

**APPENDIX**

# WHY COMMUNITIES SHOULD REDUCE PLASTIC WASTE GENERATION

By

Serpil Guran, Ph.D.

**Rutgers EcoComplex “Clean Energy Innovation Center”**

My name is Dr. Serpil Guran and I serve as the Director of Rutgers EcoComplex “Clean Energy Innovation Center and Business Incubator”. I also teach several classes as an Associate Teaching Professor at Rutgers University School of Environmental and Biological Sciences’ (SEBS). My teaching and current research involves sustainability and efficiency improvements of waste management practices. Specifically, changing from the current linear waste management practice of “manufacture-use-dispose” to a circular waste management approach which returns waste materials back into the economy to promote sustainability, efficient resource management and mitigation of climate change.

It is undeniable that fossil-fuel based plastics have a significant role in our lives. Lives are saved through the use of plastic in multitudes of medical devices, food storage has been revolutionized, automobiles are lighter and more fuel efficient because of plastics. What makes plastic so convenient in our day-to-day lives is its low production cost. It also makes it ubiquitous, resulting in one of our planet’s greatest environmental challenges.<sup>1</sup> If we look into our daily activities, we easily can name at least 10-15 or even more items made completely out of plastics or with plastic parts and components, including our smart phones! Currently, the production, consumption and disposal of plastics not only harms the environment, but also creates economic problems since current approaches do not support closed-loop, low-carbon processes.

Global annual plastics production increased from 2 million tons in 1950 to 381million tons in 2015. If this business-as-usual trend continues, plastics production is expected to quadruple (figure 1) and it is estimated that total volume of plastics ever produced will reach 34,000 million tons (Mt).<sup>2,3</sup>

## ***Recycling Plastics***

Communities generally have dealt with the plastic waste disposal problem by introducing single stream recycling practices. This pathway also included shipping a significant portion of plastic waste to China over the past 25 years. In 2016, 15 million tons of plastic waste was traded globally, with China being the top importer and the US the largest exporter. However, China in early 2018 cancelled its global imports requiring that the plastics they import be completely uncontaminated. This decision was most likely the result of single stream recycling practices which comingles paper, glass, metals and plastics together to be sorted at the recycling facility. Experts agree that single stream recycling undeniably increased the quantity of recycled materials, but reduced the quality, resulting in a contaminated supply and reduced economic viability of recycling operations.<sup>3</sup> In addition to the contamination problem, the projected plastic waste generation rates also confirm that recycling can no longer be considered the only primary solution to this serious problem. It is reported that since 1950, only 9% of discarded plastics have been recycled. Currently, the EU has the best recycling rates with approximately 30% of plastic being recycled, compared with only 9.5% -12% post-consumer plastics collected for recycling in the US. New Jersey current post-consumer plastics recycling rates varies between 6% - 9%, though some former numbers indicate recycling rates around 13%.

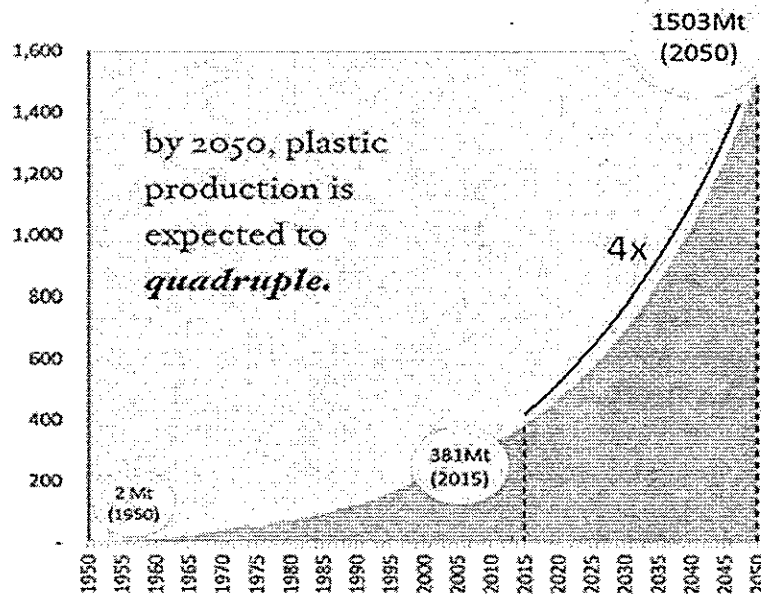


Figure 1. Annual Global Polymer Resin & Fiber Production <sup>1</sup>

Why the recycling rates are so low? Because people voluntarily decide what to put into their recycling bins and there are no attractive/encouraging incentives for plastics recycling. Also, virgin plastic prices are low as a result of high demand and low fossil fuel prices. In addition, lighter weight plastics which contain additives make these plastics unattractive and economically unfeasible for recycling. So, what happens if the plastic waste is not recycled? They certainly will leave the circular economy. We basically manufacture it, use it, and throw it away! The throw away culture treats plastics as a disposable material rather than a valuable resource to be harnessed.

### ***Single Use Plastics***

Single use plastics can be defined as “plastic packaging and other consumer products made out of plastic that are designed to be used once and thrown away after a brief use.” Single use plastics include bottles, cups, plastic lids, bags, plates, utensils, straws, stirrers, swabs, food containers, plastic films wraps, and plastic packaging. Americans purchase 50 billion water bottles per year – with average of 13 bottles per month per person. Also, 100 billion plastic bags and 25 billion “Styrofoam” coffee cups are thrown away by Americans each year - that means 307 bags and 77 cups are thrown away per person. Half a billion straws are used and thrown away by Americans every day.

The most common shopping bags are made of polyethylene - light weight and flexible synthetic resin manufactured through ethylene polymerization. Styrofoam is a brand name for foamed plastics and generally used for food containers as rigid, lightweight with good insulation properties. Two types of foamed plastics are mostly used in plastics industry. They are foamed polystyrenes and foamed polyurethanes. Foamed polystyrenes also can be further group as expanded polystyrenes (EPS) and extruded polystyrenes (XPS).

Single use- bags and Styrofoam products are strong, cheap, and hygienic ways to transport food and other goods. They may appear as commercially successful as serving their original purpose. However, when taking into account the associated environmental and related health impacts of these products,

their commercial success comes into question. The reality is that not all single use plastic waste reaches landfills or are recycled. Because these products are very light weight and the dye used (particularly on plastic bags) is problematic, it makes them unattractive for recycling. Single use plastic waste also creates visual pollution and impacts tourism, fishing and shipping industries. Mismanaged single use- plastic waste can create natural disasters by blocking the drainage system, loss of biodiversity, toxic fumes if burned, land pollution and food chain contamination. Unfortunately, the costs of removing all single-use plastic waste accumulating in the environment is estimated as higher than the cost of preventing littering today.<sup>1</sup>

***Unrecycled Plastics***

Unrecycled plastics end up in landfills, dumpsites, get incinerated or end up in water ways and oceans where they will remain hundreds or even a thousand years. The United Nations Environment Program reports that more than 8 million tons of plastics leak into lakes and oceans each year - equal to dumping a garbage truck of plastic every minute. This is expected to increase two trucks per minute by 2030, if the current trend continues.

In order to assess the baseline conditions, the Rutgers EcoComplex assessed the amount of unrecycled plastics in the municipal solid waste generated by various communities in New Jersey. The pilot study summarized that on average 18.8% of our municipal solid waste (MSW) is unrecycled plastic waste. If a landfill receives approx. 1000 tons MSW per day that means 188 tons of it is unrecycled plastics. Our assessment also found that the majority of unrecycled plastics included bags, plastic utensils, cups, plates, and other single-use plastics in addition to toys, and patio furniture pieces.

Table 1. Unrecycled waste plastics in New Jersey MSW.

<b><i>Suburban (weight %)</i></b>	<b>17.2%</b>
<b><i>Rural (weight %)</i></b>	<b>21.8%</b>
<b><i>Urban (weight %)</i></b>	<b>17.4%</b>
<b>Estimated Average NRP in a Landfill MSW (%)</b>	<b>18.8%</b>

In another study, it is stated that NJ generates yearly approx. 1,000,000 tons of plastic waste and that 28.3 % is incinerated and 58.4% goes to landfills.<sup>5</sup>

***Plastic Waste should be part of Circular Waste Management and Resource Recovery Strategy***

If properly planned and enforced plastic bans can effectively be used as a tool to reduce overuse and consequently wastage of plastics. To meet the rising tide of plastic wastage, strong government leadership and intervention will be helpful along with increased awareness and public participation. New Jersey should reduce its single use plastic waste generation through policies, education and outreach. Businesses can promote their businesses as green business by not offering plastic bags and styrofoam containers to prosper their business. New Jerseyans can be informed about environmentally safe plastic alternatives and about the of type plastics that can be recycled and which ones cannot – a

source of major confusion for many. Public awareness will serve as common denominator for the success. Also, it should be remembered that bioplastics produced from renewable sources such as corn starch or cassava roots do not automatically degrade in the environment. The plastics formula is the same, but is based on renewables. Its carbon footprint may be lesser, however, it still is a plastic. If a product is made from renewable sources **and** biodegradable it is a recommended alternative to plastics made out of fossil sources.

In addition to reducing waste generation, residents, businesses, recyclers, and haulers should be encouraged to participate in source separation and reducing the contamination of plastics waste with other waste. Source separation of plastic waste will improve the quality of plastic waste sent for recycling and will create higher commercial value. Uncontaminated plastic waste should be returned to the manufacturing sectors to be recycled and utilized, thus fostering a more sustainable Circular Waste Management and Resource Recovery Strategy.

### *Upcoming Rutgers International Symposium*

Rutgers University and the American Institute of Chemical Engineers' - Institute for Sustainability are organizing a technical symposium focused on transforming waste to value-added products, with an emphasis on sustainability and innovation. It is planned for December 5-7, 2018 at Rutgers University in New Brunswick, NJ. The Symposium will focus on waste valorization and sustainability challenges, as well as opportunities for creating value-added products from waste streams abundant in our cities, oceans, and food supply chains. Plastic waste reutilization will be one of the major subjects. The conference is chaired by Serpil Guran of Rutgers University.

Please visit the conference site at [www.AIChE.org/Sps18](http://www.AIChE.org/Sps18)

Thank you.

### References:

1. UNEP (2018). SINGLE-USE PLASTICS:A Roadmap for Sustainability ISBN: 978-92-807-3705-9 DTI/2179/JP
2. <http://www.no-burn.org/wp-content/uploads/Recycling-is-Not-Enough-online-version.pdf>
3. The New Plastics Economy – Rethinking the future of plastics, [http://www3.weforum.org/docs/WEF\\_The\\_New\\_Plastics\\_Economy.pdf](http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf)
4. <https://news.nationalgeographic.com/2018/06/china-plastic-recycling-ban-solutions-science-environment/>
5. Themelis, N.J., and Mussche, C., “2014 Energy and Economic Value of Municipal Solid Waste (MSW), Including Non-Recycled (NRP) Currently Landfilled in the Fifty States.

Good Morning, my name is Dr. Keith Cooper and I am a Full Professor at Rutgers University in the Department of Biochemistry and Microbiology and a member of the Environmental Occupational Science Institute. I have been at Rutgers since 1981 as a toxicologist studying the effects of contaminants both on humans as well as aquatic organisms. Over the years I have worked on a wide range of organic contaminants ranging from benzene, MTBE, chlorinated dioxins, to PFASs and phthalates and plastics. I am currently, the Chair of the NJ Drinking Water Quality Institute and the serve on the NJ Science Advisory Board tasked with examining emerging chemicals of concern approaches.

I am here today to discuss my concerns as it relates to plastics being broken down to form microplastics, microplastics being added to consumer products, the potential adverse chemicals associated with the wide array of plastics and the over reliance of our society on single use plastic items. Although many people are aware of the large plastic debris fields that are reported in the oceans and shown on television, few understand how they as individuals are contributing to the problem. These large debris fields truly only represent the tip of the iceberg when it comes to worldwide plastic and plastic associated chemical production (estimated 1950-2015 8300 Metrix tons). **None of the commonly used plastics are biodegradable.**

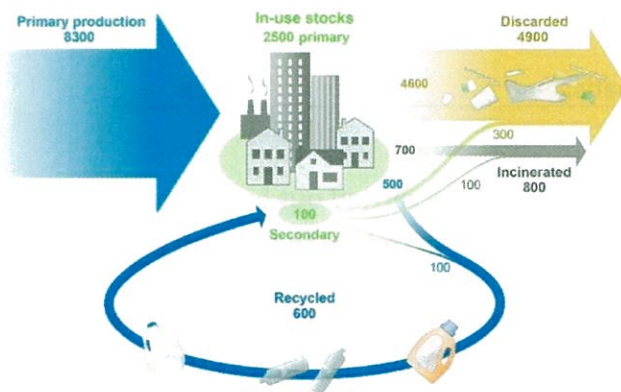


Figure 1. Global production use and fate of polymer resins, synthetic fibers, and additives (1950-2015, in million metric tons) Geyer et al. 2017 *Sci. Adv.* 3(7)

Our previous work has dealt with the effects of phthalates on reproduction and the effects of feminization of male pathways and altered gene expression along with Bisphenol A which are non-bound compounds. My laboratory has been collaborating with Dr. Ravit on assessing the potential impacts from different microplastics recovered from urbanized watersheds, pure polymers mixed additives that modify the plastics properties and chemicals associated with the microplastics. The size of the microplastics that were recovered can be filtered and or eaten via the organisms which cause poor growth and, in some cases, developmental effects and altered gene expression from compounds associated with the particles. From a toxicology point of view this demonstrates that chemicals from the surrounding areas can absorb onto these particles and be a means for exposure to organisms

encountering them. Also, we found that many of these TICS are weakly bound and can be readily released into the surrounding media. It has also been reported that microorganisms can be associated and survive for longer periods in water when associated with plastic microplastics.

Table 1. Identification of use type for Tentatively Identified Compounds (TICs)

<b>USE TYPE</b>	<b># of Compounds</b>	<b>% Total</b>
Cosmetic Additive	5	4%
Flavor & Fragrance	28	25%
Flavoring Agent	10	9%
Fragrance	8	7%
Laboratory Chemical	13	12%
Natural Compound	41	37%
Pharmaceutical	4	4%
Plasticizer	1	1%
Insecticide	1	1%
Adhesive & Coating	1	1%

Some of the suggestions below need to be carried out by governmental actions and others require industrial by-in or a combination of both to reduce the overall footprint of plastics in the environment.

There needs to be a concerted statewide effort to educate the public and commercial businesses on the direct and indirect adverse effects from the single use products. That in the case of plastics have extended environmental lifespans that result in massive accumulation in landfills and throughout the general environment.

There needs to be further development of Green Chemistry alternatives for current plastics. Natural products alternatives (for example: silica instead of plastic beads for scrubs) or products that breakdown or can be metabolized by microorganisms should be substituted for plastic.

There needs to be a reduction in the amount of all plastics used in packaging and shipping, leading to an overall source reduction.

There needs to be waste to energy incineration technologies with appropriate scrubbers or other technologies developed to utilize the shear mass of plastics currently in landfills and for future waste to energy production.

August 23, 2018

*Re: Summary of Comments on Single Use Plastics to Senate Environment & Energy  
Committee, August 23, 2018 in Toms River, NJ*

My name is Beth Ravit. I am an Assistant Research Professor in the Rutgers Department of Environmental Sciences and the Co-Director of the Rutgers Center for Urban Environmental Sustainability. I am also a recent appointee to the NJDEP Science Advisory Board.

For the last three years, our research team in collaboration with the James J. Howard NOAA laboratory at Sandy Hook, has been studying microplastics in New Jersey freshwaters. Microplastic particles range in size from 5 mm (about the size of a grain of rice) to microscopic. Although the presence of plastics in ocean waters has been known for approximately three decades, scientific evidence documenting the presence of small plastic particles in freshwater systems is relatively recent (within the last six years). It now appears that where ever researchers look for these microscope plastic substances they are being found.

Today plastic manufacture is the third largest U.S. manufacturing industry and this industry continues to grow. The wide ranging benefits of plastic are widely acknowledged, and these substances (over 30,000 different plastic polymers are registered in the European Union database) now dominate human society. Just look around this room - computers, cell phones, fabrics, pens, pencils, clothing - the list is inexhaustible and growing. The property that makes plastic so desirable (its durability) is the same property that makes these substances problematic when released into the natural environment - they do not degrade!

When exposed to sunlight, heat, and cold, plastic often becomes brittle, and this causes larger plastic items to break into smaller and smaller pieces. In addition to these plastic breakdown particles, polyester fabrics shed fibers with each washing (thousands) that leave our houses and end up being discharged in effluent from water treatment plants because these plants, built decades ago, were not designed to remove microscopic plastic materials. Other sources of small plastics can be manufacturing facilities where plastic raw materials are discharged in waste water. Plastics can also be carried in surface water runoff, and researchers in France have documented atmospheric microplastic deposition. This week the NY Times reported that disposable contact lenses are making their way to water treatment plants and contributing to microplastic build up in the environment!

Because plastic released in the environment typically does not biodegrade, but instead breaks into smaller pieces, these materials are continuing to accumulate in the natural

environment. Our research<sup>ii</sup> has documented microplastic particles in the Raritan and Passaic Rivers at densities up to 3 million microscopic particles per square kilometer (Livingston, NJ sampling location). We found microplastic densities were up to two orders of magnitude higher in fresh water bodies than the densities we observed in the NY-NJ harbor waters. Approximately half of the microplastics in our samples are fragments – small pieces that have broken off of larger plastic items.

Linked with these microplastic particles are a range of organic compounds. Our research has identified over 300 organic compounds associated with microplastic particles from the Raritan and Passaic Rivers. At this point in time, we do not know what effects these associated compounds or the plastic polymers themselves might have on living organisms. However, scientists have shown that fin fish and shellfish are taking up these microparticles, which are being found in their tissues. This suggests that microplastics have the potential to enter and accumulate in human food sources.

We are potentially polluting fresh drinking water sources with emerging microplastic contaminants and exposing aquatic organisms to these substances, as well as the humans who might consume these organisms. Therefore, any reduction in the *unnecessary use* of plastic, *particularly single-use plastic items*, would be a very helpful first step in reducing the amount of plastic litter/pollution currently building up in our environment.

Beth Ravit, PhD  
Assistant Research Professor  
Department of Environmental Sciences  
Co-Director, Center for Urban Environmental Sustainability (CUES)  
School of Environmental & Biological Sciences  
Rutgers, The State University of New Jersey  
14 College Farm Road  
New Brunswick, NJ 08901  
P: 848-932-9334  
C: 201-██████████

---

<sup>i</sup> Dr. Beth Ravit, Co-Director Center for Urban Environmental Sustainability; Department of Environmental Sciences; Dr. Keith Cooper, Department of Biochemistry & Microbiology; Dr. Brian Buckley, Laboratory Director, Environmental & Occupational Health Sciences Institute

<sup>ii</sup> Ravit et al. 2017. Microplastics in urban New Jersey freshwaters: distribution, chemical identification, and biological affects. AIMS Environmental Science 4(6): 809-826. DOI: 10.3934/environsci.2017.6.809

# Real Science for Real People One Word – Are you Listening? PLASTICS!<sup>1</sup>

By Dr. Beth Ravit

In the span of one human lifetime, plastic polymers - man-made substances - have become an indispensable component of human society, while at the same time, changing the planet's environment. The benefits of plastic and its infinite uses appear to be growing exponentially, while the environmental ramifications of incorporating these relatively inert substances into all facets of daily life have now been called into question.

My students, working in collaboration with NYNJ Baykeeper, spent the last three summers collecting water samples from freshwater rivers in New Jersey and analyzing these samples to see if they contained microplastics – pieces of plastic 5 millimeters (size of a grain of rice) or smaller.

One of the systems we sampled was the Passaic River from Berkeley Heights upstream to Riverfront Park in Newark, a reach that includes sites above and below the Dundee Dam and the Great Falls.

Our working hypothesis predicted the densities of microplastics would increase the closer we got to Newark Bay, and we thought (based on scientific literature) that the predominant form of this microscopic plastic would be from microbeads added to personal care products, but we were wrong. It turns out that the suburban communities upriver were where the highest densities of microplastics were found, especially under dry weather conditions when it had not rained for a number of days (Fig. 1).

However, after a rainstorm

we saw microplastics collecting downriver in Lyndhurst, probably washing downstream, carried by stormwater runoff (Fig. 2).

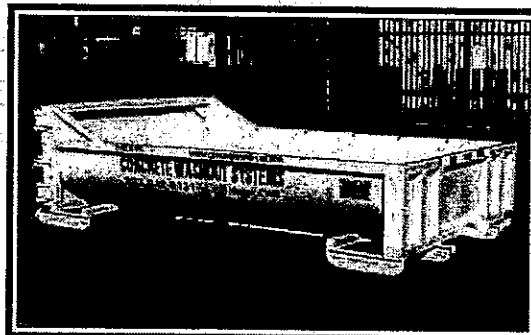
Scientists have known about the detrimental effects of plastics in the oceans for almost three decades. Now we are finding that plastic pollution is actually much closer to home, potentially in fresh drinking water sources. The densities we observed upriver in the Passaic were actually higher than microplastic densities observed in the NY/NJ Harbor study conducted by Baykeeper in 2015.

We were also wrong about the types of microplastic we would find. The highest number of microplastics (84%) came from fragments broken from larger plastic items, line, film, or Styrofoam particles – all the result of how we

## Are You "Building Green?"

NO!

YES!



**What is Green Building?** Green building is a design and construction practice that promotes the economic health and well-being of your family, the community, and the environment. A smart step toward personal economic rewards, Green Building also has positive social and environmental ramifications that assert your commitment to the future and the way we live for years to come.

**CONCRETE WASHOUT SYSTEMS INC.**  
179 RYERSON AVENUE • PATERSON, N.J. 07502  
PHONE: 973.942.3131 • FAX: 973.956.8056  
www.haftekcws.com • E-mail: info@haftekcws.com

27x

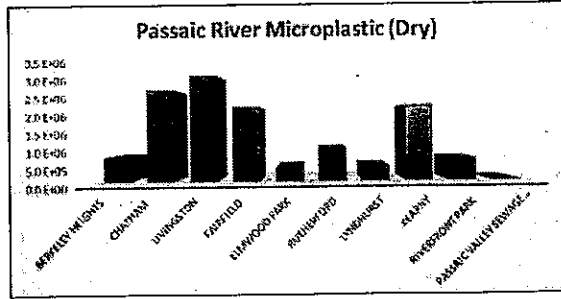


Fig. 1. Microplastic density in the Passaic River (dry weather conditions).

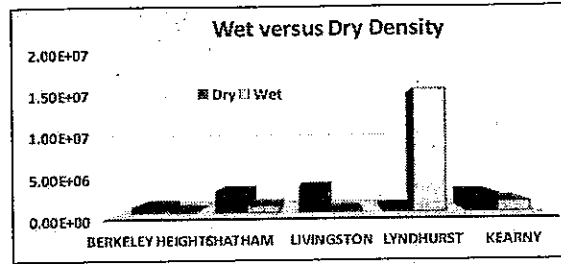


Fig. 2. Microplastic density less than 24 hours after at least 0.87" of rain.

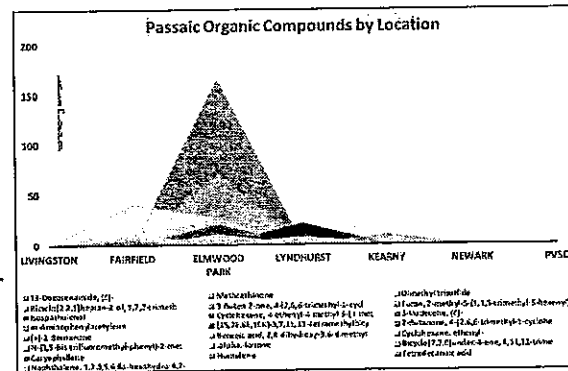


Fig. 3. Types of microplastic recovered from the Passaic River.

are currently disposing of plastic waste products, often after a single use (Fig. 3).

The plastic itself may be only part of the pollution story. We found over 300 organic compounds that were attached to the microplastic substrates. These compounds varied by location, but because they are attached to the plastic, they can be carried downstream with the plastic. However, in the Passaic River, it looks like

the organic compounds may be collecting upstream behind the Dundee Dam because they appear to be lower in the samples downstream below Elmwood Park. The organic material associated with the plastic particles appears to be a combination of natural products, laboratory compounds used in manufacturing process, some pharmaceutical compounds and cosmetic additives.

It is critical that we begin to

change our disposable lifestyles that use and toss plastic products into the garbage assuming they will eventually go away. Microbead additives to personal care products have now been banned by both Federal and State laws and the phase in of this prohibition is scheduled to be completed this year (2018). However, continued consumption of single use plastics (bags, straws, bottled water) is particularly damaging – a few minutes of use followed by an indeterminate lifespan in the environment!

The reason we utilize plastic so much is because it is indestructible. Unfortunately, this characteristic is what is causing plastic to accumulate in our environment – and it is not going away. If enough people adopt simple lifestyle changes (reusable bags for groceries, water bottles rather than bottled water, paper instead of plastic straws, support for bottle bills and laws that ban plastic bags) we can begin to diminish the unnecessary plastic waste. We also need to focus chemical engineering skills on developing uses for plastics so recycling makes economic sense. As landfills are filled up and closed, and other countries refuse to continue to accept our waste, we must transition plastic from an environmental problem to a reusable resource – because it is not going to go away in anyone’s lifetime.

*I Mr. Robinson. The Graduate. 1967.*



Alliance for New Jersey Environmental Education

**AUTUMN OUTDOOR CONFERENCE**

**“Imagine A World – Outdoors”**

Friday, September 28, 2018 at Duke Farms, Hillsborough, NJ

ANJEE presents a day full of programs for educators at **Duke Farms**, a model for environmental stewardship and a more sustainable future. The event will feature a wide variety of outdoor sessions designed to educate and inspire teachers and nonformal educators alike. Join us!

For info, including full conference schedule and registration link, go to: [www.anjee.org/autumn-conference/html](http://www.anjee.org/autumn-conference/html)

28x

## Participating Organizations

Alliance for a Living Ocean  
American Littoral Society  
Arthur Kill Coalition  
Asbury Park Fishing Club  
Atlantic Highlands Arts Council  
Bayside Regional Watershed Council  
Bayside Saltwater Flyrodgers  
Belford Seafood Co-op  
Belmar Fishing Club  
Beneath The Sea  
Bergen Save the Watershed Action Network  
Berkeley Shores Homeowners Civic Association  
Cape May Environmental Commission  
Central Jersey Anglers  
Citizens Conservation Council of Ocean County  
Clean Air Campaign, NY  
Clean Water Action  
Coalition Against Toxics  
Coalition for Peace & Justice/Unplug Salem  
Coastal Jersey Parrot Head Club  
Communication Workers of America, Local 1075  
Concerned Businesses of COA  
Concerned Citizens of Bensonhurst  
Concerned Citizens of COA  
Concerned Citizens of Montauk  
Eastern Monmouth Chamber of Commerce  
Environment NJ  
Fishermen's Conservation Association, NJ Chapter  
Fishermen's Conservation Association, NY Chapter  
Fishermen's Dock Cooperative, Pt. Pleasant  
Food and Water Watch, NJ  
Friends of Island Beach State Park  
Friends of Liberty State Park, NJ  
Friends of the Boardwalk, NY  
Garden Club of Alenhurst  
Garden Club of Bay Head and Mantoloking/Seaweeders  
Garden Club of Brelle/Bayberry  
Garden Club of Englewood  
Garden Club of Fair Haven  
Garden Club of Long Beach Island  
Garden Club of RFD Middletown  
Garden Club of Morristown  
Garden Club of Navesink  
Garden Club of New Jersey  
Garden Club of New Vernon  
Garden Club of Oceanport  
Garden Club of Princeton  
Garden Club of Ridge-wood  
Garden Club of Rumson  
Garden Club of Sea Girt/Holly  
Garden Club of Short Hills  
Garden Club of Shorebury  
Garden Club of Spring Lake  
Garden Club of Terra Nova  
Garden Club of Washington Valley  
Great Egg Harbor Watershed Association  
Green Party of Monmouth County  
Green Party of New Jersey  
Highlands Business Partnership  
Hudson River Fishermen's Association  
Jersey Shore Captains Association  
Jersey Shore Parrot Head Club  
Jersey Shore Partnership  
Junior League of Monmouth County  
Keypoint Environmental Commission  
Kiwans Club of Shadow Lake Village  
Leonardo Party & Pleasure Boat Association  
Mantoloking Environmental Commission  
Marine Trades Association of NJ  
Monmouth Conservation Foundation  
Monmouth County Association of Realtors  
Monmouth County Audubon Society  
National Coalition for Marine Conservation  
Natural Resources Protective Association, NY  
NJ Beach Buggy Association  
NJ Environmental Lobby  
NJ Friends of Clearwater  
NJ Marine Education Association  
Nottingham Hunting & Fishing Club, NJ  
NYC Sea Gypsies  
NY Marine Education Association  
NY/NJ Baykeeper  
Ocean Wreck Divers, NJ  
PaddleOutLog  
Piscataway Saltwater Sportsmen Club  
Raritan Riverkeeper  
Religious on Water  
Rotary Club of Point Pleasant  
Rotary District #7540—Interact  
Saltwater Anglers of Bergen County  
Sandy Hook Bay Anglers  
Save Barnegat Bay  
Save the Bay, NJ  
SEAS Monmouth  
Shark Research Institute  
Shark River Cleanup Coalition  
Shark River Surf Anglers  
Sierra Club, NJ Shore Chapter  
Sisters of Charity, Manis Stella  
South Monmouth Board of Realtors  
Staten Island Tuna Club  
Strathmere Fishing & Environmental Club  
Sunrise Rod & Gun Club  
Surfers' Environmental Alliance  
Surfrider Foundation, Jersey Shore Chapter  
Surfrider Foundation, South Jersey Chapter  
TACK I, MA  
Unitarian Universalist Congregation/Monm. Cnty.  
United Boatmen of NY/NJ  
Viking Village  
WATERSPIRIT  
Women's Club of Brick Township  
Women's Club of Keypoint  
Women's Club of Long Branch  
Women's Club of Merchantville  
Women's Club of Spring Lake  
Zen Society, NJ



Ocean Advocacy  
Since 1984

## Clean Ocean Action

www.CleanOceanAction.org

18 Hartshorne Drive, Suite 2  
Highlands, NJ 07732-0505  
T (732) 872 - 0111  
F (732) 872 - 8041  
Info@CleanOceanAction.org  
Tax ID: 22-2897204

### Testimony by Cindy Zipf, Executive Director of Clean Ocean Action, before the Joint Session of the Senate Environment and Energy Committee and the Assembly Environment and Solid Waste Committee August 23, 2018; Toms River Municipal Complex, Toms River, NJ

COA welcomes the opportunity to speak today on this important issue.

While there are some valued uses of plastics in medicine and cars, for example, we have gone overboard. We have allowed single use plastic products to invade our everyday lives and dominate alarmingly and needlessly in the pretext of convenience and an easier lifestyle.

One only needs to go to the beach to see the evidence – this summer has been very rainy which has washed streets and spewed litter including medical waste into the ocean. Thanks to the unusual summer east winds, the trash is washing up on our beaches. The bad news is it proves how much waste is in our ocean; the good news is that we have to look at it. It is a good reminder – we have work to do.

When it comes to plastic, we cannot seem to help ourselves. Our consumption of single use plastics is growing. No doubt plastic makes life easier, but we have “convenienced” ourselves into a waste management nightmare and an ecological tragedy with extreme consequences to the web of life that we are only beginning to understand.

And the impacts go well beyond the trillions of particles and massive amount of junk floating in the ocean that is killing, maiming and otherwise harming marine life. It is also about climate change and pollution.

Plastic products are made from fossil fuels, and in the US especially from natural gas. In fact, producing plastics from fossil fuel is only economical when the other components of extracted fossil fuel are used for energy production, so the two industries are inextricably linked. Yet another recent study also showed that plastic debris continues to release methane gas as it degrades. This greenhouse gas accelerates global warming. So the efforts we talking about here today, will help reduce fossil fuel abuse and climate change as well. In fact, the entire processing of plastic and plastic itself is dirty and threatening public health.

A recent research study investigating the in utero exposure to harmful chemicals in pregnant women in San Francisco detected an estrogenic compound used in food-related plastic products, plastic pipes and water bottles.

Studies have also documented microplastics in seafood, sea salt, bottled water, and even honey, inevitably resulting in their consumption by humans. Indeed, all of our food may be contaminated with microplastics as soon as it hits our dinner plate—a recent study estimated that about 114 plastic fibers fall on your plate at each meal, totaling over 13,000 plastic fibers each year.

Our abusive plastic use is only getting worse. Since 1985 COA has collected marine debris, including plastic debris, twice a year off the Jersey Shore beaches in over 60 towns from Perth Amboy to Delaware Bay—and our amazing volunteers have collected data. These snapshots of data provide a legacy of information about the waste management problem in our ocean.



Printed on 100% post-consumer paper.



20

According to COA data, plastic debris has increased from 71% in 1990 to 84% in 2017. The number of disposable items that routinely end-up in this data is growing, too. There is now even a plastic flossing/tooth pick tool that we are finding in greater numbers. Imagine you are a fish and swallowing that! In the Delaware River, where we are conducting assessments of NJ shoreline debris the average percentage of plastics is 92%.

Plastic lasts for generations, so every plastic straw, fork, spoon, plate or cup can become a family heirloom. However, in the ocean they break apart, and become more bite size.

If we could recycle it all and put it to good use, that would be a consideration. Unfortunately, we don't recycle well. Only Type 1 and Type 2 plastics are readily recycled, and that too with a poor 18% recycling rate globally. What we used to recycle most often went to China, but not anymore so what will happen with all that material?

We should all get used to bringing reusable bags, straws, utensils, and containers to the stores. It is not difficult, just a little inconvenient, at first, but you'll get the hang of it. Aren't our future and the lives of countless marine life worth a little inconvenience?

As for the targets of S2776/A4330 the numbers of debris collected are alarming. In 2017 in just 6 hours:

Bags:	9,052
Straws:	31,165 up almost 59 % from last comparable year
Foam containers/pieces/cups:	928 containers; 21,117 pieces; 3,455 cups

Thus, COA welcomes S2776/A4330 as important steps to reduce the plastic plague, with these suggestions:

- According to PlasticBagsLaw.com, the national leader in supporting bans on plastic bags, experience shows that in the effort to control single use bags, the best option is the so-called 'hybrid,' where there is a ban of certain items and a meaningful fee on other options.
- COA supports the hybrid model, with a minimum of 10 cent fee. Funds should be distributed to the store, and also to the community to help implement source reduction.
- Plastic single use straws are also unnecessary for most people, and for those who need them there are alternatives.
- Foam and other plastic take out containers are wasteful. Foam cups should be added. Reusable containers can be brought from home and are becoming more available to restaurants. Banning the use of these should start at the State level in the Legislative and NJDEP cafeterias, if it hasn't happened yet.
- The bill should allow towns to take further steps if they wish.

Most importantly, COA asks that these committees look beyond this bill. We urge you to establish a task force to evaluate NJ's waste management issues, including:

- The lack of enforcement against littering and recycling.
- How to increase the value of recycled material to create markets for products.
- How to manage recycled material now that China has stopped accepting our recycled waste. This is an opportunity for us to get more creative than putting waste in a hole in the ground or shipping it off to somewhere else.
- Consider the prohibition of any use of single use plastic or other item that is not readily recyclable.
- Future opportunities should be sought, and reducing the source of the waste is a good start.

Finally, COA urges Governor Murphy to take bold action on the bill that sits on his desk today. He must reject the fee-only bill and conditionally veto the bill to ensure that:

- Single use plastic items are banned by 2020 and require a fee on all others bags at a minimum fee of 10 cents. These funds should also support local community efforts to reduce sources of waste.
- The law allows towns to take further actions.
- The law requires enforcement, as well as education about the law and litter reduction.

Thank you for the opportunity to testify today.

# 2017 Annual Report



Since 1985, over 6,288,576 items removed by 123,242 volunteers!

Photo by Meg O'Brien

A day of service, a lifetime of evidence and the spirit to make the ocean cleaner!

Litter is harmful to animals that mistake it for food, and/or become entangled; it also negatively affects tourism and the coastal economy. In response, for over 30 years, thousands of dedicated volunteers — the tall and small — gather in the Spring and in the Fall for Beach Sweeps. As a result, beaches and waterways are safer for wildlife and people.

The goal of Clean Ocean Action's (COA) Beach Sweeps is to reduce and eliminate sources of litter by engaging people in volunteer efforts to clean beaches in New Jersey. During the bi-annual event, volunteers pick up and remove debris, and record and calculate data about the debris. The data collected provides a legacy of information that can be used to identify sources of pollution, monitor trends, and discover and promote solutions.

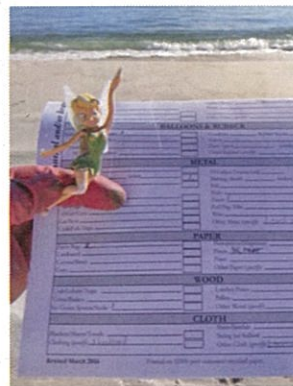
This year results of Clean Ocean Action's 32<sup>nd</sup> Annual Beach Sweeps are 7,416



volunteers removed 373,686 pieces of debris from over 60 sites in 53 municipalities and parks along the Atlantic Ocean coast, bayshores, inland rivers, lakes, and streams. Since 1985, over 6,288,576 items have been removed by 123,242 volunteers!

As in recent years, the most frequently collected items were plastic. A record 84.46% of the items collected were plastic or foam plastic.

The "Dirty Dozen" resembles previous years, with persistent and harmful plastic dominating the top twelve list. Eight of the Dirty Dozen are single use, disposable plastic items, accounting for 66% of the total items collected. This demonstrates



From Midway Beach Tinker Bell says, "Clap your hands if you want a clean ocean!"

their prevalence and our growing disposable society. The total amount of Dirty Dozen is 74% of all trash removed, a record amount.

The "Roster of the Ridiculous" continues to illustrate that one can find just about everything on the beaches.

The greatest success of the Beach Sweeps are the take-home lessons: citizens taking responsibility for the environment, making a difference, teamwork, unity, and commitment. The Beach Sweeps are a day of service in the Spring and Fall that provide a lifetime of data to help make a difference for the ocean.

## 2017 SITES

Aberdeen, Allenhurst/Loch Arbour, Asbury Park, Atlantic City, Atlantic Highlands, Avalon, Avon-by-the-Sea, Bay Head, Belmar, Berkeley, Bradley Beach, Brick, Brigantine, Cape May, Deal, Galloway, Gateway National Park at Sandy Hook, Glen Ridge/Montclair, Highlands, Ideal Beach, Island Beach State Park, Keansburg, Keyport, Lavallette, Leonardo, Long Beach Island, Long Branch, Longport, Manasquan, Margate, Middlesex County Park System, Middletown, Monmouth Beach, Monmouth County Park System, Ocean City, Ocean Grove, Ortley Beach, Point Pleasant, Point Pleasant Beach, Red Bank, Rumson, Sea Bright, Sea Girt, Sea Isle City, Seaside Heights, Seaside Park, Spring Lake, Stone Harbor, Toms River, Union Beach, Ventnor, Villas, Wildwood, Wildwood Crest

### What's Inside:

- ◆ Ocean Wavemakers: Beach Captains, Scouts, Groups, Schools, Civic Groups
- ◆ 2017 Results, Dirty Dozen
- ◆ Roster of the Ridiculous
- ◆ Watershed Mindfulness
- ◆ 2017 Flotsam And Jetsam — The Story in the Numbers
- ◆ Balloons Are Dangerous to Marine Life

Since 1985, volunteers have donated 739,452 hours of Beach Sweeping!

## SPECIAL THANKS TO OUR OCEAN WAVEMAKERS

The success of the Beach Sweeps is rooted in the Ocean Wavemakers who contribute time, effort, resources, donations, and funds.

**2017 BEACH CAPTAINS (90):** Franz Adler, Ryan Baine, Jesse Beutell, Debra Bowler, Keri Branin, Denise Bruschi, Ralph Carloni, Ryan Carr, Bill Cleary, Cookie Cleary, Ann Commarato, Lisa Cordova, Kira Dabby, Crystal DeCaro, Michelle Denny, Fran Donnelly, Peter Donnelly, Jake Donnelly, Jordan Donzelli, Bret Dunlap, Anthony Edge, Kathy Esposito, Margot Fernicola, Julie Finnell, Alexander Fradkin, Jocelyn Gandhi, Ava Gandhi, Kathleen Gasienica, Leo Gasienica, Eric Gehring, Kristin Gould, Marianne Grant, Kyle Gronostajski, Kate Grossarth, Emily Hackett, Eric Hanan, Cory Herrala, Jennifer Hess, Andrew Kaplan, Tony Kono, Beth Kwart, Justin Lamb, Mary Lenahan, Bill Macomber, Marine Academy of Science and Technology Student Coordinators Sierra Byrne and Katie Costello, Cheryl Marinelli, Jeff Martin, Kari Martin, Carol McCallum, Harvey McKenzie, Kathleen Meyer, Charlotte Moyer, Jessica Mumford, Derek Noah, Katiria Ortiz, Michael Palmisano, Peterson Family, Lynn Poinier, Keith Rella, Derek Riddle, Michael Rohal, Alexandra Ruffler, Kay C. Sagal, Sammarco Family, Leah Savia, Matt Schmidt, Allen Schultz, Jim Sharkey, Nicole Sherry, Doreen Silakowski, Greta Siwec, Lisa Stickle, Amy Strawder, Graceanne Taylor, Bob Thibault, Gene Viereck, Tina Marie Walling, JJ Walsh, Kay Warren, Elizabeth Warren, Britta Wenzel, Amanda Wheeler, Gretchen Whitman, John Wnek, Cash Woldseth, Mark Woldseth, Paula Woods, Ashley Woodward, Megan Young, Anita Zalom

### SCOUT GROUPS (56):

**BOY:** # 1, 17, 18, 21, 40, 47, 53, 58, 72, 76, 92, 126, 219, 223, 241, 343, 364, 442, 555, 749, 60343, 60832  
**Cub:** # 21, 85, 101, 141, 152, 158, 242, 358

**GIRL:** # 45, 96, 134, 186, 245, 269, 287, 324, 343, 351, 352, 440, 485, 502, 550, 716, 720, 741, 758, 839, 20204, 60177, 60359, 60461, 60608, 60710, 64036, 65825, 81386, 81608, 81709, 83807  
**Brownie:** # 327  
**Daisy:** # 244



*Sea Bright Fall Beach Sweep*

**BUSINESSES (53):** Amazon, Apple Sachs Bar, Atlantic City Electric, Aveda, Baine Contracting, Bank of America, BJ's Club 172, Bloomberg, Bohler Engineering, Caesar's Entertainment, CDM Smith, Circle K, Coca Cola Marmora, Comcast, Compass Group, CPC Behavioral Healthcare, Daveysky Surfboards, East Coast Diving Center, First Bank of Sea Isle City, Gilbane, Gloria Nilson & Co. Real Estate, IFM, JPMorgan Chase, Karuna Charities New York, Kohl's, Law office of Bonnie R. Paterson Esq., Levi's, Matrix, Meridian Health, Merrill Lynch, Metlife, Monmouth Ocean Regional Board of Realtors, Mott MacDonald Engineers, MTF, Napeys Bar, Nike, NJ American Water, NJ Natural Gas, Progressive, Ray Catena Motor Corp., RICOH USA Inc., ShopRite, Starbucks Wildwood, Symrise, T&M Engineering, Target, U.S. Bank, United Teletech Financial, Vanguard, Wakefern, Wayside Technology, Wells Fargo, Wildflowers Farm of Princeton Junction Corporation, Ricoh USA, Secret Garden Spa, Servepro at Eatontown, ShopRite, Spotify, T&M Associates, TD Bank, UBS, United Teletech Financial, Viridian Energy, Verizon, Wakefern Food Corporation, Wayside Technology, Workwave



*Comcast Cares at the Long Branch Beach Sweep*

### SWEEPS SNAPSHOTS



*Cape May Fall Beach Sweep*



*Volunteers with a buoy at Ideal Beach Spring Sweep*



*Volunteer at Fall Maple Cove Sweep with large foam plastic piece*



*Tinton Falls School at Avon-by-the-Sea Fall Beach Sweep*

**ORGANIZATIONS (57):** 4H Teen Council, ALP, Asbury Park Rotary, Bayshore Regional Watershed Council, Clean Water Association, Cliffwood Beach Neighborhood Watch, Coastal Jersey Parrot Head Club, East Brunswick Youth Council, Edison Metro Leos/Lions Club, Excelsio Medical (Neptune), Garden Club of LBI, Girls Friendly Society, Good Turn Daily Facebook Group, Hamlette the Mini Pig, Ideal Beach Community Association, Indivisible Bayshore, Infuse Environmental, Jack & Jill of America Essex Hudson Chapter, Jersey Cares, Jersey Shore Parrot Head Club, Monmouth County Realtors, Environmental Science Jump Start Academy, NJ Sea Grant Consortium, NJ Windsurfing and Watersports Association, No DAPL Water Protectors, OCC Asian Culture Club, Ocean City Beach Buggy Association, Ocean County 4H Noah's Ark Pet Pals, Ocean Mental Health, Ocean Wreck Divers, Phlock of South Jersey, Project Green, Reclaim the Bay, Red Bank Humanists, Red Bank Rotary, Regular Republican Club of Lavallette, Rotary Club of Greater Long Branch, S.E.A.S. Save Barnegat Bay, Script & Cue, Sea Shepherds, Shrewsbury Power Squadron, Sierra Club, South Amboy YMCA, South Jersey Coastal Fly Anglers, Squigley Boys Class of '89 and '92, Stone Harbor Property Owners Association, Surfrider Beach Club, Surfrider Foundation South Jersey Chapter, Team Emma for NJ Senate, The Hub Kings, Tiger Bomb, UNFI, UNICEF, Wayside Tech Group

**FAITH-BASED GROUPS (13):** Faith Community Church, Holy Cross Church, Holy Trinity Lutheran Church, Immaculate Conception Church, Lincroft Presbyterian Church, Our Lady of the Mount Church, Our Redeemer Lutheran Church, Sacred Heart, Saint Teresa of Calcutta, St. Denis Church, St. Mary's Church, St. Michael's Youth Group, Trinity Presbyterian Church East Brunswick

**PRE/ELEMENTARY/MIDDLE SCHOOLS (48):** Antrim Elementary; Assumption Regional Catholic; Atlantic Highlands Elementary; Beers Street Elementary; Ben Franklin Elementary; Bradley Beach Elementary School Environmental Club; Brielle Elementary; Central Regional Middle; Colts Neck Elementary; Deane Porter Elementary; Fairview; Forrestdale School: Environmental Club; GAMP; Goetz Middle School Builders Club; Green Brook Middle School; Global Scholars Greater Brunswick Charter School; Hazlet Middle Road; Henry Hudson; Highlands Elementary; Holy Cross School Rumson; Holy Innocents School; Howell Middle; Jordan Road School Science Club; JumpStart Academy; Lavalette Elementary; Little Silver Point Road; Manchester Middle; Manasquan Elementary School Environmental Club; Matawan Aberdeen Middle; Newark Academy; Oak Knoll Elementary; Oakwood; Ocean Avenue Elementary; Park Middle; Princeton Day School; Ravine Drive Elementary; Red Bank Charter; Rumson Country Day; South Amboy Middle School Junior Honor Society; St. Clements, St. Joseph's; Terrill Middle; The Rose Garden; Thorne Middle; Tinton Falls Middle; Union Beach Memorial; Warren E Sooy Elementary; Wildwood Middle School ROOTS; Winston School of Short Hills; Wolf Hill Elementary



*These little piggies went to the Ortle Beach Sweep*

**HIGH SCHOOLS (60):** Absegami; Allentown: FFA, Leo Club Biotechnology; Bound Brook; Brick Memorial: Key Club; Central Regional High School Ocean Club; Colts Neck High School: Environmental Club, ROTC; De Paul Catholic; East Brunswick High School SAVE Club; Edison; Freehold Biotech; Freehold High School: 4H Club; Freehold Township: Octagon Club; Governor Livingston; High Tech; Hightstown; Holmdel; Hopatcong; Howell: Wrestling Team; Jackson Liberty: Interact Club; Long Branch: ROTC; Lower Cape May Regional; Madison; Manalapan: Environmental Club, SAVE Club; Manasquan High School Environmental Club; Marlboro Memorial; MAST; Matawan Regional: Environmental Club, National Honor Society; MATES; Middletown South; Monmouth Regional High School Environmental Club; Monsignor Donovan Catholic; Neptune High School; Ocean City High School Key Club; Ocean Township; Old Bridge: German American Exchange; Paramus Catholic; Pennsburg; Pennsbury High School Environmental Club; Point Pleasant Beach; Point Pleasant Borough; Rancocas Valley High School Environmental Club; Raritan High School Environmental Club; Red Bank Regional: Environmental Club; Red Bank Catholic; Roselle Park; Rumson Fair Haven: Surf Team; Rutgers Prep; Saint Rose; Shore Regional; Sayreville War Memorial High School Environmental Club; Somerset County Vo Tech; South Amboy; Spotswood High School Environmental Club; St. Rose; Toms River East; Toms River North; Trenton; Watchung Hills Regional; West Caldwell Tech; Whitehall Twp; Wildwood Catholic; Beijing Haidian International School; Verona High School Marine Biology Club; Wildwood High School ROOTS

**COLLEGES (20):** Beta Beta Beta National Honors Society; Brookdale Community College: Biology Club, Environmental Club, Women's Volleyball; Centenary University; College of NJ Alpha Phi Omega; Fairleigh Dickinson University; Georgian Court University; Kean University: Beta Beta Beta, Environmental Club, Field Hockey Team; Kutztown University Marine Science Club; Middlesex County College: Earth Science Club; Monmouth University: Women's Lacrosse; Montclair State University; Ocean County College; Princeton; Raritan Valley Community College; Rowan University; Rutgers University: Alpha Phi Omega, Engineering Governing Council, Phi Chi Theta, Students for Environmental Awareness; Seton Hall University; Stevens Institute of Technology: Alpha Phi Omega, Chi Phi, Kappa Sigma, SAVE Club, Society of Hispanic Professional Engineers; Stockton University: Marine Science Club; Mu Sigma Upsilon; University of Pennsylvania; William Paterson University Lambda Tau Omega

**CIVIC GROUPS & PARKS (18):** Aberdeen Township Council, Atlantic Highlands Green Team, Avalon Public Works, Committee to Elect Lamb, Congressman Tom MacArthur Staff, Keyport Clean Communities, Keyport Environmental Commission, Manasquan Environmental Commission, Manto Environmental Commission, McGuire Air Force Base, Monmouth County Clean Communities, Red Bank Borough Council, Seaside Park Mayor & Council, Seaside Park Police Department, Seaside Park Public Works, Spring Lake Environmental Commission, Stone Harbor Police Department, US Coast Guard D-195

**SPECIAL CELEBRATIONS (1):** Dylan Nifanset Bar Mitzvah Project

*Note: Ocean Wavemakers are taken from completed data cards. Please let us know if we have inadvertently omitted your group.*

## 2017 RESULTS



**NOTES FOR USING BEACH SWEEPS DATA:** The Annual *Beach Sweeps* Report can be used to study and understand marine debris. When analyzing annually or over time for trends, it is important to note that the amount of debris collected depends on a variety of factors, such as weather, tides, participants, and accuracy.

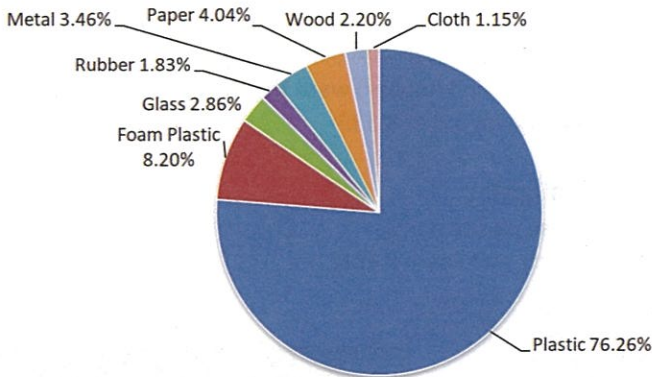
**LOCAL DATA, GLOBAL NETWORK:** Every October, COA submits the Fall *Beach Sweeps* data to Ocean Conservancy in Washington D.C., to be included in their International Coastal Cleanup (ICC) Report.

	Items	Spring	Fall	Total	% of
					Total
PLASTIC	Food, Candy Wrappers/Bags	23,247	16,980	40,227	10.76%
	Store/Shopping Bags	5,786	3,266	9,052	2.42%
	Trash Bags	1,825	1,037	2,862	0.77%
	Other Bags	3,510	2,468	5,978	1.60%
	Beverages/Soda Bottles	7,146	4,968	12,114	3.24%
	Bleach/Cleaner Bottles	307	109	416	0.11%
	Other Bottles	1,188	935	2,123	0.57%
	Buckets/Crates/Bins	404	257	661	0.18%
	Cap/Lids	24,949	25,932	50,881	13.62%
	Cap/Rings	2,873	2,377	5,250	1.40%
	Cigarette Filters	14,181	14,827	29,008	7.76%
	Lighters	757	398	1,155	0.31%
	Cigarette Packaging	1,045	825	1,870	0.50%
	Cigar Tips	3,800	3,372	7,172	1.92%
	Bait Bags/Containers	265	196	461	0.12%
	Line	530	453	983	0.26%
	Lures, Floats	256	216	472	0.13%
	Fishing Nets - Small	185	74	259	0.07%
	Fishing Nets - Large	66	19	85	0.02%
	Cups	2,227	1,448	3,675	0.98%
	Diapers	83	67	150	0.04%
	Forks, Knives, Spoons	2,536	1,581	4,117	1.10%
	Light Sticks	149	120	269	0.07%
	Plastic Pieces	31,474	24,727	56,201	15.04%
	Pens	881	514	1,395	0.37%
	Ribbon/Tape (no balloons)	1,267	1,040	2,307	0.62%
	Rope	1,029	529	1,558	0.42%
	6-Pack Holders	173	100	273	0.07%
	Sheeting Tarps	154	81	235	0.06%
	Shotgun Shells	528	359	887	0.24%
	Strapping Bands	570	326	896	0.24%
	Straws/Stirrers	12,962	18,205	31,167	8.34%
	Syringes	228	167	395	0.11%
Tampon Applicators	2,528	1,552	4,080	1.09%	
Toys	847	1,002	1,849	0.49%	
Vegetable Sacks	78	64	142	0.04%	
Other Plastics	2,294	2,046	4,340	1.16%	
FOAM PLASTIC	Building Materials	507	307	814	0.22%
	Buoys/Floats	209	79	288	0.08%
	Fast Food Containers	576	352	928	0.25%
	Foam Cups	2,529	926	3,455	0.92%
	Packaging Materials	1,080	586	1,666	0.45%
	Foam Pieces	15,411	5,706	21,117	5.65%
	Foam Plates	508	246	754	0.20%
	Other Foam Plastic	923	679	1,602	0.43%

2017 Beach Sweeps	Spring	Fall	Totals
Total Items Collected	204,943	168,743	373,686
Number of Volunteers	3,770	3,646	7,416

	Items	Spring	Fall	Total	% of
					Total
GLASS	Beverage Bottles	2,340	1,509	3,849	1.03%
	Other Bottles/Jars	290	155	445	0.12%
	Lights: Bulbs	60	41	101	0.03%
	Lights: Fluorescent Tubes	5	19	24	0.01%
	Pieces	3,289	2,485	5,774	1.55%
	Other Glass	346	164	510	0.14%
	Balloons - Mylar	835	561	1,396	0.37%
	Mylar With String/Ribbon	484	439	923	0.25%
	Balloons - Rubber	631	485	1,116	0.30%
	Rubber With String/Ribbon	312	392	704	0.19%
RUBBER	Condoms	243	118	361	0.10%
	Rubber Bands	294	312	606	0.16%
	Gloves	365	257	622	0.17%
	Tires: Part	135	69	204	0.05%
	Tires: Whole	42	13	55	0.01%
	Other Rubber	400	461	861	0.23%
	Appliances	26	10	36	0.01%
	Batteries: Car	17	2	19	0.01%
	Batteries: Other	33	42	75	0.02%
	Bottles Caps	2,121	2,230	4,351	1.16%
METAL	Aerosol Cans	58	65	123	0.03%
	Beverages Cans	2,182	1,715	3,897	1.04%
	Other Cans	104	112	216	0.06%
	Car Parts	76	45	121	0.03%
	Crab/Fish Traps	15	16	31	0.01%
	55 Gallon Drums: Old	17	8	25	0.01%
	55 Gallon Drums: New	4	14	18	0.00%
	Fishing: Hooks	42	30	72	0.02%
	Fishing: Sinkers	46	35	81	0.02%
	Foil	451	488	939	0.25%
PAPER	Nails	377	206	583	0.16%
	Pieces	436	296	732	0.20%
	Pull/Pop Tabs	96	138	234	0.06%
	Wire	316	210	526	0.14%
	Other Metal	424	419	843	0.23%
	Bags	469	485	954	0.26%
	Cardboard	771	750	1,521	0.41%
	Cartons/Boxes	246	181	427	0.11%
	Cups	904	649	1,553	0.42%
	Newspaper/Magazines	480	315	795	0.21%
WOOD	Paper Pieces	3,596	4,098	7,694	2.06%
	Plates	167	207	374	0.10%
	Other Paper	757	1,020	1,777	0.48%
	Crab/Lobster Traps	27	24	51	0.01%
	Crates/Baskets	39	40	79	0.02%
	Ice Cream Spoon/Sticks	212	238	450	0.12%
	Lumber Pieces	3,284	2,665	5,949	1.59%
	Pallets	113	157	270	0.07%
	Other Wood	629	807	1,436	0.38%
	CLOTH	Blankets/Sheets/Towels	267	146	413
Clothing: Specify		404	417	821	0.22%
Shoes/Sandals		332	257	589	0.16%
String (No Balloon)		660	567	1,227	0.33%
Other Cloth		603	641	1,244	0.33%

PERCENT BREAKDOWN BY CATEGORY/DEBRIS TYPE



Breakdown by Category/Debris Type				
2017 Totals	Spring	Fall	Total	% of Total
Plastic	152,328	132,637	284,965	76.26%
Foam Plastic	21,743	8,881	30,624	8.20%
Glass	6,330	4,373	10,703	2.86%
Rubber	3,741	3,107	6,848	1.83%
Metal	6,841	6,081	12,922	3.46%
Paper	7,390	7,705	15,095	4.04%
Wood	4,304	3,931	8,235	2.20%
Cloth	2,266	2,028	4,294	1.15%
<b>Pieces of Debris</b>	<b>204,943</b>	<b>168,743</b>	<b>373,686</b>	
<b>Volunteers</b>	<b>3,770</b>	<b>3,646</b>	<b>7,416</b>	

DIRTY DOZEN

The most commonly collected pieces of debris

2017 Rank	Debris Items	2017	Change in Rank	2016	2016 Rank	2015	2015 Rank	2014	2014 Rank
1	Plastic Pieces	56,201	—	28,885	1	42,793	1	40,880	1
2	Plastic Caps/Lids	50,881	—	23,643	2	34,426	2	29,804	3
3	Food, Candy Wrappers/Bags	40,227	—	20,979	3	33,405	3	27,381	4
4	Straws/Stirrers	31,167	↑	12,073	6	19,633	5	18,372	5
5	Cigarette Filters	29,008	↓	20,219	4	28,041	4	30,241	2
6	Foam Pieces	21,117	↓	14,513	5	12,841	6	13,050	6
7	Plastic Beverage/Soda Bottles	12,114	—	8,204	7	12,100	7	11,775	8
8	Plastic Store/Shopping Bags	9,052	—	5,564	8	10,808	8	8,037	10
9	Paper Pieces	7,694	↑	4,416	10	7,114	11	5,560	12
10	Cigar Tips	7,172	↑	3,581	11	4,846	*	6,366	11
11	Other Plastic Bags	5,978	★	3,141	*	4,717	*	4,779	*
12	Lumber Pieces	5,949	↓	5,274	9	9,426	9	9,235	9
	<b>Total Dirty Dozen</b>	<b>276,560</b>		<b>150,492</b>		<b>220,150</b>		<b>205,480</b>	
	<b>Percent of Total Debris</b>	<b>74%</b>		<b>69%</b>		<b>68%</b>		<b>67%</b>	
	<b>Number of Volunteers</b>	<b>7,416</b>		<b>3,990</b>		<b>6,658</b>		<b>6,926</b>	

↑ moved up in rank ↓ moved down in rank ★ new to the Dirty Dozen — no change in rank \*not ranked for indicated year

ROSTER OF THE RIDICULOUS

A selection of the oddest items collected

**Doctor's Orders:** blood vials, dentures, knee brace, medical marijuana container, Pepto Bismol, pill bottles, surgical mask, Visine

**All Dressed Up:** acrylic nail, bag of costume jewelry, belly ring, fake mustache, mascara brush, nail clippers, perfume sample, shampoo pump

**Fun in the Sun:** 8 of spades card, Barbie shoe, baseball, baseball bat, boomerang, bubble blower, hula hoop, kayak seat, LEGO, Nerf dart, shuttlecock, tennis racket

**Handy and Sandy:** ant trap, insulation, lawn mower, mouse trap, paint brush, phone adapter, saw blade, strobe light, Swiffer sweeper, tape measure, two fire extinguishers

**What's Cooking:** cheese grater, full milk jug, jar of honey, Keurig coffee maker, measuring cup, oregano jar, pizza box, raw chicken, spatula handle, zucchini

**Stranger Things:** birdcage, Chinese newspaper, clown nose, hula girl doll, human tooth in a box, inflatable mattress, plastic Vishnu statue, rubber donut, scarecrow, tarot card

\*Note: items are identified by volunteers



## Since 1985 Cumulative Numbers:

- ◆ 6,288,576 pieces of trash removed
- ◆ 123,242 volunteers donated 739,452 hours

## 2017 Debris Record Highlights:

- ◆ For the first time, 84.45% was plastic including foam
- ◆ Dirty Dozen accounts for over 74% of all debris
- ◆ Total Balloons (Mylar and Rubber) were the highest in 7 years and nearly a record at 4,139

## Dirty Dozen Highlights:

- ◆ 66% are single use plastic items
- ◆ 28% are just Plastic and Foam Pieces

## Comparative numbers: 2017 data results to 2015

*Note: Rain events in 2016 kept turn-out low and data cards too wet to track data*

### Substantial increases (greater than 20%):

Item:	Increased by:	2017	2015
*Plastic Pieces	+31.33%	56,201	up from 42,793
*Plastic Caps and Lids	+47.80%	50,881	up from 34,426
*Plastic Straws/Stirrers	+58.75%	31,167	up from 19,633
*Foam Pieces	+64.45%	21,117	up from 12,841

\*In the Dirty Dozen

### Indicators of raw sewage:

Plastic Tampon Applicators	+18.88%	4,080	up from 3,432
Condoms	+14.97%	361	up from 314

### Substantial decreases (greater than 20%):

Diapers	-42.53%	150	down from 261
Lumber pieces	-36.89%	5,949	down from 9,426
Foam building materials	-53.27%	814	down from 1,742
Other foam plastic	-63.65%	1,602	down from 4,407
Glass beverage bottles	-22.29%	3,849	down from 4,953



*Plastic pieces are up 24%*

## Seasonal Changes Between Spring and Fall Data:

- ◆ Overall more trash is collected in spring than fall – due in part to more volunteers
- ◆ Number of **foam cups** are approximately 2.5 times higher in spring than fall
- ◆ Number of Straws/Stirrer are 29% higher in fall than spring – reflecting high summer use

## Balloons Are Dangerous to Marine Life

What goes up must come down. In that way, balloons released into the environment are delayed littering. Whether released by accident or on purpose, balloons will fall onto the land or into the sea. In the ocean they can cause harm to marine life like sea turtles who mistake them for food such as jellyfish. They can also be inadvertently eaten by big-gulp eaters, such as whales. Digestive systems of marine life are not able to process rubber or plastic and it causes painful, harmful, and even lethal impacts. The strings also cause harm or death by entanglement which results in strangulation or impairment of their ability to fly, swim, or escape predators.

The cumulative total of balloons collected during Beach Sweeps is 69,688. Disturbingly, despite recent efforts to ban balloon releases and public education, balloons in 2017 increased sharply to 4,139. It's nearly tied with the highest number ever recorded, which was 4,159 seven years ago in 2011.

Some people release balloons in honor of a special occasion or in memory of loved ones. COA works to educate people about the harm that balloons can cause and urges a different choice. There are many other harmless and beautiful ways to celebrate and honor loved ones. For example, release butterflies; plant native trees, flowering shrubs, or a flower garden; donate a bee hive or milking cow to support a subsistence family; or perform other actions of sustainability and kindness.

**The best choice: skip the balloon and create a lasting lega-sea.**



*Bird beak tangled in balloon string*

**SOURCES OF LITTER: NONPOINT SOURCE POLLUTION?**

Precipitation that falls and travels over surfaces, called stormwater, picks up and moves pollution as it flows into the nearest storm drain which empties into a nearby waterway and, ultimately, into the ocean. This precipitation-pollution mix, or nonpoint source pollution, contains litter, fertilizers, pesticides, soil, oil and grease, bacteria, human and animal waste, and other pollutants. Nonpoint source pollution can be harmful and negatively affects the beauty and health of waterways for both people and wildlife.

**How Can I Be Watershed Mindful?**

Watershed mindfulness is an understanding that we are all (the small and the tall) connected to and responsible for the health of our vast network of waterways that ultimately leads to the ocean. It is this awareness that binds us to the health of our ecosystem.

Citizens can be watershed mindful by knowing their water address, a new concept from COA where everyone knows specifically how water travels from their rooftops and streets to the ocean. Knowing the watershed and reducing sources of pollution to it are vital to quality of life. Importantly, people can help prevent pollution by stopping nonpoint sources, especially polluted runoff.

One way to avoid harmful impacts to waterways is to avoid the use of single-use plastics which often end up as litter, such as straws. In just 2017 at the Beach Sweeps, volunteers picked up 31,167 straws. Let's work together to get this number lower by taking the pledge to skip the straw. COA is working with EPA's initiative, Trash Free Waters (TFW), to reduce marine debris. Members of COA staff are leading the microplastics and straws working groups. For information contact [outreach@cleanoceanaction.org](mailto:outreach@cleanoceanaction.org).

**NEED SOME TIPS TO HELP STOP POLLUTION?**

Clean Ocean Action's Tip Card series promotes reducing "people pollution." Go to [www.CleanOceanAction.org](http://www.CleanOceanAction.org) for tips about: Anglers, Boaters, Cat Owners, Cleaning, Dog Owners, Drivers, Fertilizer, Kids, Kitchen, Lawn & Garden, Smokers, and more.

**About the Beach Sweeps**

In 1985, Clean Ocean Action gathered 75 volunteers at Sandy Hook for the first *Beach Sweeps*, with plans to rid the beaches of unsightly and harmful debris.

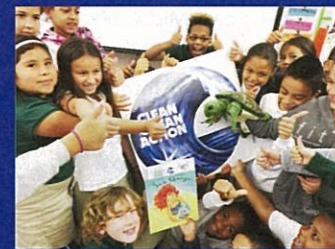
Thirty-two years later, the *Beach Sweeps* program has expanded into locations along NJ's coastline, as well as to inland rivers, lakes, bayshores, and streams. Each year, thousands of citizens participate, representing diverse groups and businesses. The program illustrates the power of citizen action.

The *Beach Sweeps* are held in the Spring and Fall, when the beaches are not being cleaned by local municipalities, resulting in a true snapshot of pollution. The goal is to have naturally clean beaches where "clean-ups"



are history. One of the most unique aspects is that every Beach Sweeper becomes a "citizen scientist" as they record each piece of

debris collected on our *Beach Sweeps* data cards. The data collection and related research help us: discover solutions to keep beaches clean and healthy; create federal, state, and local programs to reduce litter; and protect the public and the environment.



**How One Person can Make a Difference:**

Tom Stein read Sea Change by Joel Harper, to his young daughter and had an idea. The book is a charming story of a child who chose to make a difference by leading her community in a campaign to remove litter making beaches cleaner for marine life and people. Inspired, Stein partnered with COA and created "Be the Sea Change", an education program for local schools to encourage even more children to get involved. To find out more, please contact Clean Ocean Action.

## 2017 STATEWIDE SPONSORS



## 2017 COUNTY SPONSORS



## 2017 SITE SPONSORS

Atlantic City Electric, Baine Contracting, Brookdale Community College, Jenkinsons Aquarium, Jersey Central Power & Light, Kohl's Cares, NuStar, Royal Bank of Canada, ServPro of Long Branch and Eatontown, Wells Fargo Advisors

## SPECIAL THANKS

The following have contributed important resources:

Atlantic Bagel, Bloomberg LP, Gateway National Recreation Area Sandy Hook Unit, Island Beach State Park, Marine Academy of Science & Technology, Middlesex County Parks System, Monmouth County Parks System, NJ Clean Communities Council, Ocean Conservancy, Rotary Club Interact, and Water Witch Coffee

*Clean Ocean Action is a coalition of 115 organizations dedicated to improve and protect the waters off the New Jersey and New York coasts. For information about Beach Sweeps and sponsorship opportunities, reducing pollution, and for past Annual Beach Sweep Reports, please contact:*



18 Hartshorne Drive, Suite 2  
Highlands, NJ 07732  
CleanOceanAction.org  
info@CleanOceanAction.org  
(732) 872-0111



This report is printed in-kind on 100% post-consumer paper by



## CORPORATE CORNER

### CORPORATE IMPACT

The Beach Sweeps is made possible thanks to the generous support from sponsors. The funds donated go directly back to the statewide event and help to create new sites, provide outreach to increased numbers of volunteers, and educate local communities on pollution. The following are testimonies from our Statewide partners.



"Through partnerships with organizations like Clean Ocean Action, we're helping improve our environment," said Bob Doherty, New Jersey, Bank of America. "In addition to the company's financial support over the years, our employees are always excited to volunteer at Beach Sweeps to help clean up our beaches and waterways and protect wildlife."

"Wakefern Food Corp/ShopRite is pleased with our 15+ year partnership with Clean Ocean Action (COA). As an environmentally and community oriented business, ShopRite respects when an organization can bring about effective change by involving more and more community member volunteers each year," stated Suzanne Forbes, Corporate Communications, Environmental Affairs Administrator, Wakefern Food Corporation.

COA is most appreciative of the support provided by the Beach Sweeps sponsors and in-kind donors. If you would like to make an even larger difference through providing important resources, please contact us!

### CORPORATE BEACH SWEEPS

Want to make a difference with your corporation this summer? Clean Ocean Action's Corporate Beach Sweep program invites corporate partners of all sizes to enjoy a day at the beach while fostering growth and teamwork among staff members. Through hands-on beach cleanups and team building activities, employees will see the impact they are making to improve the marine environment which ultimately affects public health, quality of life, and the economy. In 2017, 445 volunteers from 14 corporations removed a remarkable 33,161 pieces of debris! Applications are available at CleanOceanAction.org.

38x

Hello! My name is Eliza Silletto and I am here speaking on behalf of Teaneck Girl Scout Troop 60019. I would like to thank you all for the opportunity to speak on this matter. We are here because we have been hard at work educating people about this issue for over five years. Starting as a Bronze Award Project and moving beyond that, myself and my troop have been working to raise awareness in our town and county about the dangers of single use plastic bags. We can say with absolute certainty that almost all of the residents we have spoken to about this issue have responded with overwhelming support for action against plastic bags. Once you have a full understanding of the scope of the problems created by plastic bags, from their creation throughout their neverending lifespan (as they never biodegrade), using them is indefensible.

and would like to show our support for a state-wide plastic bag ban -

With us today is the Plastic Bag Monster, a costume we made out of approximately 500 plastic bags, the same number of single use bags the average consumer uses in a single year. Personally, I think this is a conservative estimate, but nevertheless she is a great way to illustrate how much plastic waste is generated by each person every year. The Plastic Bag Monster has been really helpful in showing our community that every bag really counts, and makes an impact.

found fabricating these costumes, all these bags would have either ended up in landfills or in our waterway!

if we hadn't picked up these bags to make up this costume, all these bags would have either ended up in landfills or in our waterway!

My troop and myself have been speaking to residents about this issue starting in 2013, and it is remarkable how many people care and want to see change. We were motivated by the support of the residents in our town to begin lobbying our town council to pass a plastic bag ordinance, whether that be a ban or a tax. This led to our first presentation to our town council in 2015, and Teaneck finally in 2017 becoming the second town in the state of New Jersey to pass a plastic bag ordinance, placing a five cent fee on single use plastic bags. Since then we have been so excited to see more than a dozen towns in New Jersey have passed similar ordinances, mostly bans!

It has been so obvious to us that not just in New Jersey, but worldwide, people are becoming aware of the serious problem of plastic waste, and want to do something about it. From the perspective of someone who is going to be voting in a few short years, myself and my fellow troop mates are really proud to see that New Jersey could be the first state on the east coast to start becoming more responsible about plastic waste. I can tell you that Girl Scouts across northern New Jersey strongly support taking action about plastic waste, and single use plastic bags are the easiest place to start because the solution really is that simple: bring your own reusable bag.

Thank you all for your time!

## American Chemistry Council Testimony

### New Jersey Joint Assembly and Senate Environment Hearing

August 23, 2018

Thank you for the opportunity to speak with you today to address marine debris, litter and plastics. My name is Keith Christman and I am Managing Director of Plastic Markets at the American Chemistry Council where I oversee our marine debris prevention programs, and Packaging, Automotive and Building and Construction market teams. In this role I also Chair the Global Plastics Alliance team to reduce marine litter.

Chemistry and plastics are an important and growing part of our economy. Plastic materials manufacturers directly employ 57,600 people in the US. These employees earned on average \$93,600 which is more than 44% higher than the average wage for all industries. Including product manufacturing the plastics industry employs nearly 1 million people nationwide. In New Jersey the Industry accounts for over 20,000 jobs.

Plastics also provide important benefits to society. For example, plastics reduce the weight of our cars reducing fuel use and GHG emissions. Plastics also keep our food fresh and clean reducing food waste. For example, 1.5 grams of plastic protects cucumbers for 14 days vs 3 days without and packaging for grapes reduces waste by 20%. Reducing food waste is important because EPA estimates that more food reaches landfills and incinerators than any other single material in our everyday trash, constituting 22 percent of discarded municipal solid waste. Additionally producing our food uses 10 times more energy than producing the packaging to protect it.

Although plastics provide important benefits to society, plastics and other trash doesn't belong in our waterways or the environment. That's why we are actively engaged in concrete actions to reduce litter and prevent marine debris.

The first step to ending plastic waste in the environment starts with understanding the sources. The primary cause of marine litter is the lack of municipal solid waste systems in rapidly developing countries. Over half of land-based plastic waste leaks from just five countries: China, Indonesia, the Philippines, Thailand, and Vietnam.<sup>1</sup> A recent World Bank study confirms that root cause, and found that human trash in Indonesian rivers includes 53 percent organic waste, 13 percent diapers, 29 percent plastic and the remainder other debris.<sup>2</sup> So, while consumer plastics are a large fraction of the waste stream, holistic solutions are needed. That is also consistent with McKinsey's analysis for Ocean Conservancy's *Trash Free Seas Alliance* which identified the need to immediately accelerate implementation of waste collection infrastructure, plug post collection leakage, and improve processing of collected waste.<sup>3</sup> While the impulse to act is understandable, we must acknowledge that we will not fundamentally solve the problem at its source through single-product restrictions.

---

<sup>1</sup> J. R. Jambeck, R. Geyer, C. Wilcox, T. R. Siegler, M. Perryman, A. Andrady, R. Narayan, and K. L. Law, "Plastic waste inputs from land into the ocean," *Science*, 2015, Volume 347, Number 6223

<sup>2</sup> The World Bank Group, *Indonesia Marine Debris Hotspot Rapid Assessment Synthesis Report*, April 2018

<sup>3</sup> Ocean Conservancy, McKinsey Center for Business and Environment, *Stemming the Tide: Land-based strategies for a plastic - free ocean*, Oct. 2015 <https://oceanconservancy.org/wp-content/uploads/2017/04/full-report-stemming-the.pdf>

There are steps we can take, including better systems to reduce and then manage the waste we produce, and plastics makers are actively engaged in reducing marine debris globally. In 2011, we helped lead the development of the Declaration of the Global Plastics Associations for Solutions on Marine Litter.<sup>4</sup> Since launching this Declaration, seventy-five plastics associations in 40 countries have signed the Declaration and more than 355 marine litter projects are planned, underway, or have been completed around the globe.

We are also taking important steps in the US. In May The American Chemistry Council's (ACC) Plastics Division announced three ambitious goals that crystalize U.S. plastics resin producers' commitment to recycle or recover all plastic packaging used in the United States by 2040 and to further enhance plastic pellet stewardship by 2022.

Specifically, members of ACC's Plastics Division have set the following goals for capturing, recycling, and recovering plastics:

- 100% of plastics packaging is re-used, recycled or recovered by 2040.
- 100% of plastics packaging is recyclable or recoverable by 2030.

We are embracing the drive toward a circular economy for plastics because it is consistent with our overarching commitment to sustainable materials management. In setting these goals our industry publicly affirmed our vision of the future we want for safe, sanitary plastic packaging and our intention to get there quickly.

Together with our value chain partners we intend to transition to increasingly circular systems for designing, manufacturing, recycling and recovering our plastic packaging resources.

To achieve these goals, plastic resin producers plan to focus on six key areas: designing new products for greater efficiency, recycling and reuse; developing new technologies and systems for collecting, sorting, recycling and recovering materials; making it easier for more consumers to participate in recycling and recovery programs; expanding the types of plastics collected and repurposed; aligning products with key end markets; and expanding awareness that used plastics are valuable resources awaiting their next use.

Reaching these goals will take collaboration between the plastics industry, government and NGO's. We look forward to working with you to get there. Some opportunities include joining our plastic wrap and bag recycling partnership called WRAP which is helping in Connecticut and expanding polystyrene foam recycling.

Thank you.

---

<sup>4</sup> [www.marinelittersolutions.com](http://www.marinelittersolutions.com)

218<sup>TH</sup> NEW JERSEY LEGISLATURE  
JOINT COMMITTEE HEARING  
SENATE & ASSEMBLY ENVIRONMENT COMMITTEES  
HONS. BOB SMITH & NANCY PINKIN-CHAIRS

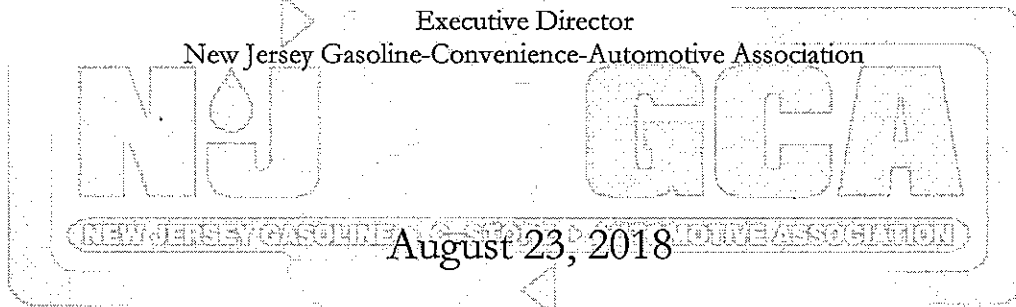
# TESTIMONY

---

SAL RISALVATO

Executive Director

New Jersey Gasoline-Convenience-Automotive Association



August 23, 2018

LMH ROOM, TOMS RIVER MUNICIPAL COMPLEX  
TOMS RIVER, NJ

## Testimony of Sal Risalvato

Chairs Smith and Pinkin, members of the Committee, my name is Sal Risalvato, Executive Director of the New Jersey Gasoline, Convenience Store, Automotive Association (NJGCA), here representing nearly a thousand independent small businesses in this state.

The issue of how we, as a society, deal with the prevalence of single-use plastics is one that is growing in importance and has been at the center of a lot of media attention in the last few months. Convenience stores make frequent use of these types of plastics because they are, as our name implies, *convenient*.

There have been some proposals to completely ban the availability of plastic straws. I have even heard some advocates declare that a straw ban would be simpler than banning items like plastic bags and Styrofoam containers, but I disagree completely. There are alternatives available to fill the niches satisfied by those products (albeit they are more costly). But, at least for now, there is not a true alternative to the plastic straw.

There are straws made of paper, but these are completely lacking in durability for more than a few minutes. Restricting the usage of straws at restaurants makes sense, since the customer is going to be sitting peacefully at a table for the complete duration of their meal. But a typical customer at a convenience store who needs a straw is immediately getting in their car. The straw may sit in a large cup for an hour or more as the consumer drinks it, leaves it behind for a while, carries it around, etc. Paper straws are also about seven times more expensive than plastic ones, a cost which will of course slightly impact the consumer. There are reusable straws made of metal or bamboo, but by definition a consumer needs to bring the straw with them in advance, and have previously cleaned it, which complicates the convenience aspect of our members' business model.

Starbucks, a massive corporation with the ability to leverage the buying power of 28,000 retail locations worldwide, has announced that they hope to eliminate straws at their locations in 2020 by replacing them with plastic lids customers can drink through. It should be noted however, that a recent report calculated that the current straw and thin lid combination at Starbucks consists of 3.55 grams of plastic for a large cup, while the new straw-less lids have 4.11 grams, meaning a 15% increase in the amount of plastic used and immediately thrown away.<sup>1</sup>

Since bans on straws started popping up, some disability advocates have spoken out<sup>2</sup> against them, as they rely on soft plastic straws that won't disintegrate in order to consume their beverage of choice. A blanket ban on straws in all cases would disproportionately hurt the disabled community. In fact, I would wonder if a retailer were to voluntarily remove all their straws, would they be at

<sup>1</sup> <https://reason.com/blog/2018/07/12/starbucks-straw-ban-will-see-the-company>

<sup>2</sup> <http://time.com/5335955/plastic-straws-disabled/?xid=tcoshare>

risk of having violated the Americans with Disability Act because they removed a previously freely provided product that people with certain disabilities require in order to consume the products being sold?

While there is certainly value in cutting back on the usage of disposable plastics, we feel it is too dramatic and unfair a step to go from completely carefree access and usage of these products to complete and total bans, perhaps with very severe fines on retailers who do not fall in line. This is true for plastic bags as well, which is why we have reached out to Governor Murphy to ask him to sign the plastic bag fee bill.

It is better to start with carrots instead of sticks, and encourage the public to volunteer to cut back on the waste they generate. Perhaps in a few years, after there has been more cultural acceptance and better alternatives have been developed and become widespread and cheaper, that a ban would make more sense and be more effective.

Even under one of the highest estimates of straw-usage, worldwide straw consumption only amounts to about 0.03% of total plastic pollution per year.<sup>3</sup> One environmentalist I read recently wrote “Critics of the plastic straw movement point out that straws are small, and reducing the use of a larger product would be much more impactful. While that’s true, single-use plastic straws are relatable products we have all used, and forgoing them is an easy behavior change for many who are new to the movement. Environmentalists know that the plastic straw movement isn’t actually about straws, but is rather a gateway to the larger effort to reduce unnecessary and harmful waste in our oceans.”<sup>4</sup>

If the point of cutting back on plastic straw usage is to more easily convince people to be more aware of the pollution they generate in everyday life, then a government-enforced ban is actually the worst direction to take, because it completely takes the onus off the consumer and makes it so they never think about the issue again (unless it’s to curse environmentalism after their paper straw disintegrates).

The issue of plastic waste and pollution is a serious one, and in the spirit in which this committee was called, I do want to leave with some suggestions for actions which this Legislature could take to help with the problem. In addition to not hurting independent small businesses, I genuinely believe that any of these proposals would have a greater positive impact on the environment than a government ban on plastic straws.

---

<sup>3</sup> <https://www.bloomberg.com/view/articles/2018-06-07/plastic-straws-aren-t-the-problem>

<sup>4</sup> <https://www.newsweek.com/problem-plastic-straw-ban-opinion-1054966>

## Ideas:

- Increase awareness among the general public on the value of voluntarily cutting back on plastic usage whenever they can, and to properly dispose of what they do use. Many consumers just take and use these types of plastic without giving any thought whatsoever to them. Simply ensuring that the issue is on their mind can lead to a large number of people choosing to change their behavior.
- A commission of some kind to study our waste management process to find out how plastics and all other forms of litter actually get on our beaches and in the ocean. How much is the result of beach-goers leaving their garbage behind, and how much is washed up from the ocean? Even if someone throws their recyclable plastic into the garbage, it should all still be collected and sent to dedicated landfills. If some is lost along the way and winds up in the environment, how can that be prevented? How much is flowing down from New York? Once we have a better understanding of exactly how pollution winds up on the beach, we can make informed decisions on how to counteract it.
- A resolution asking the federal government to lead the way in working with developing nations to improve their waste and recycling management. A McKinsey report estimated that more than half of all the plastic pollution in the oceans comes from just 5 countries—China, Indonesia, the Philippines, Thailand, and Vietnam.<sup>5</sup> These are countries going through rapid development, and their waste management systems have not caught up with their economic expansion. It's hard to imagine how just the state of New Jersey can help with this, but no doubt Congress and/or the State Department could try and work with the governments of these nations to provide them with the expertise necessary.
- Some way to deal with the waste produced by commercial fishing. Another survey estimated that 46% of the mass of the Great Pacific Garbage Patch came solely from abandoned fishing nets.<sup>6</sup> Commercial fishing equipment continues to kill marine life even after it has been abandoned, and there should be some way to incentivize responsible fishing practices that don't leave their equipment behind.

Thank you.

---

<sup>5</sup> <https://oceanconservancy.org/wp-content/uploads/2017/04/full-report-stemming-the.pdf>

<sup>6</sup> <https://www.nature.com/articles/s41598-018-22939-w>

Unitarian Universalism subscribes to the principle of respect for the interdependent web of all existence, requiring us to take care of the Earth, which supports our life.

From a common sense point of view, if we don't take care of the Earth, we can hardly expect it to take care of us.

Thank you for introducing S2776 banning plastic bags, expanded polystyrene, and plastic straws. This is an important step forward, and we strongly support it in place of a fee, which may not be large enough to change behavior significantly.

I have some thoughts about what to ban. My mother always told me to clean up the biggest mess first, so we should ask what are the main sources of plastic waste on our beaches, rivers, lakes, parks, and streets. Clean Water Action carries out yearly Beach Sweeps and classifies the trash found. Ignoring plastic pieces, whose source is hard to determine, the offenders are, in order, plastic caps and lids, food and candy wrappers and bags, straws and stirrers, cigarette filters, plastic beverage and soda bottles, plastic store and shopping bags, and cigar tips. Similar results have been reported on a national level. I would urge you to consider banning as many of these items as we can find good substitutes for. In particular, instead of using plastic bags and food and drink containers – all forms, not just expanded polystyrene – reusable bags and containers are available and convenient.

Here's another point: Corporations have managed to duck responsibility for reuse and recycling of plastic. Back in the 50s and 60s I recall bottle return fees: you made a deposit when you bought something in a glass bottle, then you got your deposit back when you returned it. The producer (e.g., Coca-Cola) is then responsible for reusing or disposing of the bottle.

Recycling is really complicated these days. Our recycling company in Westfield was actually giving wrong answers to questions about what and how we can recycle things. The Green Team spent significant time trying to understand what can be recycled and how. Given the complexity of recycling, and the changes from year to year, it is hard to make progress with recycling only. An interesting alternative is to require that the producer of a single-use item has responsibility for its disposal.

Thank you for your time.

## TESTIMONY by Ray Nichols

The Assembly Environment and Solid Waste Committee and the Senate Environment and Energy Committee will meet jointly on Thursday, August 23, 2018 at 10:00 AM to 12:30 PM in the LMH Room, Toms River Municipal Complex, 33 Washington Street, Toms River, NJ. The committees will meet to hear testimony from invited guests and the public on the issues of single-use plastics and plastic waste, and what steps the State can take to address these issues.

Thank you for providing this opportunity to ~~voice about our concerns.~~ *Speak to the joint committee*

I grew up in Bloomfield, NJ. My parents had lived through both the Great Depression and World War II. They brought me up to enjoy frugal comfort and preached "waste not, want not". They warned me to be wary of the people and advertisers who wanted to sell me things I did not need, ~~or would not good for me~~

One reason I am here today is because I adopted those values as my own and ~~or the world we live in~~ have shared them with my children.

Secondly, I'm here as a member of UU Faith Action of NJ, a statewide organization of Unitarian Universalists.

As a Unitarian Universalist, my faith calls me to engage in the democratic process, to ~~improve this world we live in.~~ Another of our principles calls me to show "respect for the interdependent web of all existence." In other words, there is a moral imperative to care for the environment that nurtures us, and all life.

Regarding specific legislation:

*Like many*  
*the hearing*  
*retailers*  
*businesses*  
*and*  
*conditional*  
we have appealed to the Governor to ~~veto~~ *conditionally* S2600/A3267 which was rushed through the legislature in late June. We realize that that bill was really intended to generate a new stream of income for the State without appearing to raise taxes. The simultaneous attempt to regulate the distribution of carry-out bags was simply a ruse to make it appear "Environmentally beneficial".

*not gas*  
A far superior piece of legislation is represented by S2776 and A4330. This bill is a reasonable first step to reduce the amount of non-biodegradable plastics in the environment. Just as importantly, since most plastics are derived from *natural gas and* petroleum, reducing the demand for materials made from plastics will result in the generation of less green-house gases, thus reducing the rate of Climate Change. *coupled with a sustainable*

Today, I ask you to consider three words that are especially relevant to the subject of today's hearing: REDUCE, REUSE, and RECYCLE. Consider what they mean in terms of creating more sustainable behavior by New Jersey's residents and visitors.

Thank you for providing this opportunity to voice about our concerns.

I grew up in Bloomfield Hills. My parents had lived there for the last 40 years. My father and I went to the same high school. They brought me up to enjoy the great outdoors. I was not a very good student. They wanted me to be a part of the outdoors. I was not a very good student. They wanted me to be a part of the outdoors. I was not a very good student. They wanted me to be a part of the outdoors.

Recently I have been a member of the Michigan State Bar Association. I have been a member of the Michigan State Bar Association. I have been a member of the Michigan State Bar Association.

As a Michigan resident, my father called me to join the state bar. I have been a member of the Michigan State Bar Association. I have been a member of the Michigan State Bar Association. I have been a member of the Michigan State Bar Association.

Regarding the Michigan State Bar Association.

We have appeared on the Michigan State Bar Association. We have appeared on the Michigan State Bar Association. We have appeared on the Michigan State Bar Association. We have appeared on the Michigan State Bar Association.

A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association. A Michigan State Bar Association.

Today I ask you to consider the words that are especially relevant to the subject of today's hearing: REDUCE, REUSE, and RECYCLE. Consider what they mean in terms of creating a more sustainable future for Michigan residents and visitors.

If we Reduce the amount of stuff we buy, we will create less waste.

If we can Reuse the stuff we buy, it won't become waste.

*Jancy*  
*point* *Now consider the concept of Recycling. & how.*  
However, recycling programs have been shown to be only partially effective, unless there are strong market forces that favor the recycling of specific materials. Otherwise, materials will be discarded in the most convenient manner Businesses, by "giving" <sup>us plastic ~~be~~ containers are reusing</sup> or in reality, "selling" us stuff we can use only once, are responsible for creating the waste that we all abhor.

*we*  
State government can <sup>on a should</sup> effectively prevent businesses from creating that waste, by passing well written laws, and then ensuring they can be properly enforced. Doing so will help reduce waste and improve the environment for us and future generations to enjoy.

It is time for New Jersey to act to repudiate the advocates of the "Throw-away economy". We need to reduce the production and marketing of things that can be used only once, and then discarded. At the same time, we need to be promoting the use of reusable materials. ~~Plastics are littering our landscape and causing significant numbers of many species of animals to die after inadvertently ingesting plastic particles. For this reason, the authors of this legislation are to be commended. Expanded polystyrene particles, plastic bags and plastic straws are among the most common, easily visible, forms of solid waste in this state. In most cases, where they are used just once and then discarded, there are less environmentally damaging alternatives readily available. Therefore, S2776/A4330, which bans those uses for which alternatives are available, is long overdue!~~

*I thank you for your attention and*

*Consistent -*

*Corporations, beginning with the petro-chemical industry have become very skilled at persuading individuals to be responsible for recycling plastics, thus ~~exp~~ forcing on us costs that they don't want to absorb*



# Oceans Awash in Toxic Plastic

## Brought to You by the Fracking Industry



**Hydraulic fracturing (fracking) is powering a dangerous plastics bonanza. The plastics and fracking industries rely on one another to prop up their polluting business models. The fracking industry needs a new demand source to sop up excess gas to justify more drilling,<sup>1</sup> and the plastics industry needs a source of low-cost ethane, a fracking byproduct used to manufacture plastics.<sup>2</sup> Much of the fracking-driven resurgent plastics production ends up polluting the oceans.**

The process of turning fracked gas into plastic releases climate-altering air pollutants,<sup>3</sup> while increased plastics manufacturing means more disposable plastic materials that pollute our air, water and even table salt.<sup>4</sup> Continued plastics production will leave a toxic legacy that threatens ocean ecosystems and human health.<sup>5</sup> Much of this plastic waste ends up in our oceans and surface waters, resulting in potentially irreversible destruction to aquatic habitats.<sup>6</sup>

### The symbiotic relationship between fracking and plastics

The rapid fracking expansion created a gas glut that drove real natural gas prices to the lowest levels in decades,<sup>7</sup> but the plastics industry is riding to the rescue of the fracking industry. According to *Plastics News*, fracking “represents a once-in-a-generation opportunity” for the plastics industry.<sup>8</sup> A renewed push for plastics manufacturing provides the fracking industry with a polluting partner to absorb the ever-increasing quantity of fracked gas.<sup>9</sup>

Investors are lining up to build new factories that transform fracking byproducts into plastics.<sup>10</sup> Since 2012, chemical companies have been aggressively investing in petrochemical plants to tap the gas glut.<sup>11</sup> These facilities convert gas byproducts into petrochemicals to manufacture products, primarily plastics.<sup>12</sup>

This fracking-driven plastic pollution has a global reach. More than half of the new raw plastics produced in the United States are slated for export.<sup>13</sup> For example, the United Kingdom-based chemical giant Ineos has teamed up with the U.S. fracking industry to fuel European plastics factories.<sup>14</sup> The controversial Mariner East pipeline system delivers ethane to the Marcus Hook export terminal in Pennsylvania, then large “dragon ships” deliver the fracked-gas byproducts across the Atlantic Ocean to Ineos’ European facilities.<sup>15</sup>

### Fracking, plastics manufacture, climate change and ocean acidification

Plants that convert natural gas into petrochemicals emit massive amounts of air and climate pollutants, including carbon dioxide (CO<sub>2</sub>) and nitrogen oxide.<sup>16</sup> This can exacerbate ocean acidification, caused when rising CO<sub>2</sub> levels in the atmosphere alter seawater chemistry.<sup>17</sup> Some sea life shows decreased rates of survival and growth, higher rates of deformities and even behavioral changes in acidified waters.<sup>18</sup> This could have far-reaching implications for the abundance and biodiversity of marine life, as well as for ecosystem health and resiliency.<sup>19</sup> Coral reefs serve as the foundation for many ocean food webs. Studies have shown that increasing acidity dissolves coral skeletons, making it harder to form new reef structures.<sup>20</sup>

The emissions from petrochemical plants and fracked-gas power plants are harmful to human health and accelerate the acidification of the ocean.<sup>21</sup> Continued fracking and buildout of natural gas infrastructure like the Mariner East 2 pipeline will lock in future CO<sub>2</sub> emissions, delaying a transition to clean energy alternatives.

## Plastic pollution is toxic and has a growing footprint

Fracked gas is supercharging the plastics industry, contributing climate-altering emissions and even more unnecessary plastic. The global plastics industry is expected to increase production 40 percent over the next decade, driven by dropping prices for manufacturing inputs like fracking byproducts and by massively scaled-up production.<sup>22</sup> Most of the plastics industry manufactures packaging — materials that are immediately discarded.<sup>23</sup> Worldwide, each person disposes of 110 pounds of plastic annually.<sup>24</sup> Since 1950, the industry has produced 18.3 trillion pounds of plastics, and only about 9 percent was recycled — meaning that more than 16 billion pounds have been tossed into landfills, littered into the environment or incinerated.<sup>25</sup>

Additionally, plastic products are inherently toxic and can become a vehicle for other pollutants.<sup>26</sup> Many plastics contain hazardous chemicals and thousands of different additives, which may leach out as the plastic ages.<sup>27</sup> These risky additives can make up half of plastic by weight.<sup>28</sup> Some are extremely noxious, many have been linked to chemical toxicity, and some are classified as endocrine disruptors, which can alter hormone function.<sup>29</sup> These additives can seep from plastics into food and the environment, accumulating over time.<sup>30</sup>

Once created, plastic lasts for hundreds to thousands of years, and the toxic remains of plastic pose serious challenges.<sup>31</sup> Discarded plastic fills up increasingly limited landfill space.<sup>32</sup> As water percolates through these landfills it picks up toxins, generating super-polluted runoff that is harmful to human health and the environment.<sup>33</sup> Recycling facilities may also release dangerous plastic chemical additives into the environment.<sup>34</sup>

## Massive amounts of plastic trash inundate our oceans

Forty percent of all plastic waste is unaccounted for, and a large volume of plastic waste enters the ocean where it remains for decades.<sup>35</sup> In 2010 alone, nearly 200 coastal countries generated over 600 billion pounds of plastic waste, with 11 billion to 28 billion pounds ending up in the oceans.<sup>36</sup> This litter constantly accumulates in colossal plastic garbage masses floating in our oceans.

Studies have found microplastics — tiny plastic fragments degraded from plastic litter — in open oceans, freshwater sources, lake sediments, river beds and the deepest ocean trenches.<sup>37</sup> While large plastic waste is easiest to see, ingesting small microplastics is extremely harmful to aquatic life and seabirds.<sup>38</sup> Microplastic ocean pollution is widespread. Between 2007 and 2013, an estimated 538 million pounds of plastic particles were found on the oceans' surface — from coastal Australia to the Mediterranean Sea.<sup>39</sup>

In the Pacific Ocean, four major ocean currents have concentrated this waste into a slow-moving "plastic soup."<sup>40</sup> Dubbed the Great Pacific Garbage Patch, the world's largest dump is four times the size of California.<sup>41</sup> Many discarded plastics join this rapidly growing, floating mass of trash — one of five gigantic plastic ocean trash heaps.<sup>42</sup>

## Plastics increasingly threaten important aquatic ecosystems

Plastic contamination poses a significant threat to marine biodiversity, impacting over 600 marine species.<sup>43</sup> Frequently plastic debris floats at the ocean's surface, mixing with food sources, where it entangles, chokes or is consumed by wildlife.<sup>44</sup>

Large chunks of plastic have accumulated in whales' stomachs, causing them to starve to death.<sup>45</sup> Sea turtles, including critically endangered leatherbacks, accidentally consume plastic bags, mistaking them for jellyfish.<sup>46</sup> And scientists have found plastic pellets in endangered puffins' stomachs.<sup>47</sup>

Microplastics cause liver toxicity in fish, accumulate toxic chemicals in the fat tissue of sea birds, impair cell function in mussels and kill sea urchin embryos.<sup>48</sup> As larger animals eat smaller ones, these toxins move up the food chain and bioaccumulate in larger marine life, posing serious systemic risks.<sup>49</sup>



Sea turtles may accidentally consume plastic bags, which can be mistaken for jellyfish. PHOTO CC-BY-SA © MICHAELISSCIENTISTS / COMMONS.WIKIMEDIA.ORG

## Plastic pollution may damage irreplaceable parts of the global carbon cycle

Plastic pollution can contribute to potentially catastrophic impacts on ocean ecosystems.<sup>50</sup> The ocean plays a critical role performing half of the planet's photosynthesis — absorbing massive amounts of carbon — but plastic pollution threatens oceans' carbon sequestration.<sup>51</sup> Large quantities of plastic can block light and hinder algae photosynthesis.<sup>52</sup> While photosynthesis at the ocean's surface pulls carbon from the atmosphere, large amounts of the carbon will re-enter the atmosphere unless sequestered deeper in the ocean.<sup>53</sup>

Many animals comprise the "biological pump" that removes more than 10 billion tons of this carbon from the surface ocean annually.<sup>54</sup> Critical to this process are 22 trillion pounds of surface-feeding, plankton-eating fish that subsequently bring the carbon to the ocean depths.<sup>55</sup> These fish account for over 40 percent of the carbon sequestration in some parts of the ocean.<sup>56</sup> Unfortunately, these fish are now consuming large amounts of plastic, which potentially disrupts this natural sequestration process.<sup>57</sup> Microplastics also interfere with smaller carbon sequesterers such as zooplankton, preventing carbon-rich debris from sinking.<sup>58</sup>

## Microplastics end up everywhere, pollute everything

Microplastics are ubiquitous, finding their way into the food we eat and the air we breathe.<sup>59</sup> Even indoor air can have high concentrations of microplastics from household products and synthetic textiles, which accumulate in people's lungs after being inhaled.<sup>60</sup> In the United States, the Clean Water Act generally does not regulate small debris under 5 millimeters, such as microplastics, and wastewater treatment systems do not always remove plastic fragments from water.<sup>61</sup> Microplastics are present in soil and contaminate organic fertilizers.<sup>62</sup> Plastic particles have been found in tap water, beer and sea salt, and one study even found them in 93 percent of bottled water.<sup>63</sup> In Europe, shellfish consumers eat as many as 11,000 microplastic particles every year.<sup>64</sup>

## Conclusion

The fracked plastics economy generates vast volumes of pollution that directly impact the climate and overburdened oceans. We must stop producing more unnecessary and unsustainable plastics. A first step would be to correctly classify plastic waste as hazardous.

Natural gas is a cheap but dirty fossil fuel. The toxic fracking legacy is now spreading through the expansion of petrochemical and plastics plants. The drive to build more fracked gas infrastructure like pipelines and power plants also supports an unnecessary and wasteful plastics boom that will

expose people and the environment to toxic pollution for generations to come. Rather than continually investing in fossil fuels and chemical industries, we must invest in clean, renewable energy.

Consumers need to understand that using plastic props up the polluting and climate-destroying fracking industry. People can help secure a sustainable future by making more conscientious shopping decisions. People should limit their purchases of plastic products, an activity that effectively supports and finances the oil and gas industry.

## Endnotes

- 1 U.S. Energy Information Administration (EIA). "Ethane production expected to increase as petrochemical consumption and exports expand." April 1, 2016; Wilczewski, Warren. EIA. "Growing U.S. HGL production spurs petrochemical industry investment." January 29, 2015.
- 2 Ghanta, Madhav et al. "Environmental impacts of ethylene production from diverse feedstocks and energy sources." *Applied Petrochemical Research*. Vol. 4, Iss. 2. 2014 at 167; American Chemistry Council (ACC), Economics & Statistics Department. "Plastic resins in the United States." July 2013 at 14 and 15.
- 3 Benchaïta, Tayeb. Inter-American Development Bank, Environmental Safeguards Unit. "Greenhouse Gas Emissions From New Petrochemical Plants. Background Information Paper for the Elaboration of Technical Notes and Guidelines for IDB Projects." July 2013 at 3 to 5, 10 and 15; Chen, Mei-Hsia. "A feasible approach to quantify fugitive VOCs from petrochemical processes by integrating open-path fourier transform infrared spectrometry measurements and industrial source complex (ISC) dispersion model." *Aerosol and Air Quality Research*. 2015 at 1110.
- 4 Taylor, Matthew. "\$180bn investment in plastic factories feeds global packaging binge." *The Guardian* (U.K.). December 26, 2017; Geyer, Roland et al. "Production, use, and fate of all plastics ever made." *Science Advances*. Vol. 3. 2017 at 1; GlENZA, Jessica. "Sea salt around the world is contaminated by plastic, studies show." *The Guardian* (U.K.). September 8, 2017; Karami, Ali et al. "The presence of microplastics in commercial salts from different countries." *Scientific Reports*. Vol. 7, No. 46173. April 16, 2017 at 1; Dris, Rachid et al. "A first overview of textile fibers, including microplastics, in indoor and outdoor environments." *Environmental Pollution*. Vol. 221. July 19, 2017 at 453.
- 5 Rist, Sinja and Nanna Bloch Hartmann. "Aquatic Ecotoxicity of Microplastics and Nanoplastics: Lessons Learned From Engineered Nanomaterials." In Wagner, Martin and Scott Lambert (Eds.). (2018). *Freshwater Microplastics: Emerging Environmental Contaminants?* Cham, Switzerland: Springer Nature at 25, 27 and 28; Rochman, Chelsea et al. "Comment: Classify plastic waste as hazardous." *Nature*. Vol. 494. February 14, 2013 at 169; Lithner, Delilah et al. "Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition." *Science of the Total Environment*. Vol. 409. 2011 at 3322.
- 6 Jackson, Jeremy B. C. "The future of the oceans past." *Philosophical Transactions of the Royal Society B*. Vol. 365. 2010 at 3765, 3769, 3770 and 3771; Jambeck, Jenna et al. "Plastic waste inputs from land into the ocean." *Science*. Vol. 347, Iss. 6223. 2015 at 768.
- 7 Puko, Timothy and Nicole Friedman. "Natural gas falls to all-time inflation-adjusted low extremely warm weather continues to limit demand." *Wall Street Journal*. December 16, 2015; Puko, Timothy. "Gas firms rally on signs glut is easing; Four of nine top-performing stocks in the S&P 500 are gas producers." *Wall Street Journal*. May 13, 2016.
- 8 Eisenberg, Barry. "Plastics in today's re-emerging U.S. economy." *SPI Magazine*. Fall 2013 at 8.
- 9 Blunt, Katherine. "Ethane consumption surges with petrochemical boom." *Houston Chronicle*. February 24, 2018.
- 10 ACC. [Fact sheet]. "U.S. Chemical Investment Linked to Shale Gas: \$164 Billion and Counting." April 2016.
- 11 MacIntyre, Stacy. EIA. "Ethane production expected to increase as petrochemical consumption and exports expand." April 1, 2016; Wilczewski (2015).
- 12 Wilczewski (2015).
- 13 Asbury, Martina. Petrochemical Update. "U.S. Northeast Petrochemical Industry: Market Outlook 2018." November 2017 at 5.
- 14 Ineos Olefins & Polymers Europe. [Press release]. "Ineos Europe and Evergas enter into long-term shipping agreements." January 23, 2013.
- 15 Ineos Olefins & Polymers Europe. [Press release]. "Ineos Intrepid leaves USA carrying first shale gas shipment to Europe." March 9, 2016.
- 16 Benchaïta (2013) at 3 to 5, 10 and 15; Chen (2015) at 1110; Rivas-Arancibia, Selva et al. "Oxidative stress caused by ozone exposure induces loss of brain repair in the hippocampus of adult rats." *Toxicological Sciences*. Vol. 113, No. 1. 2010 at 187.

57x

## Oceans Awash in Toxic Plastic — Brought to You by the Fracking Industry

- 17 The Royal Society. "Ocean acidification due to increasing atmospheric carbon dioxide." (Policy document 12/05), June 2005 at 39.
- 18 Long, William Christopher et al. "Effects of ocean acidification on juvenile red king crab (*Paralithodes camtschaticus*) and tanner crab (*Chionoecetes bairdi*) growth, condition, calcification, and survival." *PLOS ONE*. Vol. 8, Iss. 4. April 4, 2013 at 1.
- 19 The Royal Society (2005) at 20.
- 20 Guinotte, John M. and Victoria J. Fabry. "Ocean acidification and its potential effects on marine ecosystems." *New York Academy of Sciences*. Vol. 1134. 2008 at 327 to 328.
- 21 Benchaita (2013) at 3 to 5, 10 and 15; Chen (2015) at 1110; Rivas-Arancibia et al. (2010) at 187; Burnham, Andrew et al. "Life-cycle greenhouse gas emissions of shale gas, natural gas, coal, and petroleum." *Environmental Science & Technology*. Vol. 46. 2011 at 621.
- 22 Taylor (2017).
- 23 Jambeck et al. (2015) at 768.
- 24 Worm, Boris et al. "Plastic as a persistent marine pollutant." *Annual Review of Environment and Resources*. Vol. 42. 2017 at 2.
- 25 Geyer et al. (2017) at 1.
- 26 Rochman et al. (February 2013) at 169.
- 27 Lithner et al. (2011) at 3322.
- 28 Rist and Hartmann (2018) at 29.
- 29 Scherer, Christian et al. "Interactions of Microplastics With Freshwater Biota." In Wagner and Lambert (2018) at 174; Lithner et al. (2011) at 3309 and 3316.
- 30 Teuten, Emma et al. "Transport and release of chemicals from plastics to the environment and to wildlife." *Philosophical Transactions of the Royal Society*. Vol. 364. 2009 at 2027 to 2028 and 2035; Hahladakis, John N. et al. "An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling." *Journal of Hazardous Materials*. Vol. 344. 2018 at 179 and 191.
- 31 Barnes, David K. A. et al. "Accumulation and fragmentation of plastic debris in global environments." *Philosophical Transactions of the Royal Society*. Vol. 364. 2009 at 1985.
- 32 Zia, Khalid Mahmood et al. "Methods for polyurethane and polyurethane composites, recycling and recovery: A review." *Reactive & Functional Polymers*. Vol. 67. 2007 at 676.
- 33 Postacchini, Leonardo et al. "Environmental assessment of a landfill leachate treatment plant: Impacts and research for more sustainable chemical alternatives." *Journal of Cleaner Production*. Vol. 183. 2018 at 1021 and 1023.
- 34 Hahladakis et al. (2018) at 179 and 182.
- 35 Worm et al. (2017) at 1; Thompson, Richard et al. "Lost at sea: where is all the plastic?" *Science*. Vol. 304, No. 5672. May 7, 2004 at 838.
- 36 Jambeck et al. (2015) at 768.
- 37 Rist and Hartmann (2018) at 25, 27 and 28; Klein, Sascha et al. "Analysis, Occurrence, and Degradation of Microplastics in the Aqueous Environment." In Wagner and Lambert (2018) at 58, 59 and 62; Jamieson, Alan J. et al. "Bioaccumulation of persistent organic pollutants in the deepest ocean fauna." *Nature Ecology & Evolution*. Vol. 1, No. 51. February 2017 at 1 to 3.
- 38 Scherer et al. (2018) at 160; Rist and Hartmann (2018) at 35; Eriksen, Marcus et al. "Microplastic: What Are the Solutions?" In Wagner and Lambert (2018) at 277; Yamashita, Rei et al. "Physical and chemical effects of ingested plastic debris on short-tailed shearwaters, *Puffinus tenuirostris*, in the North Pacific Ocean." *Marine Pollution Bulletin*. Vol. 62. 2011 at 2845 and 2848.
- 39 Eriksen, Marcus et al. "Plastic pollution in the world's oceans: More than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea." *PLOS ONE*. Vol. 9, Iss. 12. 2014 at 1.
- 40 Grant, Richard. "Drowning in plastic: the Great Pacific Garbage Patch is twice the size of France." *The Telegraph* (U.K.). April 2009.
- 41 *Ibid.*; Lebreton, L. et al. "Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic." *Scientific Reports*. Vol. 8, No. 4666. 2018 at 1 and 13.
- 42 Lebreton et al. (2018) at 1 and 13; Cózar, Andrés et al. "Plastic debris in the open ocean." *Proceedings of the National Academies of Science*. Vol. 111, No. 28. 2014 at 10239.
- 43 Johnston, Emma L. and David A. Roberts. "Contaminants reduce the richness and evenness of marine communities: A review and meta-analysis." *Environmental Pollution*. Vol. 157. 2009 at 1745; Gall, S. C. and R. C. Thompson. "The impact of debris on marine life." *Marine Pollution Bulletin*. Vol. 92, Iss. 1-2. March 2015 at 3 and 5.
- 44 Boerger, Christiana M. et al. "Plastic ingestion by planktivorous fishes in the North Pacific Central Gyre." *Marine Pollution Bulletin*. Vol. 60. 2010 at 2275; Barnes et al. (2009) at 1985; Green, Danielle Senga et al. "Impacts of discarded plastic bags on marine assemblages and ecosystem functioning." *Environmental Science & Technology*. Vol. 49. 2015 at 5380.
- 45 Horton, Helena. "Post-mortem on thirteen dead sperm whales finds their stomachs full of plastic." *The Telegraph* (U.K.). March 29, 2016.
- 46 Moore, Charles James. "Synthetic polymers in the marine environment: A rapidly increasing, long-term threat." *Environmental Research*. Vol. 108. 2008 at 134.
- 47 Amos, Ilona. "Plastic pollution found inside dead seabirds." *The Scotsman*. March 25, 2015.
- 48 Rochman, Chelsea M. et al. "Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress." *Scientific Reports*. Vol. 3, No. 3263. 2013 at 1; Tanaka, Kosuke et al. "Accumulation of plastic-derived chemicals in tissues of seabirds ingesting marine plastics." *Marine Pollution Bulletin*. Vol. 69, No. 1 to 2. 2013 at 291; Yamashita et al. (2011) at 2845 and 2848; von Moos, Nadia et al. "Uptake and effects of microplastics on cells and tissue of the blue mussel *Mytilus edulis* L. after an experimental exposure." *Environmental Science & Technology*. Vol. 46. 2012 at 11327; Martínez-Gómez, Concepción et al. "The adverse effects of virgin microplastics on the fertilization and larval development of sea urchins." *Marine Environmental Research*. Vol. 130. September 2017 at 10.
- 49 Ericksson, Cecilia and Harry Burton. "Origins and biological accumulation of small plastic particles in fur seals from Macquarie Island." *Ambio*. Vol. 32, No. 6. 2003 at 384; Jackson (2010) at 3765, 3769, 3770 and 3771.
- 50 Jackson (2010) at 3765, 3769, 3770 and 3771.
- 51 Villarrubia-Gómez, Patricia et al. "Marine plastic pollution as a planetary boundary threat — The drifting piece in the sustainability puzzle." *Marine Policy*. December 2017 at 1 and 3 to 5; Field, Christopher B. et al. "Primary production of the biosphere: Integrating terrestrial and oceanic components." *Science*. Vol. 281. 1998 at 237.
- 52 Bhattacharya, Priyanka et al. "Physical adsorption of charged plastic nanoparticles affects algal photosynthesis." *Journal of Physical Chemistry*. Vol. 114. 2010 at 16556.
- 53 Robinson, J. et al. "How deep is deep enough? Ocean iron fertilization and carbon sequestration in the Southern Ocean." *Geophysical Research Letters*. Vol. 41. 2014 at 2489, 2493 and 2494; Passow, Uta and Craig A. Carlson. "The biological pump in a high CO2 world." *Marine Ecology Progress Series*. Vol. 470. 2012 at 249, 250, 258 and 259.
- 54 Turner, Jefferson T. "Zooplankton fecal pellets, marine snow, phytodetritus and the ocean's biological pump." *Progress in Oceanography*. Vol. 130. 2014 at 4, 5 and 6.
- 55 St. John, Michael A. et al. "A dark hole in our understanding of marine ecosystems and their services: Perspectives from the mesopelagic community." *Frontiers in Marine Science*. Vol. 3. Article 31. March 2016 at 1, 2 and 4; Hudson, Jeanna M. et al. "Myctophid feeding ecology and carbon transport along the northern Mid-Atlantic Ridge." *Deep-Sea Research I*. Vol. 93. 2014 at 104, 105 and 114.
- 56 Davison, P. C. et al. "Carbon export mediated by mesopelagic fishes in the north-east Pacific Ocean." *Progress in Oceanography*. Vol. 116. 2013 at 14 and 28.
- 57 Wicczorek, Alina M. et al. "Frequency of microplastics in mesopelagic fishes from the northwest Atlantic." *Frontiers in Marine Science*. Vol. 5, Article 39. February 2018 at 1, 4, 6 and 8.
- 58 Cole, Matthew et al. "Microplastics alter the properties and sinking rates of zooplankton faecal pellets." *Environmental Science & Technology*. Vol. 50. 2016 at 3239 and 3240; Cole, Matthew et al. "Microplastic ingestion by zooplankton." *Environmental Science & Technology*. Vol. 47. 2013 at 6646, 6652 and 6653.
- 59 Wright, Stephanie L. and Frank J. Kelly. "Plastic and human health: a micro issue?" *Environmental Science & Technology*. Vol. 51, Iss. 12. 2017 at 6634.
- 60 Dris et al. (2017) at 453; Pauly, John L. et al. "Inhaled cellulosic and plastic fibers found in human lung tissues." *Cancer Epidemiology, Biomarkers & Prevention*. Vol. 7. May 1998 at 419.
- 61 Brennholt, Nicole et al. "Freshwater Microplastics: Challenges for Regulation and Management." In Wagner and Lambert (2018) at 248; Lasee, Steven et al. "Microplastics in a freshwater environment receiving treated wastewater effluent." *Integrated Environmental Assessment and Management*. Vol. 13, No. 3. 2017 at 528.
- 62 Weithmann, Nicolas et al. "Organic fertilizer as a vehicle for the entry of microplastic into the environment." *Science Advances*. Vol. 4, April 4, 2018 at 1 to 2; Huerta Lwanga, Esperanza et al. "Field evidence for transfer of plastic debris along a terrestrial food chain." *Scientific Reports*. Vol. 7, No. 14071. 2017 at 1.
- 63 Carrington, Damian. "Plastic fibres found in tap water around the world, study reveals." *The Guardian* (U.K.). September 5, 2017; Liebezeit, Gerd and Elisabeth Liebezeit. "Synthetic particles as contaminants in German beers." *Food Additives & Contaminants*. Vol. 31, No. 9. 2014 at 1574; Glenza (2017); Karami et al. (2017) at 1; Mason, Sherri A. et al. State University of New York at Fredonia, Department of Geology & Environmental Sciences. "Findings: Synthetic polymer contamination in bottled water." Published by Orb Media. 2018 at 1.
- 64 Cauwenbergh, Lisbeth Van and Colin R. Janssen. "Microplastics in bivalves cultured for human consumption." *Environmental Pollution*. Vol. 193. 2014 at 65.

info@fwwatch.org

202.683.2500 (DC) • 510.922.0720 (CA)

Copyright © July 2018 Food & Water Watch

foodandwaterwatch.org

food&waterwatch

52x

JERSEY SHORE PARTNERSHIP REMARKS  
JOINT SESSION  
NJ SENATE ENVIRONMENT AND ENERGY COMMITTEE  
AND  
NJ ASSEMBLY ENVIRONMENT AND SOLID WASTE COMMITTEE  
August 23, 2018  
Presented by Margot Walsh, Executive Director  
Jersey Shore Partnership

Good morning, Chairman Smith and Chairwoman Pinkin. I am here this morning to bring the Committees up to date on bills S1614 and A826 that would increase the Shore Protection Fund. I note my appreciation to Senator Greenstein and Assemblyman Wolfe for their sponsorship.

In the Jersey Shore Partnership's testimony before your committees in the past two Legislative Sessions, we presented and provided a comprehensive analysis of the State's Shore Protection Fund that showed the needed increase in the Fund level projected into 2025.

In preparation for giving the most accurate and updated funding need in our 2018 Legislative testimony, the Partnership filed an OPRA request with the New Jersey Department of Environmental Protection (DEP), Division of Engineering and Construction (DEC), for all summary documents that include and could be utilized to create a new 10-year budget for finances through 2028 related to all coastal engineering projects presently ongoing or planned within that timeframe with the U.S. Army Corps of Engineers (USACE), Philadelphia and New York Districts. DEP has confirmed delivery of the requested information on August 24, 2018.

The OPRA information, with data already acquired from the USACE, New York and Philadelphia Districts, will allow us to prepare a newer, more comprehensive analysis of the state's need for additional funding to support its federal cost-share partnership and state-funded municipal projects over ten years.

This new data also will allow us to filter out the post "Sandy" expenditures and commitments to get a more concise view of anticipated funding needs over the next ten years. We anticipate that we will forward our completed documentation and Committee testimony to you in September.

Over the past two years, the Legislature has taken positive steps that show that the State cares about our beaches:

- A public access bill requires shore municipalities to adhere to public access requirements set by the State to support the public's right to enjoy our beaches;
- The Governor, Legislature, environmentalists, and the public have fought against gas and oil drilling 3 miles off our coast;
- Natural resources – wetlands, living shorelines, and dunes - are supplementing hard structures in protecting our beaches;

- Most important, legislation has been introduced to update the 1980 Shore Master Plan - a welcome sign that the State is concerned about the future of our coast, especially in view of sea level rise and anticipated storm activity.

HOWEVER, these initiatives assume that our beaches will always be there for our enjoyment and a source of economic enrichment for our State. Unfortunately, we know that beach erosion is going to occur and ongoing maintenance is required to protect our coastal infrastructure, New Jersey's first line of defense in the advent of severe storms.

The goals envisioned in a new Shore Master Plan will not succeed without the necessary funding to implement its objectives for achieving a more resilient and sustainable coastal infrastructure. Increased funding for shore protection goes hand-in-hand with a new Master Plan.

The \$25 million Shore Protection Fund is locked into a Realty Transfer Fee 20-year old flat allocation – minus the benefits of an inflation factor. An increase in the Fund requires Legislative approval and the Governor's signature.

The Jersey Shore Partnership's new, updated, comprehensive report covering ten years through 2028, will definitively demonstrate the imperative need for increased funding for shore protection. We look forward to moving Bills A826 and S1614 through the Legislature and Governor's office this Legislative session.

Margot Walsh  
Executive Director  
Jersey Shore Partnership  
[mwalshjspf@gmail.com](mailto:mwalshjspf@gmail.com)  
732-212-4145 (Office)  
732- [REDACTED] (Cell)

**ADDITIONAL APPENDIX MATERIALS**  
SUBMITTED TO THE  
**SENATE ENVIRONMENT AND ENERGY COMMITTEE**  
*and*  
**ASSEMBLY ENVIRONMENT AND SOLID WASTE COMMITTEE**  
*for the*  
**August 23, 2018 Meeting**

**Submitted by Beth Ravit, Ph.D.**, Co-Director, Center for Urban Environmental Sustainability, and Assistant Professor, Department of Environmental Sciences, School of Environmental and Biological Sciences, Rutgers, The State University; and Member, Ecological Processes Standing Committee, Science Advisory Board, Department of Environmental Protection, State of New Jersey:

B. Ravit, K. Cooper, G. Moreno, B. Buckley, I. Yang, A. Deshpande, S. Meola, D. Jones and A. Hsieh: "Microplastics in urban New Jersey freshwaters: distribution, chemical identification, and biological affects," *AIMS Environmental Science*, December 27, 2017. © 2017 the Authors, licensee AIMS PRESS.