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A Newsletter from the Connecticut Department of Energy & Environmental Protection
Exploring Long Island Sound - Issues and Opportunities

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Site Selection Begins for a National Estuarine Research Reserve for Long Island Sound

Regular readers of *Sound Outlook* will recall DEEP's efforts to establish a National Estuarine Research Reserve (NERR) in Connecticut (please see the October 2015 issue for more background). The NERR system is a partnership between states and the National Oceanic and Atmospheric Administration (NOAA) that promotes the stewardship of coasts and estuaries through innovative research, education, and training, addressing both local issues as well as contributing to national focus areas.

There are currently 29 NERRs across the country, each of which is designed to be "locally relevant and nationally significant." Of these, Connecticut is in the very small minority of coastal states that lack a NERR, and there are several compelling reasons why we are working to change this.

A NERR links science, people, and places, and in that vein a Connecticut-based NERR makes sense because:

- Connecticut has many great places in and around our coastal areas that deserve the benefits a NERR affords, while at the same time bringing our State's unique habitats and resources to the national NERR system.
- A NERR can provide complementary support / resources, and the addition of national expertise for existing Connecticut science and research efforts, many of which already align with NERR Strategic Goals. Water quality monitoring, environmental change indicators, and habitat restoration are just a few areas where this overlap can be leveraged and improved.
- Every year programs offered at reserves attract more than a half a million visitors, and educate approximately 85,000 students and 3,200 teachers. Decision makers from over 2,500 communities and 570 businesses benefit by reserve-based science and technical expertise nationwide each year. In a time when resources to support education, training, and environmental recreation are continually eroding, taking advantage of the opportunities a NERR can provide is a sound investment.

Recent Progress
A Steering Committee led by DEEP, the Marine Sciences Department at the University of Connecticut, and CT Sea Grant has been spearheading the effort to establish a NERR in Connecticut. Working closely with NOAA program leadership,

Inside

First Impressions

Column Shares the "First Impressions" that Make an Environmental Difference

a kick-off meeting was held in the Spring of 2016, and since then a Site Selection team of dedicated, hard-working volunteers from a wide range of state, federal, academic, and non-governmental entities has been actively researching and evaluating potential locations. Some general guidance for this process was available from NOAA which was subsequently adapted to suit Connecticut's needs.

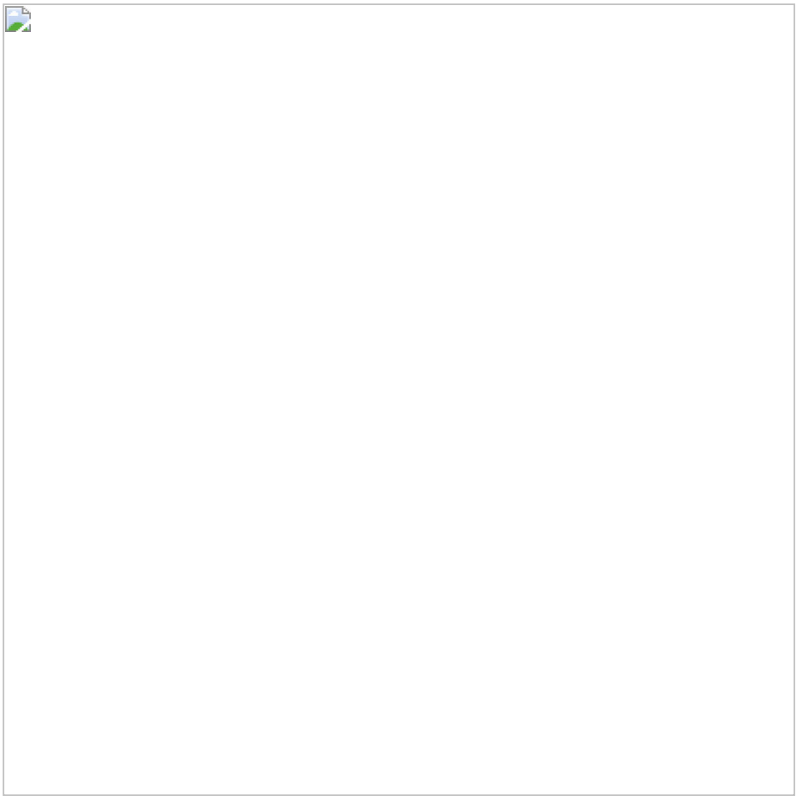
In the process, "Site Selection" is a two-tiered approached. The first tier--a high level overview--is designed to broadly identify possible candidate locations and vet them based on their resource-based characteristics as well as their likelihood to support NERR programmatic goals. Once this process narrows the possible candidates down to about 3-5 finalists, the second tier--a more detailed evaluation--begins, which takes a much closer and rigorous look at more than 30 factors. The finalist sites are scored on how well they address each of the factors, with the highest-scoring site ultimately identified as the Connecticut Reserve. Once identified, a formal public meeting will be held in the vicinity of the site to provide information on how the Reserve site was selected and to take public comments.

As part of the first tier overview process, the Steering Committee held an informal public meeting at UConn Avery Point on May 16th 2017 to provide an update and share the finalist sites under consideration. Copies of the site selection presentation, meeting notes, and other team meeting information can be found on the NERR Teams web page.

The Site Selection team spent a considerable amount of time during 2016 evaluating many possible options. In the end, four regions comprising a combination of properties rose to the top as exemplary site locations. These sites provide a great range of coastal habitat types as well as opportunities to support science, education, and stewardship. Accordingly, these four finalist sites will be more closely scrutinized during the Summer of 2017.

The four sites are (click on each map for a larger image):

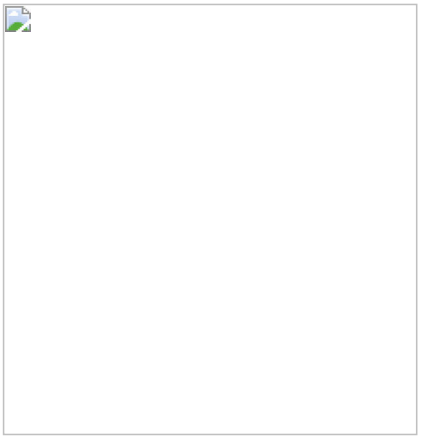
Western LIS Region: A combination of State and Federal properties including the Norwalk Islands, Great Meadows, and Milford Point Unit of the Stewart B. McKinney National Wildlife Refuge, plus Sherwood Island State Park and Wheeler Wildlife Area



According to Eric Eckl, the founder of Water Words That Work , his market research shows that there is a common progression among people who consider themselves to be "environmentalists." It starts with a "first impression" or experience that then makes them take a first environmental step. This step is usually then followed by a greater environmental awareness and a behavior change, and ultimately results in a "big step," such as choosing an environmental career.

This column features the "First Impression" that set someone on his or her path to environmentalism. We hope *Sound Outlook* readers will relate to these "First Impressions" and recall their own experiences that led them to appreciate and care about Long Island Sound.

Meet **Sue Bailey** of DEEP's Land and Water Resources Division, who will be celebrating 30 years of working at DEEP in September 2017!

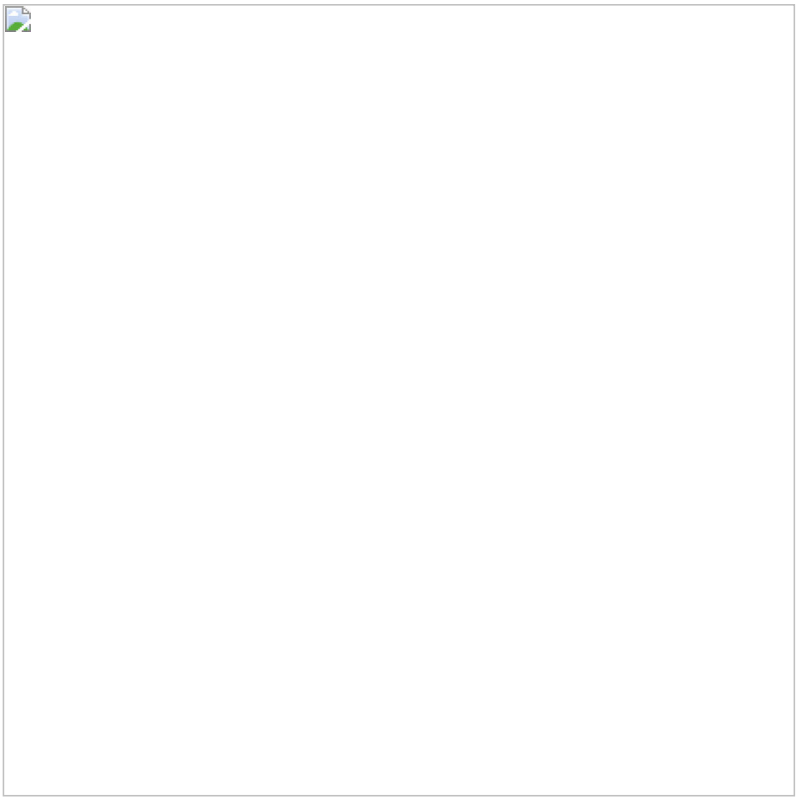


Sue attributes her "First Impression" to the 22 summers she spent at her family's cottage at Point O' Woods beach in Old Lyme. Most of the time she was wading in the tidal wetland that was mere steps from the back of the cottage:

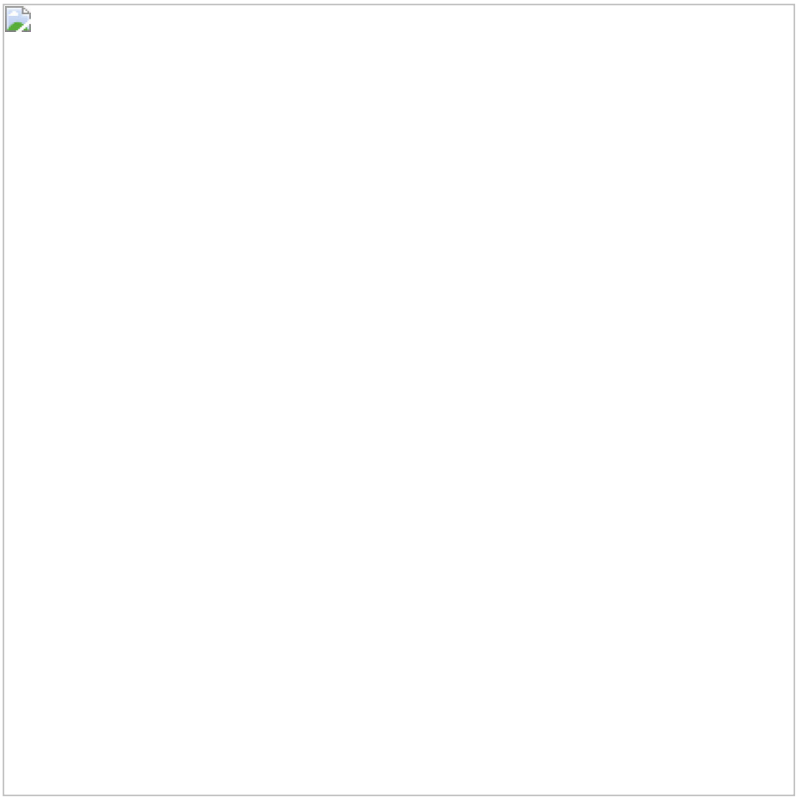
All summer long I'd be crabbing and catching minnows and just always be in the marsh. I didn't know what a "marsh" was, but I'm sure that had an innate impression on me. And I didn't realize it did until I was trying to think of what to do with my life after high school.

Initially, Sue was not on a college track--too much math! She wanted to be an actress, but that didn't pan out. Growing up, she thought the only thing you could do in the environmental field was be a

Central LIS Region: Hammonasset State Park/Natural Area Preserve, Hammock River Wildlife Management Area, and Duck Island Wildlife Area



Connecticut River Region: Upper (Freshwater) Component--Haddam Neck Wildlife Area, Machimoodus State Park; Lower (Brackish) Component--Ferry Point Wildlife Area, Great Island Wildlife Area, Lord Cove WA, Nott Island Wildlife Area, and Ragged Rock Creek Wildlife Area



Eastern LIS Region: Bluff Point State Park/Natural Area Preserve/Coastal Reserve, Haley Farm State Park, and Barn Island Wildlife Management Area

forest ranger. She liked that idea, but someone told her you have to take a lot of math, so she decided against it.

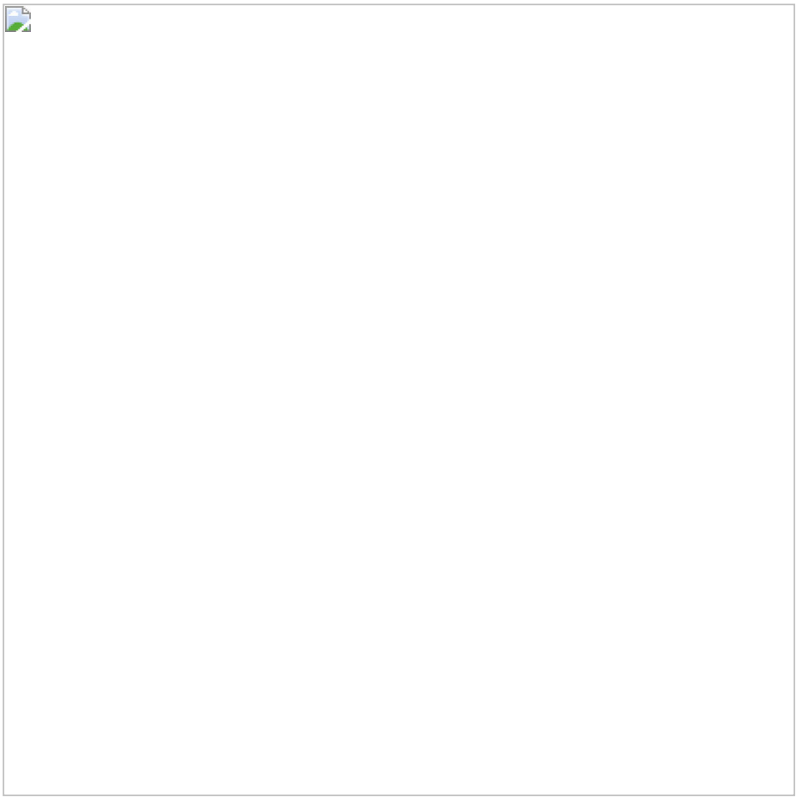
She started working as a nurse's aide, following a friend's advice to pursue a career that helped people. She did that for a year and, suddenly, college started to look better and better. Rather than become a nurse, Sue pursued an Associate's Degree in therapeutic recreation at Northwestern Connecticut Community College (NCCC). But the first day of classes turned out to be her "First Environmental Step":

I was sitting at a picnic table looking at the course catalog, already signed-up for therapeutic recreation classes, when I came upon the environmental health technology major offered at the school. That's when the clouds parted for me. I looked at the courses I'd have to take--air pollution, water pollution, solid waste--and I thought, "THAT'S IT!" I went right into the registrar's office and changed my major on the first day of school. Switching that major was my first step. I recognized the importance of preserving the environment and trying to take care of it.

It was the dawning of the environmental movement, with the passage of the federal Clean Air Act and Clean Water Act, and Sue was inspired by the subjects she'd have to take for her degree. She recalled learning about ecology in 10th grade biology class and really connecting with the concept of living in balance, understanding the interaction between organisms and their biological, physical, and chemical environment. Although the coursework proved difficult, Sue persevered:

Yes, there was math. Yes, there was chemistry. It was not easy for me--I cried a lot--but I forced myself to do it. This was the path I knew I had to stick with. And suddenly the whole Point O' Woods beach thing, it all came together for me.

Sue's environmental awareness peaked at Point O' Woods. She recalls a proposal in the mid 1960's to dredge-out her beloved marsh and turn it into a boat basin, an idea that did not sit well with her:



A note about the site boundaries depicted on the maps: At this point, the upland limits of the sites are defined by the property boundaries, but the selection team is still developing more well-defined water and off-shore boundaries. The off-shore delimiters shown on these examples serve only to provide an envelope within which more specific areas will be identified. The areas will be focused on incorporating a variety of sub-tidal bottom types (sand/silt to rocky areas) at various depth ranges. Making these distinctions is required in order to distinguish the proposed Connecticut site from several other Reserves in New England that predominantly include shallow, soft-bottom habitats.

Next Steps
The Site Selection Team and the Steering Committee will be working hard during the summer and fall of 2017 to evaluate and score the finalists. We hope to hold the formal public meeting after that, and provide the nomination package to NOAA by the end of 2017.

Once a site is nominated, however, there is still much to do. NOAA must first review and accept the nominated Reserve. If accepted, NOAA must then conduct a complete Environmental Impact Statement (EIS). The EIS process is required by law, and has to analyze the proposed location's relative to impacts to the physical environment as well as its relationship to human interests and activities.

In parallel, Connecticut DEEP must develop a plan to manage and operate the Reserve. It's important to note that the management plan will only incorporate existing State and Federal regulations, and not create new ones. This is one of the long-standing principles of the NERR system, and is designed specifically to allow the maximum flexibility at the State level to ensure resources are conserved while still encouraging the public to use and enjoy the Reserve and its programs.

Across all 29 existing Reserves, there are some activities that are allowed and encouraged and others that are limited or prohibited (e.g., no open fires, limited access to wildlife areas during breeding seasons, or open fishing and shellfishing areas). Allowing or restricting activities within the NERR will simply be a reflection of whether that activity is currently allowed or restricted; no new regulations will be established specifically because that site is a Reserve.

Get Involved
If you are someone who might be knowledgeable about the environmental

I didn't know the specifics of the project, hearing it with a child's ears, but they had already done that to a marsh in the area many years before. And I remember thinking, "That's just wrong." I had also noticed one year that there were no crabs, and it was strange to me because I had caught so many the year before. Maybe I took all the breeders, maybe it was disease, I don't know. But at the time it stimulated me to think, "Why is that happening?"

That question would encourage Sue to take her "Big Environmental Step." The environmental health technology program turned out to be more focused on how the environment relates to public health, and didn't focus on the ecology concepts that appealed to her. This led Sue to pursue yet another degree, a Bachelor's in Biology with a specialization in environmental science at Central Connecticut State University. Sue was working full-time for alcohol manufacturer Heublein, first as a security guard and then as a quality control lab technician, when she learned that the company would pay for her degree. It took five years to finish her coursework, which then led to four years working in the Vernon and Manchester sewage treatment plant labs. Although it was important work, it still didn't resonate with Sue's ecology interests.

Determined to find her perfect environmental career, Sue enrolled in the Master's in Environmental Science degree program at the University of New Haven. While there, a friend told her about a job opening at the Connecticut Department of Environmental Protection (DEP). Although it would mean a substantial cut in pay, Sue thought a job with DEP had the potential to be very interesting.

Hired in September of 1987 during the height of Connecticut's real estate boom, Sue started a property transfer research job, coordinating within DEP to determine whether or not the agency had taken any enforcement action against properties being transferred.

Just as that boom cooled off, a reorganization at DEP moved the coastal regulatory program from the inland water resources program to the coastal management program. Sue saw great opportunity in regulating activities in tidal wetlands and in the coastal waters of the

resources at or near one of the four finalist sites, or may have information about research, education, or conservation activities that might be appropriate to share, we'd like to know! Please contact Kevin O'Brien at 860.424.3432 to share your thoughts or to ask questions. Additionally, you can sign-up for our e-mail list to receive updates and announcements about meetings, web postings, and other information relating to the Connecticut National Estuarine Research Reserve.

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NOAA Coastal Fellow Joins DEEP to Work on the Long Island Sound Blue Plan

Development of a Blue Plan for Long Island Sound is moving full steam ahead. The Blue Plan Advisory Committee meets quarterly, while subcommittees and work teams meet monthly to analyze data, develop map products, engage and solicit input from experts and stakeholders, develop outreach materials, and host events to keep the public informed of Plan progress. For example, a pproximately 200 people attended an event held at UConn Avery Point on April 25, 2017 to learn about the Blue Plan, provide feedback, and ask questions of Advisory Committee members.

With no funding from the legislature (all planning is to be accomplished "within available resources"), Blue Plan partners have pooled their resources to provide whatever support they can for Plan development. This includes private grants, student research assistance through local universities, and recent funding from the Long Island Sound Study.

Another opportunity to help see the Long Island Sound Blue Plan to completion will soon be realized, as DEEP's Land and Water Resources Division (LWRD) will be hosting a federally funded Coastal Fellow for a two-year fellowship starting in August 2017.

Emily Hall will be joining DEEP LWRD as Connecticut's Blue Plan Fellow. Emily graduated from Duke University in May 2017 with a master's degree in environmental management. She also earned a bachelor's degree in conservation biology from the State University of New York, College of Environmental Science and Forestry in Syracuse. Emily originally hails from the South Shore of Long Island, so she is keenly aware of regional and Sound-related issues and the critical need to coordinate development of the Blue Plan with New York.

Emily Hall, NOAA Coastal Fellow
Photo Credit: NOAA Coastal Services Center

The Coastal Management Fellowship program was established by the National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center in 1996 as a way to provide on-the-job training in coastal resource management and policy for graduate students nationwide. The Fellowship program also provides assistance to the nation's coastal management programs as they work on cutting-edge, emerging coastal management issues such as marine spatial planning. DEEP has been fortunate to participate successfully in this highly competitive program, and Emily will be our seventh Coastal Fellow.

As Blue Plan efforts move into high gear, Emily will be instrumental in managing all of the moving pieces, working closely with Blue Plan Advisory Committee members, subcommittees, and work teams, as well as coordinating with stakeholders and the general public in Connecticut and New York to develop a meaningful plan for Long Island Sound.

state, and volunteered to transfer to the coastal permitting program:

I had another "A-ha!" moment, like sitting at the picnic table at NCCC. I would be able to combine my science background with my love of marshes. It all seemed to be predestined from Point O' Woods.

Sue would work in the permit section for the next 29 years, striving to minimize adverse impacts to coastal resources, minimize encroachments into the public trust area, and minimize adverse impacts to navigation:

I worked hard to make sure that every activity I reviewed had the least amount of impact and damage to the environment, while still allowing the applicant to exercise their riparian rights. That takes a lot of negotiation and cajoling, and sometimes it's difficult to find a good compromise. But the point is to make sure it's a quality product which takes time and analysis. You don't just rubber stamp it, whether it's a permit or a bottle of vodka.

Sue has always worn the term "regulator" as a badge of honor. While others with similar degrees might be more inclined to take a scientific research or academic route, or work in private consulting, Sue believes in the importance of regulation:

In my opinion, if you have no power to regulate protection of the environment, the research can't help you. I think it's really important to actually have the law on your side so you can affect protection or change, or restoration if someone does something that adversely impacts the environment. In the mid-1960's my father had a boat we'd launch in the Connecticut River, and I distinctly remember the smell of dead, rotting fish at the boat launch. Fifteen years later I went boating on the river with a friend, and things had improved a lot. After environmental laws went into effect, you could swim in the river. You need laws and enforcement to help people do the

Needless to say, we are very excited to have Emily on board, and we look forward to working with her on the historic Blue Plan initiative!

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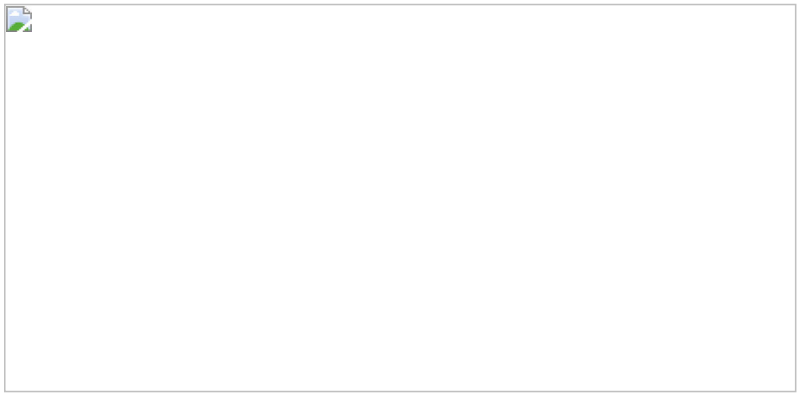
SPOTLIGHTED COASTAL ACCESS: New Interactive Connecticut Coastal Access Guide Map Released

Since October of 2004, the digital version of Connecticut Coastal Access Guide--originally published in paper format in 1999--has helped the public "explore the shore" and find a place to swim, fish, launch a boat, and otherwise the enjoy Connecticut's coast. However, like an old but reliable vessel, the Guide was beginning to show its age and needed a major overhaul.

Thanks to new Internet mapping technology, that overhaul was recently completed, and Version 2.0 of the Connecticut Coastal Access Guide is out of dry dock and can now be boarded!

The Guide has been updated to use the latest interactive mapping tools to help you find more than 300 sites where the public can access Connecticut's coast. Guide Version 2.0 uses a map-based user-interface to navigate and search for coastal access sites (please click on all maps to see a larger image):



As further explained in the "How to use the Guide" section on the right side of the web page, a quick way to access information about a place or area along Connecticut's coast is to enter the name of the place you'd like to visit in the search box in the upper left corner of the page:

right thing. It restores your hope.

Not surprisingly, "enforcement" brings Sue's 30-year career at DEP/DEEP full circle. Sue has now volunteered to work in the new enforcement section created by a recent reorganization of the Land and Water Resources Division. Her intimate knowledge of the coastal regulatory program and its related statutes and her understanding of what activities are likely to be permittable make her well-qualified to make recommendations about how to mitigate and address violations. The new position gives her the opportunity to restore environmental damage as well as her hope.

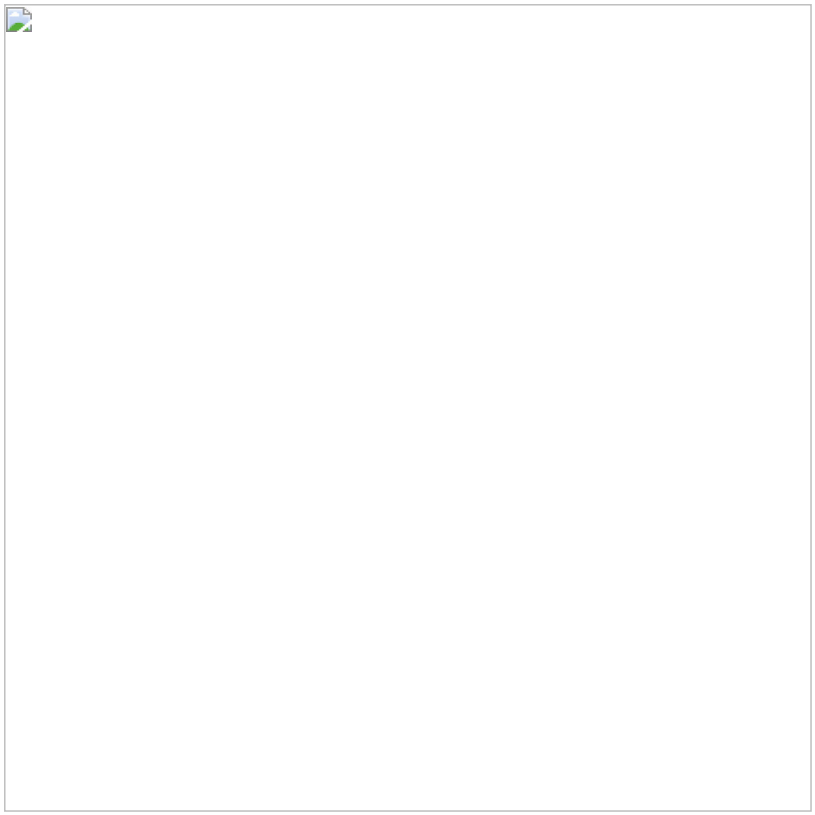
And what does Sue think about her 30-year career at DEP/DEEP?

If someone had told me when I started working here that I'd have to stay for 30 years, I would have said, "Absolutely not!" I had just quit 3 jobs over 4 years before I started working here! But somehow it evolved that way. And as stressful as the job can be, I have never been bored by it. There is always something new and different, some weird legal or environmental twist, that makes it interesting and stimulating to find a resolution.

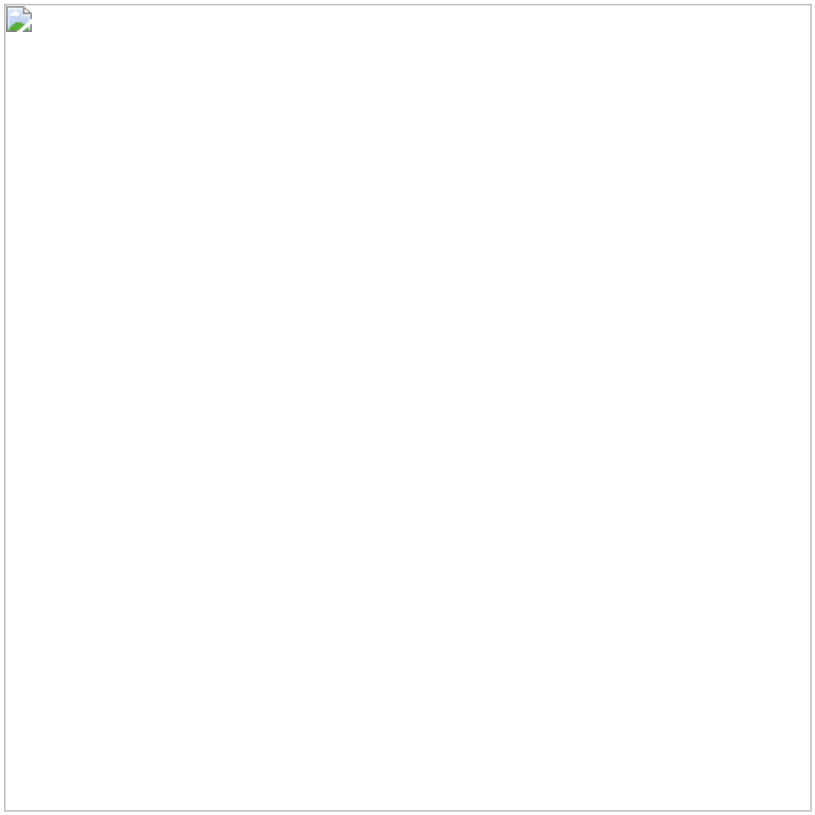
While at DEP/DEEP, Sue has even had a chance to fulfill her first career aspiration--acting--by appearing in some of DEEP's videos, singing the praises of LEAN improvements to the coastal permit program, and portraying a Gladys Kravitz-type nosy neighbor concerned about outdoor wood burning stoves. Sue strongly believes in educating the public about DEEP's programs, and these videos are one way to get the message out:

I believe that people don't violate environmental laws on purpose, I believe it happens because they don't realize their activity is regulated and they need permits. Educating them about what's required can help them change their behavior.

Sue's "Behavior Change" came into play as she started to run a household, understanding the importance of being an environmentalist in her daily life, both inside and outside the house. She



Simply enter a place name, such as "East Lyme" or "Rocky Neck State Park," and click the search icon to the right. The map will be directed to your area of interest, and links to additional information about coastal access sites in the area can be accessed by selecting the square orange icons:



recycles, composts food scraps and leaves, and never uses pesticides or herbicides (except in very rare instances to kill aggressive poison ivy). She even appreciates clover for its pollution prevention qualities--"it's a nitrogen fixer!"--and prefers "green and cut-able" to a lawn monoculture.

She also takes great pride in having raised her two daughters to appreciate the earth. And nurturing the next generation of environmentalists is, perhaps, the biggest environmental step anyone can take.

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Sound Outlook

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Look Out For Upcoming Events!

Blue Plan Advisory Committee Meeting
September 7, 2017
10:00 am to 12:00 noon
Location TBD

Long Island Sound Study (LISS)
Committee Meetings

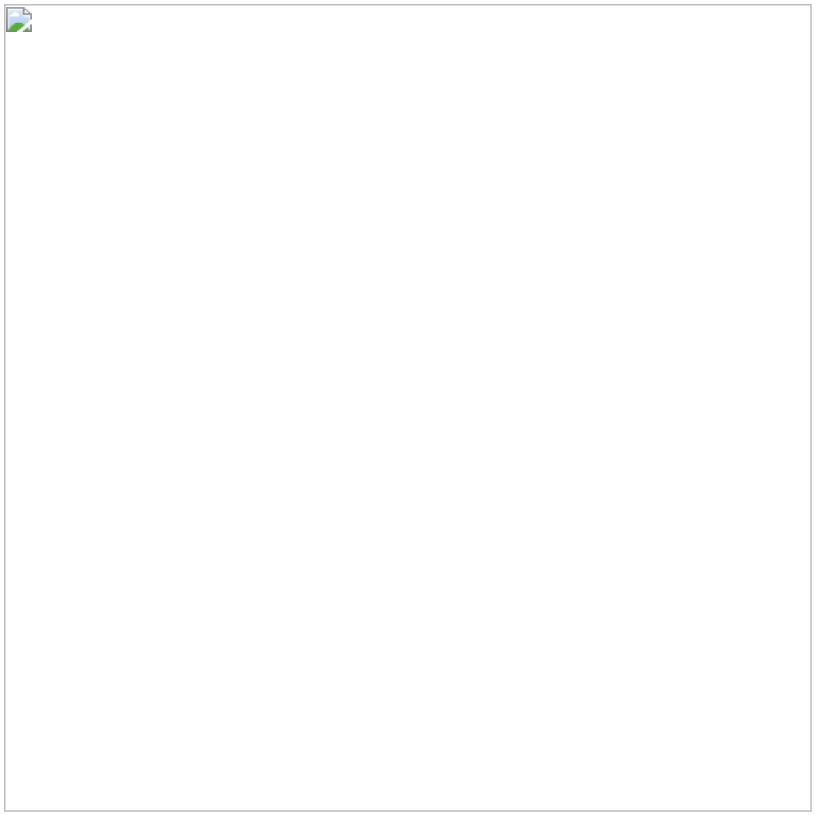
Please be sure to check the
Calendar of Events on
DEEP's website

Purchase of a LIS License Plate Supports the LIS Fund

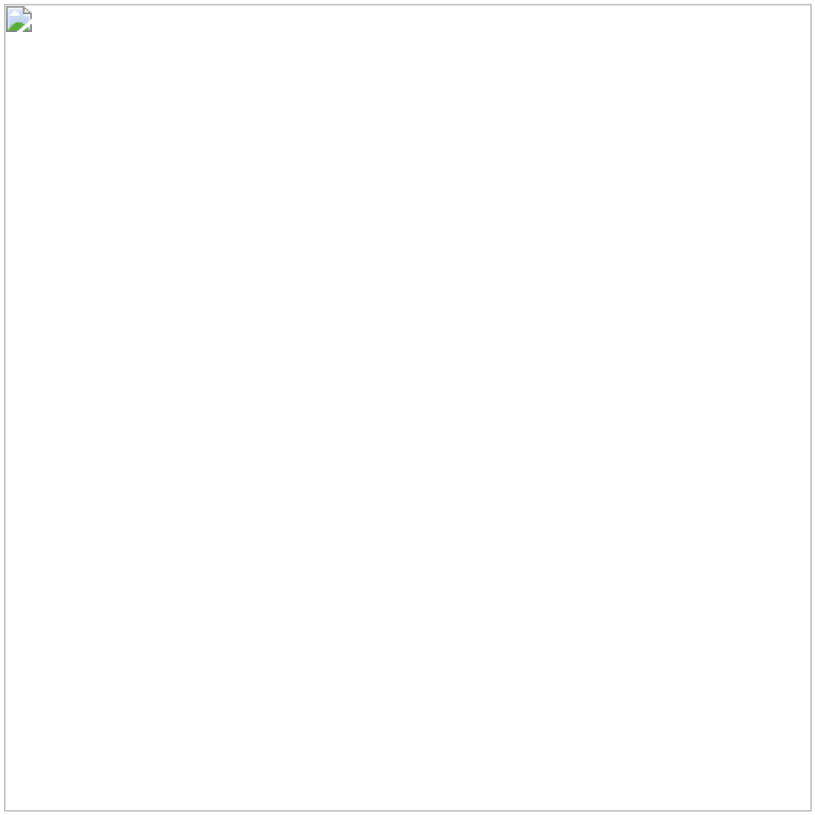
The LIS fund supports projects in the areas of education, public access to the shoreline, habitat restoration, and research.

Grant Funds Available for Boating Infrastructure Projects and Marine Pumpout Programs

The Connecticut Department of Energy and Environmental Protection (DEEP) is pleased to offer a Request for Application under the Boating Infrastructure Grant Program. Congress created this program recognizing that insufficient tie-up facilities



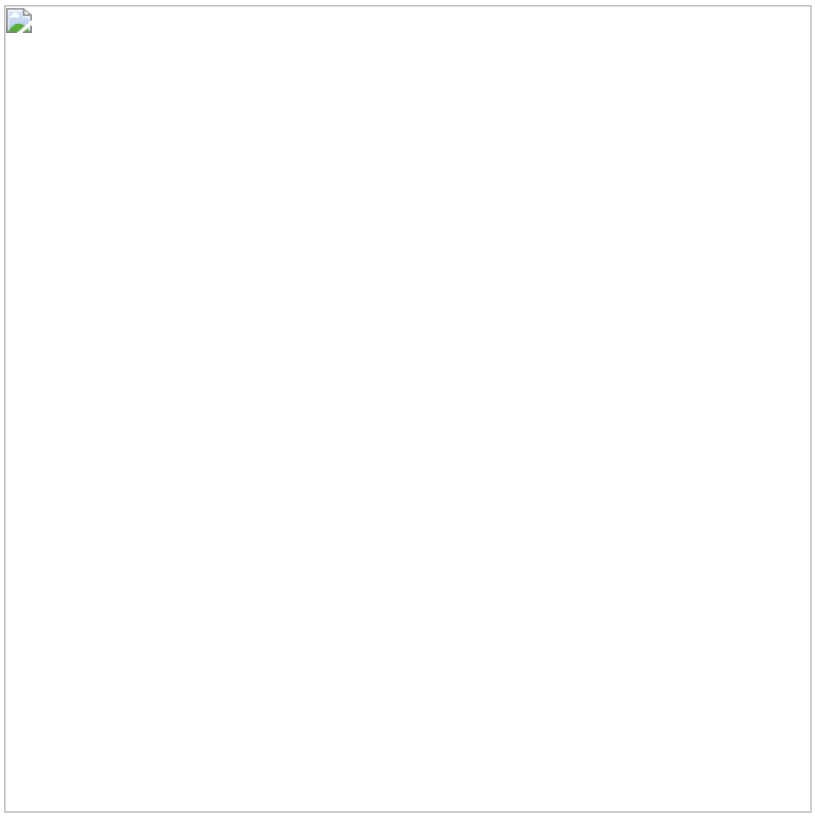
If you don't know the name of the destination, but know the general area of interest you plan to visit, simultaneously depress the "Shift" key and use your mouse to draw a box around the area, and a more detailed map of the area with coastal access site icons will be displayed:



exist for transient boaters to gain reasonable and convenient access from navigable waters. The deadline for the next cycle of grant applications is August 1, 2017.

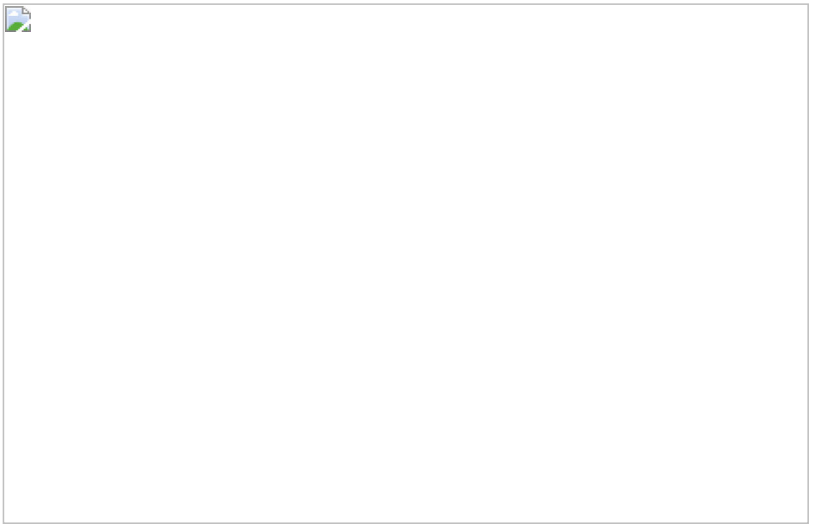
DEEP is also accepting applications for the 2018 boating season for marine sewage disposal facilities (MSDF) on Long Island Sound and Candlewood Lake. Grant proposals may be submitted by owners and operators of public or private marine facilities for installation of new MSDFs; repair or upgrade of existing MSDFs; and to operate new or existing MSDFs, including pumpout boats and central vacuum pumpout systems which are incorporated within a marina or boatyard dock system. The deadline for grant proposals is 4:00 pm on Wednesday, August 9, 2017.

Please contact Susanna Simonds at 860.447.4349 for more information about either of these funding opportunities.



Again, select the square orange icons to see additional information about the site.

Alternatively, you can use the search buttons beneath the search box in the upper left corner to find sites based on specific criteria:



 "Things to Do" (e.g., fishing, supervised swimming)

 "Facilities" available (e.g., boat launch, access pier)

 "Environmental Setting" (e.g., sandy beach, intertidal flat)

The other search buttons include the "Basemap Gallery" button  to select a different basemap for your search (e.g., satellite imagery or a street view), while the "Near Me" button  will show you other coastal public access sites within a specified distance from your selected site.

Released just in time for the summer season, the new and improved Connecticut Coastal Access Guide should be helpful in planning your next trip to Connecticut's

beautiful shoreline!

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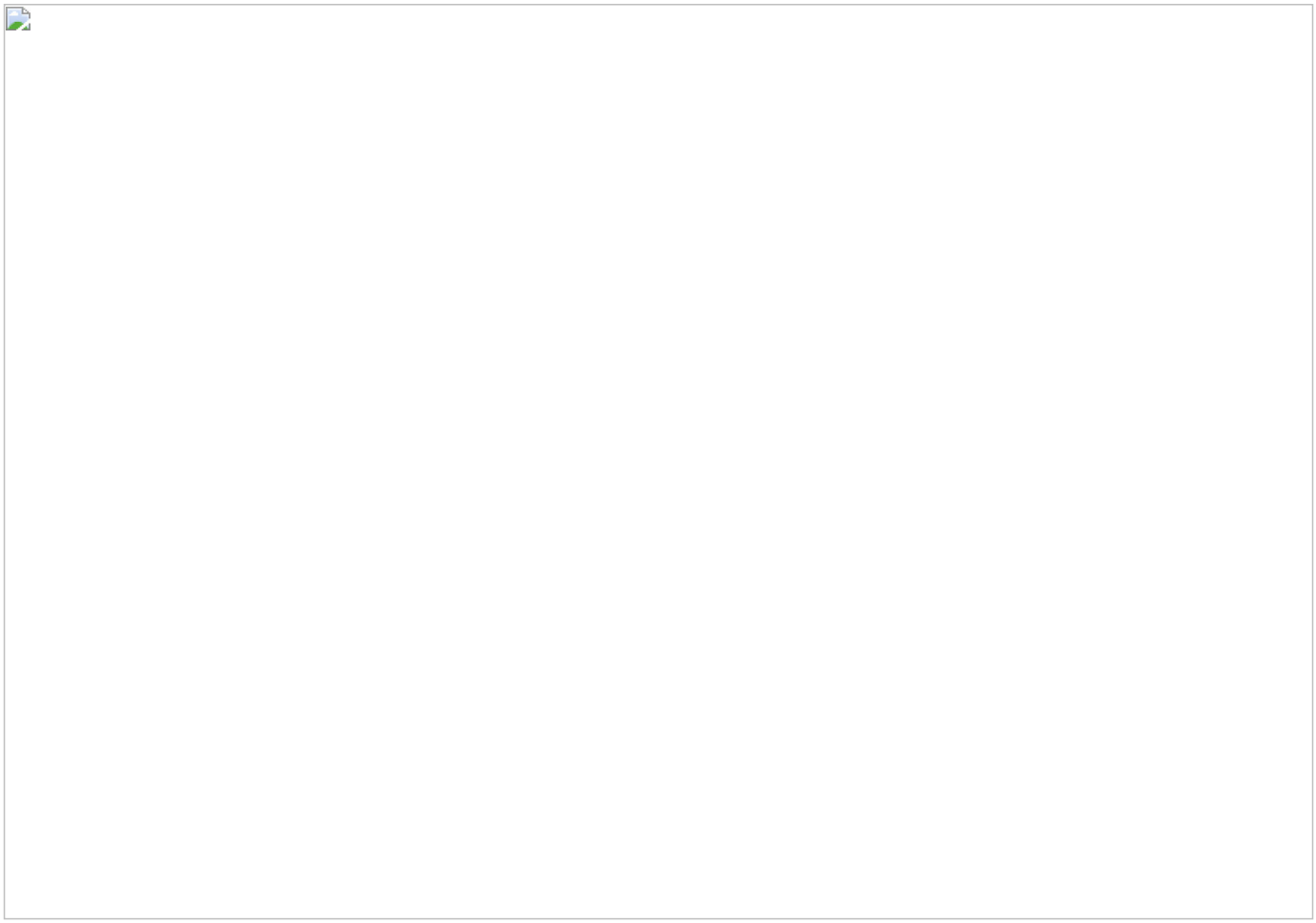
SPOTLIGHTED COASTAL RESOURCE: Clean Dredged Material
Thin Layer Placement as a Beneficial Use to Restore Degraded Tidal Wetlands

Dredging is an activity that must be undertaken in order to keep our navigation channels, harbors, and shipping ports open and functioning. But it is also an activity that conjures negative misperceptions for some people who refer to dredge spoils, "toxic sludge," and open water dumping, just to name a few.

Perhaps the most controversial (and costly) aspect of dredging is the disposal of thousands--sometimes millions!-- of cubic yards (cy) of dredged material. The most expensive disposal costs are associated with the "dirtiest" dredged material, contaminated to the point that it must be transported a long distance, usually by truck, to a facility that is licensed to handle such material. If an average dump truck carries 10 cy of material, you'd need 100,000 dump trucks to dispose of one million cy of dredged material, so it's easy to see how the activity could get very expensive, very quickly.

Dredged material that does not fall into this "unsuitable" category may be disposed of in open water. There are three approved and currently open dredged material disposal sites in Long Island Sound, and almost everything dredged out of the Sound and its connected bays, harbors, and rivers ends up in one of these disposal sites. Dredged sediments are contained and transported in a specific type of barge called a scow, which is brought to a disposal site by tugboat. Some of the dredged material that is suitable for open water disposal does, indeed, contain small amounts of contaminants. However, scow barges are often loaded up with clean dredged material as well--sediments that are suitable for beneficial use. One such beneficial use of dredged material was highlighted in the June 2013 issue of *Sound Outlook* which described a project that deposited high-quality sand dredged from the channel leading to Clinton Harbor onto the beach at Hammonasset Beach State Park to renourish an area that suffered from chronic erosion.

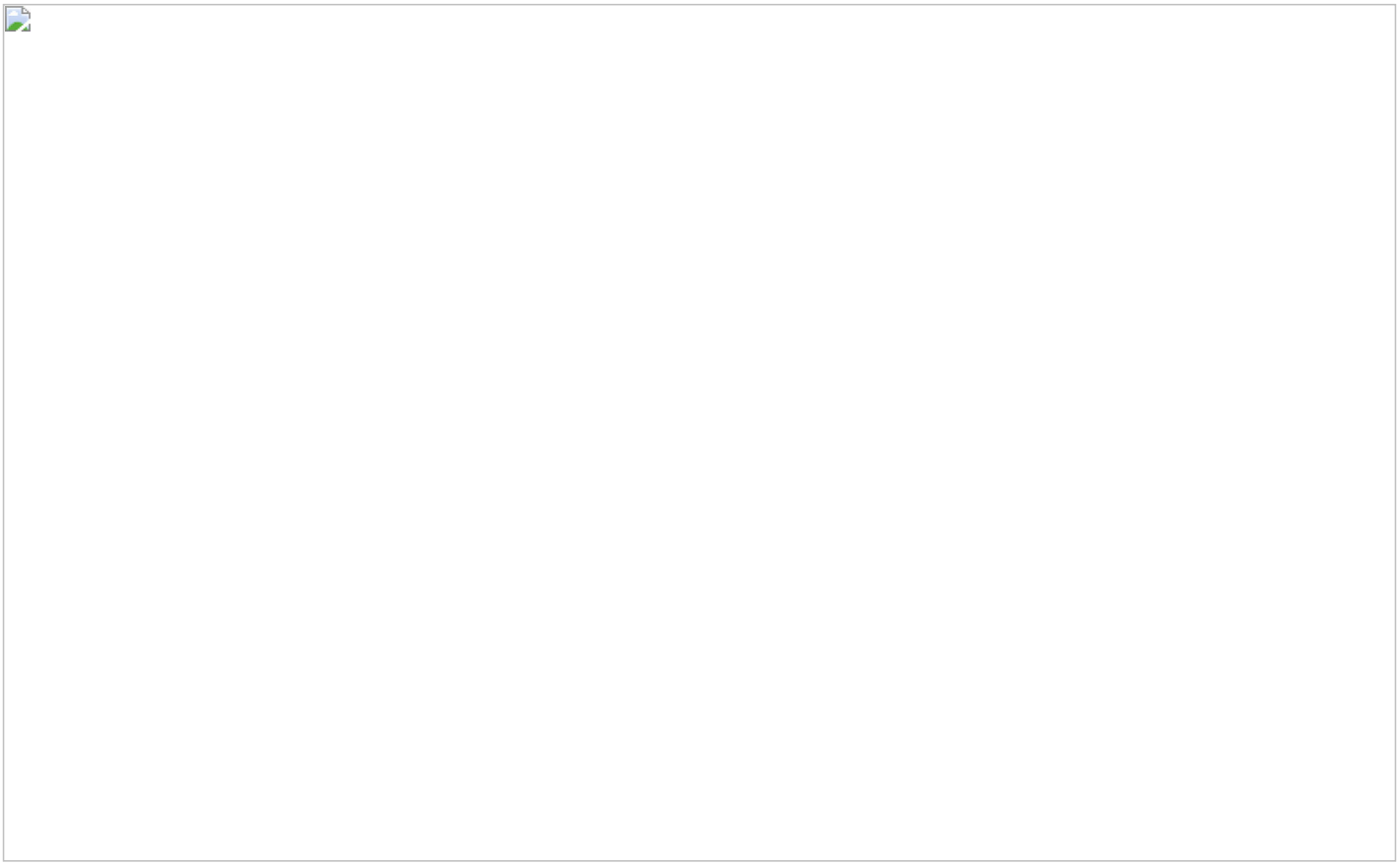


Scow barge about half-full of material dredged out of New Haven Harbor, January 2014
Photo Credit: CT DEEP

Long ago it was standard practice to fill tidal wetlands with dredged material as a convenient and inexpensive means of disposal. Back then,

tidal wetlands were regarded as wastelands that served no real purpose for humans, so filling them made sense. Filled wetlands meant fewer mosquitoes, eliminated a source of that "low-tide smell," and created buildable land. It wasn't until the mid-20th century when we realized the true value of tidal wetlands, how they protect wildlife, serve as nursery grounds for many commercially important species, and protect waterfront development and infrastructure from storm energy. With the advent of Connecticut's Tidal Wetlands Act in 1969, the filling of tidal wetlands has since been strictly regulated and increasingly rare. The use of wetlands for dredged material disposal has all but become prohibited, which has contributed to the need for open water disposal.

Well, we seem to have come full-circle on this issue. Many scientists and environmentalists are now actually promoting the filling of tidal wetlands with thin layers of clean dredged material--known as Thin Layer Placement (TLP)--to restore marshes degraded because of decomposition of organic peat soil or diminished natural inputs of mineral sediments. The critical difference between filling wetlands today vs. filling wetlands in the 1930s has everything to do with determining an environmentally safe elevation. In other words, we must figure out how high we can pile on the dredged material before we have to stop. The answer varies quite a bit from one degraded marsh to the next, but in general, the "thin" in TLP is likely a 3- to 6-inch layer of dredged material that brings the elevation of the marsh to a few inches above the Mean High Water elevation. At the opposite end of the spectrum are "thin" layers that could be several feet thick, reserved for marshes which have already lost several feet of elevation due to erosion, decomposition, or other factors, and have no vegetation growing on them.



A suction dredge is used to deepen a channel. Both water and mud are sucked-up into a pump and the mix (or slurry) is sprayed onto a low spot in an adjacent tidal marsh. This raises the elevation to the point where the marsh can once again support vegetation.
Photo Credit: U.S. Army Corps of Engineers

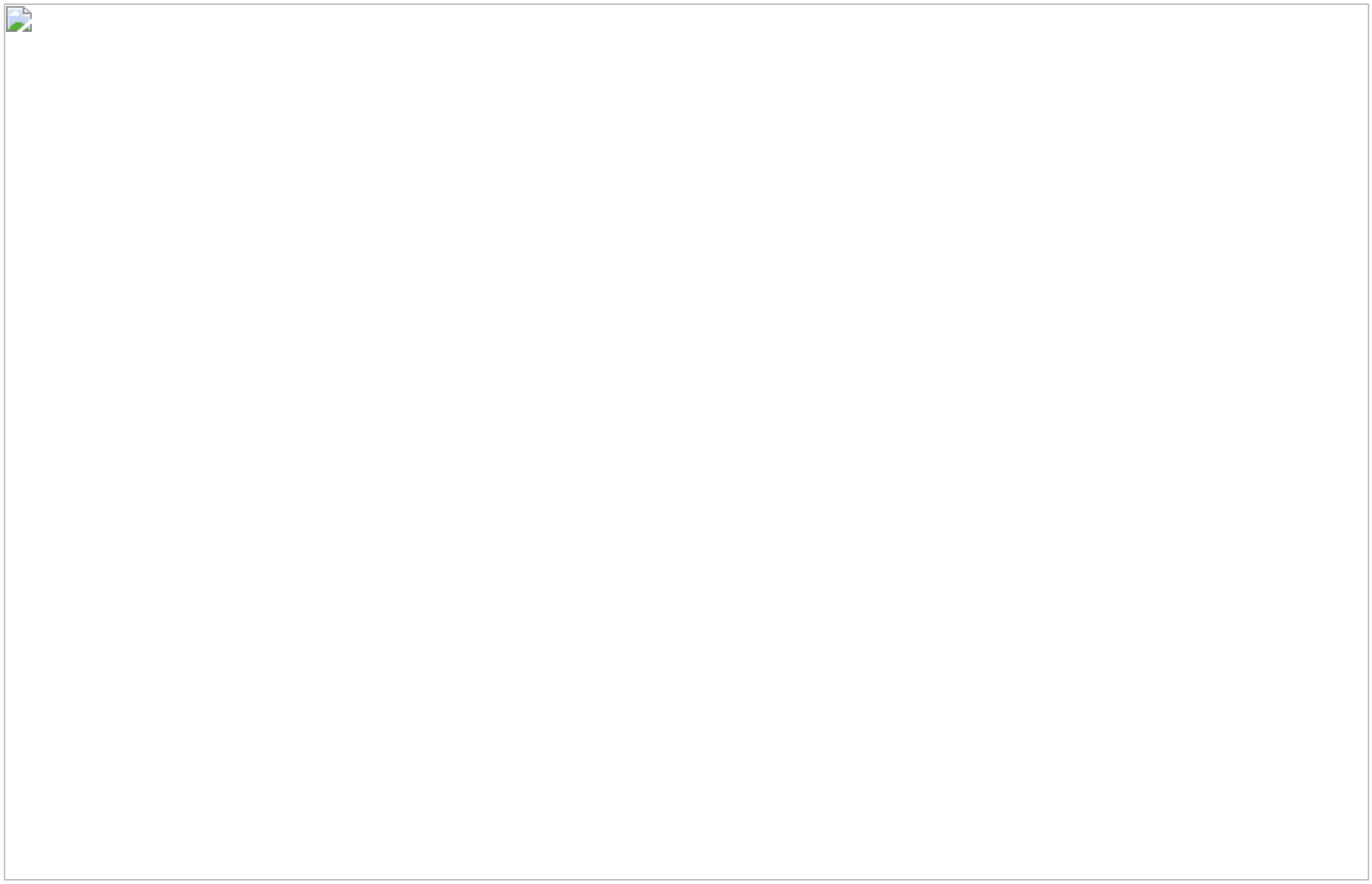
The conventional wisdom that "Mother Nature Knows Best" might support the natural succession of tidal wetlands converting to open water or healthy and functioning intertidal flats. But this is not what actually happens. These marshes are degrading due to human impacts. A degraded wetland that superficially looks like a mudflat will not remain that way for very long. These are actually unvegetated "peat-flats" that are still composed of mostly organic material, and they are still decomposing. If these flats are "protected" from filling and left alone long enough, they will continue to lose elevation and will eventually become completely subtidal, covered by water even at low tide. Moreover, we cannot count on tidal marshes being able to sustain themselves by migrating landward in response to sea level rise, as described in previous *Sound Outlook* articles on the Sea Level Affecting Marshes Model (SLAMM, please see the February 2017 issue for more SLAMM information).

Bride Brook TLP Pilot Project
As of June 1, 2017, there has been only one example in Connecticut of a tidal marsh restoration project using Thin Layer Placement of dredged material. A pilot-scale study within Rocky Neck State Park is expected to restore approximately 1 acre of tidal marsh habitat. The project scope includes dredging sand out of Bride Brook and placing the material into degraded and unvegetated areas in the adjacent marsh.

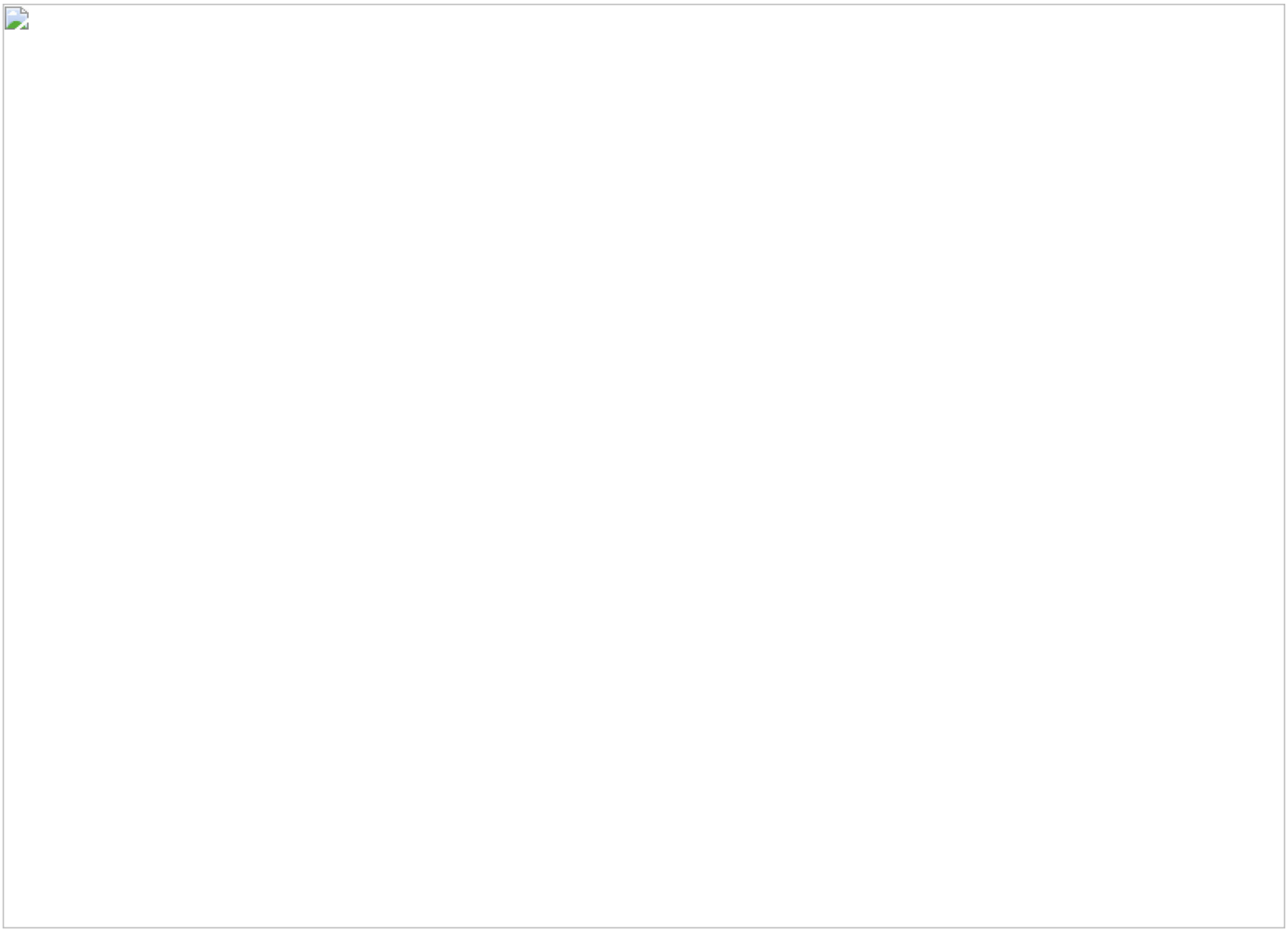
Large sandy shoals have formed throughout the lower ¼ mile of the brook and they prevent the entire marsh system from fully draining at low tide. The shoals cause water to remain on the marsh surface, gradually causing "subsidence," or a loss in marsh surface elevation. Subsidence initially leads to the conversion of high-marsh to low-marsh (i.e., changes in drier high-marsh plants to wetter low-marsh species),

followed by conversion to unvegetated "peat-flats," and finally to shallow ponds and pools that cannot drain.

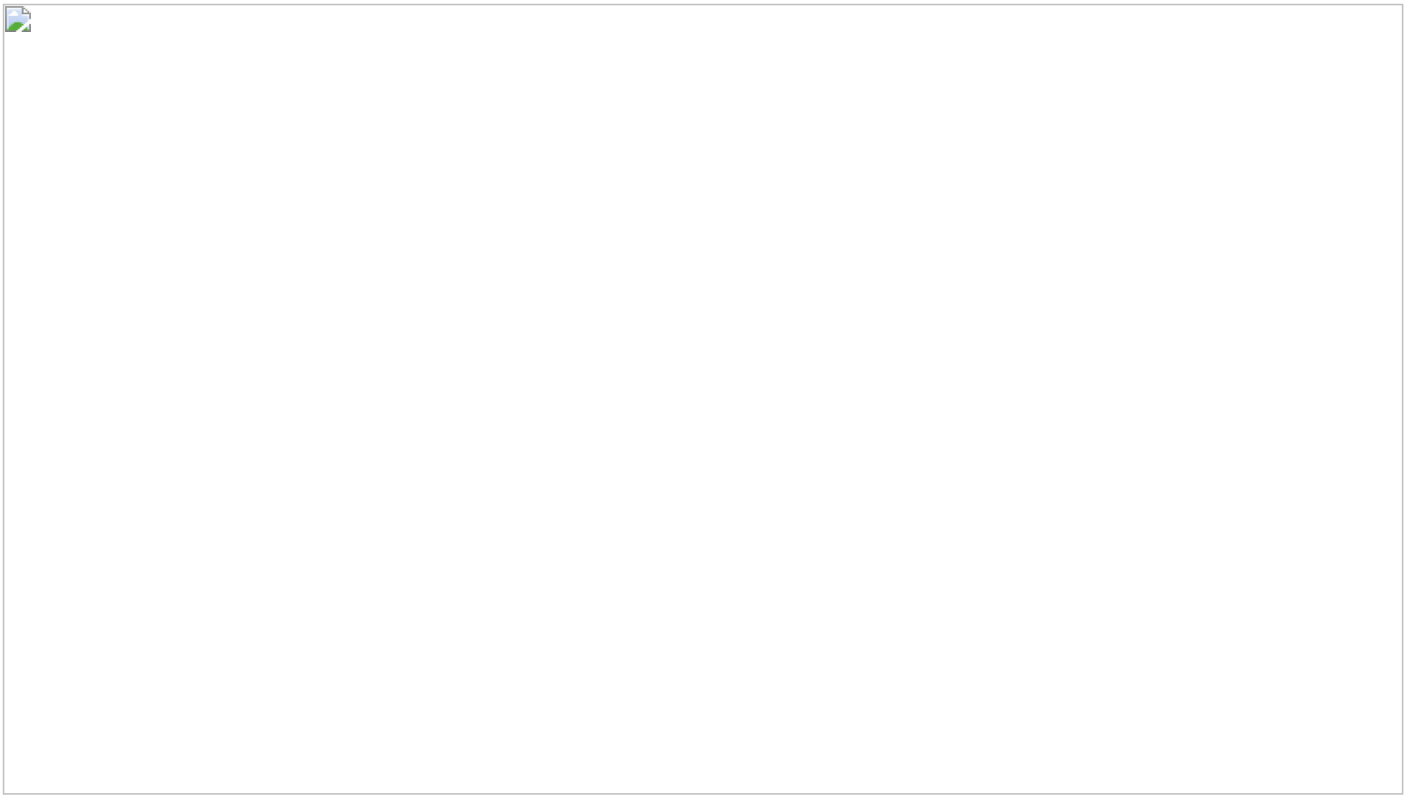
The sand shoals are a result of storm energy pushing beach sand upstream through a pair of long but small-diameter pipes which once connected Bride Brook to Long Island Sound. Water flowing out of the marsh during the falling tide did not have enough energy to carry the sand back out of the system. In 2010, DEEP completed a restoration project in which the pair of undersized pipes was replaced with a much shorter concrete box culvert, with an opening that had a much larger cross-sectional area. (You can read more about this culvert replacement on the Long Island Sound Study Bride Brook Restoration Project webpage.)



1934: Red-circled area shows healthy marsh;
Purple-circled area shows no sandy shoals in Bride Brook

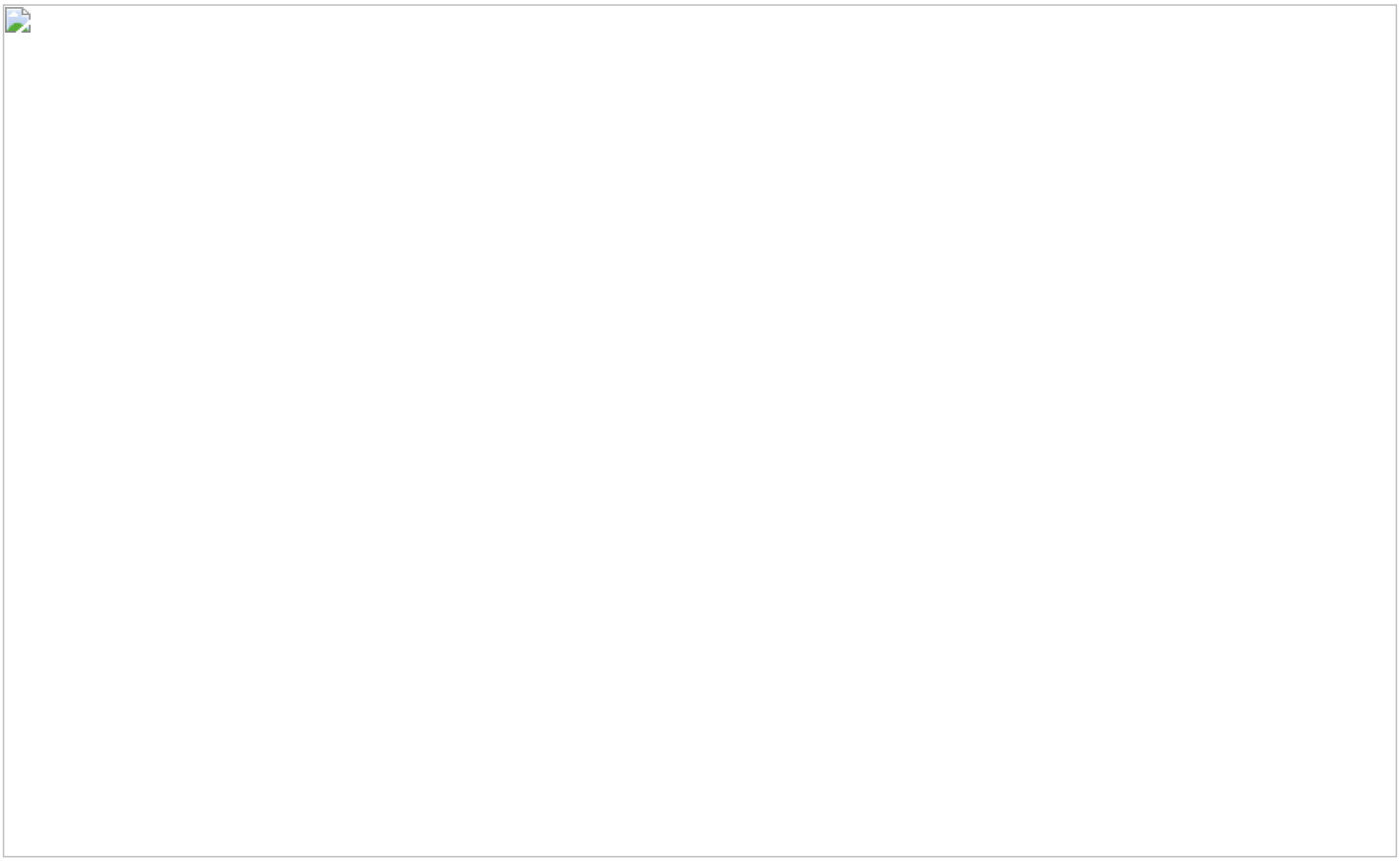


1974: Red-circled area shows the early conversion of productive marsh areas to open water;
Purple-circled area shows sandy shoals forming in Bride Brook



2010: Red-circled area shows significantly expanded open water areas;
Purple-circled area shows substantial sandy shoal throughout Bride Brook

Note Green Arrow identifying a bridge as a reference point



Area of Thin Layer Placement in Bride Brook marshes
Photo Credit: CT DEEP

While it was anticipated that a properly sized culvert would help transport the sand from Bride Brook back out into Long Island Sound, no improvement in the shoaling resulted within the 5 years that followed the culvert replacement. So DEEP decided to intervene and remove the sand mechanically. The Bride Brook TLP project began in Fall of 2016, in compliance with seasonal restrictions that limit construction activities in tidal marshes. DEEP cleared as much sand possible with DEEP staff and equipment, and the next step is to hire a contractor to complete the project.

Since Fall of 2016, DEEP has received multiple requests for information related to TLP for dredging projects in Norwalk, New Haven, Guilford, and Old Saybrook. Given this increased level of interest in TLP in Connecticut, DEEP and the Army Corps of Engineers New England District have started a dialog to assist with the authorization of TLP at the federal level. While there is still some planning left to do before all parties reach consensus on a final guidance document, DEEP is taking an environmentally sound, common sense approach to reviewing TLP proposals and has adopted the following requirements for state permit applications:

- Project proponents must start with a subtidal area for tidal marsh creation, or a degraded tidal marsh for restoration, and end with an elevation that will support a healthy assemblage of tidal marsh plants;
- The condition of the tidal marsh habitat prior to TLP and predictions of post-TLP conditions must be documented;
- The project shall not interfere with endangered, threatened, or special concern species; commercial interests; navigation; or other water-dependent uses; and
- Projects must include pre-construction surveys and post-construction monitoring.

The time has come to treat clean dredged material as a valuable resource, rather than as a waste by-product of dredging that should be disposed of in open water, and TLP can play a major role in this effort. And if TLP can restore degraded marshes that are subsiding, the practice might also prove promising in the future to help tidal wetlands combat the effects of accelerated sea level rise.

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Climate Change Update: Using Green Infrastructure for Coastal Resilience

Sound Outlook has long been a strong supporter of Green Infrastructure (GI) and Low Impact Development practices to help clean rainwater runoff before it gets discharged to streams, rivers, lakes, and Long Island Sound (please see the February 2013 issue for more information). Traditional GI practices like rain gardens and permeable pavements manage stormwater runoff by imitating the natural way water moves in the environment. They improve water quality and decrease the volume of rainwater that runs off the ground surface by allowing water to

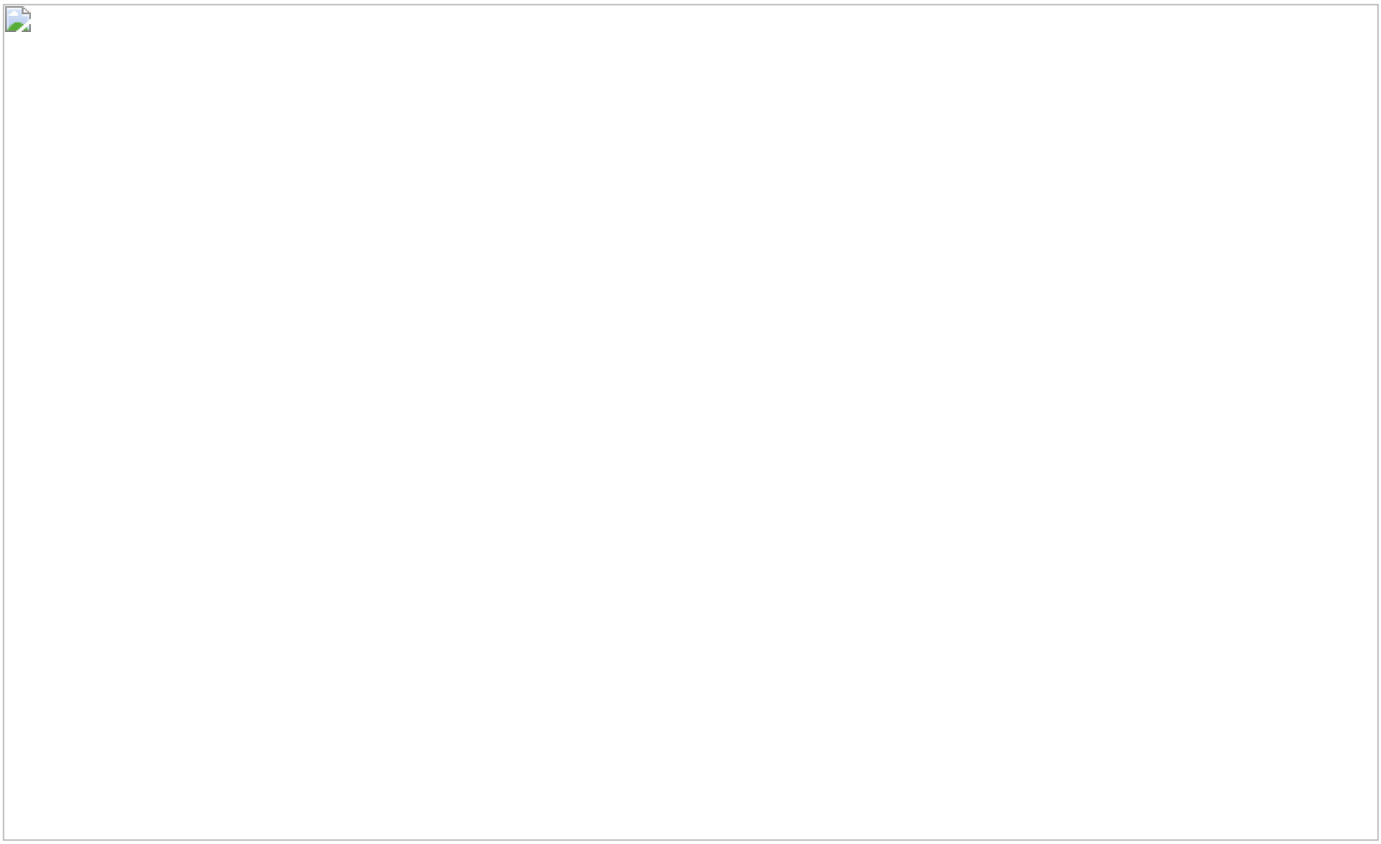
soak into the ground to be stored and filtered.

Now, GI techniques are being praised as a way to help cities and towns become more resilient in fighting coastal storms and sea level rise.

On Tuesday, May 23, 2017 the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut and the National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management offered a training workshop highlighting this important connection between GI techniques and coastal resilience.

The use of GI practices is especially important in coastal areas where flooding from upland rain runoff drains down to meet rising coastal waters surging up onto the land. GI practices that reduce stormwater volume, like rain gardens and green roofs, can hold upland flooding at bay, while living shorelines like tidal wetlands and offshore reefs can slow storm surge and reduce coastal erosion (please see the June 2012 issue of *Sound Outlook* for more information on living shorelines).

During the workshop, staff from NOAA and CIRCA focused on the fundamental GI concepts and practices that can play a critical role in making coastal communities more resilient to natural hazards.



Green Infrastructure techniques that can help with coastal resilience
Illustration Credit: NOAA

The program featured information about CIRCA-funded green infrastructure projects and included presentations from the Metropolitan Council of Governments, the Eastern Connecticut Conservation District, and the University of Connecticut Center for Land Use Education and Research (CLEAR). Through group discussions and activities, workshop participants learned what they can do to support green infrastructure implementation in their coastal communities.

CIRCA has also announced another round of available funding through their Municipal Resilience Grant Program. Municipal governments and regional Councils of Government are eligible to submit grant proposals that advance resilience. Projects can include the creation of conceptual designs, construction of structures, or the design of practices and policies that increase resilience to climate change and severe weather. Proposals are due to CIRCA by September 1, 2017.

More information about NOAA's GI and coastal resilience efforts can be found in *A Guide to Assessing Green Infrastructure Costs and Benefits for Flood Reduction*, while NOAA's Green Infrastructure Practices and Benefits Matrix contains information about common green infrastructure practices that can be used to lessen community flooding, ranging from natural landscape conservation to nature-based solutions at the site level.

Visit the DEEP website at www.ct.gov/deep

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Additional information about GI and Low Impact Development practices in Connecticut can be found on the UConn CLEAR Website. Check out the story map that highlights The State of Low Impact Development in Connecticut.

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contact us at (860)418-5910 or deep.accommodations@ct.gov if you: have a disability and need a communication aid or service; have limited proficiency in English and may need information in another language; or if you wish to file an ADA or Title VI discrimination complaint. Any person needing a hearing accommodation may call the State of Connecticut relay number--711. Requests for accommodations must be made at least two weeks prior to any agency hearing, program, or event.