Beaufort County Stormwater Management Utility Board (SWMU Board) Meeting Minutes

July 10, 2019 at 2:00 p.m. in Executive Conference Room, Administration Building, Beaufort County Government Robert Smalls Complex, 100 Ribaut Road, Beaufort, South Carolina

Board Members

Ex-Officio Members

Present William Bruggeman Marc Feinberg James Clark Patrick Mitchell Allyn Schneider Steven Andrews James Fargher	Absent	Present Neil Desai Van Willis Scott Liggett	Absent Kim Jones
Beaufort County Staff		Visitors	
Eric Larson		Alice Howard, County	Council
Melissa Allen		Denise Parsick, Beaufor	rt Conservation District
Katie Herrera		Alan Warren, USCB	
Daniel Rybak		Danielle Mickel, USCB	
David Wilhelm		Beth Lewis, Town of B	luffton
Patty Wilson		Bill Baugher, Town of I	Bluffton
Amber Woods		Dr. John Weinstein, The	e Citadel
		Lane Fargher, Centro de l	Investigacion y de Estudios Avanzados

1. Meeting called to order – William Bruggeman

- A. Agenda Approved.
- B. June 12, 2019 Minutes Approved.

2. Introductions – Completed.

3. Public Comment(s) – None.

4. Special Presentation – Dr. John Weinstein with The Citadel, Department of Biology, shared a presentation on his ongoing research called Microplastics and Tire Particles in Our Coastal Waterways: The Role of Stormwater Runoff and Implications for Public Health. He referenced a paper and graphic from 2014 that shows that plastic debris is a global problem, as more that 5 trillion plastic pieces are estimated to be in the ocean. Most plastics are 5mm or less, the microplasics. The route of entry of microplastics into the coastal water ways are through point sources and non-point sources. He shared the fate of microplastics in coastal waters explaining in warm water they get a bio-film and sink down and as they spend time the bi-film may change and they become re-suspended.

In 2014 the lab started studying microplastics by doing a survey of the harbor. Sampled intertidal sediments and the water. Found a harbor wide average of 23 particles per kilogram of

sediment. The levels of microplastics were not evenly distributed through the harbor, which peaked their interest. Daniel Island was 4 times higher than other sites. They wanted to identify sources, looking at shapes of particles (fibers, foam, fragments, spheres). Spheres are microbeads in toothpaste and facial scrubs were only 1% of what was found, which have now been banned. Fragments were where being found, most of them which were black, oblong fragments with a twisted shape. They spent two years trying to determine what they were. They suspect the source of these fragments are tire particles, based on analytical chemistry called further transformed infrared spectroscopy (FT-IR). If they are tire particles they should be able to go near roads and bridges drainages and found millions of these particles in the sediment.

Are tire particle an emerging concern? They contain zinc and PAH's and 30% of tread material ends up as tire particles.

Stormwater pond assessments to see what is found in pond, discharge point, and tidal creek (receiving water). River Landing (residential) pond, sediment lower levels at discharge, and lower at tidal creek suggesting they server as a sink for microplatics particles. Tidal creek was 8 times higher than harbor average, suggesting that the stormwater pond may be servings as a source to the harbor. Booz Allen Hamilton (commercial) and Bayview (residential) sediment; all trends were higher than the harbor.

The water, the trends were not as clear and may need to correlate data to rain events as it may get an impulse of microplastics and tire wear particles and they may be floating vs sinking.

Potential opportunity to mitigate inputs to coastal waters before they get into stormwater ponds and receiving waters. The have applied for funding to further look at stormwater ponds and their contribution to particles into coastal waters. Particle capture devices for water to go through before going into the pond.

The lab is looking at microplastics in oysters along the South Carolina Coast. It is a 5 year project, finishing up year one. Working with DNR to gain access to commercial and recreation shellfish beds. There are 15 sites along the coast to sample oysters. Oysters have 1.5-2 grams of tissue. Charleston Harbor was studied and compared to other studies that were done. They are going to look at potential public health concerns.

Discussion about stormwater ponds. Daniel Island truck and trailer from port. Mr. Scott Liggett commented about expecting tire wear to occur more significantly when turning, stopping and starting and focusing research where you have vehicles engaging in those maneuvers. Dr. Weinstein mentioned that the Mt. Pleasant bridge is steeper on one side. Work with the town of Mt Pleasants as they clean out boxes to see what they are capturing. Tire particles are between 63 and 150 is what they have been finding but can be up to 500 microns.

5. Reports – Mr. Eric Larson and Mr. David Wilhelm provided a written report which is included in the posted agenda and can be accessed at:

https://www.beaufortcountysc.gov/stormwater-management-utilityboard/agendas/2019/071019.pdf

A. Utility Update – Eric Larson

In reference to item 2, regionalization, the project is slightly behind schedule, as there are more details that need addressed. The FY2020 Budget (item 5) was approved as proposed with the rate increase.

B. Monitoring Update – Eric Larson

Two points on the monitoring map errors were pointed out, OKWP3 should be labeled as OKW3A and BCCC2 point [by BCCC1] was not labeled. Mr. Larson mentioned there some elevated levels of bacteria in the Okatie and several samples were highly turbid.

Dr. Alan Warren shared that the wet and dry weather sampling for the second quarter is complete and third quarter monitoring has started. He commented on the Okatie West BMP and the effectiveness of the filtration media. The lab will be launching a new effort to study retention time in ponds by tracking a dye from the input point to the discharge. Mr. Larson commented on how the retention time may be some of the success of the Okatie pond, as they plugged it to saturate the bold and gold filter. Dr. Warren shared that there was no input, no output, lots of UV light penetration and a lot of time for sedimentation to occur and could not quantify fecal coliform bacteria and was previously fairly high.

C. Stormwater Implementation Committee (SWIC) Report – Eric Larson

Please reference the report, no additional updates.

D. Stormwater Related Projects – Daniel Rybak

In reference to Horse Island, item #2a, the scope and proposal has been received from the Consultant. Working on preliminary construction estimate. Item #2b, flyover bridge, the proposal has been received and submitted for approval.

Results of Alljoy meeting (item #3), submitted the hazard mitigation grant, expect approval within a year's time frame.

E. Professional Contracts Report – Daniel Rybak

Salt Creek it is at 30% design development and Brewer Memorial is at 70% design development. In reference to Evergreen, 30% design drawings were received from consultant, geotechnical investigation/report completed, and survey and wetland delineation complete.

F. Regional Coordination – Eric Larson

Item #1, County staff will be meeting BJWSA and Town of Bluffton to discuss projects. The Charleston MS4 group is meeting later in August; Berkeley County was recently audited by the EPA on their MS4 permit, so it will help to know what to expect in the event an auditor comes.

G. Municipal Reports – Eric Larson

Mr. Desai shared that Mossy Oaks Task Force met for an update. The City is waiting for regulatory approvals to begin some of the major maintenance and construction efforts. Mr. Larson is working with City on an MOA for the co-funding of the project. Report attached. Mr. Liggett commented that new projects are beginning with the new budget year.

H. Municipal Separate Storm Sewer System (MS4 Update) – Eric Larson

Mr. Larson commented that the County does not report plan review for Single Family Homes, issue a lot more permits than what are showing.

Some weather stations were down and missed the rain event. Staff is out doing maintenance to get them back online.

I. Maintenance Projects Report – David Wilhelm

Mr. Billy Bruggeman asked about the Bellinger Bluff project drainage. Staff explained it improved the existing channel to help with some flooding.

Mr. David Wilhelm provided a litter update. He announced Mr. Marc Feinberg has created an Adopt a Highway Group has about 20-25 members to pick up along HWY278. Starting next Saturday the Public Works department will be overseeing the County Day Watch program where people can choose to pick up litter instead of serving time. There will be on average of 5-8 people for eight hours on Saturday and Sunday. The area of focus will be on HWY170 Lemon Island to Snake Road, it is a problem area.

In response to a comment, Mr. Wilhelm explained that in FY19 the focus was on getting a full time litter crew and expanding the Adopt-A-Highway program. This year the focus will be at looking on ways to create an enforcement officer. Ms. Katie Herrera commented that there is a Palmetto Pride mobile app where you can report a "litter bug."

- 6. Unfinished Business None.
- 7. New Business None.
- **8.** Public Comment(s) None.
- 9. Next Meeting Agenda Approved.
- **10. Meeting Adjourned**



John E. Weinstein

The Citadel, Department of Biology Charleston, SC





Climate Change Interactions at the University of SC

Plastic Debris – A Global Problem



Eriksen M, Lebreton LCM, Carson HS, Thiel M, Moore CJ, et al. (2014) Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea. PLOS ONE 9(12): e111913. doi:10.1371/journal.pone.0111913 <u>http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111913</u>



- **Point sources:** identifiable, discrete sources
 - Municipal and industrial wastewater
- Non-point sources: diffuse sources over a large area
 - Runoff from roadways
 - Atmospheric deposition







Global Problem in Our Backyard: Charleston Harbor

- Characterize the sources, fate, and abundance of microplastic debris
- Determine the process by which the most common types of plastic polymers degrade
- Assess the toxicity associated with microplastic exposure

Global Problem in Our Backyard: Charleston Harbor

- Characterize the sources, fate, and abundance of microplastic debris
- Determine the process by which the most common types of plastic polymers degrade
- Assess the toxicity associated with microplastic exposure

Microplastic Survey – Charleston Harbor (2014)



Sediments – Charleston Harbor



Sediments – Microplastic Shapes

 \bigcirc



Sediments – Microplastic Type

 \bigcirc



Sediments – Black Fragments



Source of Black Fragments

- 1. FT-IR revealed black fragments contained carbon black and polybutadiene
- 2. Visually similar to tire wear particles (TWP) reported in the literature
- 3. Hot spots for these particles should be associated with road and bridge runoff







Source of Black Fragments

- 1. FT-IR revealed black fragments contained carbon black and polybutadiene
- 2. Visually similar to tire wear particles (TWP) reported in the literature
- 3. Hot spots for these particles should be associated with road and bridge runoff





Tire Particles: An Emerging Concern?

- Tires particles contain Zn and PAHs
- 30% of tread material on tire ends up as tire particles
- 1.8M metric tons are emitted in the U.S. per year
- 1,864 metric tons emitted in Charleston County per year
 - 50% may end up in waterways



Stormwater Pond Assessment

- 4 SW ponds
- 1 reference site



Ho Non Wah

Booz Allen Hamilton

River Landing Drive

The Cottages on Charleston Harbor

Bayview Farms

Stormwater Pond Assessment – **Generalized Sampling Scheme**



- **SW pond** = Stormwater Pond
- **Receiving Waterbody**
 - TC Up 50 = Tidal Creek Up
 - **TC Down 50** = Tidal Creek Down 50m
 - **TC 100** = Tidal Creek Down100m





RIVER LANDING DRIVE (Daniel Island)

\mathcal{O}

RIVER LANDING DRIVE SEDIMENT



RIVER LANDING DRIVE SEDIMENT

 \bigcirc







BOOZ ALLEN HAMILTON (N. Charleston)



BAYVIEW FARMS (James Island)

SEDIMENT

 \bigcirc



SEDIMENT

 \bigcirc



\bigcirc

WATER



\bigcirc

WATER



Preliminary Conclusions – Stormwater Pond Assessment

- Stormwater ponds serve as a <u>sink</u> and a <u>source</u> for microplastics and tire particles
- Stormwater runoff and ponds may be <u>an</u> <u>important pathway</u> for microplastics and tire particles in our coastal waterways
- Potential opportunity to mitigate inputs to coastal waters

Next Steps – Stormwater Assessment

• Applied for Funding – SC Sea Grant Consortium



Next Steps – Stormwater Assessment

• Applied for Funding – SC Sea Grant Consortium



Collaborators:

Hillary Ripek, Stormwater Manager, Mount Pleasant John Moll, Crystal Stream Technologies

Center for Oceans and Human Health and Climate Change Interactions

- National Institute for Environmental Health Sciences
- Interactions between climate change factors and health-related issues associated with Vibrio spp., harmful algal blooms, and microplastic exposures
- Survey oysters along SC coast for microplastics
- Estimate human exposures and calculate risks related to liver disease









Oyster Sampling Sites (Spring 2019)



Microplastics in Field-Collected Bivalves



Charleston Harbor – Oysters (C. virginica; preliminary)

- Fort Johnson: 18.7 MP/g (±5.8); 63.0% TWP (n=3)
- Ashley River: 4.4 MP/g (±1.3); 35.2% TWP (n=10)
- Wando River: 7.1 MP/g (±4.7); 75.0% TWP (n=3)

Mainland China – Mussels (M. edulis) (Li et al., 2016)

- 4.6 MP/g (>65% fibers)

Vancouver Island – Oysters (C. gigas) (Murphy, 2018)

- Wild oysters 77.1 MP/g
- Farmed oysters 212.8 MP/g

Public Health – Potential Concerns

Exposure estimates lacking

Ingestion from seafood

- fish versus shellfish
- Interactions with cells and tissues
 - Transfer of POPs
 - Leach plasticizers and plastic monomers
 - Nanoparticles (<100 nm) translocate into cells through endocytosis

Mixture interactions



Acknowledgements

The Citadel **Austin Gray Rachelle Riegerix Chad Hayes Brittany Crocker Daniel Mendez** Erin Bucherl **Blake Holt Emily Schwendinger** Justin Kiel John Dekle



<u>College of Charleston</u> Barbara Beckingham Hope Wertz Rachel Leads Sarah Kell



<u>Clemson University</u> Steve Klaine Peter van den Hurk Sarah Au



<u>University of South Carolina</u> Geoff Scott Saurabh Chatterjee





CITY OF BEAUFORT

TO: Eric Larson, P.E.

FROM: Neil Desai, P.E.

DATE: July 5, 2019

SUBJECT: Stormwater Utility Board Report

The following is the City of Beaufort Public Works Department monthly report from June 1 to June 30, 2019

1) <u>CAPITAL IMPROVEMENTS UPDATE</u>

- a) Mossy Oaks Drainage Project City has received approval from OCRM for State M&R permits where applicable. Jane Way Canal drainage improvements completed.
- b) Mossy Oaks Drainage Project City has sent out applicable forms & agreements to residents affected along West Royal Oak drainage sub-basin. Awaiting completion of agreements before work can start.

- c) Battery Shores Drainage Improvement project will be redesigned to align pipe on City's property.
- d) Greenlawn Streetscape Water Quality component with manufactured device at outfall. Utility companies working out final design of utility banks.

2) MAINTANCE & REPAIR UPDATE

- a) Complete maintenance of entire Battery Shores Subdivision Vac Truck Contractor
 - i) Phase I re-establish roadside drainage ditch completed
 - ii) Phase II blow out driveway pipes completed
- b) Routine maintenance of drainage easement City wide.