

The Midden

Bluebonnets by Diane Humes

Galveston Bay Area Chapter - Texas Master Naturalists

April 2016

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Next Chapter Meeting

April 7th

6:30pm

Beneficial Insects

By

Dr. William Johnson
County Coordinator
County Extension Agent,
Horticulture

At Carbide Park

President's Corner by Maureen Nolan-Wilde, President 2016

While writing this column, I was just thinking back to everything we have already accomplished for the year. Amazing!

Our training class is getting ready to graduate, so thanks go out to everyone who has helped make this a success, especially the training class team and mentors.

In February, a group of us attended the Mid-Coast TXMN chapter's monthly meeting in Bay City. We were there to partner with Dr. Sue Heath and Audubon TERN to share our experiences monitoring nesting shore birds and cleaning up nesting islands. We encouraged Mid-Coast members to follow our lead and have registered some successes.



Photo by Alan Wilde

Later in the month, we were honored to attend a reception in Houston for the state board of the National Audubon Society. We were one of only two partners invited and were recognized for our work supporting various Audubon initiatives. During this meeting, attendees - including people from other TXMN chapters - told us that our efforts are known and appreciated state-wide. This reputation is built on the work we have done over the past 15 years for our community and the environment. Let's continue to build on these stewardship efforts!

Thank you for your dedicated volunteer work, and for continuing our love of food, fun and friendship. You make a difference.

Be safe! I hope to see you on the beach, bay, prairie or classroom in the coming months.

Prairie Ponderings: Little Goat Herd on the Prairie

by Diane Humes

Have you seen the goats at the Texas City Prairie Preserve? For the last couple of months Della Rose and Follow Me Joe have occupied quarters behind the potting area at Texas City Prairie Preserve. These handsome Nubian goats - she light brown and he black, with the characteristic long "Roman" noses and pendulous ears - are part of an experiment to see how useful they can be at ridding the prairie of undesirable vegetation. In their first trials, Della Rose and Follow Me Joe munched their way through baccharis, dewberry, AND deep-rooted sedge. Although they seem to prefer having dry feet, it is hoped that they can also be used in areas too wet for machinery.

The Nubian goat breed was developed in Great Britain as a cross between the native goat breed and Middle Eastern/North African stock. Primarily a dairy goat, a Nubian can withstand hot climates and is considered sociable, outgoing, and vocal. Highly intelligent, each goat knows its own likes and dislikes and, once shown the correct procedures, will walk itself, load itself and wait to be milked.

Tim O'Connell has worked with Della Rose and Joe for two months now, and can vouch for some of these goat characteristics!

Using goats to aid prairie restoration by removing woody vegetation, "woodies", may be new to TCPP, but it has been tried successfully at prairies in Iowa, Wisconsin, and Minnesota to remove Common buckthorn, Chinese bushclover, and Multiflora rose. Many prairie remnants exist only on steep slopes or rocky terrain or low, wet areas - in other words, places more accessible to goats than people and their machines.

Unlike cattle and bison, goats go for the woodies first, leaving the grasses alone. They nip off the growing tips

of invasive shrubs and get the buds before flowering, decimating those thorny species that are so difficult to remove! In an experiment in Iowa to test the outcomes of browsing by goats after cutting the vegetation versus cutting only, the cut stumps re-sprouted and the cut stumps browsed by goats did not.



Photo by Diane Humes

The trail-blazing pair of goats on the Texas City Prairie Preserve may turn out to be the secret weapon against invasive species, or at least another weapon in the arsenal. A successful outcome could put the Attwater's prairie chickens one step closer to returning home. Keep your fingers crossed for Della Rose and Follow Me Joe.

Wetland Wanderings: Urban Beavers

by Diane Humes

The Wetland Restoration Team has had its share of adventures and learned a lot about many parts of the city of Houston. But, a very unexpected lesson learned was that Houston has urban beavers! This became quite apparent during our stormwater wetland project along Brays Bayou in Mason Park.

This project was designed to create a series of ponds to direct the stormwater coming out of a neighborhood culvert through our created marshes before it entered Brays Bayou. Brays Bayou in Mason Park has never been channelized or lined with concrete, as have other

Houston bayous. This made it possible for engineers to widen the channel and dig out the soil for marshes and ponds. The plan was to construct a native wetland, using a nearby reference site as a model for the vegetation, with the objectives of creating habitat and beauty, with the benefit of cleaning the stormwater at this site, so near the Houston Ship Channel that we could feel the wave action from ships as we planted in the tidal marsh.

This was the first project of its kind in Houston and it was a great success. Water testing using Texas Stream Team methods and equipment demonstrated a

significant reduction in bacteria levels, compared to stormwater runoff from the culvert and the bayou waters upstream of the project. We know wildlife was recruited to the site; we observed herons and egrets immediately and red-eared sliders were born on-site from the early planting days. We also observed a common loon in Brays Bayou, probably resting on his way north one spring day.



Photo by Diane Humes

However, when the trees and shrubs were planted between the service road and the bayou, we soon realized a startling truth - we had beavers in the bayou! Although we never saw a single beaver, we were distressed to find that they were gnawing down our bald cypress tree saplings. The folks at the Buffalo Bayou Partnership were similarly familiar with our problem; the same had happened along Buffalo Bayou after a planting. In both cases, the trees re-sprouted and grew up as multi-trunked versions.

According to Texas Parks and Wildlife, beavers, *Castor canadensis*, in the south mostly build burrows in river banks, tunneling into the dirt and hollowing out living areas above the waterline. They may use sticks and branches plastered with mud over the burrow site as protection from predators - we know there are also alligators in Houston bayous, having also seen evidence of them.

There is more wildlife than we ever realized, even near downtown, and bayous are corridors by which they move around. We built it and they came!

Beach Patrol: A New Beach, a New Season by Steve Alexander

The new 15-block beach west of Galveston's 61st Street has survived thus far. Created in November of last year, it has lost some sand to winter waves, but much stands firm, its profile still stretching out a good ways from the seawall. And as recently witnessed on a Saturday afternoon, the beach is already populated by hundreds of beachgoers. Although they walked, ran, and lounged on the sand, no one ventured into the mid-60 degree water.

And speaking of that new stretch of beach, it may have a new name if approved by Galveston's city council- the A. R. "Babe" Schwartz Beach. Now 90 years old, the "Babe" was a local politician who served in the Texas legislature from 1954-1981. During his time in the legislature, he championed the cause of coastal protection and the public's right to access beaches in Texas. So this honor is well deserved.

With spring recently upon us, there's no doubt the warming air will warm the water. And with warmer water, fish will begin moving from their deep winter retreats into shallow waters in search of food. And with warming water, other gulf residents will join fish in the shallows.

Female Kemp's ridley sea turtles will be making their way through the surf and onto the beach to lay their eggs in the dunes. Spotting their tracks will be the objective of patrollers who will begin their rounds April 1st. And of

course, don't forget the spring-early summer deluge of *Sargassum*. We were spared last year, but don't count on that happening two years in a row.



Photo by Steve Alexander

And last, but certainly not least, people will begin to bloom along the beachfront as the warmer seasons approach, some 6 million of them according to tourism estimates. So if you have a desire to roam the shoreline of a deserted stretch of beach, your time is running out.

NICK-AMOY Team News by Maureen Nolan-Wilde

On Tuesday, February 16, the chapter's Nesting Island Cleanup by Kayak & American Oystercatcher Monitoring (NICK-AMOY) team held their second annual monitoring paddle and strategy planning meeting. Dr. Sue Heath of Gulf Coast Bird Observatory (GCBO) and Kari Howard, Audubon TERN (and GBAC-TXMN), were in attendance to discuss plans for the coming year, which include providing support for the newly-created Oystercatcher Monitoring Network.



We were advised that we are no longer regarded as volunteers but are being used as model citizen scientists whose work can be leveraged up and down the Texas coast.

Nesting season has already started, so team members will be monitoring nesting islands through July by kayak, on land and in power boats. Some of our members may also be involved in the banding of both adults and chicks.

If you would like to learn more about this work, take a look at the YouTube video that was created by the team to be used by our partners to educate and solicit volunteers along the coast.

(<https://youtube/gSUvUxUkrCY>)

This is a great way to be out in nature, get some exercise and help our beloved coastal nesting birds. If you would like to join this effort, please contact me at mnwiki@comcast.net.

Diurnal Raptors of the Galveston Bay Area by Diane Humes

On February 29, 2016, 64 eager and enthusiastic, potential and confirmed, spring hawk watchers arrived at Carbide Park to participate in our chapter's annual Advanced Training "Diurnal Raptors of the Galveston Bay Area" presented this year by Lynn and John Wright. We enjoyed excellent and delicious refreshments and studied the fine points of hawk counting and identification. The training was in preparation for the Hawk Watch, conducted every day from March 1 to April 30, led by John and Lynn. For questions or to join the hawk watching team, please contact them: John, wrightjn@rice.edu, Lynn, lynn-wright@comcast.net.

The Hawk Watch was started in 1996 by our own Dick Benoit, who, as an experienced hawk watcher from Michigan, wanted to continue counting in Texas. After extensive research, he chose Sylvan Beach and Little Cedar Bayou Park in La Porte, TX as most convenient and favorable for hawk viewing during spring migration. Checking dates, you will realize that our site already has 20 years of data; Lynn and John are logging our results with HMANA (Hawk Migration Association of North America), and you can follow us on: <http://hawkcount.org/SylvanBeach>.

Watching hawks requires a collection of skills: spotting, identifying, counting, recording, and reporting the birds seen migrating. Also, you need to figure out which birds are locals, but usually migrants are in a big hurry to go north, so it is fairly obvious. Counters need to have a

comfortable chair, sunscreen, shade, hat, binoculars, water or coffee, snacks (although it is hard to swallow while looking up!), clicker/counter, a smart phone, and data sheet. We keep track of the weather - no sitting out in a storm! Wind direction determines the location; north and north westerly winds are more favorable for Sylvan Beach; winds from south and east, the birds will fly over Little Cedar Bayou Park.

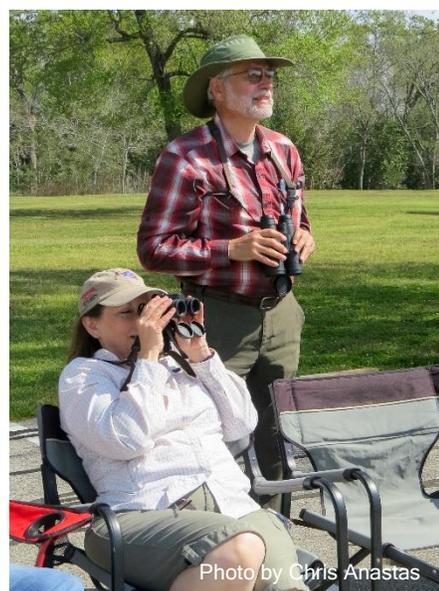


Photo by Chris Anastas

Eagles, falcons, buteos, accipiters, osprey, northern harriers, vultures, and caracaras are the diurnal raptors - those active during daylight hours. Some are year-round residents of the Galveston Bay area, but most spend "our" winters in Central and South America, returning each spring, often traveling far to the north before reaching their breeding/nesting destinations, then reversing the transcontinental migration each fall. Raptors use thermal lift to aid their flight; they won't cross large water bodies (with no thermals), so our location along Galveston Bay is ideal for seeing spring migrants traveling along the shore. Most birds journey past Veracruz, Mexico, funneled into a narrow strip between mountains and ocean. Watchers there observe a twice-yearly "river of raptors", should you ever wish to view a truly amazing migration spectacle.

Diurnal raptors are the stronger, fiercer birds at the top of the food chain, with characteristic keen vision, hooked bills for piercing flesh, and strong piercing talons for grabbing and holding prey. In the 1970's, such bird species - peregrines, eagles, osprey (and pelicans!) - were noticeably absent in North America and found to be threatened with extinction because of the accumulation of the insecticide DDT in the tissues of top predators. DDT disrupted egg shell production, making successful reproduction difficult and population numbers plummeted. Hawk counting sites were set up to monitor bird populations and the need for such data has not diminished!

Of the 34 raptor species found in North America, our area usually sees 18: Black and Turkey vultures, Bald eagles, Osprey, Red-tailed, Red-shouldered,

Swainson's, Broad-winged, Sharp-shinned, and Coopers' Hawks, American Kestrels, Merlins, Peregrine Falcons, Mississippi, White-tailed (formerly called Black-shouldered), and, our favorite, Swallow-tailed kites, Northern Harriers, and Crested Caracaras. John suggests learning them one at a time. Fortune sometimes favors those prepared for anything; last year a California condor popped up in a backyard in Los Alamos, NM!

Since raptors exhibit few colors, being mostly brown and gray, identification clues come from proportional shapes and sizes, behavior, and color patterns. Look for shorter tails and longer wings in eagles and vultures, and long tails and shorter wings in accipiters. Falcons and kites have long narrow pointed wings and long tails. On Hawk Watch the birds may be too distant to distinguish anything but shape. Falcons seldom fly together and a huge kettle will almost surely be Broad-winged hawks and/or Mississippi kites. Banding, barring, and white color patches may give the very clues necessary to ID the bird. For example, a mature bald eagle will show a bright white head and tail, but a crested caracara will flash four white points at you - head, tail, and ends of both wings.

Our Hawk Watch averages almost 20,000 hawks counted in a season. Most of these are Broad-winged hawks (~16,000) and Mississippi kites (~3,000). Counting can be slow one day and fast and furious the next. On one very good day, we stayed all day, were tired and sun-burned, but counted > 10,000 migrants. We can't guarantee it, but you will never see them until you look!

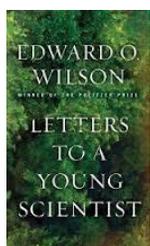
Proportions of North American Raptors

From Cornell Laboratory of Ornithology

Raptor Category	Wing Length	Wing Width	Wing Shape	Tail Length
Vultures	Long	Broad	Rounded	Short
Eagles	Long	Broad	Rounded	Short
Buteos	Moderately Long	Broad	Rounded	Short
Accipiters	Short	Broad	Rounded	Long
Falcons	Long	Narrow	Pointed	Long
Kites	Long	Narrow	Pointed	Long
Harriers	Long	Narrow	Rounded	Long

Heritage Book Study – Review of *Letters to a Young Scientist* by Madeleine K. Barnes

Starting off the new year, we read another good book by E.O. Wilson for January/February 2016. Dr. Wilson is one of the world's leading scientists, "the father of sociobiology", and an expert in myrmecology, the study of ants. He is Professor Emeritus at Harvard University in Entomology, lecturer at Duke University, and continues to do research. Dr. Wilson is a two-time winner of the Pulitzer Prize for General Non-fiction and a *New York Times* best seller for three other books. One of those best sellers, *Letters to a Young Scientist*, addresses those interested in scientific research. While Dr. Wilson focuses on student scientists, this book informs anyone interested in the pursuit of learning about nature, such as master naturalists.



Some of the memorable quotes from this book include, "*Decision and hard work based on enduring passion will never fail you.*" Be the treasure hunter. Investigate and explore nature, specifically, what interests you. How did you develop your interest in nature? Look back at how things began (where the seed was planted) and relate it to where you are now. "*Know your*

subject". Do your homework and learn more about what interests you in nature. For example, did you know that the insect brain is much more efficient, by unit volume, with more connections, added communication (like using scents to convey different messages), and fewer distribution centers, when compared to our own? Knowing this, I now have a much greater appreciation and awe of how they live and function.

On a hot topic familiar to master naturalists, Dr. Wilson writes, "*Invasive species are the second most important cause of extinctions of native species, exceeded only by the destruction of habitats through human activity.*" Another thought provoking quote is, "*If we were to*

disappear, the rest of life would flourish as a result. If on the other hand, the little invertebrates on the land were to disappear, almost everything else would die including most of humanity." This casts humans in a different perspective doesn't it? Dr. Wilson is a very good author; his books have been clear, concise, and thought-provoking, with another just released this spring.

If you would be interested in seeing and hearing E.O. Wilson talk about this book and also about his wish of building the "Encyclopedia of Life", check out the websites listed below. The Encyclopedia of Life is a free, online collaborative encyclopedia intended to document all of the 1.9 million living species known to science. http://www.ted.com/talks/e_o_wilson_advice_to_young_scientists TED is a platform for ideas worth spreading and the initials are for technology, entertainment, and design.

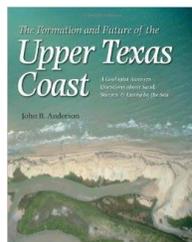
http://www.ted.com/talks/e_o_wilson_on_saving_life_on_earth

Our current reading selection is *Legends and Lore of Texas Wildflowers* by Elizabeth Silverthorne. We will meet on April 4th to discuss the second half of this book about Texas wildflowers.



Beginning May 2nd, 2016 we will be discussing the first half of the *Formation*

and Future of the Upper Texas Coast by John B. Anderson. We welcome your participation each month for two hours on the first Monday of the month starting at 10:00 a.m. at the Agrilife Extension office. Remember, we are also listed each month on the website calendar. We look forward to seeing you!



Nature Journal Workshop AT by Verva Densmore

In her book *Keeping A Nature Journal*, Claire Walker Leslie says, "my nature journals are my ongoing laboratories for learning." People have kept memories in writing since prehistoric times with marks on cave walls. Since then, we have enjoyed the memories kept in the journals of famous people throughout history: Leonardo de Vinci, Henry David Thoreau, Beatrix Potter, Lewis and Clark, to name just a few. Facing that blank page can be a challenge, but Suzanne Becker's advanced training class, held on March 7 and 14, offered creative ways to face that page. She first discussed why we might keep a journal and what we would observe, showed class



Photo by Mike Wehman

members how to make a simple journal, and then, with the talented and high quality help of Sharon Duray and Rhonda Marshall, broke the class into groups to explore some ways to embellish them.

The most important function of a journal is capturing and preserving memories. When we preserve a memory we can revisit it and enhance it. A nature journal can help us develop a deeper relationship with nature. We can reconnect with satisfying moments of our lives. Sometimes simply jotting down an observation can deepen our understanding. But a nature journal is in a class by itself. It is an opportunity to hone observation skills and to build on simple observations when we follow up an entry with research.



Photo by Mike Wehrman

First marks on the page may include date and day of the week, location, time, temperature, wind, cloud cover,

humidity, phase of the moon, and so forth. Observations can include first impressions, habitat, tides, erosion, sights, sounds, smells, movement, and color. Observe by noting what catches your eye. Focus on details. Compare and contrast. John Muir said, "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." Daunting as this sounds, it reminds us that observation is multi-faceted and can include all of our senses. There are many ways to document observations, and keeping a journal doesn't always require eloquence. Some of the ways Suzanne suggested were lists, bullet points, narrative, counts and tallies, questions, sketches, drawings, charts, photos, rubbings, prints, wishes, dreams, reflections and more. Write what you want. It's your journal. Take it home and flesh it out with drawings or color or new information if you want. Suzanne showed the class various ways to use rubbings, color pencils, paints and crayons to enrich a journal. Rhonda demonstrated simple techniques for drawing birds and class members were delighted with their almost instant success. Sharon showed how to build a plant press and several ways to include pressed plants into the journal. The bottom line is that it should be fun and personal.

I want to say thank you to Suzanne Becker for a wonderful class and another big thank you to Sharon Duray and Rhonda Marshall for sharing their talent and for their instruction for portions of the class. Also, thank you to Chuck Snyder for technical support, Mike Wehrman for photography, Beth Cooper for helping in so many ways, and to everyone who brought snacks.

Prairie Team: "Stars of the Park" by Carolyn Miles

The Prairie and Wetland Teams were honored by the Sheldon Lake State Park staff as "Stars of the Park"!! In the February 2016 issue of *The Midden*, we printed a photo of the award winning Wetland Team, but didn't have one of the Prairie Team.

Congratulations again to both teams!



Photo by Hannah Buschert

Guppies from Julie

Currently, Julie is on Family Leave. Dolphin Challenge was held February 27 which is very important to Julie. Below are Julie's comments regarding the 2015 Dolphin Challenge, which we feel she would want to repeat this year. (The number of teams increased to sixteen this year. Now, imagine Julie's excitement!)

Thank You from Dolphin Challenge!

Twelve teams from across Texas and Arkansas rolled into Galveston for Dolphin Challenge in late February! These high school students had been preparing for the ocean sciences quiz bowl for months and the time had arrived!

Dolphin Challenge is the regional competition for National Ocean Sciences Bowl (NOSB). The competition is intended to increase knowledge of the oceans on the part of high school students, their teachers and parents, and to raise the visibility and public understanding of the national investment in ocean-related research. It is managed by the [Consortium for Ocean Leadership](#), a nonprofit organization representing 94 of the leading public and private ocean research and education institutions, aquaria and industry with the mission to advance research, education and sound ocean policy.

On the day of the competition, Master Naturalists and Texas A&M Galveston (TAMUG) students were ready to volunteer. The high school competitors were ready - many wearing team t-shirts and my favorite - geeky glasses held together with tape in the middle! The students with buzzers in hand were nervous as were the volunteers. After a practice round, everyone settled in for a long, brain teaser of a day! Finally, Dolphin Challenge was off and running!

Texas Master Naturalists and TAMUG Sea Aggies served as officials during the competition. They were moderators, science judges, rules judges, score keepers, time keepers and runners. Four of the Sea Aggie volunteers for the day were former NOSB participants in high school - now studying ocean sciences at Texas A&M at Galveston.

The Galveston Bay Area Chapter sponsored snacks and goodies for the students. Thank you!

Thank you, Texas Master Naturalists, for making Dolphin Challenge a great success and so memorable for the students! Dolphin Challenge could not have happened without you!

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The Midden

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Comments? Suggestions? Want to join the team? Contact: Diane Humes at treimanhumes@earthlink.net.

Midden Editorial Team

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Chuck Snyder	Photo Editor
Madeleine K. Barnes	Proofreading Editor

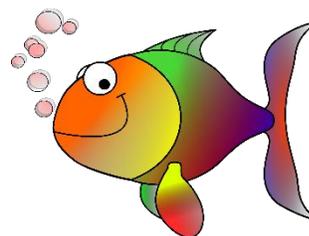
The Midden Deadline for the next issue

May 1st

If you have Advanced Training or Volunteer Opportunities, please submit information to Cindy Howard, howardc@uhcl.edu



Educational programs of the Texas A&M AgriLife Extension Service are open to all people without regard to race, color, sex, religion, national origin, age, disability, genetic information, or veteran status.. The Texas A&M University System, U.S. Department of Agriculture, and the County Commissioners Court of Texas cooperating.



April and May Activities

ADVANCED TRAINING OPPORTUNITIES

Chapter Meeting - April 7th; Beneficial Insects
Dr. William Johnson
6:30 Social, 7:00 Meeting, 7:30 Speaker
AgriLife Extension Office; 1 AT hours

Early People of Texas - April 26th
1-4pm; 3 hours AT; Limit 40
Location: Extension Office
Presenters - Mike Wehrman & TJ Fox
Register with Emmeline Dodd txdodd@aol.com

Ongoing

Galveston Island State Park
10 am at the Welcome Center
Every Saturday- Beach Explorations
Every Sunday- Bay Explorations
Tours 1 to 1 ½ hours long. Bring water and family.

Heritage Book Study Group
First Monday of every month. AgriLife Extension Office
10am-Noon; 2 hours AT
Contact: Elsie Smith (409)945-4731
April - *Legends & Lore of Texas Wildflowers* by Elizabeth Silverthorne
May - *Formation and Future of the Upper Texas Coast* by John B. Anderson

STEWARDSHIP OPPORTUNITIES

Ongoing Activities:

Mondays - Galveston Island State Park, Contact: Chatt Smith chattsmith@gmail.com

Tuesdays -

- Sheldon Lakes State Park, Contact: Tom Solomon crandr@sbcglobal.net
- Texas City Prairie Preserve, Contact: Jim Duron wishkad@yahoo.com
- Environmental Institute of Houston at UHCL, Contact: Wendy Reistle reistle@uhcl.edu

Wednesdays - Wetland Restoration Team, Contact: Marissa Sipocz m-sipocz@tamu.edu

Thursdays -

- Stormwater Wetland Team, 9 - Noon. Contact: Mary Carol Edwards mary.edwards@agnet.tamu.edu
- San Jacinto State Park, Contact: Jim Duron wishkad@yahoo.com

Fridays - Prairie Friday, ABNC, 8:30 - 11:30am, Contact: Chatt Smith chattsmith@gmail.com

EDUCATION - OUTREACH VOLUNTEER OPPORTUNITIES

Bay & Island Adventures - Volunteers teach six in-class hands-on modules on a once a month basis in Dickinson and Galveston Schools. Presenters and helpers are needed for eleven 4th and 5th grade classes. Contact: Sara Snell snellsw@verizon.net.

Education and Outreach Committee - Lots of work to do and we can use your help developing a speakers bureau; responding to requests for exhibit booths, fieldtrip guides and presenters, planning Camp Wild and Treasures of the Bay; and developing a library of education-outreach materials. Contact Sara Snell snellsw@verizon.net

Partner and Associate Programs - Many organizations sponsor guided walks and education programs or need volunteers to man their nature center. Go to <http://txmn.org/gbmn/partners/> for the list, then click on the link to the organization's website.

BOARD AND COMMITTEE MEETINGS

(At Extension Office monthly unless specified)

Board Meetings - First Tuesday; 2-4p.m.

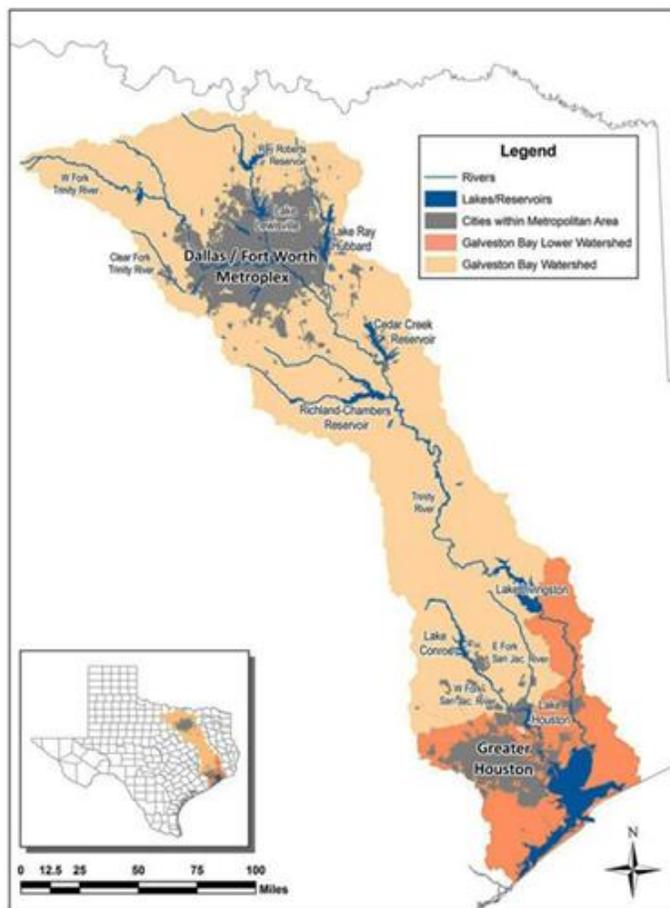
Committee Meetings

Communication - May 2nd; 9-Noon
Advanced Training - Third Monday, 10-Noon
Education/Outreach - Third Wednesday, 10 to 11:30a.m.
Stewardship - Meets quarterly.



State of the Bay 2016: “Dallas Has a Bay” by Diane Hume

The State of the Bay Conference convened January 13 and 14, 2016 at Moody Gardens Convention Center in Galveston to review the Galveston Bay Plan. The Galveston Bay Watershed stretches from our shores all the way up to Dallas and some say, "Dallas has a bay!" Stakeholders who live, work, and play within the watershed, came together to learn about the issues, successes, and future needs of Galveston Bay.



Managed by the Galveston Bay Estuary Program (GBEP), as envisioned 20 years ago, the Galveston Bay Plan is the blueprint for the health of Galveston Bay, and, as such, also informs our chapter's mission. You will be pleased to learn that the Plan has been funded for another 20 years! The State of the Bay is held every five years to review progress of the Plan and its future.

Great progress has occurred in twenty years, although some issues remain. By 2015, 270,131 acres of coastal marshes have been restored with 26,777 lineal feet of shoreline; over 12,000 acres of estuarine marshes and seagrasses have been restored; only freshwater wetlands are still declining. Keynote speakers highlighted the successful stormwater wetland project at Mason Park, the Ghirardi WaterSmart Park, and the prairie and wetland restorations at Sheldon Lake State Park. They

stressed the importance of research on techniques for maximizing wetland functions and resolving questions of connectivity in coastal prairie wetlands and water quality. Future research topics included freshwater inflows and zooplankton food webs.

Half the human population of the state of Texas lives in the Galveston Bay Watershed, as shown in the map from galvbay.org. Their numbers are expected to increase greatly by 2060; more people will surely affect water quality and quantity. With the expansion of the Panama Canal to accommodate more and bigger ships, we expect to have up to 20,000 more ships per year and will need to widen and deepen the Houston Ship Channel. Transfer of ballast water and the organisms it carries will be an issue; apparently new treatments are being studied.

The Houston/Galveston area has 600 - 700 local wastewater treatment plants and thousands of individual septic systems, certainly contributing factors to the bacteria contaminating half of our bayou stream miles. Bacterial levels are decreasing, but, pharmaceuticals, which our treatment plants were not designed to treat, are increasing. Drugs - diphenhydramine and diltiazem - have been found in fish blood plasma at higher than therapeutic levels - merely a small sample of the thousands of medicines entering the water.

Mercury and other heavy metals, organic chemical compounds - PCB's, dioxin, PAH's - are pollutants that move up the food chain and must be dealt with. Superfund sites have left a legacy of chemical soup on the waters. We have more than 100 invasive species, feral hogs wreaking havoc, colonial waterbirds in decline, oyster reefs needing help, and harmful algal blooms. On the positive side, zebra mussels, which cause so much trouble up north, will probably dislike our warm waters and not become established here.

Clearly, much work remains to be done, but many, many people are dedicated to preserving and improving Galveston Bay for all species. We all owe a big THANK YOU to those who spend their whole lives thinking about these problems and coming up with solutions, such as all the folks who attended the State of the Bay from the following organizations: GBAC-TMN, USEPA, TCEQ, GBF, H-GAC, Artist Boat, HARC, Houston Wilderness, RAE, TNC, Galveston Parks Board, USFWS, Houston Parks Board, UT-Arlington, TAMUG, Wildflower Center, TX A&M AgriLife Extension, City of Pasadena, City of Galveston, GBEP, TWDB, Trundle Engineering & Science, USGS, HCFCD, UHCL, EIH, Shead Conservation, TCWP, HAS, GCBO, TEXAS SEA GRANT, ABC, University of Mississippi, Lee College, ABNC, TXDOT, Baylor University, GLO, Coastal Bend Bays & Estuaries Program, TAMU, Baylor University, Jacobs Technology, and NASA JSC.