for these meetings and related actions.

> > **Facilitation of Tree Strategy Implementation Group (TSIG)** (2020-21) to assist in City of Houston's Resilient Houston Plan's 4.6 Million Trees by 2030 Goal. Comprised of all the major large-scale native tree planters in the region, the TSIG created and published a strategy to reach the CoH Goal by 1) maintaining an average of 400,000 native trees planted annually, 2) creating of a TSIG Regional Native Tree Planting Policy & Procedures Manual and associated v-Forums, 3) tracking where major native tree removals are taking place and encouraging alternatives to deforestation, and 4) supporting regulatory improvements (https://houstonwilderness.org/46-million-trees-by-2030-goal)

> > **Regional Assessments of Wildlife Along Riparian Corridors (RAWARC) Program in Greater Houston** (2019-23) – HW worked with Board members & NGO partners around the region to assess wildlife species through camera monitoring along riparian corridors in the region, including species presence, absence and distribution, relative population abundance, and natural/man-made factors that influence population trends and dynamics. A Regional Wildlife Fact Sheet will be widely distributed in late 2022 through 2023.

Collaborative Grant-Organizing (CGO) Program (created in 2013)
> HW works with multiple stakeholders and federal/state agencies on collaborative grant proposals and funded projects, often in "pioneering" areas of environmental planning and resilience in the Greater Gulf-Houston Region. To date, HW and a variety of different regional partners have received funding from multiple CGO grant proposals totaling over $1.7 million in additional funds to the region for land and water conservation efforts. Sometimes these awarded proposals become established programs at HW. (https://houstonwilderness.org/cgo-program)

Super Trees for Sustainability Initiative *(created in 2023)*

Houston Wilderness' Super Trees for Sustainability Initiative is a multi-year, large-scale native tree planting collaborative that incorporates the 25-miles Houston Ship Channel (HSC) TREES Program, the multi-county Riverine Targeted-Use-of-Buyouts (TUBs) Program, and other targeted urban forestry projects (native species and fruit trees) in communities around the 13+ county region to enhance biodiversity and reduce health risks associated with urban heat, air and water pollution and flooding.

Houston Ship Channel Trees & Riparian Enhancement of Ecosystem Services (HSC TREES) Program *(created & begun in 2018)* — a multi-year, collaborative program by HW, Houston Health Department, Buffalo Bayou Partnership, and multiple private/public landowners along the HSC that focuses on enhanced ecosystem services through targeted large-scale tree plantings using 14 scientifically-chosen native Super Tree species that are ranked in priority based on their respective levels of air pollution and water absorption, carbon sequestration, and canopy benefits. (http://houstonwilderness.org/port-of-houston-trees-program)

Regional River and Waterway Targeted Use of Buyouts (Regional River & Waterway TUBs) Program (created & begun in 2020) — In partnership with the Institute for a Disaster Resilient Texas (IDRT), and Texas A&M University-Galveston, the TUBS Program creates riverine resilience by installing nature-based stabilization techniques on county/city buyout properties that are adjacent to parks and other public open space.

Carbon Credit in Trees & Riparian Enhancements of Ecosystem Services (TREES) Program (created in 2021, projected to begin in 2023) — Under HW's CGO Program, allowing HW to serve as: a) a "Local Applicant/Operator" to obtain carbon credits for large-scale tree plantings that HW and other entities are doing in collaboration with various partners and with use of various grant funds, and b) as an carbon credit broker, as needed, for public entities to find buyers for carbon credits related to large-scale tree plantings.

Southeast Texas Native Seed Mix Project (begun in 2020) — developing commercially-available and regionally-adapted native seed mixture options for use within floodwater conveyance channel, stormwater detention basin, and roadway rights-of-way where mowing is not required on a frequent basis for the Harris County Flood Control District (HCFCD).

II. Eco-Region Advocacy through Education

Creation & Distribution of Environmental Resources

A Six-Step guide for making nature-based infrastructure decisions based on the benefits of multiple ecosystem services (2nd Edition, 2019), provides both analysis and policy goals for protecting and increasing ecosystem services in the Greater Houston Region (http://houstonwilderness.org/ecosystem-services).

Texas MFS Pollinator Step-by-Step Guide, created to help landowners build and maintain pollinator habitat through a consistent, easily replicated process (revised edition published in 2022)

Policy Paper on Increasing Carbon Sequestration in the Gulf-Houston Region Through Targeted Large-Scale Planting of Native Trees and Flora Species *(Summer 2019)*

TSIG Regional Native Tree Planting Policy & Procedures Manual *(July 2021)*

Scientific Journal Paper: Hopkins, L. P., January-Bevers, D. J.,Caton, E. K., & Campos, L. A. (2021). A Simple Tree Planting Framework to Improve Climate, Air Pollution, Health, and Urban Heat in Vulnerable Locations using Non-traditional Partners. *Plants, People, Planet, 1–15.*

Great Green Quest (GGQ)

With the Wilderness Passport as a guide to the 10 diverse ecoregions found in the 13+ county region surrounding Greater Houston, Great Green Quest distributes over 35,000 of these passports to schools, YMCA centers, park community centers, and region-wide libraries and interested community groups. (http://houstonwilderness.org/passport).

HW Annual Wild Life Luncheon (begun in 2008)

For the first 6 years of HW annual luncheons, the annual event highlighted environmental aspects of the 10 diverse ecoregions. In 2014, the annual luncheon highlights Wild Life legacy award recipients and Wild Partner awards. (https://houstonwilderness.org/luncheon)

SLATE OF INITIATIVES

Gulf-Houston Regional Conservation Plan (Gulf-Houston RCP) – facilitated by Houston Wilderness, the Gulf-Houston RCP is a long-term collaborative of environmental, business, and governmental entities working together to implement an ecosystem continuity and connectivity plan for the Gulf-Houston region through implementation of three key goals for enhanced resilience and nature-based infrastructure.
Ecoregions Affected: All 10 ecoregions
Ecosystem Services Enhanced/Utilized: Air & Water Quality, Water Absorption (flood abatement), Carbon Sequestration, Wildlife Habitat, Urban Heat Island Reduction, Ecotourism, Erosion Control, Energy savings

Super Trees for Sustainability Initiative - a multi-year, large-scale native tree planting collaborative facilitated by HW that incorporates the 25-mile Houston Ship Channel (HSC) TREES Program, the multi-county Riverine Targeted-Use-of Buyouts (TUBs) Program, and targeted urban forestry projects in communities around the 13+ county region to enhance biodiversity and reduce health risks associated with urban heat, air and water pollution and flooding.
Ecoregions Affected: All 10 ecoregions
Ecosystem Services Enhanced/Utilized: Air & Water Quality, Carbon Sequestration, Water Absorption, Urban Heat

Texas Monarch Flyway Strategy (TxMFS) Program – a statewide HW-facilitated effort to restore, increase and enhance Monarch habitat across the state serving as critical links in the Monarch butterfly journey along the Central Flyway from Canada to Mexico, and protecting habitats for other pollinators that are crucial to local ecosystems and agriculture.
Ecoregions Affected: All 10 ecoregions
Ecosystem Services Enhanced/Utilized: Air & Water Quality, Carbon Sequestration, Wildlife Habitat, Ecotourism

Collaborative Grant-Organizing (CGO) Program – serving regional stakeholders and network partners by facilitating informative meetings to discuss a multitude of advancements in nature-based infrastructure and/or environmental enhancements. These discussions often lead to development of regional initiatives with multi-partner federal/state grant funding proposals and awards for the enhancement of targeted environmental risks and stressors, such as large-scale native vegetation and reforestation.
Ecoregions Affected: Bayou Wilderness, Coastal Marshes, Estuaries & Bays, Post Oak Savannah, Prairie Systems
Ecosystem Services Enhanced/Utilized: Air & Water Quality, Water Absorption (flood abatement), Carbon Sequestration, Wildlife Habitat, Urban Heat Island Reduction, Ecotourism, Erosion Control, Energy Savings

Houston Ship Channel TREES (HSC TREES) Program - Beginning in 2020, a 10-year collaborative program, facilitated by HW in collaboration with Economic Port Alliance, Houston Health Department, Buffalo Bayou Partnership and multiple municipalities and private business along the Houston Ship Channel that is focused on enhanced ecosystem services and resiliency through targeted large-scale native Super Tree species plantings along the 25 miles of the Houston Ship Channel, use of the 14 targeted Super Trees species (see more at: www.houstonwilderness.org/resources-for-native-supertrees-and-hsc-trees-program). The goal is 1 million planted native Super Trees by 2030.

Riverine Targeted-Use-of-Buyouts (Riverine TUBs) Program - The pioneering Riverine Targeted Use of Buyouts (Riverine TUBs) Program is an innovative approach to coastal resilience and hazard mitigation through a long-term strategy for habitually flooded properties to be 1) purchased by respective regional counties or municipalities, 2) held by the county or municipality - with maintenance/enhancement MOUs with community partners or transferred to a state agency or NGO for fee-simple ownership, and 3) enhanced with native bioswales, large-scale native trees/plants, replaced coastal wetlands, and other types of nature-based infrastructure techniques

    BOTH PROGRAMS:
    Ecoregions Affected: Bayou Wilderness (Riparian), Estuaries & Bays, Gulf of Mexico
    Ecosystem Services Enhanced/Utilized: Air & Water Quality, Water Absorption (flood abatement), Carbon Sequestration, Wildlife Habitat, Erosion Control, Urban Heat, EJ Community enhancements

Network Partner Access & Advocacy Program – providing problem-solving assistance and facilitation on various environmental policy issues that benefit various parts of the seven land-based and three water-based eco-regions, through informational meetings, short-term initiatives and communications on "environmental issues of the day," such as regional wildlife assessments, EJ community needs, etc.

Great Green Quest (GGQ) – distributing thousands of our Wilderness Passports to regional public and private schools in various school districts every year in late May as schools prepare to release students for the summer. The passport, in both English and Spanish provides detailed site-specific information on all the public outdoor places in the 15+ county area, divided up by ecoregion.
Ecoregions Affected: All 10 ecoregions

Implementation of 3 Key Goals

A Regional Land-Use Strategy Enhanced Air, Water and Soil & Long-term Resilience

8-County Region: Brazoria • Chambers • Fort Bend • Galveston • Harris • Liberty • Montgomery • Waller

Facilitated by Houston Wilderness, the Gulf-Houston Regional Conservation Plan is a long-term collaborative of 100+ environmental, business, and governmental entities working together to implement an ecosystem continuity and connectivity plan for the Gulf-Houston region through implementation of three (3) Key Goals for enhanced resilience throughout the 8-county region. Progress is tracked through regional projects and initiatives that increase protected lands provide more nature-based infrastructure and contribute to increased carbon sequestration throughout the 8-county region.

THREE KEY GOALS

(1) Reaching **24% by 2040** in protected/preserved <u>nature-based infrastructure</u> in the 8-county region
(2) Providing **50% by 2040** in <u>nature-based stabilization techniques</u> on riparian, developed & undeveloped, agricultural and coastal lands in the region, and
(3) Working toward a **.4% annual increase** in <u>organic carbon offsets</u> on regional lands through enhancements in native soils, plants and tree species throughout the region

PROGRESS ON 1ST KEY GOAL
27% is currently developed land-use
16% is currently preserved nature-based infrastructure
40% is available undeveloped land
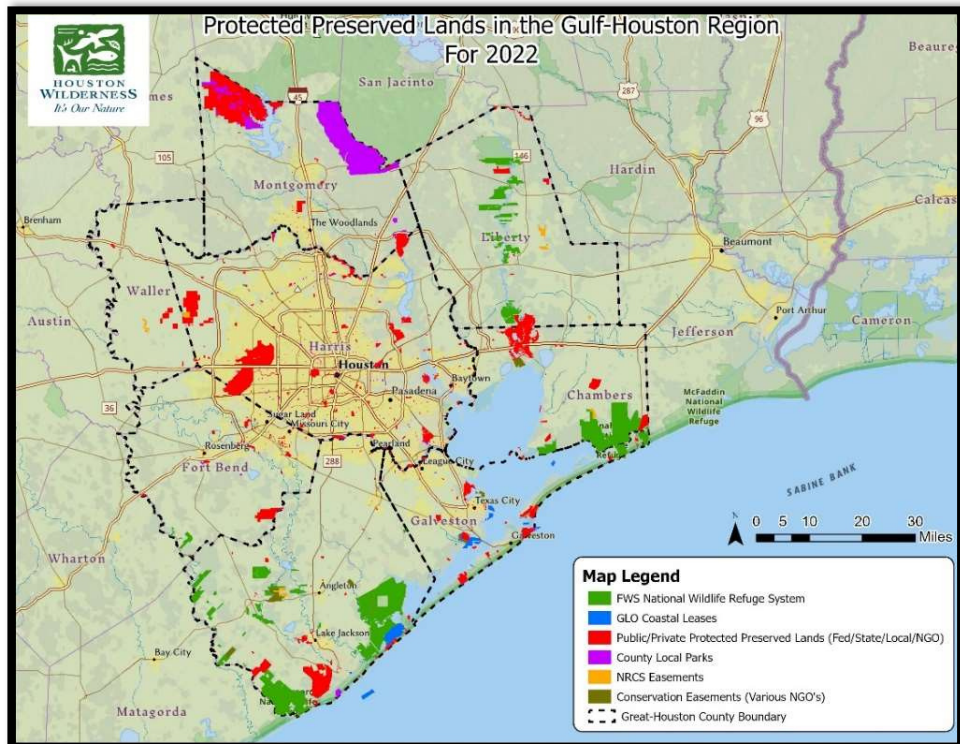
1st Key Goal: *24% protected/preserved lands by 2040.*

16.0% (**794,118 acres total**) of the 8-county region is now conserved green space, up from 9.3% in 2018. Among other efforts, Coastal Prairie Conservancy's recently funded Texas Grasslands and Savanahs Initiative promises to drive further preservation of land.

RCP Plan Protected/Preserved Land Progress
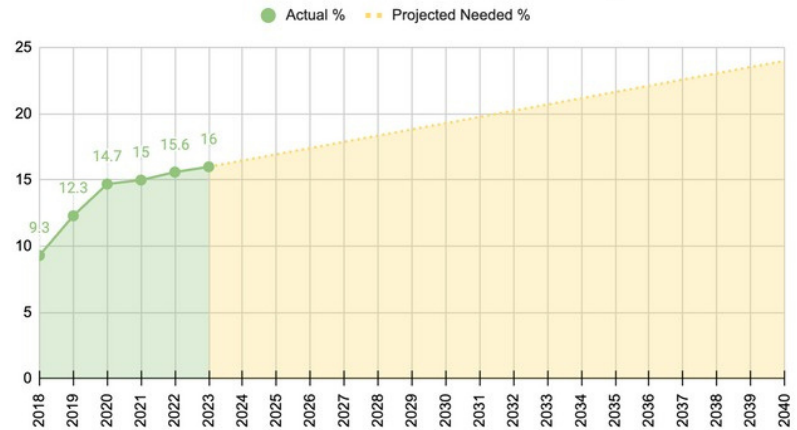
● Actual %　● ● Projected Needed %

2nd Key Goal: Nature-Based Stabilization Techniques on 50% of land coverage by 2040

Land-coverage by nature-based stabilization techniques has doubled to 1.25 million+ acres of the 4.9 million acres in the 8-county region since the beginning of the RCP. HW is installing bioswale designs (see image to the left) and other nature-based infrastructure (NBI) through our TUBs program. The RANSM Coalition was formed in 2023 to facilitate access to native seeds and spur further adoption of NBI.

3rd Key Goal: 4‰ Annual Carbon Sequestration

Public and private partners planted 400,000+ native trees, hundreds of acres of native grasses, and oyster reefs in the past year, helping achieve a 4‰ increase in carbon absorption in regional soils. HW's Super Trees for Sustainability Initiative continues to promote planting native trees with high levels of carbon sequestration ability (among other ecosystem services).

1st Key Goal: *24% protected/preserved lands by 2040.*

From the initial 9.3% in protected/preserved lands across the 8-county Gulf-Houston region in 2018, there is a current total of 16.0% of conserved green space (794,118 acres total) as of our October 2023 update. A number of initiatives promise ongoing progress toward land preservation, including Coastal Prairie Conservancy's recently funded Texas Grasslands and Savanahs Initiative (TGSI), which Houston Wilderness is partnering on.

2nd Key Goal: *Nature-Based Stabilization Techniques on 50% of land coverage by 2040*

Land-coverage by nature-based stabilization techniques has doubled to 1.25 million+ acres of the 4.9 million acres in the 8-county region since the beginning of the RCP. HW is facilitating multiple collaborative grants to install and accelerate adoption of nature-based infrastructure, including developing best management practices for local bioswale design with the National Resources Conservation Service in our Riverine Targeted Use of Buyouts (TUBs) Program. HW is also coordinating the Regional Ac~~cess to Native Seed Mix (RANSM)~~ Coalition to secure access to native seeds fo~~r native grass plantings. There will b~~e a press conference on the Native Seed Mix developed with Harris County Flood Control District on November 29th at Lawson Basin.

3rd Key Goal: *.04% Annual Carbon Sequestration*

Public and private partners planted 400,000+ native trees, hundreds of acres of native grasses, and oyster reefs in the past year, helping achieve a 4‰ increase in carbon absorption in regional soils. HW's *Super Trees for Sustainability Initiative* continues to promote planting native trees with high levels of carbon sequestration ability (among other ecosystem services) which informs our tree planting efforts in the *Houston Ship Channel TREES* Program, *TUBs* Program and other planting events. Improvements of soil health through the TGSI promise further progress on increased carbon sequestration. HW has continues to facilitate the Tree Strategy Implementation Group (TSIG) to help achieve the City of Houston's 4.6 Million Trees by 2030 goal, including the creation of the TSIG's regional Tree Planting manual.

COLLOBRATIVE GRANT ORGANIZING PROGRAM

Houston Wilderness' Collaborative Grant Organizing Program serves a key role in our mission to protect and preserve the ecoregions around greater Houston by coordinating multiple nonprofits and other interested parties to seek funding for large-scale environmental projects in our region. By working together, we are able to magnify our efforts by drawing on the strengths and expertise of numerous partners to take on projects that would be daunting for any single entity. To date, the CGO program has been awarded over 40 grants which will bring 3.8 million dollars to our region, including the over 2.1 million dollars in funding for collaborative grants that Houston Wilderness is currently administering. The current grants primarily support large-scale tree plantings to sequester carbon and absorb floodwater, research on and installation of green stormwater infrastructure on buyout properties, and the creation of pollinator habitats targeted at Monarch butterflies. These programs impact all of Greater Houston's ecoregions, and continue to focus especially on environmental justice communities which suffer disproportionately from health disparities that will continue to be exacerbated by climate change. Houston Wilderness is also acting as a partner organization on a number of other grants that are bringing additional funding to conservation and environmental quality efforts in the region, including an air quality monitoring project in partnership with the Houston Health Department, and a large-scale land-conservation and soil improvement project with the Coastal Prairie Conservancy. We look forward to continued progress in Fiscal Year 2023-24, including targeting funding for programs such as facilitating access to native seed mixes.

Background: *Houston Ship Channel TREES Program* (formerly *Port of Houston TREES program)* is a multi-year, multi-partners collaborative program by Houston Wilderness, Port Houston, Houston Health Department, Buffalo Bayou Partnership, and multiple municipalities and private business along the Houston Ship Channel and Galveston Bay that is focused on enhanced ecosystem services through targeted large-scale tree plantings. The HSC TREES Program is accomplished through a comprehensive tree inventory and installation of thousands of native trees along Lower East Buffalo Bayou, and 25 miles of the Houston Ship Channel, using targeted native tree species, GIS-based data mapping, and avian analysis.

Goals & Impacts: The Port of Houston landscape is distributed over a 25-mile long chain of land areas that are utilized for storage and active port operations but still provide significant green spaces. The HSC TREES Program identified the number and species of trees that already existed and now targets locations along the Ship Channel where additional native trees can be planted. The ability to conduct a comprehensive inventory of a large-scale riparian corridor allowed the program partners to analyze and value this riparian ecosystem more effectively and gain valuable insight into the impacts of the ecosystem services and how to enhance them.

Houston Ship Channel Trees & Riparian Enhancement Program
Large Scale Tree Plantings 2019 - 2022

A GIS-based database tracks the trees inventoried, and the number and tree species planted. Houston Wilderness staff researched, calculated and ranked the ecosystem services values associated with native tree species in our region. Based on these rankings, the top 17 "Super Tree" species are targeted for large-scale plantings along the riparian corridor. These native *Super Tree* species were ranked in priority based on their respective levels of air pollution absorption (GHGs), water absorption and carbon sequestration. Large-scale native *Super Tree* plantings provide a multitude of ecosystem services - increased air & water quality, erosion control, phytoremediation and habitat enhancement. For more information, please see Houston Wilderness website: https://houstonwilderness.org/houston-ship-channel-trees-program

Project Breakdown: Phase 1, 2 and 3 are divided into 5 different sections throughout the 25 miles Houston Ship Channel riparian corridor. To date, over 30,904 native trees have been planted under this Program with many more planned in 2021-2025. The *Houston Ship Channel TREES* program will be particularly impactful to the natural environment and human health and welfare in the industrial and residential areas along the Houston Ship Channel.

Phase 1: Port Houston-owned properties

Phase 2: Private landowners along Port Houston
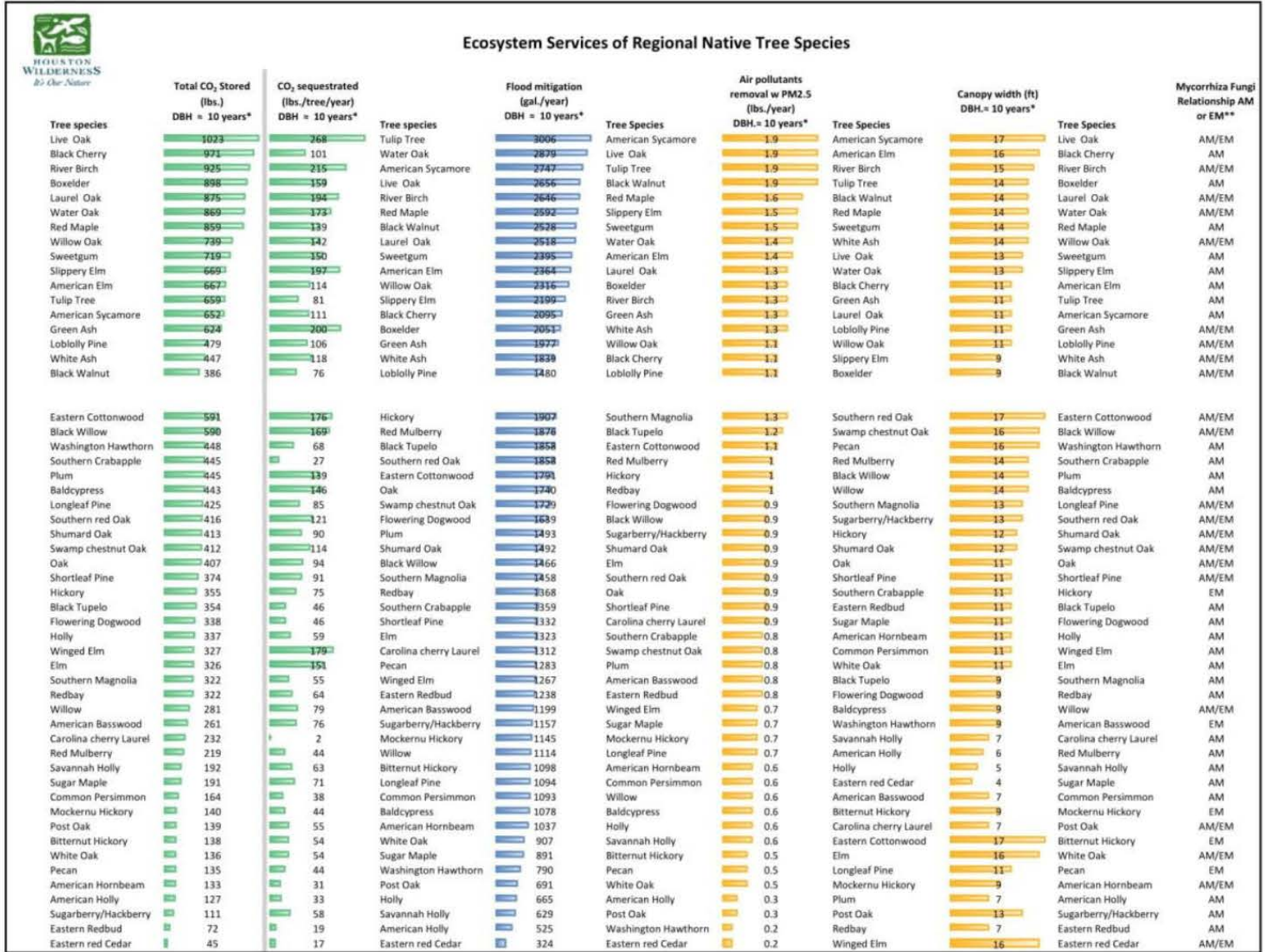*Phase 3*: Public properties along the Houston Ship Channel

Ecosystem Services of Regional Native Tree Species

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Total CO₂ Stored (lbs.) and CO₂ sequestrated (lbs./tree/year) — DBH = 10 years*

Tree species	Total CO_2 Stored (lbs.)	CO_2 sequestrated (lbs./tree/year)
Live Oak	1023	268
Black Cherry	971	101
River Birch	925	215
Boxelder	898	159
Laurel Oak	875	194
Water Oak	869	173
Red Maple	859	139
Willow Oak	739	142
Sweetgum	719	150
Slippery Elm	669	197
American Elm	667	114
Tulip Tree	659	81
American Sycamore	652	111
Green Ash	624	200
Loblolly Pine	479	106
White Ash	447	118
Black Walnut	386	76
Eastern Cottonwood	591	176
Black Willow	590	169
Washington Hawthorn	448	68
Southern Crabapple	445	27
Plum	445	139
Baldcypress	443	146
Longleaf Pine	425	85
Southern red Oak	416	121
Shumard Oak	413	90
Swamp chestnut Oak	412	114
Oak	407	94
Shortleaf Pine	374	91
Hickory	355	75
Black Tupelo	354	46
Flowering Dogwood	338	46
Holly	337	59
Winged Elm	327	179
Elm	326	151
Southern Magnolia	322	55
Redbay	322	64
Willow	281	79
American Basswood	261	76
Carolina cherry Laurel	232	2
Red Mulberry	219	44
Savannah Holly	192	63
Sugar Maple	191	71
Common Persimmon	164	38
Mockernu Hickory	140	44
Post Oak	139	55
Bitternut Hickory	138	54
White Oak	136	54
Pecan	135	44
American Hornbeam	133	31
American Holly	127	33
Sugarberry/Hackberry	111	58
Eastern Redbud	72	19
Eastern red Cedar	45	17

Flood mitigation (gal./year) — DBH = 10 years*

Tree species	Flood mitigation (gal./year)
Tulip Tree	3006
Water Oak	2879
American Sycamore	2747
Live Oak	2656
River Birch	2646
Red Maple	2592
Black Walnut	2528
Laurel Oak	2518
Sweetgum	2395
American Elm	2364
Willow Oak	2316
Slippery Elm	2199
Black Cherry	2095
Boxelder	2051
Green Ash	1977
White Ash	1839
Loblolly Pine	1480
Hickory	1907
Red Mulberry	1876
Black Tupelo	1858
Southern red Oak	1858
Eastern Cottonwood	1791
Oak	1740
Swamp chestnut Oak	1729
Flowering Dogwood	1639
Plum	1493
Shumard Oak	1492
Black Willow	1466
Southern Magnolia	1458
Redbay	1368
Southern Crabapple	1359
Shortleaf Pine	1332
Elm	1323
Carolina cherry Laurel	1312
Pecan	1283
Winged Elm	1267
Eastern Redbud	1238
American Basswood	1199
Sugarberry/Hackberry	1157
Mockernu Hickory	1145
Willow	1114
Bitternut Hickory	1098
Longleaf Pine	1094
Common Persimmon	1093
Baldcypress	1078
American Hornbeam	1037
White Oak	907
Sugar Maple	891
Washington Hawthorn	790
Post Oak	691
Holly	665
Savannah Holly	629
American Holly	525
Eastern red Cedar	324

Air pollutants removal w PM2.5 (lbs./year) — DBH = 10 years*

Tree Species	Air pollutants removal w $PM2.5$ (lbs./year)
American Sycamore	1.9
Live Oak	1.9
Tulip Tree	1.9
Black Walnut	1.9
Red Maple	1.6
Slippery Elm	1.5
Sweetgum	1.5
Water Oak	1.4
American Elm	1.4
Laurel Oak	1.3
Boxelder	1.3
River Birch	1.3
Green Ash	1.3
White Ash	1.3
Willow Oak	1.1
Black Cherry	1.1
Loblolly Pine	1.1
Southern Magnolia	1.3
Black Tupelo	1.2
Eastern Cottonwood	1.1
Red Mulberry	1
Hickory	1
Redbay	1
Flowering Dogwood	0.9
Black Willow	0.9
Sugarberry/Hackberry	0.9
Shumard Oak	0.9
Elm	0.9
Southern red Oak	0.9
Oak	0.9
Shortleaf Pine	0.9
Carolina cherry Laurel	0.9
Southern Crabapple	0.8
Swamp chestnut Oak	0.8
Plum	0.8
American Basswood	0.8
Eastern Redbud	0.8
Winged Elm	0.7
Sugar Maple	0.7
Mockernu Hickory	0.7
Longleaf Pine	0.7
American Hornbeam	0.6
Common Persimmon	0.6
Willow	0.6
Baldcypress	0.6
Holly	0.6
Savannah Holly	0.6
Bitternut Hickory	0.5
Pecan	0.5
White Oak	0.5
American Holly	0.3
Post Oak	0.3
Washington Hawthorn	0.2
Eastern red Cedar	0.2

Canopy width (ft) — DBH = 10 years*

Tree Species	Canopy width (ft)
American Sycamore	17
American Elm	16
River Birch	15
Tulip Tree	14
Black Walnut	14
Red Maple	14
Sweetgum	14
White Ash	14
Live Oak	13
Water Oak	13
Black Cherry	11
Green Ash	11
Laurel Oak	11
Loblolly Pine	11
Willow Oak	11
Slippery Elm	9
Boxelder	9
Southern red Oak	17
Swamp chestnut Oak	16
Pecan	16
Red Mulberry	14
Black Willow	14
Willow	14
Southern Magnolia	13
Sugarberry/Hackberry	13
Hickory	12
Shumard Oak	12
Oak	11
Shortleaf Pine	11
Southern Crabapple	11
Eastern Redbud	11
Sugar Maple	11
American Hornbeam	11
Common Persimmon	11
White Oak	11
Black Tupelo	9
Flowering Dogwood	9
Baldcypress	9
Washington Hawthorn	9
Savannah Holly	7
American Holly	6
Holly	5
Eastern red Cedar	4
American Basswood	7
Bitternut Hickory	9
Carolina cherry Laurel	7
Eastern Cottonwood	17
Elm	16
Longleaf Pine	11
Mockernu Hickory	9
Plum	7
Post Oak	13
Redbay	7
Winged Elm	16

Mycorrhiza Fungi Relationship AM or EM**

Tree Species	Mycorrhiza Fungi Relationship AM or EM
Live Oak	AM/EM
Black Cherry	AM
River Birch	AM/EM
Boxelder	AM
Laurel Oak	AM/EM
Water Oak	AM/EM
Red Maple	AM
Willow Oak	AM/EM
Sweetgum	AM
Slippery Elm	AM
American Elm	AM
Tulip Tree	AM
American Sycamore	AM
Green Ash	AM/EM
Loblolly Pine	AM/EM
White Ash	AM/EM
Black Walnut	AM/EM
Eastern Cottonwood	AM/EM
Black Willow	AM/EM
Washington Hawthorn	AM
Southern Crabapple	AM
Plum	AM
Baldcypress	AM
Longleaf Pine	AM/EM
Southern red Oak	AM/EM
Shumard Oak	AM/EM
Swamp chestnut Oak	AM/EM
Oak	AM/EM
Shortleaf Pine	AM/EM
Hickory	EM
Black Tupelo	AM
Flowering Dogwood	AM
Holly	AM
Winged Elm	AM
Elm	AM
Southern Magnolia	AM
Redbay	AM
Willow	AM/EM
American Basswood	EM
Carolina cherry Laurel	AM
Red Mulberry	AM
Savannah Holly	AM
Sugar Maple	AM
Common Persimmon	AM
Mockernu Hickory	EM
Post Oak	AM/EM
Bitternut Hickory	EM
White Oak	AM/EM
Pecan	EM
American Hornbeam	AM/EM
American Holly	AM
Sugarberry/Hackberry	AM
Eastern Redbud	AM
Eastern red Cedar	AM/EM

References:

Native tree species selected from City of Houston tree ordinance
* Total CO2 stored and CO2 sequestration Calculated with CUFR Carbon Calculator (CTCC)
* Flood mitigation, Air pollutants removal calculated with i-Tree planting tool
   Annual value calculated = total 10 year - total 9 year
   Flood mitigation = Rainfall interception + avoided runoff
   Air pollutants include O_3 + NO_2 + SO_2 + small particulate matter ($PM_{2.5}$)
* Biogenic VOC emission rate includes Isoprene and Monoterpenes volatile organic compounds
* Diameter at breast height (DBH) - calculated for each tree species when approximately 10 years old
* The references of the arbuscular mycorrhizal (AM) and ectomycorrhizal (EM) structural characteristics:

** Teste, François P., et al. "Dual-mycorrhizal Plants: Their Ecology and Relevance." *The New Phytologist*, vol. 225, no. 5, 2020, pp. 1835–51, https://doi.org/10.1111/nph.16190.

** Heklau, Heike, et al. "Mixing Tree Species Associated with Arbuscular or Ectotrophic Mycorrhizae Reveals Dual Mycorrhization and Interactive Effects on the Fungal Partners." *Ecology and Evolution*, vol. 11, no. 10, Wiley, 2021, pp. 5424–40, https://doi.org/10.1002/ece3.7437.

** https://planting.itreetools.org/
** https://extension.okstate.edu/fact-sheets/mycorrhizal-fungi.html
** https://www.lebanonturf.com/education-center/tree-shrub-and-flower-care/mycorrhizal-types-on-important-plants
** https://www.arboristnow.com/news/mycorrhizae-my-favorite-kind-of-fungi

Tree Strategy Implementation Group

Key Objectives in the TSIG Strategy to reach 4.6M Trees by 2030

1. **Maintaining an average of 400,000 native trees per year through 2030 -** using three main actions: a) continue large-scale native tree planting with multiple native species by TSIG members, b) create an educational campaign to encourage residential involvement in large-scale native tree plantings, and c) provide data and tracking of the planting of millions of native trees through 2030. See Actual & Projected Tree Plantings below, and City of Houston **4.6M Trees Scoreboard** created.

2. **Creation of a Regional Native Tree Planting Policy & Procedures Manual -** educating decision-makers and the general public on the Best Management Practices of why, how and where to do large-scale native tree plantings, targeting specific native tree species based on location and ecosystem services needed. See Large-Scale Tree Planting Manual www.houstonwilderness.org/46-million-trees-by-2030-goal.

3. **Tracking locations of major native tree removals -** See Large-Scale Tree Planting Manual above.

4. **Supporting regulatory improvements** that will assist in reaching the 4.6 million goal, such as updating county/city native tree lists, and allowing additional green space locations for large-scale tree plantings.

Tree Strategy Implementation Group - TSIG

CoH Resilience (Priya Zachariah & Laura Patino)
Harris Co. & Harris Co. Flood Control District (Nicolas Griffin)
Harris County, Prec. 2 (Jorge Bustamante)
Harris County Tollroad Authority - HCTRA (Doug Emery)
H-GAC (Justin Bower & Cheryl Mergo)
Houston Parks & Recreation Dept (Kelli Ondracek)
Houston Parks Board (Marissa Llosa & Alexis Overdiek)
Houston Wilderness (Deborah January-Bevers)

Landscape Architects: Keiji Asakura (Asakura Robinson), Matt Baumgarten & Rachel Wilkins (SWA), and Sheila Condon (Clark Condon)
Engineering Industry Rep. Matthew Smith (ALJ Lindsey)
Master-Planned Communities & MUDs (Alia Vinson)
Nature's Way Resources (John Ferguson)
TxDOT - Houston District (Ethan Beeson)
Texas A&M Forest Service (Mickey Merritt & Mac Martin)
Mitigation Bank Industry Rep. (Matt Stahman, RES)

COMPREHENSIVE LIST OF ACTUAL PROJECTED REGIONAL TREE PLANTINGS - annually (starting in 2019)
Tree Strategy Implementation Group

Large-Scale Native Tree Planters	Native Tree Plan/Projects	2019 Season	2020 Season	2021 Season	Current 2022 Season	Projection 2023 Season	Projection 2024 Season	Projection 2025	Projection 2026	Projection 2027	Projection 2028	Projection 2029	Projection 2030	
TxDOT-Houston Dist. Native Trees [2]	Green Ribbon Program	100,000	100,000	100,000	100,000	100,000	100,000	80,000	50,000	50,000	40,000	30,000	25,000	
City of Houston [1]	Resilient Houston Plan & Climate Action Plan													
HPARD - City parks and medians	Riparian Restoration Project	20,000	10,000	15,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Houston PWD	Varied	1,500	1,500	10,000	10,000	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
Harris County	HC Flood & Infra. Resilience Plan													
HCFCD Row & Detentions	HCFCD Tree Planting Program	15,000	20,000	20,000	20,000	25,000	25,000	20,000	20,000	20,000	15,000	15,000	15,000	
HCTRA Row	Varied	8,000	8,000	8,000	8,000	10,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	
Harris County, Precinct 1	Varied	250	250	250	1,250	250	250	250	250	250	250	250	250	
Harris County, Precinct 2	Varied	250	250	5,000	4,000	5,000	250	250	250	250	250	250	250	
Harris County, Precinct 3	Varied	250	250	250	250	250	250	250	250	250	250	250	250	
Harris County, Precinct 4	Varied	250	250	250	250	250	250	250	250	250	250	250	250	
U.S. Army Corps of Engineers (ACE)	Ecosystem Restoration Projects	2,500	2,500	5,000	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
Trees for Houston[3]	Varied	9,100	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Houston Parks Board	Bayou Greenways 2020	600	1,500	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Buffalo Bayou Partnership	BBP Master Plan	801	204	1,500	1500	1500	1500	1500	1500	1500	1500	1500	1500	
Memorial Park Conservancy	MP Master Plan	1070	1200	1,500	1,500	5000	5000	5000	2500	2500	2500	2500	2500	
Hermann Park Conservancy	HP Master Plan	250	250	1000	1000	500	250	250	250	250	250	250	250	
Exploration Green	Multi-phase projects	300	100	250	50	50	50	50	50	50	50	50	50	
Houston Botanic Garden	Multi-phase projects	0	342	350	100	50	15	15	50	10	10	10	10	
Houston Wilderness (CGO projects)	HSC TREES & TUBs Program	2,500	4,500	7,500	18,000	20,000	30,000	35,000	25,000	20,000	20,000	15,000	10,000	
Local commercial nursery sale of trees – average	Varied tree species sales	3,000	3,000	3,000	2,500	5000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
American Forests/HGAC	Regional Urban Forestry Program	500	500	500	500	500	500	500	500	500	500	500	500	
Texas Forest Service	Varied projects/plans	NA	NA	1,000	1500	2000	2000	2000	2000	2000	2000	2000	2000	
Landscape Architects	Varied projects/plans	1,000	1,000	8,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	
Mitigation Banks (private companies)[2]	Mitigation Bank restoration plans	75,000	210,000	225,000	110,000	200,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	
Developers for Master Planned Communities, MUDs & Smaller Developments (TOTAL)	Nature-based Infrastructure Projects	40,000	52,000	50,000	40,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	
Residential/NGO/Neighborhood/Commercial Tree-Plantings	Varied projects/plans	NA	5,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000	5,000	5,000	
Estimated TOTAL		282,121	432,596	493,350	400,400	510,350	454,315	434,315	386,850	381,810	366,810	351,810	341,810	**4,836,537**
Estimated tree removals & loss		25,000	25,000	25,000	100,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	**375,000**
Estimate TOTAL after annual tree loses														**4,461,537**

1. Inter-departmental planting plans/projects
2. Includes in Harris County area
3. Trees not already listed by other tree planters

Faciliated by Houston Wilderness

Super Trees for Sustainability Initiative

Targeted Native Tree Spcecies for Enhancement of Ecosystem Services

Background: *The Regional Super Trees for Sustainability Initiative* is a multi-year, large-scale native tree planting collaborative facilitated by Houston Wilderness that incorporates the 25-mile Houston Ship Channel (HSC) TREES Program, the multi-county Riverine Targeted-Use-of-Buyouts (TUBs) Program, and targeted urban forestry projects in communities around the 13+ county region to enhance biodiversity and reduce health risks associated with urban heat, air and water pollution and flooding.

Houston Ship Channel (HSC) TREES Program - A 10-year collaborative project with multiple private/public partners focused on large-scale *Super Trees* plantings along the 25 miles of the HSC's industrial complex, targeting native tree species based on their respective levels of air pollution absorption (including CO2, GHGs and PM) as well as water absorption and erosion control. This pioneering program has public and private funding to support over 150,000 trees planted, to date.

Riverine Targeted-Use-of-Buyouts (TUBs) Program - a region-wide approach to coastal and riparian resilience, erosion and sediment reduction, and hazard mitigation through implementation of green stormwater infrastructure (GSI) techniques on contiguous buyout properties adjacent to riparian corridors. This multi-partner effort results in biodiversity enhancements through *Super Trees* plantings and bioswales on over 3,000 acres of new green space along critical waterways in the region.

Biodiversity to Reduce Health Risks Projects - Often in working in EJ communities, these urban forestry projects target *Super Tree* plantings on contiguous properties (block by block, pavement by pavement) based on their ecosystem services needs. The use of researched, calculated, and ranked ecosystem service values associated with planting *Super Trees* contiguously allows these high health-risk neighborhoods to maximize the benefits of large-scale forest biodiversity vs. small-scale, landscape-style planting.

Goals & Impacts: HW collaborated with NGO, Rice University and Houston Health Dept partners to create a framework to develop native tree planting programs that capitalize on three key components: 1) identification of optimal native tree species for climate change adaptations and air pollution mitigation around variables important locally (called the region's native *Super Trees*); 2) selection of large-scale native tree planting locations where populations are already disproportionately experiencing flooding, increased heat and air pollution related health effects that could be further exacerbated from climate change; and 3) engagement of multisectoral leadership broadened beyond those traditionally working on climate change resilience through heightening awareness of the link to human health. The *Super Trees* species are selected among all native tree species in the region according to the different capabilities of the region's many native trees in carbon sequestration, air pollutant reduction, flood mitigation through water absorption, and urban heat reduction (canopy). The unique properties between individual native tree species can be prioritized to optimize response to the above-mentioned program goals and educate the community about their benefits. For example, in Houston, the Live Oak ranks high in annual carbon sequestration, GHG absorption and water absorption but lower in tree canopy size, whereas the American Sycamore ranks high in canopy size, GHG absorption and water absorption but lower in carbon sequestration. (Reference:

Hopkins, L. P., January-Bevers, D. J., Caton, E. K., & Campos, L. A. (2021). A simple tree planting framework to improve climate, air pollution, health, and urban heat in vulnerable locations using non-traditional partners. Plants, People, Planet,1–15. 10245. https://doi.org/10.1002/ppp3.10245)

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In partnership with:

For more information: https://houstonwilderness.org/houston-ship-channel-trees-program

The Riverine Targeted use of Buyouts Program

Background on Regional Frequently-flooded Property Buyouts: The impact of recent flood events, such as Hurricane Harvey and other frequent repetitive flood events that impact rivers and waterways both upstream and downstream in respective regional counties, compounded from tropical storms originating in the Gulf of Mexico, has sparked new proposals for buying out damaged properties to reduce flood risk and return them to natural open space.

Example of Greens Bayou buyout property

In conjunction with Houston Wilderness, Harris County Flood Control District, the City of Houston, and local NRCS staff, the *Institute for a Disaster Resilient Texas* (IDRT) at Texas A&M University-Galveston plays a key role in the *Regional River & Waterways TUBS* Program by providing analysis, research, and technical support on property buyouts and acquisition in relation to Green Stormwater Infrastructure (GSI) techniques.

Strategic property buyouts to enhance flood resilience:

A 2020 study by Dr. Brody and the IDRT at Texas A&M University Galveston found that implementing nature-based infrastructure onto contiguous buyout properties, as the Riverine TUBs Program is doing, substantially reduced flood risks to surrounding communities and "statistically and spatially demonstrates the feasibility of incorporating additional ecological and proximity criteria into the flood buyout selection process without compromising strong economic benefits" (Atoba et al., 2020 - https://doi.org/10.1080/17477891.2020.1771251).

The pioneering Riverine Targeted Use of Buyouts (Riverine TUBs) Program is an innovative approach to coastal resilience and hazard mitigation through a long-term strategy for habitually flooded properties to be 1) purchased by respective regional counties or municipalities, 2) held by the county or municipality - with maintenance/enhancements MOUs with community partners or transferred to a state agency or NGO for fee-simple ownership, and 3) enhanced with native bioswales, large-scale native trees/plants, replaced coastal wetlands, and other types of nature-based infrastructure techniques (also called Green Stormwater Infrastructure - GSI). In addition, the Riverine TUBs Program partners are working together to create Best Management Practices (BMPs) for GSI techniques, especially bioswales, that NRCS staff can use to advise application of GSI techniques along other riparian corridors and the Texas coast. GSI enhancements and monitoring activities conducted through the Program will help mitigate flooding, improve water and air quality, restore natural habitats, and benefit at-risk communities.

Intersection of HPARD and Harris County Parks and Candidate Buyouts
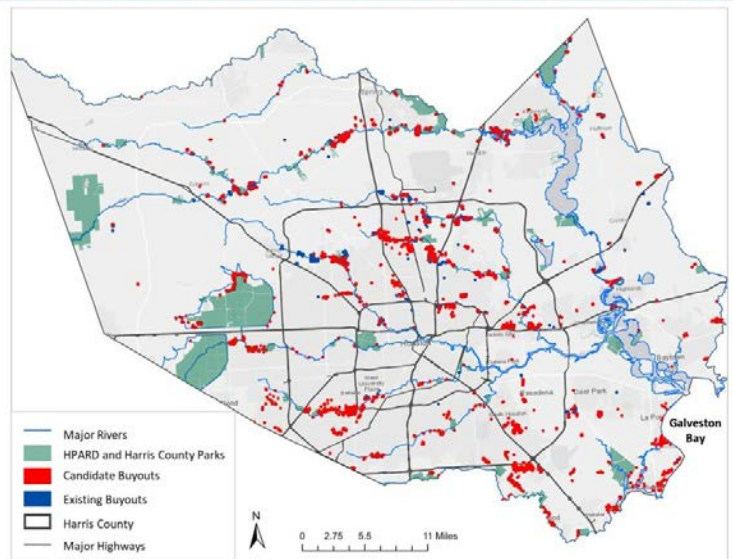
Beneficial Results: Working with state legislators and regional stakeholders to implement the *Riverine TUBs Program* in 2022-2023 will help mitigate the impacts of future large rain events on Greater Gulf-Houston Region's key community assets, such as essential infrastructure, and provide critical connectivity along riparian corridors. Planting numerous additional native tree and grass species in strategic buyout locations on both private and public protected/preserved lands, as well as other public/private locations will increase resilience and recovery from shocks and stressors by 1) protecting, restoring and improving the water/air quality, carbon absorption, riparian erosion rates and habitat of multiple watersheds, and 2) reducing Urban Heat Islands.
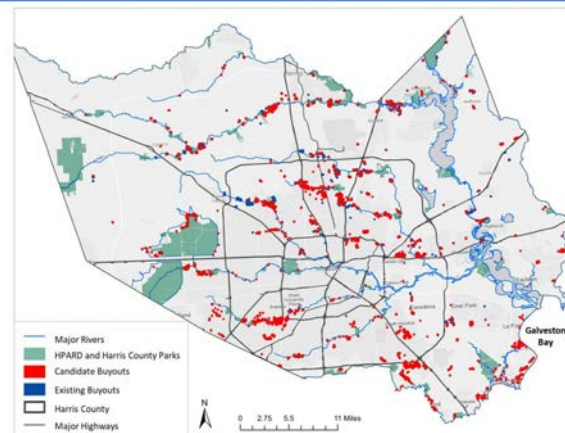
[1]July, 2022

Bioswales in Riverine TUBs

The pioneering **Riverine Targeted Use of Buyouts (Riverine TUBs) Program** is an innovative approach to coastal resilience and hazard mitigation through a long-term strategy for habitually flooded properties that have been purchased and maintained by respective regional counties or municipalities. This project will allow these areas to be enhanced with native grass bioswales, large-scale native tree plantings, replaced coastal wetlands, and other types of **nature-based infrastructure** (NBI). Project partners include the Institute for Disaster Resilient Texas (IDRT), Harris County Flood Control District (HCFCD), NRCS, NFWF, the City of Pasadena, Houston Parks Board (HPB), Resources Environmental Services (RES), and Buffalo Bayou Partnership (BBP).

Additionally, the Riverine TUBs Program partners are working together to create Best Management Practices (BMPs) for NBI techniques, especially bioswales, that NRCS and other partners can use to advise application of NBI techniques along other riparian corridors and the Texas coast. NBI enhancements and monitoring activities conducted through the Program will help mitigate flooding, improve water and air quality, restore natural habitats, and benefit at-risk communities.

Intersection of HPARD and Harris County Parks and Candidate Buyouts

- Major Rivers
- HPARD and Harris County Parks
- Candidate Buyouts
- Existing Buyouts
- Harris County
- Major Highways

0   2.75   5.5   11 Miles

Galveston Bay

Example: HCFCD demonstration bioswale in Houston

What is a Bioswale?

A native bioswale is a NBI method that mimics natural landscape features to manage, filter and slow down stormwater, and captures non-point source runoff, using native vegetation in a linear, shallow channel designed to maximize the time water spends in the swale and enhance the ecosystem services before flowing into bayous and waterways.

Benefits of native grass bioswales:

- Increase infiltration of stormwater in our region's heavy clay soils with the deep root systems of native grasses
- Stabilize soil and prevent erosion of riparian corridors
- Improve water quality by removing pollutants from stormwater
- Enhance habitat quality for native wildlife

For Volunteers:

HW volunteers have the opportunity to participate in the Riverine TUBs program with volunteer bioswale plantings! Volunteers can expect to plant a diverse array of native grasses in a 1 ft shallow channel. Visit houstonwilderness.org to learn about volunteer opportunities!

Houstonwilderness.org

Bioswale Volunteer Planting Photos

NATIVE GRASS
BIOSWALE PLANTING

MEMORIAL PARK
Pasadena, TX

BIOSWALE IN PROGRESS

BIOSWALE IN PROGRESS

Texas Monarch Flyway Strategy
(TEXAS MFS)

Facilitated by Houston Wilderness, the *Texas Monarch Flyway Strategy (Texas MFS)* is an outgrowth of the *Gulf Houston Monarch Flyway Strategy* & *Tri-Regional Monarch Flyways Strategy*, which is a collaborative effort modeled after Texas Parks & Wildlife Department's Monarch & Native Pollinator Conservation Plan. The *Texas MFS* Program includes three phases, which include the restoration and enhancement of:

A) Grass and riparian lands in urban areas (implemented from 2016 – 2019)
B) Rural/Suburban Areas (implemented from 2019 – 2020)
C) Sustainability and long term maintenance of these areas (ongoing)

Utilizing funding from various federal, state and regional sources, Houston Wilderness is working with Texas biologists, multiple municipalities, private and public landowners, schools and environmental nonprofits to enhance or restore over 25,000 acres of habitat for monarch butterflies within the monarch's migratory flight path through Texas.
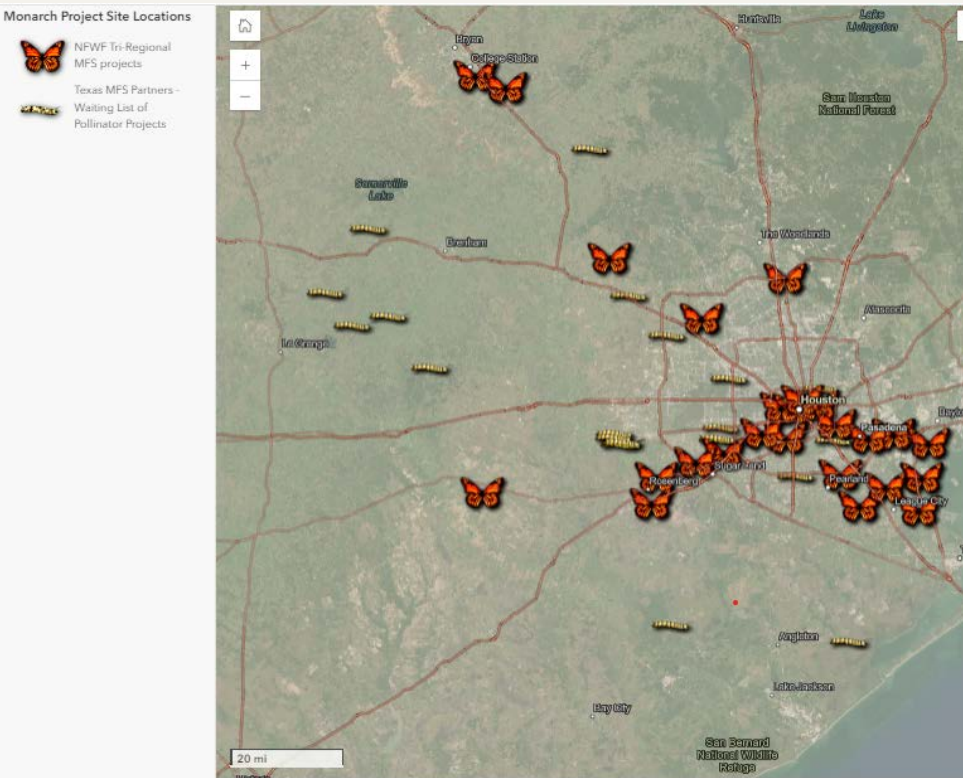
TxMFS Step-by-Step Guide to Pollinator Habitat Creation in Texas Revised Edition

•**Not recommending to plant tropical milkweed – not native to Texas (OE too strong)**

Get an up close and personal look into the various pollinator habitat locations using our interactive map
Visit: www.houstonwilderness.org/mfs

Collaborative Native Seed Mix (NSM) Development Project

HARRIS COUNTY

Background: Native Seed Mix (NSM) Development is a multi-year collaborative program facilitated by Houston Wilderness, Harris County Flood Control District (HCFCD), and Texas A&M University – Kingsville focused on development of an available and affordable regional **native grass seed mix(es)** to provide valuable ecosystem services and increased ecological resilience along riparian corridors in Harris County. Structurally mature and floristically complex native plant communities along riparian corridors will increase ecological resilience by 1) decreasing erosion, 2) decreasing sedimentation in rivers and waterways, 3) increasing streambank productivity, 4) improving local water quality and supply characteristics, and 5) enhancing overall environmental functions and processes.

NSM Project Breakdown: The NSM partners are now 1 year and 5 months into the process of testing the survivability of various native seed mixes – first through the use of 10' by 10' plots on two half-acre sites – one in North Harris County and one in South Harris County - to determine species survivability rates, and then through the planting of viable seed mixes in a ½ acre area in the North site and 10' x 10' plots in the South site to evaluate seed performance on slope conditions. Plots of one native species and mixed native species were tested to compare effects of increased biodiversity on survivability and growth rates. Sections at each site were prepped with hydro mulch to mimic current HCFCD protocol for soil stabilization following planting, the other plots were left untreated for comparison analysis.

The North site shows resilience to invasive species like KR Bluestem because of the time of year of planting and demonstrates a native seed mix planting in an established basin-style site. The South slope plots were treated with herbicide to reduce the invasive KR Bluestem that began establishing.

North HCFCD Site – half-acre plot

Future Steps: Benefit relevant indicators of the change in ecosystem services will be monitored throughout the project. An on-site workshop with interested stakeholders facilitated by Houston Wilderness in November 2022 highlighted the progress of the NSM project:

1. The Gulf Coast and East Texas are the only regions without a native seed mix
2. Based on the success of the North NSM demo site, early successional, annual species can be used to close the gaps between native grasses and avoid invasive species take over
3. Timing of the NSM plantings is a key to avoiding invasive species like KR (Old World) Bluestem
4. TNS seed development is a 4–7-year process and accessibility of targeted NSM species varies based on commercial availability of seed.

[1]November 2022

News coverage from the NSM Media Event on November 29, 2023

abc**13**   ▶ WATCH LIVE

FLOODING

Harris County experimenting with different plants for flood control and water conservation

By Jeff Ehling abc13
Wednesday, November 29, 2023

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LOCAL // ENVIRONMENT

Grass from a new Southeast Texas native seed mix will resist storms and drought

By **Rebekah F. Ward**,
Nov 29, 2023

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New grass seed mix is suited to region

By Rebekah F. Ward
STAFF WRITER

With the launch of a seed mix designed to grow native grasses that are adapted to Southeast Texas, landscapers and local governments in the Houston area expect to cut down on their water use and mowing costs by growing turf-style landscapes better suited to the region's floods and droughts.

The first iteration of the mix is now available through a coalition of growers and major buyers

gion that should ever have had short-root, nonnative grasses," said Deborah January-Beavers, the CEO of Houston Wilderness.

In testing over the past two years by researchers at Texas A&M Kingsville's Texas Native Seeds Program, the new 12-species mix "handled inundation of water, it handled drought and it looks fabulous," she said.

"All of these species are native to the region," said Tony Falk, director of Texas A&M Kingsville's native seed research, who said the process of selecting which

Tina Peterson, the Harris County flood control district's executive director, said at a press conference Wednesday that it was gratifying to finally have a seed mix in hand that adapts to the local landscape and can help her teams' flood mitigation work.

"We know that native seeds and native plants really create an opportunity to create habitats and restore our ecosystems," Peterson said. "We also have an opportunity to in areas where the native seeds will be useful and

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LOCAL NEWS

What's being done to protect the Houston area from future flooding

—

Local leaders talked about what's being done to protect the Houston area from future flooding events.

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Southeast Texas Native Seed Mix (NSM) Development Project

drought   mitigation   flood control   planting   seeds   grasses   southeast texas   houston

By ChannelTwoNews
December 2, 2023 in Houston and the Environment

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How a native seed mix could reduce storm damage, environmenta impacts in Gulf Coast region

By Melissa Enaje | 2:28 PM Nov 30, 2023 CST
Updated 2:28 PM Nov 30, 2023 CST

Wharton Journal ★ Spectator

Native seed mix coming to Wharton

Dec 1, 2023 Updated Dec 1, 2023   💬 0

GREAT GREEN QUEST
WILDERNESS PASSPORT

Houston Wilderness created the *Great Green Quest (GGQ)* to provide children and families the opportunity to spend quality time together and better understand the importance of natural systems in their lives.

The *Great Green Quest (GGQ)* is an interactive educational experience that gets kids interested and involved in their natural surroundings during the summer months. The *GGQ* helps meet the essential need that our region's natural areas are visited, enjoyed, and valued. The *GGQ's* Wilderness Passport is an outdoor nature resource guide detailing the 10 ecoregions that make up the Houston Wilderness coverage area. The passport has information on over 50 parks, preserves, nature centers and refuges that boast countless wildlife viewing opportunities, outdoor recreation and beautiful landscapes.

The 2023 *Great Green Quest* connected children, students, and families to their natural world via the distribution of over 37,000 Wilderness Passports to area school districts, Houston Parks and Recreation Department's community centers, area libraries, youth organizations, and children's museums. Over 30 urban and suburban schools and libraries received passports at the end of the spring semester, as did multiple YMCAs and municipal community centers.

Hoppi is the Houston Wilderness Guide for the 10 ecoregions of the Greater Houston area and he's very curious about nature. He likes to observe seeds, leaves, and flowers. He makes a camera motion with his hands to pretend to take photos. Hoppi makes binoculars with his hands and invites volunteers to observe birds and insects too! Hoppi likes to skip about, hand out Wilderness Passports at events and boost volunteers' spirits with fun dances. Hoppi loves to take photos with volunteers posing with jazz hands! Hoppi is enthusiastic and patient as he invites volunteers to engage with the great outdoors! Oh, and his favorite Super Tree is the loblolly pine!

Hoppi the Frog!

For more information visit:
www.houstonwilderness.org/ggq
www.houstonwilderness.org/passport
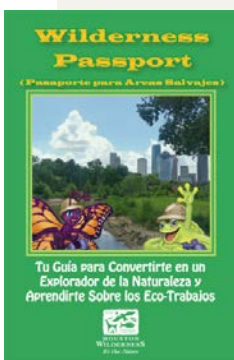
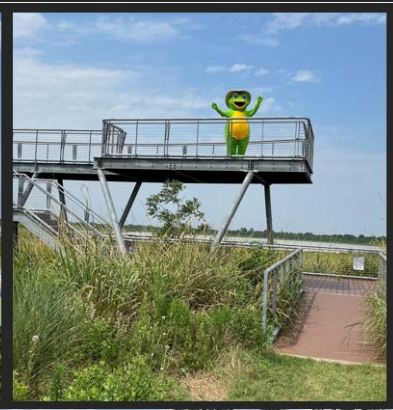Scan the QR code to download your wilderness passport!

Hoppi Tour 2023

Brazos Bend State Park

Katy Prairie Preserve

Bridgeland
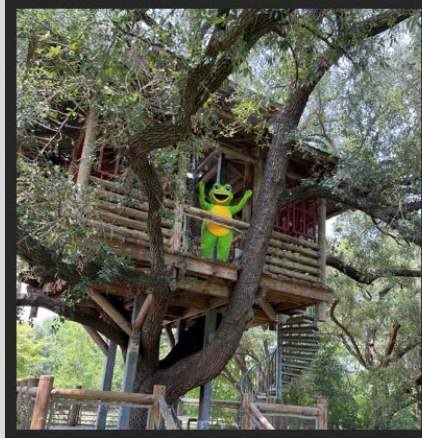
Memorial Park

Edith L Moore Nature Sanctuary

HOUSTON ARBORETUM & NATURE CENTER

HOUSTON AUDUBON

HOUSTON BOTANIC GARDEN

Lake Livingston State Park

Huntsville State Park

Galveston Island State Park

Buffalo Bend Nature Center

SKIP CHANNEL

Sam Houston RANGER STATION
SAM HOUSTON National Forest

Houston Wilderness Program Metrics 2023

TEXAS MONARCH FLYWAY METRIC TOTALS

	Acres	Patches	# of Sites	Pollinator Seeds (lbs)	Nectar (lbs)	Milkweed (lbs)	Live Plants	Live Nectar
GULF-HOUSTON MFS	290.19	7	20	35	31.5	3.95	263,572	263,188
TRI-REGIONAL MFS	216.05	32	47	154.232	196	2.477	44,405	26,165
ADDITIONAL PROJECT SITES	1.2	4	3	2.1	.1	2	20	14
TEXAS MFS	129.25	0	17	115.25	0	5.25	0	0
ALL MFS TOTALS	636.69	43	87					

HSC TREES METRIC TOTALS

Planting Year (FY)	SUM of Total Trees (AUTOMATIC)	SUM of Total CO2 Sequestered (lbs./year)	SUM of Total CO2 Stored (lbs. at 10 year DBH)	SUM of Total Water Absorption (gal./year)	SUM of Total Air Pollutant Removal w/PM2.5 (lbs./year)	SUM of Total Tree Canopy Width (ft)
2018 Fall - 2019 Spring	35	3495	14155	46955	26.6	229
2019 Fall - 2020 Spring	415	63636	301628	1128541	652.2	5374
2020 Fall - 2021 Spring	7669	1193706	5315952	20294440	9930.2	99630
2021 Fall - 2022 Spring	18006	2944003	13818653	49617672	26359.4	231283
2022 Fall - 2023 Spring	12842	2027874	9786417	36420049	19200.8	161699
2023 Fall - 2024 Spring	15412	2437000	11937463	45038558	23205.7	197841
Grand Total	**54379**	**8669714**	**41174268**	**152,546,215.00**	**79374.9**	**696056**

Houston Ship Channel TREES Program

- VOLUNTEER
- PROVIDE LAND for planting

Native SUPER TREES at work!

Scan to learn more!

Native Super Trees were planted here to promote natural carbon capture and storage.
Contact info@houstonwilderness.org

HOUSTON WILDERNESS
It's Our Nature

GREAT GREEN QUEST METRIC TOTALS

|	
UHCL	41
Founder's District talk	40
City of Houston Earth Day Event	385
Spring Tree Plantings	300
2023 Luncheon	200
Pachyderm Club	50
Brazos Bend State Park	500
Dickinson ISD	1,280
Stafford ISD	640
Spring Branch ISD	7,700
Fort Bend ISD	4,160
Aldine ISD	1,600
Katy ISD	4,480
Waller ISD	640
Magnolia ISD	1,920
Tomball ISD	1,920
Pasadena ISD	1,280
YMCA	3,200
Sam Houston National Forest	150
Lake Livingston State Park	250
Huntsville State Park	320
ConocoPhillips Bring the Future to Work Day	280
Lamar Consolidated ISD	320
Harmony School of Excellency	1,060
Magnolia Fall Fest	150
CELF	1,600
Tomball Intermediate	100
Fall Tree Plantings	200
TOTAL	**34,766**

2023 ANNUAL LUNCHEON

On Wednesday, February 22, 2023, Houston Wilderness honored the work of Carter Smith, who has spent decades working on behalf of conservation in Texas, including nearly fifteen years as the executive director of the Texas Parks and Wildlife Department.

Carter has been a HW Board and Advisory Board member for 20 years, and has strengthened private lands stewardship, expanded state parks and wildlife management areas, bolstered conservation, law enforcement, and park funding, and brought a renewed focus on connecting Texans young and old with the state's natural resources.

FISCAL YEAR 2022 - 2023

REVENUE

- 42%
- 21%
- 19%
- 12%
- 6%
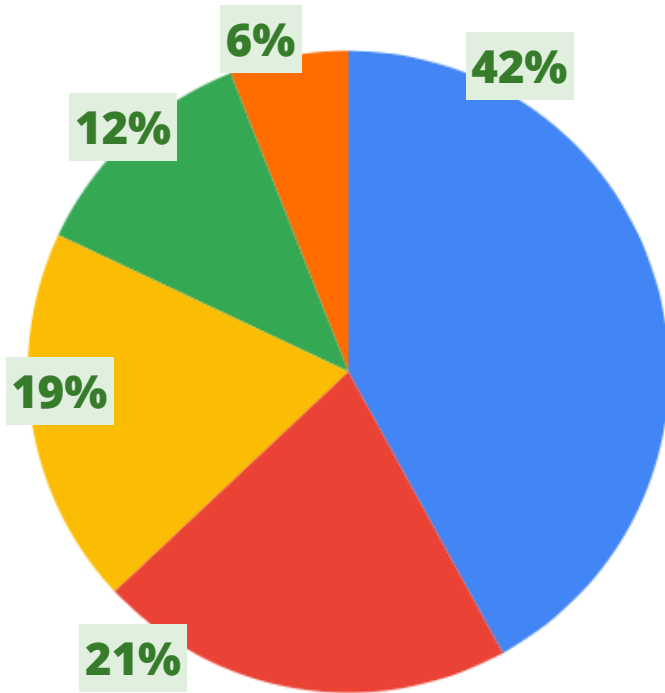
Legend:
- Corporate Contributions
- Luncheon and other Special Events, net
- Collaborative Grant Organizing
- Foundation Contributions
- Other

EXPENSES

- 26%
- 15%
- 13%
- 9%
- 8%
- 2%
- 1%

Legend:
- Houston Ship Channel TREES Program*
- Regional Conservation Plan
- Other Collaborative Grant Organizing
- Fundraising
- Management and General
- Great Green Quest
- Access and Advocacy
- Texas Monarch Flyway Strategy*
- Eco-System Services
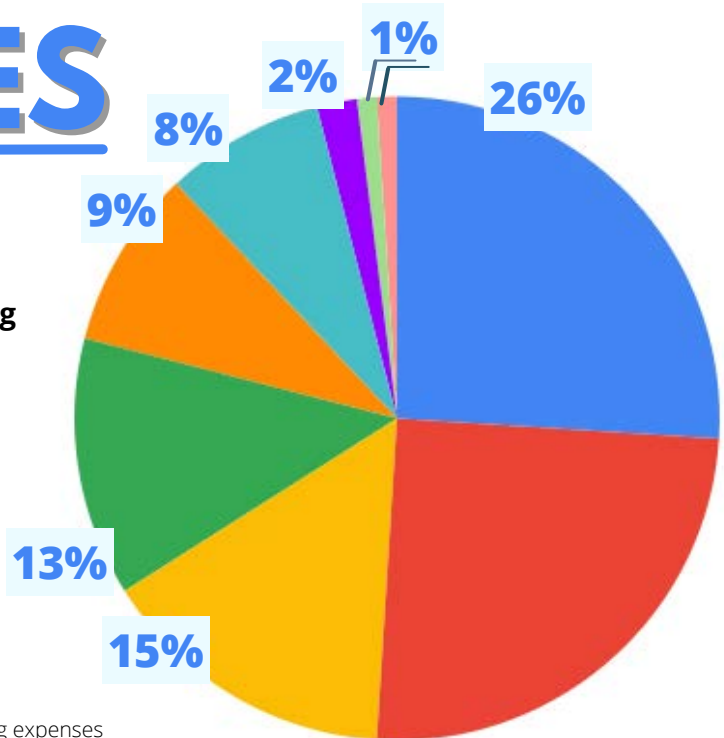
*Includes costs for Collaborative Grant Organizing expenses

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Houston Wilderness Published Resources

1

Ecosystem Services (ES) Primer, 2nd Edition

The HW ES Primer for Greater Gulf-Houston Region, A Six-Step Guide for making nature-based infrastructure decisions based on the benefits and values of multiple Ecosystem Services, and related slide presentation, discusses ways for decision-makers to determine ES benefits and values using different established study/valuation methods depending on targeted infrastructure/project goals. HW staff speak regularly at environmental conferences on the region's ecological assets and regional ES case studies.

2

Wilderness Passport

Houston Wilderness has created three specialized versions of its Wilderness Passport: a Family Passport designed for parents and children to explore the outdoors together, an Ecotourism Passport for visitors to the Houston Area and other adults, and a Careers in Conservation Wilderness Passport in both English and Spanish, which includes information on careers in environmental science and conservation.

3

Texas Monarch Flyway Strategy Step-by-Step Guide

Designed by HW for use by anyone interested in creating and maintaining pollinator habitat in Texas, the Guide provides users with an easy to follow pollinator habitat creation process and resource guide for obtaining plants and other materials, based on regional locations around the State of Texas.

4

Houston Wilderness Atlas of Biodiversity

The Houston Atlas of Biodiversity is about the 10 ecoregions of the 13+ County Greater Houston region. People enjoy the Atlas because it provides a comprehensive history and in-depth information on the various ecoregions in our region.

5

Resources for Native Super Trees and HSC TREES Program

Provides published journal articles, news articles, policy papers and Super Trees data and information for use in research, development and implementation of large-scale native tree planting projects and initiatives by communities around the world.

6

HW Policy Paper on Increasing Carbon Sequestration in the Gulf-Houston Region Through Targeted Large-Scale Planting of Native Trees and Flora Species

Part of HW's work on the 3rd key goal of the *Gulf-Houston RCP* to provide research, opportunities and information to help the 8-county region increase its organic carbon sequestration to .4% annually in organic soil content through large-scale native tree planting and use of native grasses throughout the region.

7

Regional Wildlife Assessment and Informational Fact Sheet

A compilation of the HW-facilitated collaborative of interested stakeholders who spent three years using wildlife cameras to identify and access the diverse wildlife species in the 8-County Greater Houston Region. Provides information and tools for human coexistence with the region's wildlife and their natural habitats.

HOUSTON WILDERNESS

Facilitating opportunities to preserve 10 ecoregions by convening, problem-solving and educating

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