

# MACRO TO MICROPLASTIC IN NARRAGANSETT BAY



## WORKSHOP SUMMARY

**NARRAGANSETT BAY  
ESTUARY PROGRAM**

**FRIDAY, OCTOBER 7, 2022**

Roger Williams University CAS 157  
1 Old Ferry Rd.  
Bristol, RI 02809

# PLASTICS IN NARRAGANSETT BAY



## Acknowledgements

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The Narragansett Bay Estuary Program would like to thank its partners, the planning committee, the speakers, and the public for creating a fantastic event. **RWU Events Staff** secured space for this meeting and managed all logistics. **Rhode Island Water Resources Center** at the University of Rhode Island's College of Engineering provided honorarium and travel support for our keynote speaker, Dr. Scott Coffin. The **Planning Committee** crafted the event, suggested speakers, and participated during the event. The speakers and the public created an open and inviting forum to discuss plastic pollution in the region and how best to research and manage the pollution.

*Thank  
you!*

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**Kathleen Shannon**, University of Rhode Island

**Koty Sharp**, Roger Williams University

**Coleen Suckling**, University of Rhode Island

**Jed Thorp**, Clean Water Action

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### Event Partners

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Roger Williams  
University



This event has been funded by the United States Environmental Protection Agency under Assistance Agreement CE00A00967 to Roger Williams University on behalf of the Narragansett Bay Estuary Program. The contents of this event do not necessarily reflect the views and policies of the USEPA, nor does the USEPA endorse trade names or recommend the use of any products, services, or enterprises mentioned during this event.

# PLASTICS IN NARRAGANSETT BAY



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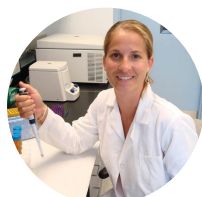
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# PLASTICS IN NARRAGANSETT BAY



## *About the Workshop*

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**Plastic pollution** is a known threat to the Narragansett Bay region, from the macro scale (the plastic we can see) to the micro scale (the tiny bits of plastic that may not be seen without a microscope). Trash and plastic are on our streets, clog storm drains, and find their way to local waters. Improperly recycled plastic adds to our local landfills. Researchers at our region's universities and federal agencies are working to understand how plastic pollution impacts the environment, and what we can do about it.

On October 7, 2022, the Narragansett Bay Estuary Program (NBEP) hosted a **learning forum** that focused on the status of plastic pollution in the region and how scientists and advocates are tackling the issue. Regional, national, and international experts on plastic pollutions and solutions joined local community groups and citizens to **discuss, brainstorm, and create content** to share with advocacy agencies and policy makers to support and create more equitable solutions to plastic pollution.

This event **built on** many prior conversations and collaborations started before the COVID-19 pandemic and **set the stage for** more challenging conversations to re-ignite progress and develop interdisciplinary partnerships. The final pages of this document contain a list of ideas to expand the community of practice and create collaborations for monitoring, litter reduction, and, more specifically, how NBEP will support these goals.

This summary shares key ideas and content from the forum. Please visit the website for all related videos and documents:

<https://www.nbep.org/nbep-plastics-event-2022>

# PLASTICS IN NARRAGANSETT BAY



*History of Plastic*

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“We have deep, deep roots here. The **problem with plastics goes back to the beginning.**” ~ Rebecca Altman

Our relationship with plastic began in the 1850s, when natural latex rubber from tropical rubber trees was vulcanized to make the rubber stable in more climates. Charles Goodyear (the tire company was named *after* him, not founded by him) showcased all the products that could be made with rubber. From that moment forward, through genocide and environmental injustices, plastic became part of our lives. As the petrochemical industry took hold, plastic manufacturers created markets for byproducts and became as inventive with their marketing as with their molecules. Today, there are over 8.3 metric tons of plastic in the world.

“Plastics have always been global while imposing localized burdens. While the focus is downstream, then, as now, they pose upstream issues too... including **social, health, and environmental consequences** across plastics’ supply chains even if substrate is biobased.”

~ Rebecca Altman

# PLASTICS IN NARRAGANSETT BAY



## *Current Policies Tackling Plastic Pollution*

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**"Legislation takes time"~ Jed Thorp**

Locally, Rhode Island and Massachusetts have advocacy agencies supporting various actions to reduce litter and enhance producer responsibilities towards plastic reduction. Advocates have successfully advanced a number of initiatives, including a bottle-redemption bill under consideration in RI. Policies need to be crafted carefully to address how they will be managed/enforced and minimize unintended consequences. Additionally, the policies are scrutinized by constituents, advocates, and lobbyists, which adds time, and complexity. For each item mentioned in these policies, manufacturers do not want to see their products banned, or their production changed which might cost the manufacturer money. Therefore, legislation takes time; for example a 2022 bill issuing a statewide ban of single-use plastic bags in RI took four years to pass.

### **What advocates need for plastic pollution reduction policies:**

- ✓ education of decision makers
- ✓ engagement and education of the public
- ✓ new voices and perspective at the table
- ✓ better explanation of the plastic problem
- ✓ good examples from other states

# PLASTICS IN NARRAGANSETT BAY



*California Leads the Way*

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California **definition of microplastics** (adopted June 6, 2020):  
solid polymeric materials which are particles which have **at least 3 dimensions that are greater than 1 nanometer and less than 5,000 micrometers.**

California has stood out as an example of statewide efforts to tackle trash and plastic pollution. In 2015, California passed a "trash" TMDL (total maximum daily load) which sets a narrative objective for no trash, discharge prohibition, and sets expectation for stormwater. Permittees may comply in two different ways - trap everything larger than 5 millimeters and/or create source controls (like bag bans) to show reduction of litter. Following on this success, in 2018 California passed mandates to develop a microplastic strategy including water quality standards. The state has since defined microplastics and developed a strategy to reduce microplastic pollution. California is on track to develop water quality standards for drinking water and ecological risk.

"There are **more microplastics in bottled water than tap water** because most of the particles come from the bottle itself.  
Want to reduce the plastic *you* ingest?  
Bring reusable water bottles."  
~ Scott Coffin

# PLASTICS IN NARRAGANSETT BAY



*Where do we find plastic?*

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**Plastic is everywhere and  
gets into everything**

Textiles, both natural and manufactured, are essential to our way of life - from clothing to seat covers to rope to tea bags. Typical fibers are 20-25 micrometers which is smaller than the width of a human hair (75 micrometers), and are categorized as microfibers. Fibers get into the environment through manufacture, use, and disposal. Laundering clothes is the top way fibers get into surface waters. Most disposed fabric is sent to landfills or incinerated, not recycled. Along the shore, lost nets and ropes from fishing gear or boats are considered litter. We cannot eliminate textiles from our lives, but we can reduce their release into the environment.

"Fast fashion has increase the amount of **fabric produced per person from 5 lb in 1900 to 25 lb in 2016**"

~ Martin Bide

"Rhode Island's Johnston Landfill has about **20 years left before it's completely full**"

~ Madison Burke

Rhode Island has one central landfill and materials recycling facility located in Johnston and operated by Rhode Island Resource Recovery. Recycling is a business requiring buyers for the material, a facility to sort and process the materials, and responsiveness to the economics of the recycling program. In 2022, over 7,000 tons of plastic containers were sorted and sold by Rhode Island Resource Recovery through its recycling program. RI Resource Recovery is promoting recycling as a strategy to slow the pace of filling the landfill.



# PLASTICS IN NARRAGANSETT BAY



*Where do we find plastic?*



ONE DAY OF CLEANING PROVIDENCE PLACE MALL SIPHON INLET STRUCTURE

Image credit:  
Christopher Dracoules

Plastic finds its way into our wastewater through washing textiles and stormwater runoff channeling litter into the stormwater collection system. Plastic bottles and rags are the biggest contributors to back-ups as water enters the wastewater treatment facility. This plastic (and other debris) requires time, money, and manpower to remove. The Narragansett Bay Commission uses preventative maintenance to reduce back-ups and system delays.

Trash ends up on our beaches and along our shores. In 2021, Save the Bay hosted 219 cleanups, with 1,940 volunteers, and collected 120,651 pieces of trash (equal to 11,778 pounds) along 231 miles of Rhode Island's shoreline. The fastest growing category of trash collected is "tiny trash" which includes small pieces of plastic and foam (usually less than 1 inch in size). Save The Bay is now finding plastic throughout the wrack line tangled in seaweed. Beach cleanups are a Band-Aid to plastic pollution and more upstream controls need to be in place.

"Tiny Trash – the small bits of plastic – is the **fastest growing category of trash clean-up**"

~ July Lewis

# PLASTICS IN NARRAGANSETT BAY



*Learning from our neighbors: Trash-Free Mystic*



Left: Boom and Trash Traps. Right: Visual Trash Assessment

Image credit: Sushant Bajracharya

The Mystic River Watershed is a network of streams, rivers, and lakes which drain into the Mystic River, outside Boston, Massachusetts. It is 76 square miles, with 21 communities and over 600,000 people. Mystic River Watershed Association undertook a large initiative, Trash-Free Mystic, to curb trash and plastic pollution in the watershed. They conducted a trash survey to find trash hot-spots and deploy volunteers to conduct clean-ups or organize street sweeping. On the rivers, they used trash traps and booms to capture trash before it reached the Mystic River. The Mystic River Watershed Association promotes small changes to reduce plastic in people's everyday lives - such as bringing a reusable water bottle to events.

Trash-Free Mystic Website: <https://mysticriver.org/trashfree-mystic>

Trash-Free Mystic's Malden River trash trap **has visibly reduced trash** in the river and **has increased recreation**.

~ Friends of Malden River

# PLASTICS IN NARRAGANSETT BAY



Where is plastic in our environment?

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Once plastics leave the land  
they enter the water,  
sediments, and organisms

"Currently, we have **very little information** about plastics in the waters of Narragansett Bay" ~ Andy Davies

Microplastics have been found in the waters, sediments, and organisms in Narragansett Bay. While most pollutants in Narragansett Bay are more concentrated in the urbanized northern reaches than the suburban southern reaches, microplastics do not follow that trend. They are found everywhere.

As methods improve, we **will find more microplastics** in the environment



Can you pick  
the plastic  
particle?



Image credit: Coleen Suckling

Organisms **cannot distinguish** plastics from their food sources.

# PLASTICS IN NARRAGANSETT BAY



## Where is plastic in our environment?

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Organisms react differently to the presence of microplastics. When eastern oysters filter feed, they can reject some of the microfibers without retaining them in their gut. Conversely, *Astrangia* coral (a coral species that lives in RI waters) preferentially ate microplastic beads over brine shrimp (a standard food choice). Once the coral rejects the microplastic beads, they will reject natural food sources that are similar in size and shape. The next logical research step is to investigate if microplastics can be passed up the food chain.

Simple questions – **can microplastics be passed up the food chain** – are critical and have not yet been fully answered.

Chemicals, bacteria, and pathogens **can “hitch a ride” on microplastics** into and onto organisms potentially causing harm

Microplastics can act as vectors of disease and harmful pathogens for organisms in the water. Biofilms develop on microplastic particles and could contain harmful pathogens (chemical, bacterial, and viral) which can negatively affect organisms which ingest the particles. Research by Dr. Koty Sharp shows that the pathogens can be deposited in the organism even as the microplastic bead (which was the vehicle to deliver the pathogen) was egested from the organism.

Dr. Sharp's presentation was recorded at a later date and included here:

<https://youtu.be/krATroUZqlo>

# PLASTICS IN NARRAGANSETT BAY



Building the community of practice

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"It takes a village to deal  
with microplastics."

~ Kay Ho



The University of Rhode Island created a research collaboration to connect researchers focused on plastic pollution. The collaboration is expanding to create a network of researchers, policy makers, and advocates beyond URI.

## Local Research and Outreach Programs

### University of Rhode Island

- Assessment of marine surface waters
- The role of watershed transport from fresh to salt water
- Movement of plastic in the food web and impacts on organisms

### United States Environmental Protection Agency

- Standardize extraction, identification, and quantification methods for microplastics in sediments
- Volunteer science methods to identify microplastics
- Explore effects of micro- and nanoplastics on organisms that live in the sediment, such as bivalves and bacterial communities

### Roger Williams University

- Developing microplastic sampling protocols in rivers and streams
- Assessing the impact of plastics pollution on marine microbial ecosystems and how those pollutants change the way animals interact with microbes
- Developing soy-based material to use as soil erosion control

# PLASTICS IN NARRAGANSETT BAY

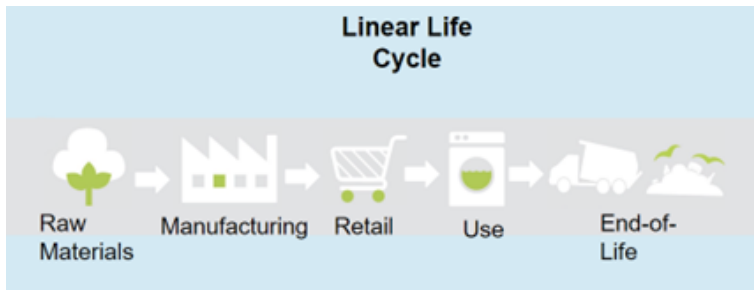


What's Next

"Plastic waste is a resource at  
the wrong time and place"  
~ Vinka Craver

Since the beginning of our relationship with plastic, we have thought of it as a linear economy: creation, use, and then disposal. Now, we have the opportunity to re-think our relationship with a circular economy in mind: how do we use our waste to prevent the creation of more plastic. This invites collaboration across sectors.

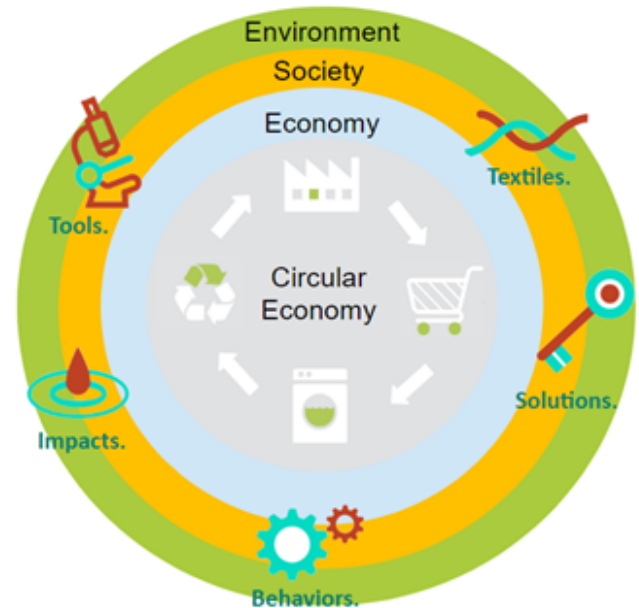
## Collaborative Research Opportunities



Above: Linear Life Cycle.

Right: Circular Economy with collaborative opportunities

Image credit: Vinka Craver



Plastic is not “bad”. Plastic in our cars, in our homes, in our hospitals, and all around us protects us from harm. We need to create a better relationship with plastic through **learning from our history, communication and engagement, research and monitoring, and better policy creation.**

# PLASTICS IN NARRAGANSETT BAY



## What's Next

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### **Learn from history, don't repeat it!**

- Engage unlikely partners – from the communities to the producers/manufacturers/distributors of plastic and other technology or commercial industries
- Encourage more diverse viewpoints with a focus on unintended consequences of decision-making
- Engage environmental justice advocates, researchers, and social scientists to weigh in
- Explore ways to reduce plastic production through better reuse of the plastic currently in the world

### **Communicating and engaging with people on plastic**

- Better communicate how macro-plastic becomes microplastic
- Work with local agencies and governments to create new programs to encourage better sorting and disposal of trash
- Develop municipal composting programs to further reduce overall trash, and encourage better recycling
- Engage new partners to craft messages and release them to different audiences
- Encourage creative reuse of plastic in our environment
- Encourage small measures to reduce plastic pollution – bringing reusable water bottles and coffee cups to events
- Engage with volunteer scientists to monitor their neighborhoods for plastic pollution

# PLASTICS IN NARRAGANSETT BAY



What's Next

## Research/Monitoring topics

- Develop a tiered monitoring system to find “hot spots” of plastic pollution and strategically use the more expensive, technologically advanced detection methods
- Need to “age” plastics in the environment – how long do plastics last in the environment? And where do they go?
- Explore new disposal techniques that are more environmentally friendly
- Fully understand the direct and indirect impacts of plastic on the economy (both plusses and minuses)
- Need to understand the combined impacts of plastic and climate change

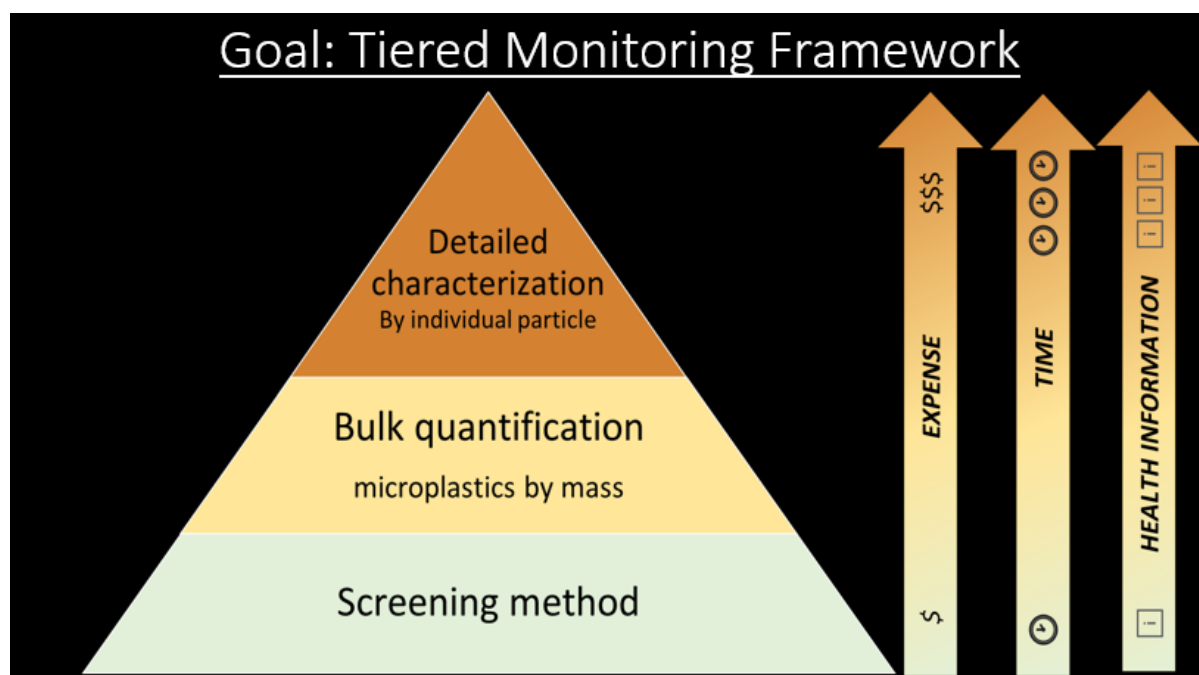


Image credit: Scott Coffin



# PLASTICS IN NARRAGANSETT BAY



What's Next

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## **Upstream and downstream policies**

- Engage all stakeholders including local regulators, government officials, plastic producers, healthcare industry, and for-profit entities from the beginning of policy development
- Create policies to address upstream sources while cleaning downstream sources
- Focus on consensus-driven policies which adequately explore impacts to those most vulnerable and the unintended consequences of these policies
- Create a regional approach for New England or work with regional organizations to join those approaches
- Share how policy is developed and passed – does the benefit outweigh the cost?
- Explore policies which would group buyers to drive plastic production, rather than banning certain types of plastic

## **What NBEP has done and will continue to do...**

- Fund and support interns, projects, and programs
- Convene meetings and workshops for interested people and organizations
- Participate in regional planning and programs and convey those messages to our local partners

# PLASTICS IN NARRAGANSETT BAY



*What you can do to tackle trash RIGHT NOW!*

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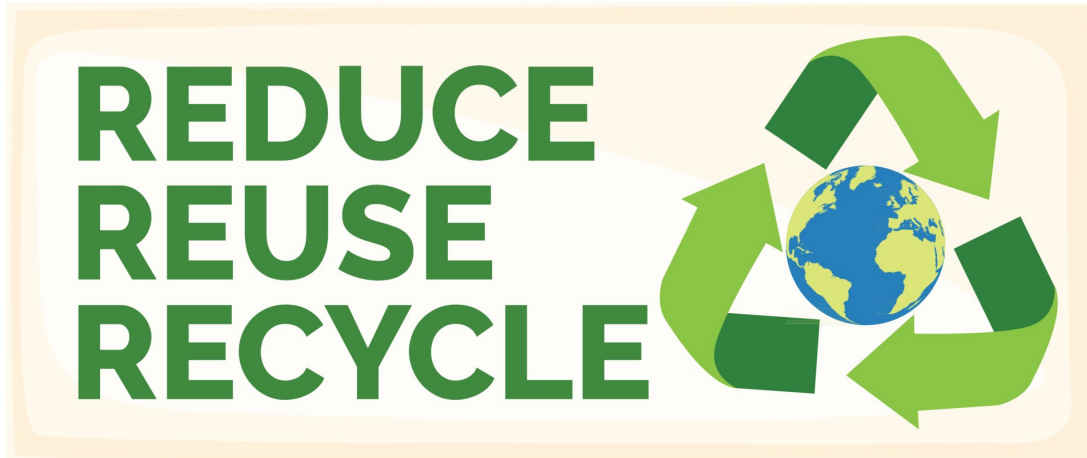


Image credit:  
[Vecteezy](#)

**These are listed in order!**  
**Reduce, reuse, *then* recycle**

## **“Pack in, pack out”**

When you go out, put your trash in the proper receptacles or bring it home with you. Use reusable containers for food, drinks, or other items

## **Sort your trash to reduce your trash!**

Categories: (1) recycled at home, (2) recycled via drop-off or special collections, or (3) composted at home

## **Recycle your plastic packages from online orders!**

Any clean, dry bags and film that can stretch a little can be put in the drop-off containers located inside big box stores or grocery stores.