

*2nd Annual*

# TEXAS PLASTIC POLLUTION SYMPOSIUM

**Tuesday, October 29, 2019**



TEXANS  
FOR CLEAN  
WATER

Friends of  
Heron Park  
Of Shoreacres

**Moody Gardens IMAX Theater  
1 Hope Blvd., Galveston, Texas 77554**

# Welcome!

The Plastic Pollution Prevention Partnership is proud to host the second annual Texas Plastic Pollution Symposium. We have a great program of talks and posters this year from presenters all around the Gulf of Mexico!

A special thanks goes out to our generous sponsors who made this event possible - Galveston Bay Area Chapter of the Texas Master Naturalists, Surfrider Foundation, Moody Gardens, Texas Sea Grant, Houston Audubon, Texans for Clean Water, and Friends of Heron Park of Shoreacres

A free lunch, provided by our sponsors, will be served at the Moody Gardens Garden Restaurant.

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

*Texas Plastic Pollution Symposium Planning Committee*

Jace Tunnell, Stennie Meadours, Cynthia Clevenger, Joanie Steinhaus, Theresa Morris, Sandy Parker, & Anna Vallery

**Follow the meeting on social media with #TxPPS2019**

# Table of Contents

Schedule.....	4
Poster Titles and Presenters.....	6
Abstracts for Oral Presentations.....	7
Abstracts for Poster Presentations.....	15
Plastic Pollution Prevention Partnership.....	19
Attendee Organizations.....	20

# Schedule

8:15 AM - **Check-In**, Moody Gardens IMAX Theater, Galveston, Texas

9:00 AM - **Welcome and Opening Remarks**  
Stennie Meadours

9:15 AM - **Keynote Speaker: Trash Free Waters**  
Ken McQueen, Regional Administrator, EPA Region 6

## RESEARCH

9:40 AM - **Hurdles with Nurdles: A Gulf-wide Citizen Science Project**  
Jace Tunnell

9:55 AM - **The All-Women Sailing Crew Tackling Ocean Plastics**  
Sasha Franics

10:10 AM - **Methods Development and Initial Assessment of the Extent of Microplastic Pollution on Three Texas State Park Beaches**  
Maureen J. Hayden

10:25 AM - **Toxicity Assessment of Microplastic Pollution in Fish**  
Elizabeth DiBona\*, Jeremy Conkle, Simon Geist, Jeffrey Turner, and Frauke Seemann

10:40 AM - **BREAK (15 minutes)**

10:55 AM - **Marine Debris Entanglement of Marine Birds and Sea Turtles in the Coastal Bend of Texas from 2005 to July 2019**  
Alicia Walker

11:10 AM - **Ingestion and Use of Plastics by Galveston Bay Colonial Waterbirds**  
Anna Vallery

11:25 AM - **Galveston Bay Regional Litter and Marine Debris Database**  
Erin Kinney\*, Stephanie Glenn

11:40 AM - **POSTER SESSION**

12:00 PM - **LUNCH (1 hour)**

**\*From 11:40 AM to 1:00 PM the theatre will be closed for a private showing\***

- 1:05 PM - **Keynote Speaker: Summary of the NOAA Marine Debris Program and Future Priorities**  
Caitlin Wessel, Gulf of Mexico Regional Coordinator for NOAA Marine Debris Program

## **PUBLIC POLICY**

- 1:30 PM - **The Increasing Risk of Plastic Pollution in Texas**  
Pamela Plotkin
- 1:45 PM - **EPA's Escaped Trash Assessment Protocol**  
Renee Bellew
- 2:00 PM - **A New Policy Solution for Comprehensive Litter Prevention**  
Maia Corbitt
- 2:15 PM - **The Heavy Hand of the State: How State-Level Laws are Holding Back Local Plastic Pollution Prevention Legislation**  
Sarah Damron\*; Jennie Romer, Esq.; Angela Howe, Esq.; Neil McQueen
- 2:30 PM - **Grassroot Approach to Reduction of Single Use Plastics**  
Theresa Morris
- 2:45 PM - **BREAK (15 minutes)**

## **SOLUTIONS AND PREVENTION**

- 3:00 PM - **The Great Monofilament Fishing Line Tube Adventure**  
Rick Becker\*, Susette Mahaffey, Keith Mahaffey, Stennie Meadours, Maureen Nolan-Wilde, Sandy Parker
- 3:15 PM - **Galveston Beach Hero Project**  
Susette Mahaffey d Maureen Nolan-Wilde
- 3:30 PM - **Join the Plastics Reduction Challenge to Save Wildlife: July 2020**  
Sophia Darling, Cullen Geiselman, Shannon Colledge and Anna Vallery
- 3:45 PM - **Plastics on a Texas Bay**  
Diane Wilson
- 4:00 PM - **Good Intentions Aren't Enough to Reduce Fishing Line Litter: A Case of Effectively Reducing Threats to Marine Wildlife Along the Texas Coast**  
Bill Wooten\*, Cynthia Clevenger, Sophia Darling, Kari Howard, Stennie Meadours, Martha Parker, Sandra Parker, Taylor Rhoades
- 4:15 PM - **Tackling Plastic Pollution on Social Media: Reflecting on Texas Sea Grant's Plastic-Free July Campaign**  
Sara Carney\*, Kimber De Salvo, Callie Rainosek

4:30 PM - **Plastic Pollution Prevention Partnership**  
Stennie Meadours

4:45 PM - **Closing Remarks**  
Stennie Meadours

5:00 PM - **POSTER AND NETWORKING SESSION (25 minutes)**

## Poster Titles & Presenters

### **Using Green Chemistry to Quantify Persistent Organic Pollutants on Nurdles Found Along Texas Beaches**

Carol Haley\*, Jeremy Conkle, Jace Tunnell, Zhanfei Liu

### **Quantifying Microplastics loading to Nueces Bay, Corpus Christi, Texas**

Lauren Rodriguez\*, Jianhong Ren and Jeremy Conkle

### **Microplastics in the Mississippi River**

Kerrin Toner\*, Mark Benfield, Ahmed Gad, Stephen R. Midway

### **Microplastic Quantification in Texas Waterways**

Matthew Watford\*, Jess Meyers, Simon Geist, Jeremy Conkle

### **The Great Monofilament Fishing Line Tube Adventure**

Rick Becker\*, Susette Mahaffey, Keith Mahaffey, Stennie Meadours, Maureen Nolan-Wilde, Sandy Parker

### **Galveston Beach Hero Project**

Susette Mahaffey\* Maureen Nolan-Wilde\*

### **Campus Going Strawless**

Yadira Hernandez\*

# Abstracts for Oral Presentations

## KEYNOTE SPEAKERS

### **Trash Free Waters**

Ken McQueen  
EPA Region 6

### **Summary of the NOAA Marine Debris Program and Future Priorities**

Caitlin Wessel  
NOAA Marine Debris Program

The NOAA Marine Debris Program (MDP) is authorized by Congress to work on marine debris through the Marine Debris Act, which was signed into law in 2006 and amended in 2012 and 2018. The Act requires the program to “identify, determine sources of, assess, prevent, reduce, and remove marine debris and address the adverse impacts of marine debris on the economy of the United States, marine environment, and navigation safety.” This presentation will provide insight into the marine debris issue from the perspective of a governmental agency. An overview of the NOAA Marine Debris Program will be presented, including the program structure, mandates we must follow, and collaborative efforts we have established with other governmental agencies. The remainder of the presentation will focus on NOAA MDP priorities including; prevention, research, and removal projects we are currently funding, and future funding opportunities and directions.

## RESEARCH

### **Hurdles with Nurdles: A Gulf-wide Citizen Science Project**

Jace Tunnell  
Mission-Aransas National Estuarine Research Reserve

Nurdles are small lentil sized plastic pellets that are the raw material for almost everything plastic. These pellets look like food to animals and are being ingested, causing a number of behavioral changes in the animals. The pellets absorb toxins such as PCBs, PAHs, and DDTs; however, direct links of toxin transfer from one species to another have yet to be discovered. In order to learn more about the concentrations and distributions of plastic pellets washing up on beaches around the Gulf of Mexico, the Mission-Aransas National Estuarine Research Reserve at the University of Texas Marine Science Institute in Port Aransas, Texas, initiated a Gulf-wide Citizen Science Project gathering data on nurdles. Over 500 hundred citizen scientists have conducted over 2,000 surveys at over 1,000 sites from Mahahual, Mexico to the Key West, Florida. This presentation will describe what a nurdle is, how they get into the environment, what the impacts plastic pellets are having, what the citizen science data is showing, and describe solutions for reducing nurdles getting into the environment.

### **The All-Women Sailing Crew Tackling Ocean Plastics**

Sasha Franics  
Moody Gardens

The eXXpedition Round the World Voyage begins October 8th in the UK. The mission is to sample and analyze plastic particles in the ocean along its entire trip, which will travel through four of the five oceanic gyres. Through three different sampling approaches, the crew will gather data on the polymer composition of different plastics found on the surface, subsurface, and in subtidal sediments. The broad, connecting range of sampling locations will allow for a better understanding of how these particles are distributed, whether they are sinking, and if more global ‘hot spots’ can be identified. It will provide much needed information to fill current gaps in other fragmented studies. The full project will take about two years and be made up of 30 consecutive legs across 38,000 nautical miles. The research vessel crew throughout the voyage will consist of only women, in an effort to offer opportunity and empowerment to women in STEM. At each port along the way, the crew will host events with local communities to gather more information about the anthropogenic factors in their environment. The 300 total crew members are from various professions, backgrounds, and countries of residence in hopes that the knowledge they gather will be spread wide in all forms of outreach efforts.

I will be a crew member on Leg 6, sailing from Panama City to The Galapagos, a particularly important and fragile ecosystem. It is well-known for its endemic wildlife. A huge percentage of the species you encounter there live nowhere else on earth. As a Galveston local selected out of 10,000 applicants, I am thrilled to bring knowledge back to this island community, which relies on the health of its beaches for its livelihood. I know the way we think and act here has a direct impact on the Gulf of Mexico, and the connecting waterways. Our residents are passionate people who are inspired by storytelling and personal connections so I look forward to making a difference here through my experience and the information I gather during it.

### **Methods Development and Initial Assessment of the Extent of Microplastic Pollution on Three Texas State Park Beaches**

Maureen J Hayden\*, Charlotte Miller, and Dr. Mary K Wicksten  
Texas A&M University

A recently published two-year survey of marine debris spanning the Gulf of Mexico (GofM) from North Padre Island, Texas to Santa Rosa, Florida found that marine debris accumulation rates were ten times greater in Texas than similar coastlines of the north central GofM, with 69-95% of the marine debris consisting of plastics (Wessel et. al., 2019). The goal of this study was to conduct an initial assessment of the extent of small marine debris pollution on Texas state park beaches (Galveston Island, Mustang Island and Sea Rim) and to determine what extent of that small debris pollution is made up of microplastics. Collections took place during June and July (Permit No: 2019-R4-01). We used a modified surface sediment sampling protocol based on the NOAA Marine Debris Monitoring Program. At each beach, we laid out a 50 X 1 meter transect on the high tide line. We collected small marine debris (plastic particles and fibers small enough to fit in a 50 mL Falcon centrifuge tube). We characterized the samples using a dissecting microscope with a camera attachment, and measured each piece of small debris using ImageJ. Larger particles, mainly fibers, were measured manually by hand using a ruler. Microplastics were found at all three sample sites. In June, Galveston Island State Park had the most plastic pollution and the highest percentage of microplastics collected per sample (54%). We will conduct further sampling during different months to investigate trends of microplastic pollution on Texas beaches.

### **Toxicity Assessment of Microplastic Pollution in Fish**

Elizabeth DiBona\*, Jeremy Conkle, Simon Geist, Jeffrey Turner, Frauke Seemann  
Texas A&M University-Corpus Christi, College of Science and Engineering

Microplastic pollution and the negative consequences of microplastics entering the food web has come into the focus of research in recent years. However, a baseline study of microplastic pollution in the water

column, ingestion by early juvenile fish and effect on nutritional condition is lacking in the South Texas Bays. Here we show baseline information on microplastic pollution in Corpus Christi Bay and the Upper Laguna Madre, which are important nursery areas for such as redfish (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), Atlantic croaker (*Micropogonias undulatus*) and anchovies (*Anchoa* spp). We then examined the diet of selected species representing two different foraging types, bottom feeder or filter feeder. The hypothesis tested was, water column filter feeders (e.g. *Anchoa* spp.) will have higher amounts of plastic in their digestive tract than bottom feeders (e.g. *M. undulatus*). Preliminary results show that out of 175 fish, ~80% had one or more suspected microplastic in their digestive tract, with bottom feeders being the most affected species (Kruskal–Wallis test,  $p = 0.017$ ). Blue and black colored fibers were the most abundant with ~45% blue and ~36% black. Water treatment plants are the prime suspect to be the source as it is assumed that most of these fibers stem from shedding of clothes and enter the bay. As a next step, the type of plastics found in the digestive tracts will be determined by a micro Fourier Transform Infra-Red system.

### **Marine Debris Entanglement of Marine Birds and Sea Turtles in the Coastal Bend of Texas from 2005 to July 2019**

Alicia Walker\*

Amos Rehabilitation Keep at the University of Texas Marine Science Institute

Over the past two decades, entanglement caused by marine debris has become a growing issue for marine wildlife in our area. Entanglement can cause the loss of life and limb to marine birds and sea turtles. This issue is complex and hard to assess as most wildlife affected may never be observed. The Amos Rehabilitation Keep (ARK) is a wildlife rehabilitation facility that focuses on the rescue, rehabilitation, and release of marine birds, birds of prey, and sea turtles in South Texas. Marine debris entanglement is currently one of the most common causes for injury to wildlife in our area. This is an extensive look at the patients that were admitted to the ARK with entanglement related injuries and the survivability of those patients with entanglement related injuries since 2005. Over the last 14.5 years, 534 sea turtles and 690 birds have been affected by entanglement. This data will be used to make a larger impact in public education and to help promote prevention, cleanups, and recycling programs.

### **Ingestion and Use of Plastics by Galveston Bay Colonial Waterbirds**

Anna Vallery\*

Houston Audubon

Nearly every seabird species on Earth has now been observed having ingested plastics. Pelagic species, in particular, have been researched heavily and used as the face of the plastic pollution problem. Very few studies, however, have focused on ingestion rates of waterbirds that forage closer to shore. With few exceptions, the Gulf of Mexico has been overlooked with regards to the impacts of plastic on its resident and migratory birds. Many of the species that are commonly seen in Galveston Bay, for example, have only been documented ingesting plastic in other regions. Houston Audubon manages colonial waterbird nesting islands in Galveston Bay. In late July of 2019, as nesting season was wrapping up, Houston Audubon staff visited North Deer Island and opportunistically sampled dead birds that were in early stages of decomposition. The crop and proventriculus of 12 birds were dissected and visually inspected for plastics. Only one bird, an adult Laughing Gull, had ingested plastic. Nests were also opportunistically surveyed for evidence of plastic material, with minimal evidence of plastic material use. More research is needed to understand the rate of plastic ingestion and use of plastic by waterbirds of the region. This pilot study provided an opportunity to develop methodology and prepare for larger sampling efforts in the future.

## **Galveston Bay Regional Litter and Marine Debris Database**

Erin Kinney\*, Stephanie Glenn

HARC

The Galveston Bay Report Card identified trash and litter as a priority issue of stakeholders, but no watershed-wide litter and trash data set exists. In 2017, over 25 government agencies and non-profits came together for a Trash Summit to discuss problems surrounding litter and marine debris in the watershed. Two years and four Trash Summits later, the Galveston Bay Watershed Trash Action Plan (Action Plan) has been outlined, with stakeholders agreeing on three Plan Goals of Research, Removal and Reduction. The Action Plan is not intended to be regulatory but instead is a voluntary collaborative effort.

The Action Plan identified the need for a searchable database that organizes all trash and marine debris data (locations, quantities, type of trash, etc.). HARC has received funding from the Texas General Land Office to create an online platform for a Galveston Bay Regional Litter and Marine Debris Database. We plan to utilize data from Action Plan stakeholders who have tracked their litter collection over the years and have extensive experience with successful collection and methodology. We are seeking collaborations with partners who are developing new methods of collection, tracking and removal, including microplastic detection and impacts. The Marine Debris Database is meant to be a shared resource that will highlight the efforts of regional and state-wide partners to improve our understanding of litter and marine debris in Texas.

# **PUBLIC POLICY**

## **The Increasing Risks of Plastic Pollution in Texas**

Pamela Plotkin

Texas Sea Grant

Plastic pollution on land, in our rivers and in our oceans is a growing threat to the environment and our economy. Plastic defaces our natural areas daily, overruns our built environments and increases flooding in these areas, is a menace to livestock, fish and wildlife, and threatens coastal tourism and the communities whose economies depend on it. Numerous studies have documented the plastic pollution problems in Texas over the years and indicate increasing risks for the future. A synthesis of what is presently known about plastic pollution in Texas, along with recommendations for reducing this increasing risk is needed now to educate the public and state decision-makers. The goal of this talk is to discuss a new effort underway to build a coalition of organizations and individuals to synthesize the published and unpublished literature, to identify the current status of plastic pollution in Texas and along the Texas Gulf coast, and to assess potential risks to the natural, built and economic environments.

## **EPA's Escaped Trash Assessment Protocol**

Renee Bellew

EPA

People all over the world are trying to assess the trash that escapes into the environment, so they can take effective action to prevent it. There are apps, datasheets, databases, photo-based efforts, --you name it, someone is using it to figure out how to assess the trash in their community. This energy and creativity allow for local solutions, ownership, and pride, and with so many different collection methods, it also makes it difficult to compare the data generated from these great efforts.

Community groups want to collect data that is meaningful. They want data to help them in identifying the source of the trash and finding solutions to recover valuable materials from the waste stream – keeping materials in their highest, productive use. Governments at local, state, and federal levels also want to use the data collected by communities to gain knowledge of the bigger picture about what’s happening in the environment.

EPA’s ETAP was created to provide a method to collect data about escaped trash that can be compared and shared with communities all over the U.S. for data collection. The data collected will also be able to be used by programs working under the Clean Water Act and the Resource Conservation and Recovery Act to compare data about materials escaping into the environment to materials being recycled, recovered, or landfilled.

### **A New Policy Solution for Comprehensive Litter Prevention**

Maia Corbitt\*

Texans for Clean Water

Materials for Community Resiliency is a new policy approach to litter prevention that creates a framework for the aggregation and collection of plastic beverage containers (bottles), film plastic (bags, etc), and single use drink cups.

### **The Heavy Hand of the State: How State-Level Laws are Holding Back Local Plastic Pollution Prevention Legislation**

Sarah Damron\*; Jennie Romer, Esq.; Angela Howe, Esq.; Neil McQueen

Surfrider Foundation

Preemption of local plastic pollution control ordinances is playing out at the state level of government across the U.S. as a way to quash local waste and litter reduction efforts. These preemption laws generally prohibit municipalities from adopting local ordinances regulating a broad array of food and beverage containers, including prohibiting bans or fees on carryout plastic bags and expanded polystyrene foam food containers. Preemption laws infringe upon municipalities’ right to regulate the protection of health and safety, including the power to regulate waste, as well as usurp Home Rule. This issue encompasses not only plastic pollution but also the loss of local power to corporate interests. The American Legislative Exchange Council (ALEC), where corporate lobbyists and state legislators develop model bills that often benefit corporations’ bottom line at public expense, has made preemption part of its new playbook to rein in environmental regulation. The plastics industry (and industry generally) has found that they have more power at the state level and are increasingly focusing legislative efforts on preemption bills in order to block all progress at regulating plastic pollution at the local level.

This presentation will discuss the status of the state-level preemption movement, both generally and as it pertains to the regulation of containers and bags, and the impact that this movement is having on local communities in Texas and beyond. Potential approaches for progressing past or in spite of preemption will also be laid out.

### **Grassroot Approach to Reduction of Single Use Plastics**

Theresa Morris

Turtle Island Restoration Network

Due to the political climate in Texas, Turtle Island Restoration Network (TIRN) has had to modify their advocacy approach from seeking legislative bans of single-use plastics to encouraging grassroots efforts of individual lifestyle changes that will make significant impacts to the environment. By creating citizen

science research programs, educational curriculum for all ages and reaching local stakeholders, Galveston has taken steps to reduce the environmental impacts made by single-use plastics.

## **SOLUTIONS AND PREVENTION**

### **The Great Monofilament Fishing Line Tube Adventure**

Rick Becker\*, Susette Mahaffey, Keith Mahaffey, Stennie Meadours, Maureen Nolan-Wilde, Sandy Parker

Galveston Bay Area Chapter of Texas Master Naturalists

In mid-2018, members of the Galveston Bay Area Chapter of Texas Master Naturalists were introduced to the Texas Monofilament Recovery & Recycling Program. Stewarded by Sea Grant Texas, the program encouraged people to construct and install fishing line tubes, register them and collect line from the tubes for recycling and report the amounts collected.

Upon investigation we discovered that only 14 tubes had been registered in Galveston County. While these tubes were installed with the best of intentions, many had been abandoned and were non-functional.

Galveston Bay Area Master Naturalists partnered with Sea Grant Texas to develop a managed, sustainable solution to remove monofilament line from the environment and recycle it. A project was initiated to locate all of the monofilament tubes in Galveston County. A search by Master Naturalist teams discovered over 90 tubes. Each tube was described and GPS mapped. A Google map was created and volunteers were recruited to monitor the tubes. Project plans, goals and data repositories were established to ensure long-term project sustainability. Outreach and communication teams created a Facebook site, offered Beach Heroes programs in local schools and set up booths at local fishing tournaments and nature events to encourage community engagement.

Now, anglers can deposit their used line in these tubes and volunteers will collect, clean and ship the line to Berkley Tackle Company in Spirit Lake, Iowa to be recycled. Berkley has the special equipment to recycle monofilament line, turning it into plastic feedstock to make fishing line spools and park benches.

### **Galveston Beach Hero Project**

Susette Mahaffey\* Maureen Nolan-Wilde\*

Galveston Bay Area Chapter of Texas Master Naturalists

The Galveston Beach Hero art project is sponsored by the Galveston Bay Area Chapter – TX Master Naturalist (GBAC-TXMN). This project was successfully implemented in two elementary schools in Galveston; Oppe and L. A. Morgan Elementary.

GBAC-TXMN members delivered a presentation showcasing the various ways we are Galveston Bay beach heroes including: rescuing injured birds, cleaning our beaches, recycling used fishing line, protecting sea turtles and education/outreach activities to our community. The presentation was interactive with our members donning “hero capes” and sharing what we are doing to protect the environment. Our audience was 2nd grade students from L. A. Morgan and 3rd grade students from Oppe elementary schools.

At the end of the presentation, we placed our hero capes on the students and challenged them to join us by becoming Beach Heroes. Each student was asked to draw or depict what actions they are taking to be Galveston Beach Heroes. Our chapter donated art supplies to the schools for the project, and the school’s

art teachers welcomed the opportunity for the students to do a free form art project. Art work was exhibited at the schools as well as a public art exhibit in Galveston.

We have selected five art pieces from the collection to create blank greeting cards. The monies from the sale of these cards helps us in financing this program and purchasing art supplies to the schools that are participating now and in the future. This project will be repeated in more schools this coming year.

### **Join the Plastics Reduction Challenge to Save Wildlife: July 2020**

<sup>1</sup>Sophia Darling, <sup>2</sup>Cullen Geiselman, <sup>3</sup>Shannon College and <sup>4</sup>Anna Vallery

<sup>1</sup>Houston Zoo, <sup>2</sup>The Robertson Family Office, <sup>3</sup>Dallas Zoo, <sup>4</sup>Houston Audubon

Started by the Plastic Free Foundation in Australia, Plastic Free July is a global movement that helps millions of people be part of the solution to plastic pollution, helping to save marine animals. Hundreds of businesses, local governments and community organizations participate in the Plastic Free July challenge each year, working to reduce single-use plastic in their communities. Since going single-use plastic bag, bottle, and straw free, the Houston Zoo has participated in this challenge for the past four years, encouraging staff members to make changes to their daily plastic consumption habits, both on an individual level, and within their respective departments. In recent years, Dallas Zoo, Houston Audubon, and The Robertson Family Office, have joined the growing number of Texas-based organizations and businesses taking part in this annual challenge with the hope that participation will lead to creating a climate that drives staff and guests to take wildlife-saving actions year-round.

This presentation will showcase how the Houston Zoo, Dallas Zoo, Houston Audubon, and The Robertson Family Office were inspired to take part in the Plastic Free July challenge, the successes and challenges they faced since becoming involved in workplace plastic reduction efforts, and their goals as they look ahead towards participating in future challenges. This presentation will also include an invitation to all participating organizations at the Plastic Pollution Symposium to join together in the 2020 Plastic Free July Challenge, further showing how Texas is a leader in reducing plastic pollution to save wildlife.

### **Good Intentions Aren't Enough to Reduce Fishing Line Litter: A Case of Effectively Reducing Threats to Marine Wildlife Along the Texas Coast**

<sup>1</sup>Bill Wooten\*, <sup>2</sup>Cynthia Clevenger, <sup>3</sup>Sophia Darling, <sup>4</sup>Kari Howard, <sup>5</sup>Stennie Meadours, <sup>3</sup>Martha Parker, <sup>5</sup>Sandra Parker, <sup>3</sup>Taylor Rhoades

<sup>1</sup>Bill M Wooten and Associates, <sup>2</sup>Galveston Bay Estuary Program, <sup>3</sup>Houston Zoo, <sup>4</sup>Audubon Texas, <sup>5</sup>Texas Master Naturalists - Galveston Bay Area Chapter

As environmental threats continue to grow and put increasing pressure on both human and wildlife populations, researchers have been seeking out innovative approaches to lessen the impact of human-borne threats such as plastic pollution. Within the realm of social and environmental science, it is understood that just as people are often the source of environmental problems, they are equally the potential solution. Community based social marketing (CBSM) creates the right conditions and incentives to allow for a change in human behavior to be both accomplished and sustained.

In this presentation, we will demonstrate how organizations can collaborate in a unique, dynamic partnership to enhance the viability of a long-term, sustainable wildlife saving effort. We will explore the steps of developing and implementing a community based social marketing campaign and present examples of its value with respect to uncovering real and perceived barriers and benefits for adopting a new, wildlife-friendly behavior. This methodology is currently being used to address severe fishing line littering at three popular fishing sites – Surfside Jetty, Texas City Dike, and Seawolf Park. By

demonstrating each step of the CBSM process within the Plastic Pollution Prevention Partnership's fishing line recycling campaign, this presentation will showcase how this methodology ultimately results in a better research experience and creates a solid foundation for campaign implementation.

## **Tackling Plastic Pollution on Social Media: Reflecting on Texas Sea Grant's Plastic-Free July Campaign**

Sara Carney\*, Kimber De Salvo, Callie Rainosek  
Texas Sea Grant

To bring awareness to plastic pollution and spark behavioral changes, Texas Sea Grant's Communications Team promoted a Plastic-Free July campaign on our social media platforms (Facebook, Twitter, and Instagram). The campaign consisted of 45 posts, with three videos and one Facebook Live event, and a reach of over 89,000. The campaign was launched in late June with a video called the "Plastic-Free July Challenge." The challenge (1) encouraged viewers to give up a plastic item for the month of July, (2) indicated how Texas Sea Grant would participate in the challenge, and (3) directly challenged three groups to make their own videos. The video reached 1.6 thousand views and caused four groups to directly take the Plastic-Free Challenge and generate their own videos, which led to further participation downstream. The campaign also received engagements from important players in the plastic pollution movement and companies, including 4ocean, Plastic-Free July, and Ben & Jerry's. In addition to the "Plastic-Free July Challenge" video, we also produced videos on the effects of microplastics on human health and wildlife. To date, these are still some of Texas Sea Grant's most popular videos, far surpassing other videos in views. We also produced a Facebook live Q&A session that answered questions on how to reduce plastic consumption in everyday life. Overall, the campaign was well-received and successfully created a dialogue on plastic pollution among Texas Sea Grant's followers and beyond.

## **Plastic Pollution Prevention Partnership**

Stennie Meadours

Galveston Bay Area Chapter – Texas Master Naturalists & Plastic Pollution Prevention Partnership

The Plastic Pollution Prevention Partnership (P3P) was introduced at the 2016 Back the Bay Symposium as an incident command system for plastic pollution on the shorelines of the Galveston Bay Area. The P3P consists of: American Bird Conservancy, Audubon Texas, Galveston Bay Area Chapter - Texas Master Naturalist, Galveston Bay Foundation, Environmental Protection Agency, Gulf Coast Bird Observatory, Houston Audubon, Houston Zoo, Keep Bolivar Beautiful, Texas Commission on Environmental Quality, Galveston Bay Estuary Program, Texas Parks and Wildlife and Turtle Island Restoration Network. The mission statement is ".....that initiates a coordinated and collaborative cleanup/preventative response to plastic pollution and its impact to wildlife and water quality at accumulation spots along the shorelines of Galveston Bay."

P3P is modeled after the spill response Incident Command System used by agencies in oil and chemical spills.

Since January 2016 partner organizations have worked together to continue shoreline plastic cleanups, expanding efforts by:

- Creating the Galveston Bay Injured Bird Response Team
- Launching the human behavior change project "Fishing Line Recycling Campaign" currently underway.
- Hosting the 2nd Annual Plastic Pollution Prevention Symposium in October of 2019
- Fostering three additional programs via Galveston Bay Area Chapter-Texas Master Naturalist, P3 Bayou Cleanup Crew, the Great Monofilament Bin Adventure and Nurdle Patrol.

# Abstracts for Poster Presentations

## **Wildlife Habitat Restoration by Kayak**

Robin Kendrick-Yates\*

Galveston Bay Area Chapter – Texas Master Naturalists

Plastic pollution is a worldwide problem of immense proportions. Making a difference as a single individual appears unrealistic. However, a small group of volunteers regularly challenge this notion. They couple their love of wildlife and kayaking with the removal of debris found in local bayous. Groups range in size from two to seven individuals who kayak one to three times weekly, collecting debris along the way. Much of it is plastic, including single use bags, bottles, wrappers, and food and beverage containers. The public discards these items carelessly, which eventually make their way to the waterways. This debris poses a constant threat to the wellbeing of the indigenous marine life and waterfowl. It alters the local ecology, affects the food chain, and damages their habitats. With minimal equipment and expense, this group of volunteers removed over 14,000 pounds (7 tons!) of debris from our shorelines in only the past twelve months. This demonstrates the necessity of a successful strategy to minimize plastic litter reaching our oceans. Namely, we propose a grassroots effort to recruit and mobilize citizens to remove any plastic they encounter in their daily routines.

## **Using Green Chemistry to Quantify Persistent Organic Pollutants on Nurdles Found Along Texas Beaches**

Carol Haley\*, Jeremy Conkle, Jace Tunnell, Zhanfei Liu

Texas A&M University-Corpus Christi\*, University of Texas Marine Science Institute, Mission Aransas NERR

Nurdles are tiny plastic pellets that are used in the manufacture of all plastic products, including many household goods.

Spills from the transport of nurdles and manufacture of plastics have increased and there is a concern for their effects on the environment. Nurdles get washed into streams via storm drains or get dumped directly into water sources, where they flow downstream to the ocean and accumulate on beaches. Aside from being a physical problem, nurdles can sorb persistent organic pollutants (POPs) at concentrations higher than the surrounding environment. If these nurdles are consumed by wildlife, the POPs and other contaminants on the plastic may transfer to the organism. This could also lead to exposures for higher trophic levels. This proposed research will examine the presence and concentrations of POPs present on nurdles in the Gulf of Mexico by attempting to develop new methods that incorporate the principals of Green Chemistry. Sample analysis will be performed using a GC triple quadrupole mass spectrometer. Sample collection will be conducted through a partnership with Mission Aransas NERR and the Nurdle Patrol, we will use citizen scientists to help us gather nurdles for analysis of POPs. This study will be one of the first to apply Green Chemistry approaches to extract and quantify contaminants on nurdles in the Gulf of Mexico, and also globally.

## **Quantifying Microplastics loading to Nueces Bay, Corpus Christi, Texas**

Lauren Rodriguez\*, Jianhong Ren and Jeremy Conkle

Texas A&M University-Kingsville

This study focuses on quantifying the inputs of microplastics (films, fibers, and particulates) from Nueces River Basin to Nueces Bay. Water samples have been collected at/near the river discharge point into the Nueces Bay. Samples were collected using the grab and scoop method, filtered, and sorted and suspected plastics were cataloged based on properties of size, shape, and color. Suspected plastics were subsampled

for analysis with a Thermo Nicolet iN10 Fourier-transform infrared spectrometer (FTIR) with a Thermo Nicolet iN5 microscope to verify plastic polymer types. Additionally, at various locations in Nueces Bay located in Corpus Christi, Texas, the water depth, velocity (FlowTracker; SonTek/YSI; San Diego, CA, USA), salinity, specific conductivity, dissolved oxygen, temperature, pH, and turbidity will be measured (YSI Inc., Yellow Springs, OH). As of August, 2019, over 1400 potential microplastics were sorted, of this amount 45% were analyzed using the FTIR. The synthetic materials have been found including polystyrene, polypropylene, polyester, and polyethylene and the semi synthetic materials found include rayon, cellophane, linen, and filter material (nitrocellulose). This paper will present the preliminary results obtained. It is expected that this project will contribute to the discussion of the main types of plastics and the amount of each plastic type found in Nueces Bay. Furthermore, the results of this study can be used for educational purposes.

### **Microplastics in the Mississippi River**

Kerrin Toner\*, Mark Benfield, Ahmed Gad, Stephen R. Midway  
Louisiana State University

Categorized as being <5 mm in diameter, microplastics can be hard to see, but are often the most abundant in aquatic environments. While some microplastics are purposely manufactured to be small in size, such as microbeads and raw resin pellets, others come from macroplastics breaking apart overtime. This fragmented plastic, mostly derived from terrestrial sources, then finds its way into aquatic environments due to improper disposal and runoff. Alarming high concentrations of microplastics have recently been recorded in the northern Gulf of Mexico, which are believed to have come from the Mississippi River. This study seeks to quantify and identify microplastics within the Mississippi River Basin (MRB) from the Baton Rouge to New Orleans area, as well as within five fish species common throughout the MRB, hypothesizing that microplastic counts in the river and within the fish will increase from the northern sample sites to southern sample sites. Partnering with state agencies along the MRB, in 2018 we sampled n>250 fish from several sites along the Mississippi River (from Minnesota to Louisiana). Among the species sampled, Bluegill were the most common (n=69) and Flathead Catfish were the least common (n=17). Digestive tracts from fish were digested using a 10% KOH solution, and filtrated onto nylon net filters. A FT-IR spectrometer was used for identification of the microplastics. Results are still preliminary, but from the fish that have been completely processed, microplastics have been present.

### **Microplastic Quantification in Texas Waterways**

Matthew Watford\*, Jess Meyers, Simon Geist, Jeremy Conkle  
Texas A&M Corpus Christi

Plastics have become a staple in everyday life; from packaging, to toys, to clothing, plastic has completely enveloped itself in day to day activities. However, may plastic material end up in the environment where they fragment into smaller and smaller particles. Additionally, fibers from synthetic fabrics also shed thousands of fibers during normal use and even more during washing. These small fragments and fibers are called microplastics (< 5mm diameter) and are ubiquitous in aquatic environments globally. The amount of microplastics in Texas' coastal rivers and bays is now well understood. This Texas General Land Office Sponsored study is sampling all the rivers and coastal bays of Texas to quantify estimates for microplastic loads and their discharge to the Gulf of Mexico. As there is no standard sampling method, one aspect of this study is to compare collection with a peristaltic pump verses a Van Dorn sampler. Water samples are currently being collected at both the surface and 60% of the depth. The samples are then filtered using a 0.45 µm membrane filter, followed by visual identification of "suspected microplastics" under a stereo microscope. Suspected microplastics are then chemically identified using micro-Fourier Transform Infrared Spectroscopy (µFTIR). Preliminary results will be presented.

## **The Great Monofilament Fishing Line Tube Adventure**

Rick Becker\*, Susette Mahaffey, Keith Mahaffey, Stennie Meadours, Maureen Nolan-Wilde, Sandy Parker

Galveston Bay Area Chapter of Texas Master Naturalists

In mid-2018, members of the Galveston Bay Area Chapter of Texas Master Naturalists were introduced to the Texas Monofilament Recovery & Recycling Program. Stewarded by Sea Grant Texas, the program encouraged people to construct and install fishing line tubes, register them and collect line from the tubes for recycling and report the amounts collected.

Upon investigation we discovered that only 14 tubes had been registered in Galveston County. While these tubes were installed with the best of intentions, many had been abandoned and were non-functional.

Galveston Bay Area Master Naturalists partnered with Sea Grant Texas to develop a managed, sustainable solution to remove monofilament line from the environment and recycle it. A project was initiated to locate all of the monofilament tubes in Galveston County. A search by Master Naturalist teams discovered over 90 tubes. Each tube was described and GPS mapped. A Google map was created and volunteers were recruited to monitor the tubes. Project plans, goals and data repositories were established to ensure long-term project sustainability. Outreach and communication teams created a Facebook site, offered Beach Heroes programs in local schools and set up booths at local fishing tournaments and nature events to encourage community engagement.

Now, anglers can deposit their used line in these tubes and volunteers will collect, clean and ship the line to Berkley Tackle Company in Spirit Lake, Iowa to be recycled. Berkley has the special equipment to recycle monofilament line, turning it into plastic feedstock to make fishing line spools and park benches.

## **Galveston Beach Hero Project**

Susette Mahaffey\* Maureen Nolan-Wilde\*

Galveston Bay Area Chapter of Texas Master Naturalists

The Galveston Beach Hero art project is sponsored by the Galveston Bay Area Chapter – TX Master Naturalist (GBAC-TXMN). This project was successfully implemented in two elementary schools in Galveston; Oppe and L. A. Morgan Elementary.

GBAC-TXMN members delivered a presentation showcasing the various ways we are Galveston Bay beach heroes including: rescuing injured birds, cleaning our beaches, recycling used fishing line, protecting sea turtles and education/outreach activities to our community. The presentation was interactive with our members donning “hero capes” and sharing what we are doing to protect the environment. Our audience was 2nd grade students from L. A. Morgan and 3rd grade students from Oppe elementary schools.

At the end of the presentation, we placed our hero capes on the students and challenged them to join us by becoming Beach Heroes. Each student was asked to draw or depict what actions they are taking to be Galveston Beach Heroes. Our chapter donated art supplies to the schools for the project, and the school’s art teachers welcomed the opportunity for the students to do a free form art project. Art work was exhibited at the schools as well as a public art exhibit in Galveston.

We have selected five art pieces from the collection to create blank greeting cards. The monies from the sale of these cards helps us in financing this program and purchasing art supplies to the schools that are

participating now and in the future. This project will be repeated in more schools this coming year.

### **Campus Going Strawless**

Yadira Hernandez\*

Sustainability Intern for Texas A&M University Dining

Each day, 500 million people use single-use plastic straws which ultimately ends in landfills, degrading in our environment and in our oceans. A movement for change towards plastic waste must begin and it starts with each individual. We all make a choice each day and Texas A&M University Dining has decided to launch a “going straw-less” initiative at many of our on-campus dining locations. In addition to our main dining halls being straw-less, we envision a new way towards reducing our single-use plastic waste. We have made straws and lids available upon request at most of our retail dining locations. We encourage students to skip the straw and lid and promote switching to a circular lifestyle using reusable straws. With over 40 dining locations on campus, and growing, Texas A&M University is one of the largest campuses in the nation. Due to this, we see a personal responsibility to increasing our sustainability efforts. A change to single-use plastic waste is a message we would like to send campus-wide. Furthermore, we seek to expand our efforts to finding more efficient materials to ultimately replace many single-use plastics from our dining locations.

# Plastic Pollution Prevention Partnership

The Plastic Pollution Prevention Partnership (P3P) is hosting the second annual Texas Plastic Pollution Symposium. The P3P is a partnership of governmental, non-governmental, and private organizations that addresses non-point source pollutants impacting wildlife and water quality, particularly plastic litter and monofilament found on the shores of Galveston Bay. This partnership seeks to collaborate and coordinate internal resources and volunteers to enhance our collective response to shoreline non-point source litter. In addition, the P3P is broadening existing efforts, from pollution clean-up efforts to preventing pollution, through education and action.

Member organizations of the Plastic Pollution Prevention Partnership are:



A PROGRAM OF THE TCEQ



# Attendee Organizations

American Bird Conservancy	Houston Advanced Research Center (HARC)	Surfrider Foundation - Texas Coastal Bend Chapter
Amos Rehabilitation Keep	Houston Association of Sea Kayakers	Surfrider Foundation Galveston Chapter
Audubon Texas	Houston Audubon	Surfrider Foundation Texas Upper Coast
BEACH	Houston Zoo, Inc.	Texas Commission on Environmental Quality
Beach Baggin Galveston	Keep Bolivar Beautiful	Texans for Clean Water
Black Cat GIS & Biological Services	Keep Texas Beautiful	Texas A&M AgriLife Extension Service
Brazoria County Parks Dept.	Lafayette Parish Master Gardeners	Texas A&M Chartwells Dining
Buffalo Bayou Partnership	LCRA - Matagorda Bay Nature Park	Texas A&M University
Children's Environmental Literacy Foundation (CELF)	Louisiana Master Naturalists of Greater Baton Rouge	Texas A&M University Corpus Christi
City of Texas City	Lower Colorado River Authority	Texas A&M University at Galveston
Coastal Bend Bays & Estuaries Program	Mission-Aransas National Estuarine Research Reserve	Texas A&M University Kingsville
College of the Mainland	Mission-Aransas NERR at The University of Texas Marine Science Institute	Texas Adopt-A-Beach Program
Crenshaw School of Environmental Science	Moody Gardens	Texas General Land Office
Dallas Zoo	National Audubon Society	Texas Master Naturalist Program
Ecologia Consulting	Navarro Research and Engineering	Texas Master Naturalist Mid-Coast Chapter
EPA Region 6	NCTCOG	Texas Master Naturalist, Gulf Coast Chapter
Explore Works	NOAA Marine Debris Program	Texas Parks & Wildlife Department
Exxpedition	O'Connell College Prep	Texas Sea Grant
FGBNMS/NOAA	P3 Bayou Crew	Texas Senate
Galveston Bay Area Chapter - Texas Master Naturalist	P3 Partnership – GBAC -TXMN	The Nature Conservancy
Galveston Bay Estuary Program	Plum Creek Watershed Partnership	The Seib Law Firm
Galveston Bay Foundation	Power Home Remodeling Group	Tomball Memorial High School
Galveston Island Humane Society	Rice University, Baker Institute for Public Policy	Turtle Island Restoration Network
Galveston Park Board	Rio Grande International Study Center (RGISC)	Tyler Junior College
Girl Scouts	Surfrider Foundation – South Texas Chapter	University of Houston-Clear Lake
Harris County Pct. 4		United States Geological Survey
Harris County Precinct One Commissioner Rodney Ellis office		University of Texas MSI
Hays County Master Naturalists		
H-E-B		