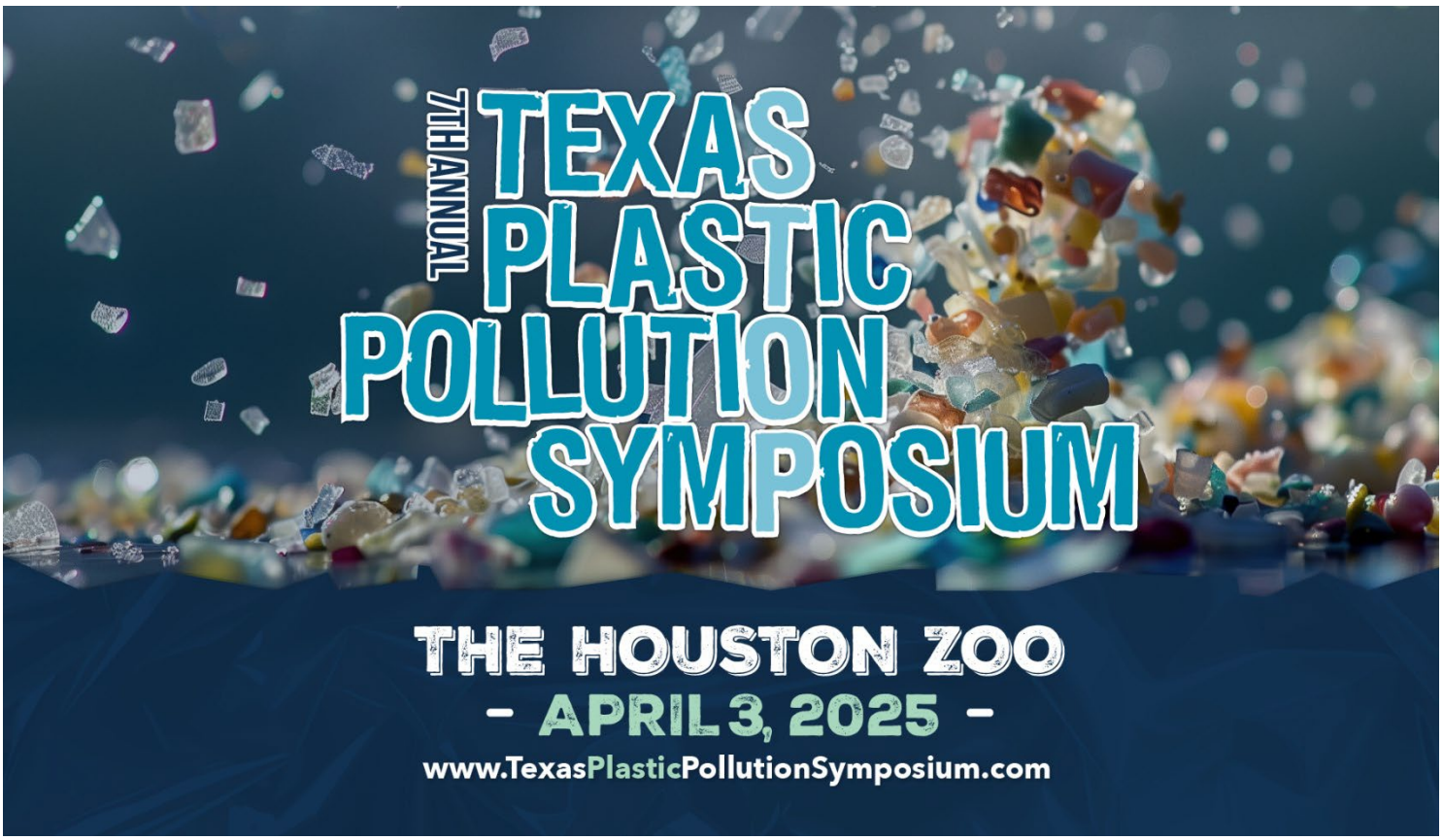

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COASTAL BEND BAYS & ESTUARIES PROGRAM

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SURFRIDER FOUNDATION
TEXAS COASTAL BEND

GALVESTON BAY FOUNDATION

American Bird Conservancy

Welcome!

The Texas Plastic Pollution Symposium planning committee is proud to host the 7th Annual Texas Plastic Pollution Symposium. We have a great program of talks and posters this year from presenters all around the state of Texas. Thanks to funding from the Nurdle Patrol through a grant from the Matagorda Bay Mitigation Trust, we are able to provide this symposium at no cost for attendees, covering registration, venue, food, and swag.

For a fourth year, we are excited to be able to offer the symposium in a hybrid format, with both in-person and virtual options. For those attending in person, meals will be catered by Houston Zoo and Jason's Deli and include snacks, beverages, and lunch. Our keynote panel discussion with staff from the Houston Zoo will provide insight into how they went single-use plastic free. We are also excited to welcome Jay and Chrissie Kleberg as our opening speakers this year.

Student presenters are an important aspect of this symposium. This year, we are pleased to honor best student awards for both oral and poster presentations, acknowledging excellence in student research. The best student oral and poster presentation awards are generously sponsored by the Coastal Bend Bays & Estuaries Program.

Once again, thank you for participating and we hope you enjoy the meeting.

Texas Plastic Pollution Symposium Planning Committee

Jace Tunnell, Harte Research Institute; Texas A&M University-Corpus Christi

Matthew Abernathy, Lisa Marshall, and Zoe Gapayao, Galveston Bay Estuary Program

Tracy Weatherall, Katie Swanson, Shelby Marincasiu, Joan Garland, and Victoria Cogdon, Mission-Aransas National Estuarine Research Reserve/University of Texas Marine Science Institute

Amanda Hackney, Black Cat GIS and Biological, LLC.

Stennie Meadours, Texas Master Naturalists – Galveston Bay Area Chapter

Quinn Hendrick, Coastal Bend Bays and Estuaries Program

Neil McQueen, Surfrider Foundation – Coastal Bend Chapter

Jenny Oakley, Houston-Galveston Area Council

Joanie Steinhaus and Maggie Sager, Turtle Island Restoration Network

Anna Deichmann and Chloe Dannenfelser, American Bird Conservancy

Natasha Zarnstorff, Galveston Bay Foundation

A special thank you goes to all the volunteers and moderators.

Follow the meeting on social media with #TxPPS2025

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Thank you to our sponsors for helping to support the 2025 Texas Plastic Pollution Symposium.

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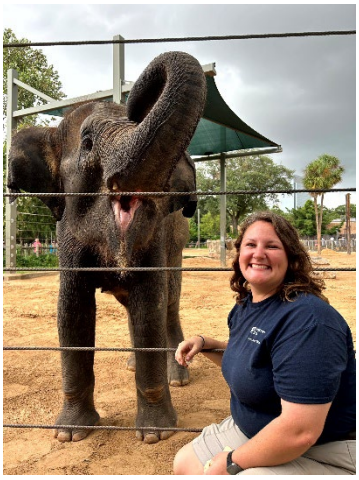
Keynote Panel Biographies

A Panel Discussion: The Houston Zoo's Journey to go Single-Use Plastic Free

Colley Hodges; AIA, LEED AP, WELL AP, SITES AP; Sustainability Manager, Houston Zoo

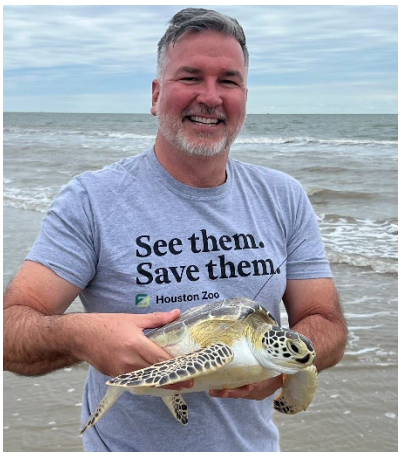
Adrian Cavazos; LEED Green Associate; Assistant Vice President, Business Operations, Houston Zoo



Kristin Windle; Elephant Supervisor, Houston Zoo

Mark Kathman; Regional Vice President, SSA Group

Keynote Panel Moderator

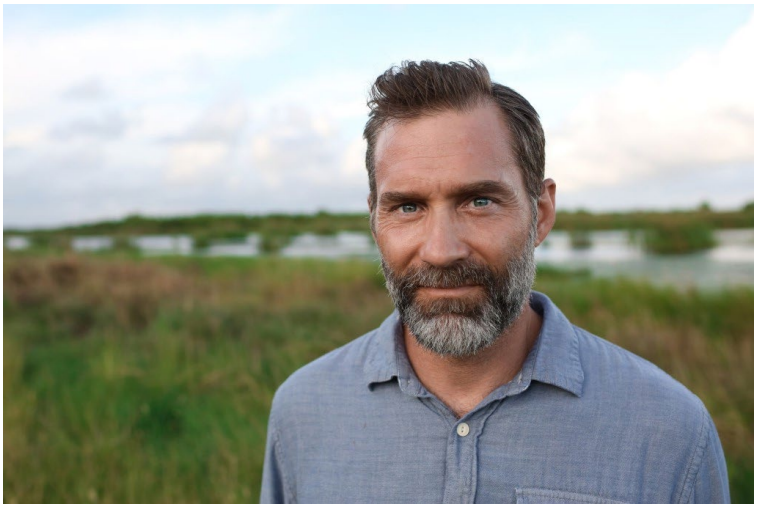


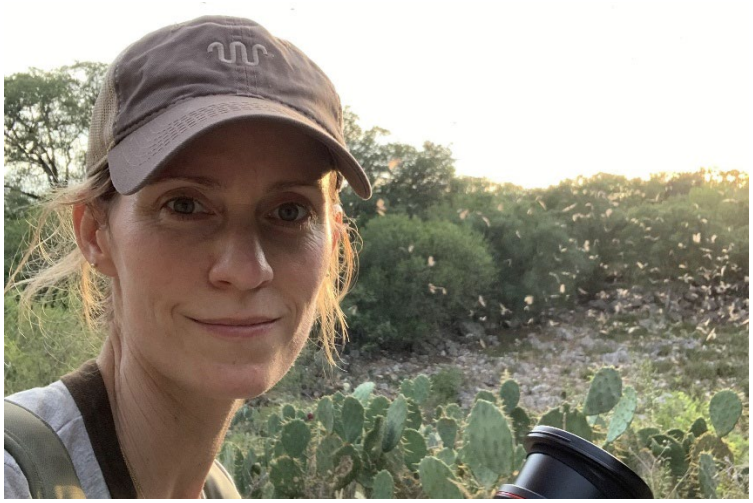
Ben Jones; Vice President of Conservation and Education Houston Zoo

Welcome Speakers Biographies

Chasing the Tide

Conservationists Chrissy and Jay Kleberg hiked Texas' 370 miles of barrier islands over 21 days in October 2023. They embarked on this journey to learn more about the rate of change occurring on the coast, hear from residents and experts about its rich diversity of wildlife, habitats, and history, and understand what the future holds. They captured the adventure on film and produced a six-part series for PBS called *Chasing the Tide*, which is currently on television stations across the nation and streaming. In addition to the series, they published a natural history and adventure book that details the journey, production process, and beauty of the Texas Gulf Coast. They have also partnered with the Gulf Trust, H-E-B, Texas Parks and Wildlife Foundation, Keep Texas Beautiful, Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi, and 40 cleanup partners to conduct a statewide trash and marine debris cleanup called Trash Free Gulf in May 2025.





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Learn more about our Distinguished Speakers on the Texas Plastic Pollution Symposium website.

Symposium Schedule
April 3, 2025

8:00 a.m.	**In-Person Registration Check-in** Gate 8, Brown Education Center, Houston Zoo **Virtual Log-In,** Teams link provided in email
8:30 a.m..	**Chasing the Tide** **Chrissy & Jay Kleberg,** Gulf Trust
9:00 a.m.	**Nurdle Count – A Machine Learning Approach to Nurdle Classification and Quantification** Seneca Holland*, Son Nguyen, Khoi Nguyen
9:15 a.m.	**Leveraging Data to Tackle the Litter Problem and Expand Collaboration in Texas** Kirsten Sorensen*
9:30 a.m.	**Utilizing The Texas Litter Database and Citizen Science to Estimate Marine Debris in the Lower Galveston Bay Watershed** Amanda Hackney*, Jess Lucas, Dr. David Retchless
9:45 a.m.	**Detection of Microplastics in Texas Beach Invertebrates and Sediment** Maureen Hayden*§
10:00 a.m.	**Airborne Microplastic Presence in *Tillandsia usneoides*** Ethan Adams*§, Hallie Blondiau*, Madison Maier*, Ava Thibodeaux*
10:15 a.m.	**BREAK**
10:30 a.m.	**Microplastics as a Disturbance to Food Web Dynamics in Texas Gulf Coastal Bays** Elizabeth Everett*§, Dr. Frauke Seemann, Dr. John Majoris, Dr. Adam Mitchell
10:45 a.m.	**Threads of Change: Zooplankton Community Shifts in Response to Fiber Disturbances** Caitlyn Lankford*§, Heaven Thomas, Addison Lehew, Ashton Fisher, and Dr. Mary Kay Johnston
11:00 a.m.	**Evaluation of Microplastic Loading in Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) and their Associated Habitats** Gabrielle Hammerbach*§, Mandi Gordon, Danielle DeChellis, Lydia Thurman, Cynthia Howard

* Indicates presenter
§ Indicates student presentation

11:15 a.m.	**KEYNOTE PANEL DISCUSSION** **The Houston Zoo's Journey to go Single-Use Plastic Free**
12:00 p.m.	**LUNCH**
12:45 p.m.	**POSTER SESSION** **Located in the Education Center Classrooms**
1:45 p.m.	**The Plastic Pollution Treaty: How Close Are We to a Global Solution?** Jillian Shiba*
2:00 p.m.	**Searching for Solutions to Plastic Pollution** Neil McQueen*
2:15 p.m.	**Policy Panel** Joanie Steinhaus*, Luke Metzger*, Jace Tunnell*, Neil McQueen*, Sarah Burgess (moderator)
2:45 p.m.	**BREAK**

Please note that there will be concurrent presentations in the Auditorium and Classroom beginning at 3:00 p.m. If you are viewing presentations on Microsoft Teams, the Classroom presentations will be available through the Rooms menu option at the top of the Microsoft Teams screen. Please return to the Auditorium at 4:15 p.m. for our final presentation of the symposium, followed by the student awards.

Concurrent Presentations – Houston Zoo Auditorium

3:00 p.m.	**Bioprospecting PET-Degrading Enzymes From the Deep Sea** Daryl R. Barth*§, Daniel J. Acosta, Julie Bondy, Kathryn E. Appler, Valerie De Anda, Phuoc H. T. Ngo, Hal S. Alper, Brett J. Baker, Edward M. Marcotte, Andrew D. Ellington
3:15 p.m.	**Unveiling the Hidden Threat: Toxic Effects of Photodegraded Plastic Nurdles on The Early Development of Marine Medaka (*Oryzias melastigma*)** Alissa Richbourg*§, Zhanfei Liu, Wei Xu, Frauke Seemann
3:30 p.m.	**Microplastics in Galveston Island Marine Ecosystems: Comparative Analysis of Texas College/University Students' Environmental Perceptions** Maeryn Rut§*
3:45 p.m.	**Beach Heroes: Youth, Art & Marine Stewardship** Brandi Keller*
4:00 p.m.	**Bioprospecting for Plastic Pollution Solutions** Kasia Dinkeloo*

Concurrent Presentations – Houston Zoo Classroom

3:00 p.m.	**We Know There is a Problem, Now What do I Do?** Maggie Sager* and Joanie Steinhaus*
3:15 p.m.	**Bay R.A.T.s Tackle Traps & Trash** Allan Berger* and Brigid Berger*
3:30 p.m.	**The Monofilament Recovery & Recycling Program: Protecting the Texas Coast for 20 Years** John P. O'Connell*, Alexis M. Sabine
3:45 p.m.	**Texas Abandoned Crab Trap Removal Program: Supporting Volunteer Efforts and Trap Detection** Holly Grand*, Evan Pettis, Alicia Walker
4:00 p.m.	**Community Engagement Through Art and Beautification** C. Todd Cleveland*, CTA

* Indicates presenter
§ Indicates student presentation

Symposium Wrap-up

4:15 p.m.	**All attendees return to the auditorium.**
4:15 p.m.	**Buildings Hidden Plastic Problem: Solutions to Reduce Plastic Pollution from Building and Construction** Ryan Johnson*, Teresa McGrath, Rebecca Stamm, Cassidy Clarity, Veena Singla
4:30 p.m.	**Student Awards Presentation** Quinn Hendrick, Coastal Bend Bays & Estuaries Program
4:45 p.m.	**Closing Remarks** Jace Tunnell, Texas A&M University-Corpus Christi
5:00 p.m.	**Symposium Ends**

Poster Titles & Presenters

The primary poster session for this symposium is scheduled from 12:45 – 1:45 p.m. on Thursday, April 3, 2025, in the education classrooms within the Brown Education Center at the Houston Zoo. The poster authors will be present during this time to answer questions and discuss their projects.

For those attending the meeting virtually: You will receive an email following the meeting containing PDF copies of the posters that were provided by the authors. Check them out, and feel free to reach out to the authors with any questions or comments you may have.

Aerial Invasion: Atmospheric Deposition of Microplastics in Mosquito Lagoon, Florida

Madison Serrate*, Tanilesse Gonzalez, Stephanie Fletcher, Paul Sacks, Joshua Fnu, Sara Kim, Lei Zhai, Abby Frey, Julia Kruger, Tara Blanchard, Emily Hays, Linda Walters

Analysis of Microplastic Concentrations in Dried Algae Mats and Sediment Collected from Detention Basins in the Edwards Aquifer Recharge Zone

Paulina Quinonez*§, Andre Felton, Jeffery Hutchinson

Digestion of Polyethylene Terephthalate Fibers by *Zophobas morio* Larvae

Isabel Li*§, Dr. Kasia J. Dinkeloo

Dynamics of Marine Litter Post-Hurricane Beryl: Assessing the Ultimate Fate of Flotsam

William Bailey*§, David Mohrig, Cornel Olariu, Kutalmis Saylam

Effects of PET Microfiber Exposure on Mating Behavior, Foraging Behavior, and Problem Solving in *Gambusia affinis*

Adrienne Lihou*§, Rivers Hartzell*, and Jing Graber*

Examining the Plastic Degrading Potential of Marine Fungi Found on the Texas Coast

Jaden Acevedo*§, Kristen Garsaud*, Dr. Kasia Dinkeloo

Fluorescent Detection of Nile Red-stained Microplastic Uptake in the Roots of *Arabidopsis thaliana*

Kailyn Nonhof*§, Jing Graber, Kasia Dinkeloo

Influence of Microplastics on Sediment Transport Dynamics

Marufa A. Upoma, Min Y. Pack*

Making Space for Migratory Birds: An Urban Conservation Program Highlight

Kiara Carrasco*§, Chloe Dannenfelser, Liz Virgl, Nancy Brown

* Indicates presenter
§ Indicates student presentation

Microbial Marvels: Investigating Dubia Roach Microbiota in Relation to Polyethylene Biodegradation

Roland Quinones*§, Kasia Dinkeloo

Non-Plastic Solutions for Oyster Reef Restoration: Efficacy and Environmental Impacts of Novel Restoration Materials

Cara Womacks*§, Madison Serrate, Otis Woolfolk, Fnu Joshua, Lei Zhai, Paul Sacks, and Linda Walters.

Plastic-Free Restored Habitats: Reducing Plastic Pollution in Community-Based Restoration of Oyster Reefs

Dr. Jennifer Beseres Pollack, Dr. Linda Walters, Dr. Lisa Chambers, Jace Tunnell, Dr. Zhanfei Liu, Dr. Terry Palmer, Natasha Breaux, Erin Hill, Mckenna Reinsch*

Plastivors: Investigating Plastic-Eating Microbes

Kayla Perez*§, Andrea Enriquez*, Kasia Dinkeloo

The Nurdleome: Identification and Characterization of Microbes Found On Gulf Coast Nurdles

Vibha Annaswamy*§, Kasia Dinkeloo

* Indicates presenter
§ Indicates student presentation

Abstracts for Oral Presentations

Nurdle Count – A Machine Learning Approach to Nurdle Classification and Quantification
Seneca Holland*, Geospatial Research Scientist & Instructor of Geospatial Science, Conrad Blucher Institute for Surveying and Science, Texas A&M University-Corpus Christi; Son Nguyen, Assistant Director of CBI Analytics & Technology Solutions, Conrad Blucher Institute for Surveying and Science, Texas A&M University-Corpus Christi

The Nurdle Count project addresses the critical environmental research priority of microplastic pollution by leveraging machine learning (ML) and artificial intelligence (AI) to classify and quantify nurdles—small plastic pellets that pose significant ecological and health risks. Nurdles absorb toxins, harm marine life through ingestion, and may impact human health via the food chain. The project's objectives include nurdle image collection, annotation, model experimentation, and integration with the Nurdle Patrol Website and Mobile Applications.

By automating the time-consuming process of counting nurdles, this project enhances data quality and consistency for citizen scientists and researchers, providing a robust foundation for studying microplastic pollution. The application of AI offers an efficient, scalable solution to track nurdle distribution and density, facilitating targeted mitigation efforts. Additionally, the project seeks to raise public awareness, support environmental research, and influence regulatory and policy changes to address the broader impacts of microplastics on ecosystems and human health. This innovative approach aligns technology with environmental stewardship, paving the way for actionable insights into plastic pollution.

Leveraging Data to Tackle the Litter Problem and Expand Collaboration in Texas
Kirsten Sorensen*

In 2024, the Texas Litter Database relaunched on a GIS platform to enhance the tracking and reporting of litter across the state. It is available for use anywhere from the individual volunteer to formal research institutions, and the data collected is open source and can be leveraged by anyone at any time. Its improved ease of use has significantly increased rates of data collection, leading to the building of a data set that can provide valuable insights for researchers, policymakers, local government, and community organizations.

In this presentation we'll talk about key successes from the database, including how that data has been utilized to inform local cleanup efforts, impact community engagement strategies, and drive decision-making. Keep Texas Beautiful aims to continue to expand this initiative to reach broader audiences and scale the database's use. Strengthened collaboration between community members, environmental organizations, and research institutions can then help to amplify the impact of individual litter cleanups by analyzing that data and taking what we learn to make informed decisions on a larger scale.

Additionally, we seek to build partnerships with research institutions to explore innovative applications of this data. From identifying pollution trends to informing mitigation strategies, there are numerous ways in which this resource can contribute to scientific research and policy development. By fostering these connections, we aim to ensure that this growing dataset serves as a valuable tool for both community-driven action and broader environmental solutions.

Utilizing The Texas Litter Database and Citizen Science to Estimate Marine Debris in the Lower Galveston Bay Watershed

Amanda Hackney*, Department of Marine and Coastal Environmental Science, Texas A&M University at Galveston, Galveston, TX; Jess Lucas, Black Cat GIS and Biological LLC, Dripping Springs, TX; Dr. David Retchless, Department of Marine and Coastal Environmental Science, Texas A&M University at Galveston, Galveston, TX

Houston area waterways are unfortunately also known as conduits for litter and marine debris, sending trash straight to Galveston Bay. Using data collected using the STOP method (Study-Track-remOve-Prevent), we mapped highly detailed transect surveys to examine the relationship between litter hotspots, landscape, and demographic features. Data covering the Lower Galveston Bay watershed was downloaded from the Texas Litter Database for the years 2020-2023. A previous analysis used points to represent survey sites, this redesigned data utilized polygons showing the true area dimensions. We tallied totals of each major material category (hard plastic, plastic film, Styrofoam, etc.) and total trash items, per site per survey then standardized for a 500 sq m area. Each survey polygon was assigned a 1000 ft buffer and landscape level variables like land cover, elevation derived products like aspect/ slope, as well as population data from census blocks, were calculated in this area. Each survey point was also assigned values representing distance factors to anthropogenic features like wastewater outfall and roadways. Using ArcPro (v 3.1.1) we ran exploratory regression models to identify the percent significance of each variable. These significant variables were then entered into Stata to run a Poisson test determining z-values and overall impact on total trash item counts. Significant variables were later used in a MaxEnt model to estimate litter coverage in the bay. By understanding the landscape and demographic factors driving trash accumulation in waterways, we can begin to address these problems with targeted education, trash capturing devices, and legislation.

Detection of Microplastics in Texas Beach Invertebrates and Sediment

Maureen Hayden*§

Anthropogenic debris, plastics in particular, are becoming an increasing problem in both marine and terrestrial realms. Ocean currents and wind deposit large amounts of plastic onto Texas beaches but to date, few studies have addressed the distribution and environmental impacts of plastics on Texas beaches and coastal waters. The aim of this study was to determine whether beach invertebrates ingest microplastics and if there is a relationship between available plastics in beach sediment and ingestion of plastics in invertebrates. Microplastic particles were found in both sediment core samples and invertebrate tissue samples from multiple taxa at all three sample sites for all sample seasons. Significantly more plastic particles were found in sediment samples compared to invertebrate tissue samples. A linear regression found a weak positive relationship between the number of plastic particles in the sediment and the abundance of invertebrates. The global presence of plastic debris in the marine environment poses a risk to marine life either through ingestion or through exposure to Persistent Organic Pollutants (POPs). The full impact of plastics on the marine environment remains unclear, however its threat to the marine environment and life continues to grow. Reducing deposition of plastics in the marine environment is essential, and continual monitoring of microplastics and determination of their effects on biota is needed to understand its impacts on marine life and coastal habitats.

Airborne Microplastic Presence in *Tillandsia usneoides*

Ethan Adams*§, Hallie Blondiau*, Madison Maier*, Ava Thibodeaux*

Tillandsia usneoides is an epiphytic plant found in subtropical regions that have been explored as bioindicators. Microplastics are a current topic of interest due to their proximity to important ecosystems and manifestation in the human body. Namely, oceanic microplastics are highly studied while atmospheric nanoplastics are neglected. The aim of this study is to determine the presence of atmospheric microplastics in Tillandsia usneoides in order to pioneer a methodology of studying airborne plastics and to further understand effects on air quality, human health, and ecosystems.

Microplastics as a Disturbance to Food Web Dynamics in Texas Gulf Coastal Bays
Elizabeth Everett*§, Dr. Frauke Seemann, Dr. John Majoris, Dr. Adam Mitchell

Microplastic (MP) bioaccumulation and biomagnification in marine food webs remain poorly understood, particularly regarding trophic transfer from primary to secondary consumers. While MP trophic transfer has been studied in fish, crustaceans, and gelatinous zooplankton, most research relies on short-term laboratory experiments or field studies that lack longitudinal data. Additionally, many studies use artificially high MP concentrations that may not reflect environmental exposure. To address these gaps, this study integrates seasonal field sampling and controlled laboratory experiments using environmentally relevant MPs and concentrations to examine MP trophic transfer between the calanoid copepod Acartia tonsa and the scyphozoan jellyfish Stomolophus meleagris.

Field samples were collected seasonally from seven bays across the Matagorda Bay region to assess spatial and temporal variability in MP concentrations. Lavaca Bay and East Matagorda Bay exhibited the highest MP levels, particularly in June and October, while Keller, Carancahua, and Tres Palacios Bays had lower and more stable MP concentrations. Copepod ingestion patterns mirrored these trends, with adult A. tonsa displaying higher MP body burdens than nauplii, and peak MP ingestion occurring in East and West Matagorda Bays during October.

Laboratory experiments confirmed MP trophic transfer from copepod to jellyfish, with body burdens increasing over time in both species. Additionally, sustained MP exposure at the highest concentration reduced copepod survival. These findings highlight the ecological risks of MP contamination, emphasizing the need for long-term monitoring and mitigation strategies to protect estuarine ecosystems and the species that depend on them.

Threads of Change: Zooplankton Community Shifts in Response to Fiber Disturbances
Caitlyn Lankford*§, Heaven Thomas, Addison Lehew, Ashton Fisher, and Dr. Mary Kay Johnston; Concordia University Texas

Microfibers are small particles of synthetic or natural origin that are frequently released from textile products during activities such as washing, wearing, or manufacturing. Unlike most natural microfibers which are generally biodegradable, synthetic microfibers are often based in plastic materials like polyester (PE) or nylon which are not easily degraded by natural processes. This presents many potential risks toward aquatic microorganisms that might ingest or become entangled in these particles. Currently, most research suggests that microorganisms experience adverse effects in growth and reproduction when subjected to microfibers, however, it is still not fully understood how entire communities may respond to textile fibers, whether synthetic or natural. Here we present evidence of changes in zooplankton community composition within microcosms (300mL volume) following inoculation with synthetic or natural fibers. Shifts in community composition appear to be idiosyncratic, depending on taxon and source population. For instance, synthetic (PE) fibers decreased copepod abundance in communities derived from poor, low productivity habitats; however, cellulose fibers increased copepod abundance in communities derived from high productivity habitats. These results suggest that both microfiber type and source community, together, shapes zooplankton community structure. Furthermore, this possible connection calls for additional research to further investigate how coevolving communities may show differential responses to anthropogenic perturbations. By studying the effects of microfibers on ecosystems, we are better able to develop effective interventions for those effects.

Evaluation of Microplastic Loading in Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) and their Associated Habitats
Gabrielle Hammerbach[1,2]*§, Mandi Gordon[2], Danielle DeChellis[2], Lydia Thurman[1,2], Cynthia Howard[1]
[1]University of Houston-Clear Lake, College of Science and Engineering, Houston, Texas
[2]University of Houston-Clear Lake, Environmental Institute of Houston, Houston, Texas

Microplastics are a globally emerging contaminant of concern. Coastal wetlands and low-lying marsh habitats act as sinks for microplastic accumulation. Wildlife species that utilize these estuaries may be at risk for negative effects from microplastic contamination. The Texas Diamondback Terrapin (Malaclemys terrapin littoralis) is the only endemic estuarine-dwelling turtle in North America and is a species of greatest conservation need in Texas. Terrapin inhabit marshes that may ultimately provide microplastic exposure or ingestion. Our primary goal is to evaluate levels of microplastic loading in terrapin and their associated low-lying marsh habitats. To date, samples collected from two sites have been analyzed using standardized laboratory protocols developed from a pilot study conducted in 2024. At each site, we collected 18 sediment cores representing two sample types: (1) randomly selected equidistant quadrats along the exposed shoreline (n = 9 cores) and (2) randomly selected quadrats within the marsh (n = 9 cores). We are currently processing sediment samples in the laboratory using a step-wise procedure which includes: sieving (with 5-mm and 100-µm sieves), small-scale density separation, and digestion using 30% hydrogen peroxide (H2O2) to remove organic materials. We are enumerating samples using a microscope and classifying plastics by type (e.g. fragment, fiber, film, etc.). Preliminary evaluation has resulted in observations of microplastics. While these results are preliminary, we plan to collect and analyze samples at additional spatially distinct sites through the remainder of 2025.

The Plastic Pollution Treaty: How Close Are We to a Global Solution?
Jillian Shiba*, Harte Research Institute

Countries around the world are working on a treaty to end plastic pollution, considered one of the most important international environmental agreements of our time. The process began in 2022, when the United Nations Environment Assembly (UNEA) adopted a landmark resolution for the development of an international legally binding agreement on plastic pollution, including in the marine environment, that addresses the full life cycle of plastic. Negotiations began that year, with the goal to complete the agreement by the end of 2024. However, 2025 began without a plastics treaty. This presentation will provide an overview of the negotiating sessions, highlighting areas of consensus and the main obstacles preventing an agreement. In explaining the treaty's importance to reducing plastic pollution, this presentation will discuss the key negotiating blocs, their objectives, and the core language and elements under consideration. With negotiations planned to resume this year, this presentation will describe the current state of this historic mission toward a world without plastic pollution.

Searching for Solutions to Plastic Pollution
Neil McQueen*, Surfrider Foundation, Texas Coastal Bend Chapter

Fifteen years of scientific evidence have shown that plastic pollution has spread to all parts of our planet, with serious implications for the long-term health of humans and the environment. Now that the problem has been defined, what sort of progress are we making toward the solutions? This presentation will explore some of the legislative, scientific and technological advances being made, as well as the setbacks that have occurred, as we search for lasting solutions to our addiction to plastics.

Nurdle Bill in Texas: A Panel Discussion
Joanie Steinhaus*, Turtle Island Restoration Network; Luke Metzger*, Environment Texas; Jace Tunnell*, Harte Research Institute, Texas A&M University – Corpus Christi; Neil McQueen*, Surfrider Foundation, Texas Coastal Bend Chapter; Moderator – Sarah Burgess, Surfrider Foundation, Galveston Chapter

Plastic pellets (called nurdles), powders and flakes are a growing source of plastic pollution, and they are the raw material that is used to make familiar plastic products like water bottles, grocery bags and polystyrene foam. They are small, cheap and easily contaminated. They are so small in fact, they are often discharged by plastics manufacturers or spilled during transport – generally with no consequences for the companies responsible. Experts and citizen scientists have documented pellet dumping and spills across Texas. Millions of pellets have been collected by volunteers and examined by experts along the Texas Gulf Coast in the last decade. In 2019, a record $50 million penalty judgement was levied against Formosa Plastics for illegal discharges of nurdles into the bays surrounding its Point Comfort, Texas plant. Despite

the judgement, the problem is still widespread. The plastics industry is rapidly expanding along the Gulf Coast and Texas is among the largest producers and exporters of plastic pellets. 6,765,977 tons of plastic were exported from the Port of Houston alone in 2022, and the port by itself accounts for over 38% of all pellet shipments. That coupled with plastic production expected to triple by 2060 will almost certainly mean increased pollution unless adequate measures are taken to curb these kinds of discharges. The Texas Legislature must take action to protect our coast, our families, and the economy from plastic pellets. This presentation covers the collaborative effort to draft a nurdle bill and where the bill currently stands in this session.

Concurrent Session Abstracts - Auditorium

Bioprospecting PET - Degrading Enzymes from the Deep Sea
Daryl R. Barth*§, Daniel J. Acosta, Julie Bondy, Kathryn E. Appler, Valerie De Anda, Phuoc H. T. Ngo, Hal S. Alper, Brett J. Baker, Edward M. Marcotte, Andrew D. Ellington

Over 8.3 billion metric tons of plastic have been produced globally since the 1950s. Polyethylene terephthalate (PET) is one of the most produced plastics. Recently discovered PET hydrolyzing enzymes, dubbed PETases, are enzymes capable of degrading PET into its constituent monomers along with other byproducts that offer potential pathways for recycling or upcycling into new, value-added materials. To expand the diversity of known PETases, we searched metagenomic data from hydrothermally impacted deep sea sediments in the Guaymas Basin, located in the Gulf of California, for novel PET-active enzymes. Hundreds of potential proteins were identified and 22 were selected based on their potential thermal stability and phylogenetic novelty. Heterologous expression and functional analysis of these candidate PETases revealed three candidates capable of depolymerizing PET or its byproducts. One is a PETase from a Bathyarchaeia archaeon (GuaPA) and two are bishydroxyethylene terephthalate hydrolyzing enzymes (BHETases) from uncultured bacteria, Poribacteria and Thermotogota. GuaPA is the first archaeal PETase discovered that is able to depolymerize PET films and originates from a specific enzyme class which has endowed it with predicted novel structural features. Co-hydrolysis of PET with GuaPA and one of the newly discovered BHETases further improves the plastic breakdown. In addition, further genomic analysis revealed that the uncultured PETase and BHETase-encoding microbes from our study are likely able to metabolize the products of enzymatic PET depolymerization, suggesting an ecological role in harnessing anthropogenic carbon sources in the deep sea.

Unveiling the Hidden Threat: Toxic Effects of Photodegraded Plastic Nurdles on The Early Development of Marine Medaka (*Oryzias melastigma*)
Alissa Richbourg*§, Texas A&M University- Corpus Christi; Zhanfei Liu, The University of Texas Marine Science Institute; Wei Xu, Texas A&M University; Frauke Seemann, Texas A&M University- Corpus Christi

Plastics are integral to daily life due to their unique properties, making them essential in manufacturing, packaging, and medicine. However, their widespread use has led to significant microplastic pollution in marine environments. Disposed plastic products can be degraded by harsh UV rays from the sun, causing plastics to release toxic compounds and products into the environment. The impact of these leachates on marine ecosystems remains poorly understood, particularly for photodegraded plastics. This study assessed the toxicity of photodegraded plastic leachate on the model species Oryzias melastigma. Nurdles of three plastic types—polycarbonate (PC), polyethylene (PE), and polyethylene terephthalate (PET)—were degraded in seawater for eight weeks, and the resulting leachate was used to treat embryos at three concentrations (0.1, 0.5, 5.0 ppm). We analyzed heart rate, developmental progression, hatching, mortality, and deformities. During early development, heart rate was significantly lowered in both the PC and PET treatment groups. Developmental deformities were observed in PC and PET treatments, with PET 0.5 ppm showing significantly higher deformity rates than the non-treated group. Hatching rates were significantly lower than the control across all treatments. Furthermore, mortality was higher in the PC and PET treatments, with PC 0.1 ppm having significantly higher mortality rates when compared to the control. PE leachate had minimal effects on development and hatching. Exposure to photodegraded

plastic leachate may induce oxidative stress and impair spine development, potentially affecting locomotion and survival. Further studies will examine the mechanisms underlying these toxic effects in O. melastigma.

Microplastics in Galveston Island Marine Ecosystems: Comparative Analysis of Texas College/University Students' Environmental Perceptions
Maeryn Rut§*, Tomball Memorial High School

The goal of my project is to discover how Texas college and university students view microplastic pollution in Galveston Island marine ecosystems and if proximity to the impacted ecosystems influences perception and level of awareness. The anticipated value of my research project is to ultimately provide a foundation of awareness that will lead to increased quality of environmental reforms, sustainable production of products, and changes in personal behaviors that could reduce the amount of microplastics that enter Galveston Island marine ecosystems. There is also a significant knowledge gap among scientists and researchers, as well as the general public, in terms of what impact people have on microplastic pollution and how aware they are of it. I have developed an online survey consisting of 19 questions (3 open ended, 14 Likert scale, where students attend college/university, and confirmation that they are a Texas college/university student) in order to determine what the perceptions are of these students concerning microplastic pollution. I aim to analyze student's knowledge of how the ocean and humans impact one another, if they believe there is microplastic pollution in the specific types of marine ecosystems in Galveston Island, and their overall attitudes on this modern pollutant. I aim to answer the question: To what extent does proximity to Galveston Island marine ecosystems impact Texas college/university students' awareness of microplastic pollution and its impacts in certain aquatic environments?

Beach Heroes: Youth, Art & Marine Stewardship
Brandi Keller*, Texas Sea Grant and Texas A&M AgriLife Extension

The Beach Heroes program, led by the Galveston Bay Area Master Naturalists, engages elementary students in Galveston ISD in hands-on marine conservation education. Through interactive lessons, volunteers teach students about sea turtles, marine debris, and coastal stewardship, empowering them to protect Galveston Bay and its shorelines.
A unique aspect of the program is its collaboration with art teachers, where students create artwork that reflects their commitment to marine conservation. This creative expression culminates in an annual public art exhibit, showcasing student work and inspiring community action – by being a Beach Hero. Since its inception in 2018, Beach Heroes has expanded from two to five schools, reaching 2,675 students. In January 2025, the program exhibited over 400 student artworks in Galveston, with two students from each school receiving special recognition for their art. Families, educators, and the community gathered to celebrate the students' achievements and their role in protecting coastal ecosystems.
This presentation will highlight the program's impact, growth, and strategies for integrating science, stewardship, and art to foster environmental advocacy among youth.

Bioprospecting for Plastic Pollution Solutions
Kasia Dinkeloo*

Bioprospecting is the search for useful products from natural sources. By studying plants, animals, and microbes, scientists have discovered new materials, medicines, and enzymes that have changed the world. Through the Freshman Research Initiative at the University of Texas at Austin, high school and undergraduate researchers are working to make such discoveries. Currently, the Bioprospecting research group is pursuing projects focusing on plastic-degrading enzymes. It is clear we are approaching a waste crisis with regards to plastics, and it is also clear that solutions may be on the horizon (or in the ocean, or in the stomachs of insects!). This presentation aims to give a research and education update for our work exploring the gut microbiome of plastic-eating superworms, characterizing plastic-degrading microbes, and selecting enzyme targets for further testing.

Concurrent Session Abstracts - Classroom

We Know There is a Problem, Now What do I Do?
Maggie Sager* and Joanie Steinhaus*, Turtle Island Restoration Network

Plastic pollution is one of the most pressing environmental challenges of our time, and Texas plays a significant role in its production. With plastic manufacturing facilities across the state contributing to the ever-growing crisis, plastic waste is infiltrating our watersheds, burdening communities, and threatening human and environmental health. Despite these impacts, media coverage often overlooks the full extent of the problem, particularly its connections to public health. Turtle Island Restoration Network (TIRN) is actively working to address plastic pollution through education, outreach, and advocacy. Our presentation will highlight the interconnected nature of this issue, emphasizing how plastic pollution flows through entire watersheds and disproportionately affects frontline communities. We will discuss how recycling alone cannot solve this crisis due to consumer confusion, lack of accessibility, and the false promise of "advanced" or chemical recycling.

Additionally, we will examine the alarming rise of microplastics, which are now found in every part of the human body, and the emerging research linking them to serious health effects. Beyond raising awareness, we will present real solutions, such as refusing plastic products, making sustainable swaps in daily life, and taking action through community advocacy. By empowering individuals to demand systemic change from corporations and elected officials, we can collectively push for policies that address the root causes of plastic pollution.

Join us to explore how we can move beyond ineffective solutions and take meaningful steps toward a plastic-free future.

Bay R.A.T.s Tackle Traps & Trash
Allan Berger* and Brigid Berger*, San Antonio Bay Partnership

While removing abandoned crab traps and trash temporarily make the bays cleaner, it is not a "solution". Collecting data while removing it, however, is the necessary step which defines the problem and can lead to improvements. San Antonio Bay Partnership (SABP) has been coordinating the removal of abandoned crab traps and conducting shorelines clean ups annually for many years. Affectionately called Bay R.A.T.s, volunteers in each program Remove Abandoned Traps and Remove Awful Trash. SABP Chairman Allan Berger will explain the data collection process for each program and share the findings which have led to the crafting of steps toward improvements to Restoring America's Treasures.

The Monofilament Recovery & Recycling Program: Protecting the Texas Coast For 20 Years
John P. O'Connell*, Texas Sea Grant and AgriLife Extension; Alexis M. Sabine, Texas Sea Grant

Fishing line can persist in the environment for centuries, posing entanglement risks to sea turtles, birds, and other marine and coastal wildlife. To combat marine debris through recycling and angler education, Texas Sea Grant (TXSG) launched the Monofilament Recovery and Recycling Program (MRRP) in 2004, in collaboration with a network of partner organizations and dedicated volunteers. The MRRP works to prevent fishing line from entering coastal ecosystems by expanding access to convenient recycling stations and raising awareness about impacts to wildlife.

Through the MRRP, PVC collection tubes are installed at fishing access points along the coast and at inland sites, such as marinas, piers, and tackle shops, providing anglers with an easy way to dispose of their used monofilament. The collected line is then cleaned and shipped to Berkley Fishing's Conservation Institute in Iowa, where it is repurposed into items like tackle boxes. Volunteers play a crucial role by helping to install and maintain the recycling devices and reporting collection data to TXSG.

Currently, more than 300 monofilament collection bins are in place across Texas, helping divert hundreds of pounds of fishing line from the environment each year. Anglers can locate their nearest recycling station using TXSG's new statewide monofilament recycling map at tx.ag/monomap.

The MRRP's success is made possible by the efforts of numerous collaborators such as AgriLife Extension, the Texas Master Naturalists, Fishing's Future, Turtle Island Restoration Network, and many more partners and volunteers. For more information, visit tx.ag/MRRP.

Texas Abandoned Crab Trap Removal Program: Supporting Volunteer Efforts and Trap Detection
Holly Grand*, Evan Pettis, and Alicia Walker, Texas Parks and Wildlife Department

In 2024, Texas Parks and Wildlife Department received funds from Gulf States Marine Fisheries Commission (GSMFC) to support the annual Abandoned Crab Trap Removal Program. Abandoned crab traps litter coastal waters and "ghost fish" important species like blue crab and diamond back terrapin. To prevent these negative environmental impacts, the Texas commercial crab fishery closes for 10 consecutive days along the Texas coast every February to allow volunteers and managers to remove abandoned traps. The grant funding received in 2024 from GSMFC went to support volunteer events hosted by the Galveston Bay Foundation, the Christmas Bay Foundation, and the San Antonio Bay Partnership. Volunteers remove the majority of traps along the coast and supporting such events is crucial to the program's success. Additionally, aerial imagery of Christmas Bay was obtained in August 2024 to help identify crabbing "hot-spots" to assist volunteers increase efficiency with their clean-up efforts during the 2025 Abandoned Crab Trap Removal Program. The survey results indicate that, at the time of the flyover, actively fishing crab traps (i.e. not derelict/abandoned) were predominantly concentrated in the southwestern portion of the bay. Additionally, an analysis of the imagery confirmed that artificial debris was most abundant on the north and west shorelines. Several derelict traps were also detected in the general vicinity of the identified crabbing "hot-spot" north of Arcadia Reef.

Community Engagement Through Art and Beautification
C. Todd Cleveland, CTA, Artist Boat

Artist Boat engages the Galveston Island community through two public art and beautification programs.

Partnering with the Galveston Park Board of Trustees, Artist Boat hosts an annual beautification contest called Beautify the Bucket. The contest invites the community to "adopt" a blue trash barrel typically lining Galveston Beaches and to paint the barrels within contest themes. There are seven categories for prizes, including Individual Adult and Youth, and group categories for corporations, youth organizations and families. These beautified barrels are then dispersed throughout Galveston to attract the attention of beach and event participants with the intention of reminding visitors to put potential marine debris in the proper place. Judging of this contest is done by volunteers, with winners being announced at Artist Boat's World Ocean Day Festival.

The second program hosted by Artist Boat is the Marine Debris Art Contest. This contest urges individual participants to collect marine debris from Galveston beaches and to turn their collection into a unique work of art. Each artist may submit their art piece through flatwork or 3D sculptures. Art pieces are judged by local artists and displayed at a local professional art gallery for one month.

Artist Boat has beautified an average of 100 barrels each year for 8 years and provided a means of creating unique art pieces for display for 6 years. These programs help to clean local beaches and keep discarded trash out of our ocean.

Buildings Hidden Plastic Problem: Solutions to Reduce Plastic Pollution from Building and Construction

Teresa McGrath, Rebecca Stamm, Cassidy Clarity, and Ryan Johnson*, Habitable; Veena Singla, Columbia University Mailman School of Public Health

Did you know that building and construction is the second highest-consuming sector of plastics, behind packaging? In this session you will learn stunning statistics about current and projected plastic use in buildings and hear recommendations to reduce plastic pollution—greenhouse gases (GHGs), microplastics, and toxic chemicals—throughout product life cycles.

This presentation will highlight the significant body of science indicating that plastic building materials are contributing to serious health and environmental harms over their life cycle, from fossil fuel extraction to production, use, and disposal. These impacts fall disproportionately on susceptible and marginalized people, including women, children, Indigenous people, low-income communities, and people of color. This session will focus on solutions and offers recommendations to strengthen policies that will reduce plastic use in the built environment and associated life cycle harms.

Abstracts for Poster Presentations

Aerial Invasion: Atmospheric Deposition of Microplastics in Mosquito Lagoon, Florida
Madison Serrate*, Tanilesse Gonzalez, Stephanie Fletcher, Paul Sacks, Joshua Fnu, Sara Kim, Lei Zhai, Abby Frey, Julia Kruger, Tara Blanchard, Emily Hays, Linda Walters

Globally over 300 million tons of plastic is produced yearly which, over time, has the potential to degrade into microplastics (MP; < 5 mm). Atmospheric deposition via rain, wind, etc. facilitates long-range transport of microplastics. The Indian River Lagoon (IRL) is an estuary of national significance in east-central Florida that has previously been identified as a MP hotspot. The northernmost basin of the IRL is Mosquito Lagoon (ML). The role that atmospheric deposition plays in MP abundance in ML is unknown. Atmospheric deposition samples were collected from 3 regions in/surrounding Mosquito Lagoon (on oyster reefs, in Canaveral National Seashore (CANA) parking lots, and citizen-scientist's yards). Replicates of three sterile collection jars were deployed, filtered, and processed via microscopy and FTIR spectroscopy to determine amounts of and chemical compositions of collected particles. Preliminary results from 238 sample sets (3 jars each) have found that CANA lots and oyster reef sites had the highest average MP abundance with 5.6 and 4.2 MPs per sample set, respectively. Fibers made up 91% of microplastics found across all site types. FTIR results indicate 25% of particles from FTIR processed samples are MPs commonly used in the textile industry such as nylon and polyester. A full year of sample collections will conclude in May 2025. The EPA is currently determining if MP should be classified as an air pollutant; these results will help bring this issue to the public as a serious ecological and health concern.

Analysis of Microplastic Concentrations in Dried Algae Mats and Sediment Collected from Detention Basins in the Edwards Aquifer Recharge Zone
Paulina Quinonez*§, Andre Felton, Jeffery Hutchinson

Recent efforts to understand microplastic (MP) transport dynamics in aquatic and terrestrial systems have focused on pathways connected to roadways and impervious surface runoff. Detention basins, located adjacent to these surfaces, potentially serve as primary sinks, capturing MPs before they infiltrate groundwater resources. This research examines the role of algae mats and sediment in detention basins as sinks for MPs in urban areas over the Edwards Aquifer recharge zone. Algae and sediment samples were collected in September 2022 and September 2024. Samples were processed using a standardized protocol for MP purification, isolation, and extraction. MP items were identified and characterized using Fourier transform infrared spectroscopy. Fibers were the most abundant morphotype, accounting for approximately 93% of all MPs, while the remaining 7% consisted of fragments, films, and foams. Cellulose acetate comprised about 50% of all characterized MPs and 42% of all fibers. The majority of fibers were composed of cellulose acetate (45%), polyester (20%), and rayon (12%). While other MPs were identified in significantly lower quantities, their presence is concerning due to their association with carcinogens. Additional results and implications will be discussed during the presentation.

Digestion of Polyethylene Terephthalate Fibers by *Zophobas morio* Larvae
Isabel Li*§, Dr. Kasia J. Dinkeloo

Background: As the environmental concern of plastic pollution increases, researchers have examined the gut microbiota of Zophobas morio larvae, or superworms, as a potential source of plastic-degrading microbes and enzymes. This research investigates whether superworms can consume 100% polyester fibers, how this consumption affects the gut microbiome, and if we can then culture polyester-degrading microbes from the worm gut.

Methods: Superworms were fed 100% polyester thread, while a control group was fed with

carrots. Superworm guts and frass were monitored during this time. After two weeks, DNA was extracted from superworm guts, quantified using a NanoDrop spectrophotometer and a Qubit fluorometer, and used for 16S metagenomic sequencing on a Nanopore MinION. Sequencing was analyzed with EPI2ME. Bacteria from the guts of polyester-fed superworms were cultured in carbon-free basal media with 100% polyester thread as the sole carbon source. After 1.5 months of growth, microbes were isolated, identified, and used for further testing.

Results: Superworms consumed the polyester string. Sequencing results from the two-week feeding trial showed changes in the gut microbiota, with the genus Intestinirhabdus increasing over 200-fold and the genus Klebsiella showing more than a twofold increase in abundance. Furthermore, sequencing from the selective liquid culture isolates indicated that Stenotrophomonas maltophilia was able to grow on polyester string.

Conclusion: Superworms are able to digest polyester fibers. S. maltophilia could be a potential polyester-degrading species. Further validation of these findings is needed, and whole genome sequencing and proteomics approaches will be used to search for polyester-degrading enzyme targets.

Dynamics of Marine Litter Post-Hurricane Beryl: Assessing the Ultimate Fate of Flotsam
William Bailey*§, David Mohrig, Cornel Olariu, Kutalmis Saylam

Marine litter is ubiquitous to coastal environments, where future sea level rise and increasing storm frequency pose significant threats of bringing plastic pollution closer to growing coastal populations. This research first analyzed microplastic concentrations in Texas bay sediments thinking these known sediment traps host microplastic hotspots. Rather, the results of this study found lower than expected microplastic concentrations, and larger microplastic particles consistently deposited with finer sediment grain sizes suggesting preferential remobilization of these particles. Storm events are proposed to govern the lack of microplastics in bay sediment as they constitute periods in which materials (sediment, plastics) are rapidly introduced into the water column and transported through the system. The fate of this suspended debris after storms is poorly constrained. The focus of current research targets the fate of flotsam (debris washed onto the beach by waves and tides) post-Hurricane Beryl to assess how storms affect plastic transport and deposition along the Texas coast. Using remotely sensed data (drone, lidar) and field measurements, this research revealed storm surge over the Matagorda barrier island followed by significant outflow floods, where preserved dune topography and vegetation preferentially trapped marine litter within highwater deposits. New barrier overwash fans indicate large quantities of debris sourced to the back-barrier and bay sediments, as well as return channels exporting material to the Gulf of Mexico. Given the ability of storms to erode material from bays and shorelines, the Gulf of Mexico is likely the ultimate fate for coastal pollutants.

Effects of PET Microfiber Exposure on Mating Behavior, Foraging Behavior, and Problem Solving in *Gambusia affinis*
Adrienne Lihou*§, Rivers Hartzell*, and Jing Graber*

Plastic pollution has significantly increased in freshwater systems in the last century. Polyethylene Terephthalate (PET) is one of the most prevalent polymers in both freshwater and marine ecosystems, yet little research has examined its effects on organisms. Studies have shown plastics, and other pollutants can cause behavioral abnormalities symptomatic of greater physiological conditions. These behavioral changes have consequences for the organism's fitness and can act as a bioindicator of individual health. The aim of this study is to identify the effects of PET microfiber (MF) exposure on cognitive flexibility, foraging behavior, and male mating behavior in Western Mosquitofish (Gambusia affinis). To do this, the mosquitofish were placed in static aquaria dosed with one of three MP concentrations: high (1000MF/L), standard (10MF/L), or no microfibers for 14 days. MP exposure concentrations were informed by environmentally relevant measures. The fish were then examined in one cognitive and two behavioral tests: feeding efficiency, male mating activity, and cognitive flexibility. Preliminary results found that no significant changes in cognitive flexibility or male mating patterns occurred post-exposure. Minimal

effects could occur for a multitude of reasons. In the natural environment, organisms are exposed to plastics throughout their entire lives, meaning that the duration of exposure in this study may not have been sufficient to detect behavioral changes, given that this is a resilient species. Additionally, populations may be behaviorally masking underlying conditions and symptoms.

Examining the Plastic Degrading Potential of Marine Fungi Found on the Texas Coast
Jaden Acevedo*§, Kristen Garsaud*, Dr. Kasia Dinkeloo

12 million tons of plastic enter the ocean every year- of this waste, approximately 230,000 tons are made up of a type of microplastics called nurdles. Providing a unique angle from which to examine the ability of microbes to degrade plastic, nurdles create a microenvironment where specialized microbial communities colonize the plastic surface and potentially evolve enzymatic capabilities to degrade the specific polymer, driven by selective pressures and the abundance of a consistent carbon source. This study aims to expand the known library of plastic-degrading marine fungi by investigating fungal species colonizing nurdles collected from the Texas coastline. Fungi are particularly proficient in degrading biological polymers, such as lignin, prompting further investigation into their ability to degrade synthetic polymers. To identify the fungal species colonizing the nurdles, fungi were cultured, their DNA was extracted, and the 18S barcoding region was amplified for sequencing. We sequenced 600 base pairs of the 18S region via Sanger sequencing and have sequenced 2,700 base pairs of the same region using the Oxford Nanopore platform. Identified fungi include Phaeosphaeria sp., Pleosporales sp., Alternaria alternata, and Stemphylium lycopersici. Alternaria alternata and Stemphylium lycopersici are known terrestrial plant pathogens; their presence raises questions about the adaptation of terrestrial species to marine habitats and their potential role in plastic degradation. Future research will focus on determining their plastic-degrading capabilities and identifying enzymatic pathways involved. Understanding these processes could contribute to the development of fungal-based bioremediation strategies, offering an eco-friendly approach to reducing plastic accumulation in the environment.

Fluorescent Detection of Nile Red-stained Microplastic Uptake in the Roots of *Arabidopsis thaliana*
Kailyn Nonhof*§, Jing Graber, Kasia Dinkeloo

With plastic synthesis and distribution having increased dramatically in recent years, a closer look at the side-effects of plastic integration into biological contexts has become vital. More specifically, increasing levels of microplastics (MPs) in the rhizosphere, the portion of soil in direct interaction with plant roots, (1) has sparked an uptake in studies exploring plastic-plant interactions. One location tracking method of micro-scale plastics is the use of fluorescent staining and imaging. Here, we explore how the introduction of Nile Red (NR) stained polystyrene (PS) MPs and polyethylene terephthalate (PET) microfibers (MFs) in the growth medium of Arabidopsis thaliana may result in the uptake of plastic material into the root system of the plant. Firstly, a co-staining approach (2) was used to track the uptake of PS-MPs into the root system of A. thaliana. NR dye was employed to stain MP samples and DAPI, a specific DNA-binding dye, was used to stain biological material. Root samples were imaged under NR and DAPI excitation wavelengths, with selectively intense regions of NR fluorescence indicative of potential MP uptake. Furthermore, to track MF uptake, a similar approach was used via the introduction of NR-stained MFs in the growth medium of GFP-expressing A. thaliana, and root samples were subsequently imaged under NR and GFP excitation wavelengths to visually distinguish plastic from plant material. Multiple areas of potentially positive MP and MF uptake have been imaged, though further analytical methods are necessary to advance our claims quantitatively.

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2. Stanton, T.; Johnson, M.; Nathanail, P.; Gomes, R. L.; Needham, T.; Burson, A. Exploring the Efficacy of Nile Red in Microplastic Quantification: A Costaining Approach. Environmental Science & Technology Letters 2019, 6 (10), 606–611. https://doi.org/10.1021/acs.estlett.9b00499.

Influence of microplastics on sediment transport dynamics
Marufa A. Upoma, Min Y. Pack*

While the environmental propagation of microplastics have been an active area of research in recent years as an emerging environmental contaminant, the influence of such microplastics on sediment beds are not well understood. This study seeks to understand the influence of negatively buoyant microplastics and their influence on the sediment rheology through a model synthetic clay. The rheological changes in the sediment are assessed with rheological parameters such as the viscosity flow curve and thixotropic recovery as a function of the particle type, size and concentration.

Making Space for Migratory Birds: An Urban Conservation Program Highlight
Kiara Carrasco*§, Chloe Dannenfelser, Liz Virgl, Nancy Brown

Due to its unique position between two major migratory bird flyways and its diverse range of ecosystems, the Houston-Galveston region plays a crucial role in supporting migratory birds. The region faces challenges from a growing human population, with one major concern being the accumulation of trash. This pollution degrades habitats, poses ingestion and entanglement risks, and threatens the overall health of coastal and urban ecosystems. With over 7 million residents in the greater metropolitan area, it is essential to create and maintain bird-friendly spaces to support the millions of migratory birds that pass through each year. The Urban Bird Treaty Program, a national partnership between the U.S. Fish and Wildlife Service and designated cities, addresses this need by promoting bird conservation in urban areas. Houston was designated an Urban Bird Treaty City in 2003, and current program efforts focus on four key areas: habitat conservation, community engagement, hazard reduction, and a grant program. In 2023, American Bird Conservancy and the Stopping Plastics and Litter Along Shorelines (SPLASh) program received funding through a National Fish and Wildlife Foundation grant to advance Houston's Urban Bird Treaty goals. This funding supports a conservation fellow in coordinating coastal trash cleanups near critical bird habitats, increasing public awareness of migratory birds, developing wildlife-focused curriculum with the Houston Community Partnerships and Engagement Program, and organizing a BioBlitz for World Migratory Bird Day. This poster highlights current program outcomes and outlines future initiatives to protect and enhance this vital region for migratory birds and other wildlife.

Microbial Marvels: Investigating Dubia Roach Microbiota in Relation to Polyethylene Biodegradation
Roland Quinones*§, Kasia Dinkeloo

Over 8 billion metric tons of plastic goods have been produced since the invention of such polymers. With few options to remediate or recycle plastic waste, researchers have turned their attention towards the study of plastic-degrading microbes and enzymes. Several species of insects have been shown to harbor plastic-degrading microbes in their gut, and a recent study showed that the Dubia cockroach, Blaptica dubia can be used to study the degradation of polystyrene. Here, we present our work with Dubia roaches to examine how they might contribute to the biodegradation of polyethylene. A feeding trial revealed that the roaches could consume polyethylene in the form of LDPE foam. Microbiome analysis of the guts of these roaches shows a shift in composition after 30 days of a plastic diet, with the genus Enterococcus showing an 25% increase in gut microbe representation among other changes. Selective liquid cultures were established to encourage growth of plastic-degrading microbes isolated from the gut of the plastic-fed roaches, resulting in evidence of growth after approximately two months of incubation.

Non-Plastic Solutions for Oyster Reef Restoration: Efficacy and Environmental Impacts of Novel Restoration Materials
Cara Womacks*§, Madison Serrate, Otis Woolfolk, Fnu Joshua, Lei Zhai, Paul Sacks, and Linda Walters

Oyster reef restoration is a common practice around the globe that typically requires the deployment of plastic materials for stabilization. As microplastics and marine debris are a growing environmental concern, many restoration practitioners seek alternatives to plastic, but there is currently little information on the efficacy and environmental impacts of these new materials. In this study, lab and field

experiments were used to assess environmental impacts and performance of non-plastic restoration materials. Lab trials assessed five non-plastic materials for shedding of microparticles. Four types of BESE® biopolymer mesh and Natrx® basalt shell bags were assessed by placing sections of each material in 150-mL flasks of seawater (30 ppt) on a shaker table. Naltex® polyethylene plastic mesh was used as a control. Flask contents were vacuum filtered each month for six months and microparticles counted and measured. In pilot field trials, four types of BESE® mesh bags, Natrx® basalt bags, and Naltex® polyethylene shell bags were deployed onto dead oyster reefs in May 2024. After seven months, material integrity was assessed by counting and measuring tears to shell bags. All materials in lab trials shed microparticles into the water, but the rigid BESE® mesh and the basalt bags shed significantly more than other materials. Preliminary results from the field study show that BESE® white and rigid mesh sustained damage that rendered them ineffective after seven months. This research is ongoing and will provide valuable insight into what materials are the best replacements for plastic in oyster restoration efforts.

Plastic-Free Restored Habitats: Reducing Plastic Pollution in Community-Based Restoration of Oyster Reefs

Dr. Jennifer Beseres Pollack, Dr. Linda Walters, Dr. Lisa Chambers, Jace Tunnell, Dr. Zhanfei Liu, Dr. Terry Palmer, Natasha Breaux, Erin Hill, Mckenna Reinsch*

Unsustainable harvest practices and environmental changes have reduced oyster reef distribution globally. In response, habitat restoration plays a key role in rebuilding degraded reefs, often by deploying substrate into coastal waters to facilitate larval recruitment of oysters. In small-scale and community-based oyster reef restoration, recycled oyster shells are commonly placed into polyethylene (PE) plastic mesh bags to create stable, three-dimensional structures and minimize shell loss from currents and wave action. Although PE plastic mesh offers affordability, versatility, and durability, this practice introduces large volumes of plastic into coastal waters and may have unintended consequences. Although there is a strong desire to eliminate plastics in habitat restoration, plastic-free materials present new issues with installation, durability, availability, and cost.

This project aims to evaluate the usability, performance, longevity, volunteer-friendliness, and cost of plastic-free restoration materials while assessing how traditionally used plastic materials degrade into micro- and nano-plastics in coastal environments. Newly developed plastic-free materials—including cement-infused jute rings, basalt bags, and biopolymer mesh—will be evaluated over two years in the field and laboratory for oyster recruitment, fauna biodiversity, material longevity, and resilience, volunteer compatibility, cost-effectiveness, and unintended consequences from material breakdown. Project findings will help identify effective plastic-free materials, which will be shared with resource managers and restoration practitioners to support broader adoption in habitat restoration.

Plastivors: Investigating Plastic-Eating Microbes

Kayla Perez*§, Andrea Enriquez*, Kasia Dinkeloo

Of the 400 million tons of plastic produced annually, only 14% is recycled, contributing to an ever-increasing accumulation of waste. Nylon is a plastic polymer used in clothing and fishing nets, among other products. Here, we present our work to find an enzyme capable of degrading nylon 6,6. Superworms, a beetle larvae shown to consume plastics, were fed a diet of nylon 6,6 for four weeks. Microbes from the superworm gut cultured in a liquid carbon-free basal medium (LCFBM) with Nylon 6.6 as the sole carbon source. Growth was observed and DNA sequencing of microbial isolates revealed one microbe with 97% similarity to Solimonas fluminis. Another isolate was identified as a Cellulosimicrobium sp. Further work will confirm the nylon degradation potential of these microbes through biodegradation assays and genetic analysis. Identifying genes responsible for plastic breakdown could lead to novel enzymatic solutions for sustainable waste management, addressing the urgent need for improved plastic recycling strategies.

The Nurdleome: Identification and Characterization of Microbes Found on Gulf Coast Nurdles
Vibha Annaswamy*§, Kasia Dinkeloo

Nurdles are significant contributors to marine pollution, taking thousands of years to decompose naturally. As these nurdles persist in the environment, they are colonized by microbes, some of which might be using the polymer as a carbon source. By studying the microbes that live on nurdles, we hope to identify and characterize species that may have the ability to break down plastic. To gain a comprehensive understanding of the nurdle microbiome (or nurdleome), we performed targeted metagenomic sequencing on nurdles collected from the Texas Gulf Coast. We found a greater amount and diversity of microbes associated with nurdles compared to the sand from which the nurdles were collected. To bioprospect for potential plastic-degraders, we employed a selective culturing approach in which we used nurdles as inoculum and the sole carbon source in carbon-free liquid media cultures. From these cultures, we have been working to isolate and identify species of interest for plastic or pollutant degradation. Thus far, we have identified Halopseudomonas, Pseudomonas, and Halomonas as candidates for plastic degradation.

Houston Zoo Map

In-person attendees will enter the Zoo through Gate 8. Gate 8 is accessible from the sidewalk to the left as you face the main entrance.