

Overview Report
Great Marsh Macroplastics Mapping
Adam Bolonsky
July 2, 2020

Dates and Areas

From February, 2020 to June 2020, Adam Bolonsky, contractor, and Cassie Holden, Seaside Sustainability intern, surveyed sections of the Great Marsh from the Cut Bridge in Gloucester to Salisbury Beach State Park in Salisbury, including the Indian River and Maudslay State Park at Newburyport, the northern shores and marshes of the Merrimack River at Salisbury and Amesbury as far west as the Amesbury Hat Company, and inland as far as Pettengill Farm, the Governor's Academy, and the Great Meadow at the Parker River Reservoir in Byfield.

Surveys were run on foot, fat bike, kayak and, where applicable, car. Areas surveyed included the Annisquam, Essex, Ipswich, Parker, Rowley and Mill Rivers, and took place in the marshes and along the shorelines of Gloucester, Essex, Ipswich, Rowley, Newbury, West Newbury, Newburyport, Amesbury, and Salisbury, including Plum Island from Sandy Point Reservation to the mouth of the Merrimack River at Plum Island's northernmost end.

Methodology

To run the survey, we walked or biked or kayaked (and, where practical, drove) large sections of the marsh accessible through public and private property or with permission from federal agencies and conservation groups or local property owners.

To mark areas as clean or needing cleanup, we used handheld GPS units. Clean areas we marked in sequence using GPS waypoints taken at intervals of roughly 25 to 50 yards. Areas requiring cleanup we marked with GPS waypoints taken every 25 feet or so. We converted the waypoints into CSV files and uploaded them into Google Earth to create polygons.

We created in Google Earth orange-colored polygons to mark areas requiring clean up. Waypoints clustered further apart (25 to 50 yards) we used to create white-colored polygons to mark areas as clean. Areas we or volunteers cleaned we marked in blue.

We made note of tire dumps where necessary.

Orange polygons were narrow, to indicate the approximate width of the wrack line where plastics typically collect..

White polygons, to mark clean areas, we expanded to the edges of nearby creeks and tidal narrows – experience taught us that areas of high marsh clean near their shorelines were typically clean as far outward as the nearest tidal creek. As a result, we expanded clean wrack line areas up to 1/8 of a mile toward their various adjacent creeks.

In total we visually surveyed, and marked up on Google Earth, approximately 10,000 acres of marsh.

Clean vs. Dirty

Prior to the COVID-19 pandemic we planned to solicit cleanup volunteers from school groups, conservation organizations, and the public at large. During the pandemic we were able to draw on 7 cohort groups for volunteer cleanups in Gloucester. Cohort groups included friends of the contractor and the immediate families of 6 Seaside Sustainability board members.

Prior to the pandemic, marsh abutters Sudbay Motors and Grand Banks Building Products in

Gloucester, and Keurig, whose employees receive paid time off for volunteer work, were committed to volunteering employees for marsh cleanup.

To deem an area as dirty and warranting cleanup (areas marked in the map in orange), we used the following criteria:

1. Are there enough plastics present to warrant asking 5-10 volunteers to drive up to two hours round-trip to clean an area of marsh, and feel like they have truly accomplished significant work?
2. Is the area to be cleaned readily accessible on foot, and are hiking distances limited to less than a mile each way?
3. Can the cleanup be completed during reasonable weather and before mosquito, no-see-um, or greenhead seasons?
4. Are hazards at the site reasonable and manageable enough (upturned nails, poor or slippery footing, ditches, ledges, poison ivy, etc.) to reduce risk of injury to volunteers?
5. Is the area suitable for adults, for adults and children, or for groups of closely-supervised teenagers?
6. What are the logistics of bagged debris removal? Can volunteers remove bagged debris themselves? If not, is the area close enough to a public road to be accessible by a local DPW?
7. Can debris need to be removed by boat?

In all, Cassie Holden, the project intern, Adam Bolonsky, the contractor, and seven cohort groups cleaned 13 areas at:

- Nichols Candy Marsh, Rust Island, Annisquam River, Gloucester
- Grand Banks Marsh, Rust Island, Annisquam River, Gloucester
- Essex County Greenbelt Association Marsh, Rust Island, Annisquam River, Gloucester
- Winthrop Creek at Stanwood Point, West Gloucester
- Camp Spindrift marsh and creek, Annisquam River, West Gloucester
- Wingaersheek Beach back marsh, Annisquam River, West Gloucester
- Wingaersheek Beach headlands at Coffins Beach (Ipswich Bay) Gloucester
- Coffins Beach headlands at Essex River, Gloucester
- Two Penny Loaf Beach at Essex River, Gloucester
- Two Penny Loaf marsh at Essex River, Gloucester
- Cox Reservation at Essex River, Essex
- Clark Beach at Great Neck, Ipswich
- Pine Island at Essex County Greenbelt Marsh, Newbury

Findings

Macroplastics in the Great Marsh tend to collect in predictable patterns. Areas of the marsh proximal to river mouths and granite headlands collect a dense mixture of marine hard and marine soft plastics (lobster trap ghost vents, ID tags, derelict traps, warp, buoys, seine-net floats, highflyers, etc.) in quantities, by weight, larger than consumer hard and soft plastics at a ratio of about four to one.

Hooksett disks are ubiquitous and tend to cluster along inland high marsh area wrack lines and sandy beachfronts.

Lobster trap zone and year tags are also ubiquitous; gear marked as early as 2001 from zones far away as Eastport, Maine and Canada are a commonplace.

Water Bottles, Shotgun Shells, Styrofoam

Nothing is more widespread in presence, number and variety than plastic beverage bottles: bottled water, Gatorade, nip bottles (especially nip bottles) etc.

Shotgun shells and wadding are ever-present, as are tampon applicators and cigarette lighters and textiles including dozens of shoes and sandals.

The largest macroplastics presence, by bulk and cubic footage, is dock flotation styrofoam.

Blue, white, or orange, dock styrofoam collects in significant clusters at Camp Spindrift on the Annisquam River in West Gloucester; Coles Island in West Gloucester, along the Maudslay State Park river shoreline; and at the Walker Overlook in Salisbury.

Dock styrofoam breaks up in consistent ways. Orange styrofoam yields a soft, billowy dust. Blue styrofoam yields a granular, sandlike apron. White styrofoam yields round pellets.

Problem area highlights

In an attempt to develop a grading system to assist local conservation commissions, DPWs, conservation and volunteer groups interested in cleaning up the Great Marsh, and to assist researchers interested in macroplastics typology drift or disbursement patterns, we devised a grading system to rank problem areas' plastics *density*, *location hazards*, and *logistics*.

We used a 3-point grading system for *density*:

Density:

- 1- lowest density of plastics seen
- 2- average density of plastics seen
- 3- highest density of plastics seen

A 3-point system for *hazards* to volunteers including remoteness, poor or dangerous footing, and construction debris or upturned nails:

Hazards:

- 1- lowest level of hazards: secure footing, level ground, no WPA ditches, etc.
- 2- average level of hazards: loose footing, uneven ground, narrow but deep WPA ditches
- 3- highest level of hazards: poor or slippery footing; steep headlands; briars or poison ivy; wide and deep or obscured WPA ditches; upturned nails, etc.

And a 3-point system for *logistics*:

Logistics:

- 1- lowest level of logistics difficulty - ample parking; public roads; public property; short walk to the debris field; debris can be removed easily
- 2- average level of logistics difficulty: limited parking; private roads; private or obscure easement properties; long walk to debris field; bagged debris removable with difficulty
- 3- highest level of logistics difficulty: restricted or no parking, private roads; private or remote public properties; bagged debris very difficult to remove or boat required

The Ratings

Gloucester

- [Sudbay Marsh North, Annisquam River, West Gloucester](#)
 - Debris = **3**
 - Hazards = **2**
 - Logistics = **1**

- [Sudbay Marsh South, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **2**
 - L = **2**

- [Rust Island northwest shoreline, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **1**
 - L = **1**

- [Cape Ann Marina to Top of the Harbor, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **3**
 - L = **3**

- [Top of the Harbor to Stanwood Point, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **1/3**
 - L = **1/3**

- [Samoset Creek, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **3**
 - L = **1**

- [Camp Spindrift, Annisquam River, West Gloucester](#)
 - D = **3**
 - H = **1**
 - L = **2**

- [Coffins Beach Headland, Essex River, West Gloucester](#)
 - D = 3
 - H = 2
 - L = 3

- [Soginese Creek, Essex River, Essex](#)
 - D = 3
 - H = 1
 - L = 3

- [Cox Reservation, Essex River, Essex](#)
 - D = 2
 - H = 1
 - L = 1

- [Woodman's back marsh/Essex River headwaters, Essex River, Essex](#)
 - D = 3
 - H = 3
 - L = 3

- [State boat ramp and Nichols Field, Ipswich River, Ipswich](#)
 - D = 2
 - H = 2
 - L = 3

- [Clark Beach and Great Neck, Ipswich and Parker Rivers, Ipswich](#)
 - D = 3
 - H = 1
 - L = 1

- [Town Farm Road and Greens Point, Ipswich](#)
 - D = 2
 - H = 1
 - L = 1

- Rough Meadows, Rowley/Newbury
 - D = 1
 - H = 1
 - L = 3

- Parker River at Routes 1 and 1st Governor's Academy and Great Meadow
 - D = 3
 - H = 3
 - L = 1

- Parker River at Newbury boat ramp to Pine Island
 - D = 3
 - H = 1
 - L = 1

- Sandy Point and Stage Island at Plum Island, Ipswich
 - D = 3
 - H = 2
 - L = 3

- Plum Island at airport and Newburyport Turnpike
 - D = 3
 - H = 2
 - L = 1

- Plum Island north basin, Newburyport
 - D = 3
 - H = 1
 - L = 1

- Moseley Woods at Deer Island, Newburyport
 - D = 3
 - H = 3
 - L = 3

- [Newburyport Water Treatment Plant, Merrimack River](#)
 - D = 3
 - H = 3
 - L = 1

- [Maudslay State Park river shoreline, Newburyport](#)
 - D = 3
 - H = 3
 - L = 3

- [Lowell's Boat Shop, Amesbury](#)
 - D = 2
 - H = 1
 - L = 1

- [Merrimack River shoreline at Carr and Eagle Islands, Salisbury](#)
 - D = 3
 - H = 2
 - L = 3

- [Walker Overlook, Salisbury](#)
 - D = 3
 - H = 3
 - L = 3

- [Pettengill Farm to Allen Rock, Salisbury](#)
 - D = 3
 - H = 3
 - L = 3

- [Salisbury State Park, Salisbury](#)
 - D = 3
 - H = 1
 - L = 1