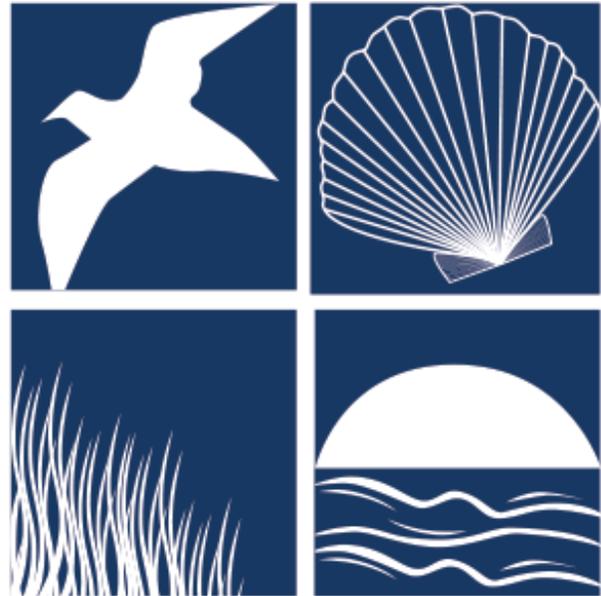


Shorelines: Summer 2016 Newsletter

apcc.org/newsletters/2016-summer.html



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APCC is once again fortunate to have two highly qualified interns join us this summer to

work on a variety of projects that will produce tangible benefits for Cape Cod's environment. APCC's ability to host successful internship programs is made possible through foundation grants, dedicated endowment programs and the continued generous support of our members. For more information, [visit our program support page](#).

The following are brief introductions to APCC's 2016 interns.

Bryan Horsley, the 2016 Maggie Geist intern, is working with APCC's Restoration Coordination Center (RCC). Bryan will assist APCC staff on various ecological restoration projects including stormwater improvements, fish run reconstructions and salt marsh restoration work. His scope of work includes assisting with updating the RCC's inventory of more than 160 potential restoration projects, helping to define and apply criteria to prioritize these projects, developing a GIS map of RCC restoration projects for display on APCC's website, assisting with field surveys and restoration monitoring at ongoing restoration projects, preparing outreach materials and compiling and organizing past salt marsh monitoring data. He also installed rain barrels to collect roof runoff for irrigation use at the new APCC headquarters.



Bryan is graduating this summer from the University of Colorado at Boulder with a bachelor of arts degree in ecology and evolutionary biology. While at APCC, Bryan hopes to gain hands-on experience in ecological restoration and to build connections within the Cape's environmental community. Following his internship with APCC, he hopes to gain full-time employment working in the field of ecological restoration with a focus on coastal and aquatic systems. Graduate school is also in his plans for the near future.

Matthew White is APCC's 2016 special projects intern. He is working on stormwater management on Cape Cod as well as researching potential coastal resilience measures for a Cape Cod database on coastal resilience strategies. Matt's work includes developing a stormwater toolkit to help Cape towns implement the requirements of the EPA's 2016 Small Municipal Separate Storm Sewer System permit, and researching the feasibility of forming a Cape Cod stormwater collaborative. Matt is also researching potential coastal adaptation measures as part of an APCC project funded by a NOAA Coastal Resilience grant to the Cape Cod Commission to develop adaptation strategies to increase resilience against sea level rise, storm surges, flooding and coastal erosion.

Matt is a Cape Cod native who graduated in 2016 from the University of Massachusetts Amherst with a bachelor of science degree in natural resources conservation with a concentration in environmental conservation. He is returning to the University of

Massachusetts Amherst for a master of science in sustainability science with a specialization in renewable energy and efficient design. He plans on working in the fields of renewable energy policy, sustainable development or consulting. Matt hopes to use his skills and experience in issues of environmental policy that he obtained from APCC to work on environmental sustainability goals.



APCC's Restoration Coordination Center is working with the University of New Hampshire (UNH) this year and next on additional monitoring of the Sesuit Creek salt marsh in Dennis. The purpose of the study is to identify potential causes for the marsh system's delayed response to restoration work conducted in 2008.

One of the major causes of salt marsh degradation is restriction of tidal flow by human-created barriers such as undersized culverts under bridges or roads that effectively cut a marsh in half and limit water flow of the main creek. This restriction of tidal water reduces the amount of salt water reaching the upper marsh, allowing non-salt marsh species to proliferate and limiting natural processes such as the flushing of nutrients from surrounding developed areas.

In 2008, the Massachusetts Division of Ecological Restoration (DER) restored tidal flow to 57 acres of the Sesuit Creek salt marsh. A two-foot diameter culvert beneath Bridge Street was replaced with twin 10 ft. by 12 ft. culverts. APCC, along with UNH, monitored the marsh both prior to and following restoration between 2007 and 2011.

The immediate result of the culvert replacement was the restoration of more natural tidal flow to the upstream marsh, with die-off of upland and invasive plant species and improved salinity levels. However, review of post-restoration monitoring data, along with more recent site visits, indicates that while the response has been positive, the speed of recovery is slower than expected. Most notable is the persistence of large areas upstream that remain

devoid of vegetation. The increase in salinity effectively killed off the salt-intolerant plants, including the invasive phragmites, but the native salt marsh plants have been slow to fill in these areas.

Once the two-year study is complete, UNH and APCC will turn over the collected data to DER along with recommendations for how to improve the restoration outcome.



Groundwater is the Cape's lifeblood, supplying water for our sole source drinking water aquifer and most of our streams and ponds. The water table, which is the top surface of the groundwater, is normally several to many feet below ground. If the water table were to rise, potential impacts could include groundwater inundation (flooding at the surface due to high groundwater), more pollution from septic systems coming in contact with the water table, and damage to roads, basements, utilities and other infrastructure.

At APCC's urging and with support from APCC and partners, the U.S. Geological Survey (USGS) published a report in June on the effect of future sea level rise on Cape Cod's groundwater and depth to the water table. The report, entitled "Potential Effects of Sea-Level Rise on the Depth to Saturated Sediments of the Sagamore and Monomoy Flow Lenses on Cape Cod, Massachusetts," is available at www.apcc.org/sealevelrise. The focus area of the study includes the Sagamore and Monomoy groundwater lenses beneath the mid and upper Cape, the most densely developed region of the Cape.

APCC believed the study was needed because earlier USGS studies of the lower Cape indicated that rising sea level would cause the water table to rise. If the



mid and upper Cape were to experience rising water tables, groundwater could become even more polluted by septic systems, and infrastructure and natural resources could be impacted. Under such a scenario, it would be important to identify what adaptation measures would be needed in order to plan for potential impacts.

The USGS study looked at potential changes in the water table and the area of shallow groundwater—where the water table is less than five feet below the surface—as sea level rises by two feet, four feet and six feet. The study found that sea level rise could raise the water table and increase the risk of groundwater inundation from below. However, the rise in the water table is partly offset by surface water drainage from streams and ponds that drain to the sea.

For a six-foot rise in sea level, the median rise in the water table for both Sagamore and Monomoy lenses would be 2.11 feet, with a greater rise in the Monomoy lens area due to less surface drainage from streams and ponds. The area of shallow groundwater in the study area would increase from 24.9 square miles at present to 40.8 square miles, mainly in low-lying coastal areas. These are areas where a higher water table could threaten septic systems and infrastructure.

APCC and our partners will use the study as the basis for developing coastal adaptation measures to protect resources and communities. To begin with, the study suggests that protecting and restoring the Cape's natural surface water drainage systems will help mitigate the effects of rising groundwater.

Partners include USGS, Cape Cod Commission, The Nature Conservancy, Massachusetts Bays National Estuary Program and Barnstable County Coastal Resources Committee. Funding was provided by a grant from the Massachusetts Environmental Trust (MET) to APCC, the Massachusetts Department of Environmental Protection, The Nature Conservancy, Cape Cod Five Cents Savings Bank and from APCC member dues and donations. MET awards nearly one million dollars in grants each year for environmental projects, and grant funding is derived from the sale of environmental license plates. License plates can be purchased from the RMV for \$40, of which \$28 goes to fund MET. For more information about the groundwater study, contact APCC's director of science programs, Dr. Jo Ann Muramoto, at 508-619-3185.



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APCC co-hosted an Environmental Protection Agency presentation in May concerning the 2016 Small Municipal Separate Storm Sewer Systems (MS4) General Permit for Massachusetts, along with a workshop on stormwater collaboratives.

Untreated stormwater runoff can cause water pollution, result in closures of shellfish beds and beaches following storms, and contribute to nutrient loading in estuaries.

Most towns on Cape Cod are MS4 communities. Compared to the 2003 MS4 permit, the 2016 MS4 permit has more stringent requirements for municipalities to monitor stormwater discharges, identify and eliminate illicit discharges of runoff from pollution sources, manage

stormwater from construction sites, exercise better practices to prevent pollution, provide public outreach and involve the public in developing and implementing stormwater management plans.

Participants at the May workshop expressed strong support for forming a Cape Cod stormwater collaborative that would work together to obtain cost-effective services or outreach. APCC is now working with partners to explore the feasibility of forming a stormwater collaborative to help towns meet their MS4 permit requirements. Partners include the Barnstable County Coastal Resources Committee, the Cape Cod Commission and the Mass Bays Program. For more information, contact Dr. Jo Ann Muramoto at 508 619-3185.



In the fall of 2014, APCC initiated a project with the Brewster Conservation Trust, Cape Cod Conservation District and Colonial Seed Company to study the potential for using a Cape Cod native grass as a low impact lawn alternative.

Preliminary results are in: After two growing seasons without fertilizers, herbicides or water other than precipitation, the native grass seed mix has exhibited steady growth and has largely filled in the test plot. Meanwhile, an adjacent “control” plot with a typical retail bluegrass/rye lawn seed mix started out strong but is now sparse and dominated by weeds.

The native grass in the study is *Deschampsia flexuosa*, also known as wavy or coastal hairgrass. As a Cape native, *D. flexuosa* is adapted to sandy, nutrient-poor soils and is drought tolerant.

APCC is an advocate for downsizing or removing lawns and replacing them with native landscaping in order to eliminate fertilizers and herbicides that are adversely impacting the Cape’s water resources. But, if a grass lawn is part of a landscaping plan, alternatives such as *D. flexuosa* may possibly be a viable, more environmentally friendly option.

The test grass plots are located at the Brewster Conservation Trust’s community garden on Lower Road in Brewster and are available for public viewing. For more information, contact APCC assistant director Don Keeran at 508-619-3185.



Using native plants in your landscape helps support the local ecology of Cape Cod. Butterflies and other native pollinators have specialized relationships with native plants, many of which are critical to their survival. As you make your way to the nursery for a few more plants for your yard, here are some quick tips for plantings that will invite butterflies and a diversity of beneficial insects into your garden.

- Locate your butterfly garden where it will have six to eight hours of sunshine; southern exposure is best.
- Location should have shelter from the wind—it will help them get to the nectar easily and give you better viewing.
- Round out your garden with a few more flowering plants for full season blooming. Don't just purchase what's blooming at the nursery—think about the early and later seasons of your garden.
- Don't buy just one of a kind! Plant in blocks of color and use groupings of the same native plant.
- Solid colors are best: yellow, pink, orange, red, purple—and don't forget white. There are many night pollinators that are attracted to white.
- Avoid planting too many cultivars with double blooms. The additional petals make it more difficult for the pollinator to get at the nectar.
- Remember to consider native grasses, vines, shrubs and trees—they offer nectar, serve as needed host plants for caterpillars and provide overwintering sites.
- Take your selected plant list with you that includes the scientific name—this will ensure you get the native plant you seek and not a hybrid or sound-a-like.
- Try to be certain that the plants have not been treated with systemic pesticides called neonicotinoids—they are harmful to pollinators.
- Avoid pesticides, because it's likely that for every bad bug you kill, some good guys will die too.

Remember, you can't have butterflies without caterpillars. As George Carlin said, "the caterpillar does all the work, but the butterfly gets all the publicity." Plant natives for nectar and also those that serve as food for caterpillars. Caterpillars eat vegetation and it's okay! Thank goodness they do because they play an important role in the transfer of energy in food webs and soft plump caterpillars are the mainstay of baby birds.

Some suggested plant choices

Perennials:

- Blazing Star – *Liatris spicata*
- New England Aster – *Symphyotrichum novae-angliae*
- Violet – *Viola pedata*
- Blue Vervain – *Verbena hastata*
- Scarlet Beebalm – *Monarda didyma*
- Milkweeds – *Asclepias tuberosa* & *Asclepias incarnata*
- Virginia Mountain Mint – *Pycnanthemum virginianum*
- Spotted Joe-Pye Weed – *Eupatoriadelphus maculatus*
- Wrinkleleaf Goldenrod – *Solidago rugosa*
- Black Huckleberry – *Gaylussacia baccata*
- Spiderwort – *Tradescantia ohiensis*
- Wild Indigo – *Baptisia* spp.
- Wild Geranium – *Geranium maculata*

Grasses:

- Little Bluestem – *Schizachyrium scoparium*
- Indian Grass – *Sorghastrum nutans*
- Big Bluestem – *Andropogon gerardii*
- Switch Grass – *Panicum virgatum*

Shrubs, vines and trees:

- Coral honeysuckle vine – *Lonicera sempervirens*
- Serviceberry – *Amelanchier Canadensis*
- New Jersey Tea – *Ceanothus americanus*
- Sweet Pepperbush – *Clethra alnifolia*
- Low Bush Blueberry – *Vaccinium angustifolium*