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Sea Grant Connecticut

WRACK LINES

Volume 19, Number 1, Spring/Summer 2019

WHERE CONNECTICUT MEETS THE SOUND

MAKING CONNECTIONS:

As the Climate Changes, People and Nature Intertwine in New Ways

AS ROADS BECOME RIVERS • WIND & WATER VS HOMES • TEALE & NATURE'S WAY

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From the EDITOR

THE WRACK LINES CONNECT US

You never know what you'll find in the wrack line.

The first day of spring on March 20 brought me to Hammonasset Beach State Park in Madison for the official unveiling of the Long Island Sound Blue Plan, a significant achievement in the state's stewardship of the estuary. Arriving early, I headed to the beach with my camera to get some scenic shots.

Looking up the beach along the wrack line, I noticed an outspread blanket with three figures, one of them playing the flute. It sounded like the cool sigh of the Earth welcoming the longer days of the vernal equinox.

As I walked towards the blanket, three smiling women amid a rainbow of coverings for themselves and the sand came into focus. I introduced myself and asked to take their picture.

Toni Johnson, Azua Echevarria and Andrea Cortez told me they'd traveled to Hammonassett from their homes in Hartford that day to celebrate nature and the first day of spring.

"Do you know you're sitting in the wrack line?" I asked them.

"What's that?" one replied.

The line of shells, seaweed and driftwood that collects at the high tide line, I explained. Birds use it to find insects and small sea creatures that get brought in with tide.

The three women nodded. Echevarria said she's noticed wrack lines many times, but didn't know the name. Why had they laid their blanket there?

"We were drawn to it," Echevarria said.

This brief encounter reminded me not only of the endless possibilities of wrack lines – both the ones on the beach and the magazine that I edit – but also of the many ways people and nature are connected. Sometimes, as in the case of these three women, humans seek nature deliberately as a place to restore the spirit. Other times, nature seems to seek us and can't be avoided, however troublesome. Either way, humans and nature can't stay away from each other.

This issue explores those connections from different vantage points. Superstorm Sandy brought the realities of climate change home for many shoreline residents, and remains their frame of reference for understanding the risks of coastal living. Elevating homes has been one way to respond, but does that bring more exposure to high winds? Rising seas are flooding some coastal roads routinely, challenging shoreline communities to find solutions that protect homes, businesses and salt marshes.

But the practical realities of the physical world are just one side of the human-nature bond. Richard Telford, reflecting on the writings of Edwin Way Teale, and the artists of our *Crosscurrents* exhibit all summon us to consider the many meanings of that relationship, and how it shapes us.

So next time you're at the beach, examine the wrack line. Amid the shells and fronds of rock weed, are there fish bones, sea glass and perhaps a plastic water bottle? Is there also fishing line and a chunk of Styrofoam, coated green with algae? A section of wrack line can reveal some of the negative ways humans are intertwined in the natural world. Or, if you find a wrack line free of trash, it will call attention to the organic diversity in the local waters. Whatever you find, it will connect you both to wild places and the human shore, and you might just discover new insight into both.

Judy Benson, editor
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Above photo: Toni Johnson, left, Azua Echevarrria, center, and Andrea Cortez enjoyed the first day of spring at Hammonasset Beach State Park in Madison.

Cover photo: Guilford town road crew workers make repairs on a seawall along Falcon Road in April. The road had been closed since November after flooding from several storms. Photos: Judy Benson

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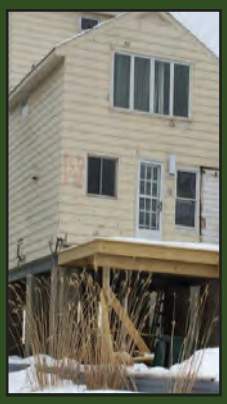

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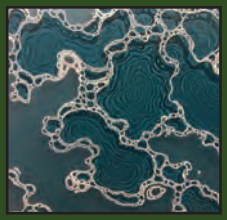

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RICHARD TELFORD
Richard Telford is currently writing a biography of Edwin Way Teale, six chapters of which have been published on UConn's Archives and Special Collections site. He has taught in the English Department at The Woodstock Academy since 1997, currently serving as its Chair. In 2012, he helped design and establish the Edwin Way Teale Artist-in-Residence Program for the Connecticut Audubon Society, a program he has coordinated since that time. He was a long-time contributing writer for *The Ecotone Exchange*. He lives with his wife and three children in a 1770 farmhouse in northeastern Connecticut.

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Judy Benson has been the communications coordinator of Connecticut Sea Grant and editor of *Wrack Lines* since 2017. Prior to that, she was a reporter and editor at The Day of New London for many years, including more than a dozen covering health and the environment. Exploring the tidal marshes, islands and natural beaches of Long Island Sound by kayak and on foot is one of her favorite pursuits. She earned both her undergraduate degree in journalism and her Master of Science in natural resources from UConn.

AS MORE ROADS BECOME RIVERS, COMMUNITIES SEARCH FOR SOLUTIONS

By Judy Benson

Dodging the effects of rising seas has become a routine habit for Milford resident Mary McCutcheon.

"Now, any time there's a higher-than-normal tide, there's road flooding," she said.

She sees it near her home on Beachland Avenue, where she's lived for the past dozen years. On some days, even when that street is passable, floodwaters can be covering the only road to the Connecticut Audubon Center's Coastal Center at Milford Point, where she volunteers.

"We'll get a call telling us not to come in," she said. "But we have to watch. The flooding is becoming much more frequent."

Less than a mile from McCutcheon's house, Nancy Rogers copes with the effects of encroaching waters with vigilance and a snow shovel. Though snow was scarce this winter, she often used the shovel to push layers of sand off her driveway that had been deposited with high tides that swept over the beach in front of her house, across her property and onto Field Court, the main access road. This winter, one of her neighbors didn't move their car in time, and it ended up under water. Rogers pointed to a dark line on that neighbor's house marking the height of the recent floodwaters – about halfway up the first floor.

"If you live here, you have to be on guard all the time," said Rogers, who elevated her home after damage from Superstorm Sandy in 2012. "Almost any time there's a rainstorm it floods. I'm tired of shoveling sand all the time, so I'm thinking of putting up a concrete wall. I think that'll help."

In most of the 24 towns along the Connecticut shoreline, there is at least one neighborhood where roads are predictably becoming impassible at higher-than-normal high tides – even at an average high tide, in some places. Of the multiple ways that the warming air, seas and wetter world coming with climate change are already affecting Connecticut, the increasing frequency of coastal road flooding is the most immediate and tangible impact communities are being forced to confront in the present moment.

"In looking at the impacts of climate change along the Connecticut coast, road flooding is probably the issue at the top of the list," said Juliana Barrett, coastal habitat specialist with Connecticut Sea Grant. "It's affecting every community, and it's something that's going to get far worse."

According to the U.S. Federal Agency Sea Level Rise and Coastal Hazard Task Force, the North Atlantic region was being affected by flooding 3.4 to six days per year from 2000 to 2015. The trend has been continuing upward since then, and is on track to increase to 45 to 140 days per year by 2050 – about four to 11 days every month. By that time, sea level will have risen another 20 inches in Connecticut, with no letup seen through the end of the century. This means many of the low-lying roads near beaches and salt marshes along the coast could be under water daily, turning some neighborhoods into islands.

Town and state officials in charge of those vulnerable roads are left to face the difficult and expensive long-term challenge of figuring out how to deal with the increasing road erosion, cleanup and repair costs, access problems for ambulances and police, and tough decisions about which flooded roads to elevate, abandon or discontinue. All three of those solutions present a suite of complex challenges of their own.

"Climate change is a global problem with local impacts, and it's fallen to state and local governments to do the job of dealing with it," said Mark Boyer, University of Connecticut geography professor. He has been doing interviews and reading municipal plans in nearly all of Connecticut's 169 towns as part of research into climate adaptation. He's found a wide spectrum of approaches, from towns that barely acknowledge the issue to those actively trying to figure out what to do.

"It ends up being a political issue and not a scientific issue of how to manage this stuff," he said. "The real problem is

A backhoe operated by a Guilford town road crew worker moves rocks to rebuild the seawall on Falcon Road in April. The road had been closed due to storm damage since last fall. Photo: Judy Benson

the built environment. How are you going to get past the built environment and the entrenched political interests and potentially declining home values (due to frequent flooding) to make some rational decisions?"

Big engineering solutions – tide gates, pumping systems, levees, sea walls, lifting roads onto causeways – might work in some places, but at a high cost. And they won't work everywhere – especially if ecologically crucial salt marshes are to be preserved.

"The bottom line is you've got to move people away from the coast," Boyer said. "Let the beaches and marshes migrate inland and reestablish the ecosystem there. But the short-term self-interest is defeating the long-term interests."

Some communities are starting to tackle the problem – with mixed results. One example is in the Fenwick Borough of Old Saybrook, where a section of Sequassen Avenue was elevated about 3½ feet by the town in 2015 at a cost of $160,000. The project was needed to preserve access to about half of the 43 homes in the borough – many of them important contributors to the town's tax base. But rather than solving the problem for the long term, all it did was buy some time.

"The town doesn't want to see us become totally isolated out here," said William Webster Jr., chairman of the borough's Roads Committee and a full-time resident for the past 10 years. He's been coming to his family home there since childhood, he said, and has noticed a steep acceleration in the frequency of road flooding in the last five years. The work done on Sequassen Avenue, he said, helped only temporarily – flooding cut off access to his house several times this winter – and new areas of flooding on other roads are starting to occur.

"In 15 to 20 years it will be unbelievable," he said. "That's the scary part – what the next generation is going to see. So you've got to start dealing with it."

Some 18 miles to the west in Guilford, Town Engineer Janice Placiak said her town has compiled a list of nine coastal roads with flooding problems. In two cases, on Chimney Corners Road and Neck Road, the flooding has become severe.

"There are about 30 homes there right now that have challenges for access on a frequent basis," she said. "But it's hard to identify the right solution."

She recalled that in 2003, she was involved in developing a

A car approaches a flooded section of Old Quarry Road in Guilford during a nor'easter in October 2018. The road had been raised about two feet within the last three years, but continues to flood during storm events. Photo: Sidney Gale

Frequent flooding on Milford Point Road, the main access to the Connecticut Audubon Center's Coastal Center at Milford Point, can cause closures of the center. Photo: Judy Benson

Nancy Rogers uses a snow shovel to push sand off her driveway on Field Court in Milford. The sand is often left after high tides that flood the road. Photo: Judy Benson

A pickup truck attempts to drive across the flooded West River causeway on Route 146 in Guilford during a nor'easter in March 2018. Photo: Sidney Gale

Floodwaters cover Daniel Avenue in the Indian Cove section of Guilford in October 2018, despite repairs made after Superstorm Sandy washed out a portion of the road. Photo: Sidney Gale

Sequassen Road in the Fenwick section of Old Saybrook is covered with floodwaters after a storm in November 2018. Photo: William Webster Jr.

Guilford resident Sidney Gale, left, talks with state Department of Transportation Engineer Theodore Nezames about plans to replace a bridge on Route 146 during a public meeting last March. Photo: Judy Benson

A bridge on Route 146 in Guilford has undersized, deteriorated culverts on either side that channel water between Long Island Sound and a salt marsh. The bridge is slated for replacement by the state DOT. Photo: Judy Benson

'In 15 to 20 years it will be unbelievable. That's the scary part – what the next generation is going to see. So you've got to start dealing with it.' – William Webster Jr.

transportation plan for the town.

"Then, road flooding wasn't even a topic of concern," she said. "But something's changed since then. It's not just the storms and sea level rise, but it's the catch basins and the drainage systems that can't handle the water."

Route 146, a state road between Guilford and Branford that crosses several marshes along the way, in many ways embodies the many perplexing problems posed by the juxtaposition of rising seas and pavement. At a March meeting, 120 residents turned out to learn about the state Department of Transportation's plan for a new $14 million bridge over a marsh that would replace undersized and dangerously deteriorating culverts channeling water between Long Island Sound and a salt marsh. Among the many opinions expressed about the merits of the plan, several speakers urged the DOT engineers not to look at the problems of this one bridge in isolation.

"I've been photographing flooding on this road for 10 years, and it's been steadily increasing," said Sidney Gale. A retired businessman, Gale has been speaking and writing articles about the need to confront the challenges of climate change since 2004, when he attended a conference and had a kind of epiphany about the reality of what's ahead.

"It's critical that we not just look at this project, but the whole of Route 146," he told the DOT engineers. "There are seven other spots on this road that flood with frequency. We'd be better off doing a comprehensive plan."

Placiak said the town has such a plan in the works in cooperation with Branford. It will be shared with the DOT, which would be required to take it into consideration before doing any work on Route 146.

Carl Ballestracci, former first selectman of the town, warned that fixing the bridge without considering the bigger picture could be a waste of time and money and only make flooding elsewhere on that road worse.

"The DOT needs to realize that building a new bridge is only one very small piece of the problem," he said. "One hundred yards north there are culverts that need to be increased. You've got to realize that sea level is rising. Every month at the railroad underpass, Route 146 is under water. You could just be making that problem worse."

The meeting lasted more than two hours. At the end, engineer Theodore Nezames, manager of bridges for the DOT's Bureau of Engineering and Construction, said he would take the comments about the need for a solution to all the flooding problems of Route 146 into consideration as the bridge plans are revised.

"I'll take this message back to our planning folks," he said. "But we have the whole coast that's got the same issues."

Robert Bell, director of the Bureau of Policy and Planning at the DOT, said the agency is starting to factor future climate change impacts into its projects. As part of that, he and others are working with David Kozak at the state Department of Energy and Environmental Protection. Kozak and the UConn Center for Land Use Education and Research (CLEAR) are leading the creation of a digital road flooding and marsh migration viewer that promises to be a useful tool for future planning. Expected to be launched this spring, the viewer can be found at: https://cteco.uconn.edu/viewer/index.html?viewer=slamm.

"We just recently got the information we need to weave the sea level rise projections into our analyses," Bell said.

For Barrett, who's been working with CLEAR and UConn Extension to organize the Climate Adaptation Academy workshops series for state and municipal officials since 2010, the road flooding issue presents both a challenge and an opportunity to engage the public about a real-time climate change issue. The digital viewer, she hopes, will be used not only by engineers and planners, but also by members of the public who want to understand what the future holds for their neighborhoods.

"It will give us a more comprehensive view of road flooding, so people can be looking at it in a much more strategic way," she said. "What will it mean to elevate one section of a road? Will that just create an island somewhere else?

"You have to start the conversation now with people, and let them know how they can be part of the process," she added. "Now is the time for communities to start figuring out the process they're going to use to prioritize road flooding problems, while they're just dealing with a handful of roads that flood. Down the road it could be 10 times as many."

A portion of this article was excerpted from, "Flooding and Eroding Coastal Roads: A Borough's Fight to Keep Roadways Safe," written by Olivia Thompson in 2018 and based on legal research she conducted as a Rhode Island Sea Grant Legal Fellow at the Roger Williams University School of Law. Her research was published in "Responding to Nuisance Flooding in Coastal Highways: Options for Municipalities," a Climate Adaptation Academy fact sheet available at: https://seagrant.uconn.edu/wp-content/uploads/sites/1985/2019/01/CoastalHighwaysFS5_FINAL.pdf

HOMES LIKE THIS ONE IN FAIRFIELD THAT WERE ELEVATED AFTER SUPERSTORM SANDY IN 2012 MAY HAVE INCREASED VULNERABILITY TO WIND. LAURA RUOCCO-PULIE, RIGHT, CIVIL ENGINEER FOR THE TOWN, COLLABORATED ON A PROJECT WITH UCONN PROF. WEI ZHANG TO ASSESS THE WIND LOAD RISK. PHOTOS: NANCY BALCOM

Solving an engineering conundrum: as coastal homes get elevated, new research looks at whether the vulnerability to wind damage is increasing

By Nancy Balcom

Among the many images of devastation wrought by hurricanes in recent years, one stands out in my mind. It's of a beachfront home on a stretch of Mexico Beach, Fla., that remained standing and largely undamaged after Hurricane Michael devastated the Florida Panhandle in 2018. It was a new home, constructed to withstand whatever Mother Nature could throw at it in a tantrum of storm surge, water and wind. Among the piles of wrecked homes and lives, it was a symbol of resilience, one that I hope we will see more frequently in coastal communities following hurricane events.

Hurricane Irene and Superstorm Sandy are Connecticut's most recent reminders of the tremendous destruction that can be caused by coastal storms. In New Haven and Fairfield counties, 4,000 homes were destroyed and the resulting damages tallied $360 million. As coastal communities and residents look warily to the next big storm, they are starting to take steps to prevent or mitigate future losses. For some, these steps include rebuilding and elevating single-family homes above new higher flood level projections from the Federal Emergency Management Agency (FEMA).

"The risk of flood damage is typically greater than the risk of wind damage in Connecticut," said Wei Zhang, an assistant professor of civil and environmental engineering at the University of Connecticut. "But single-family homes in New England tend to have multiple stories and steep roofs which increase the wind pressure [load] on the structure." He began to wonder whether elevating an existing house to increase its resilience to flood hazards might inadvertently increase its vulnerability to wind.

With funding from Connecticut Sea Grant and in collaboration with the Towns of Milford and Fairfield, Zhang and his team set out to investigate this question: Does elevating existing homes above the 100-year or 500-year flood line to reduce their vulnerability to storm surge and flooding make them more susceptible to the ravages of high winds? This could be the proverbial out-of-the-frying-pan-and-into-the-fire scenario or, in this case, out of the water and into the wind.

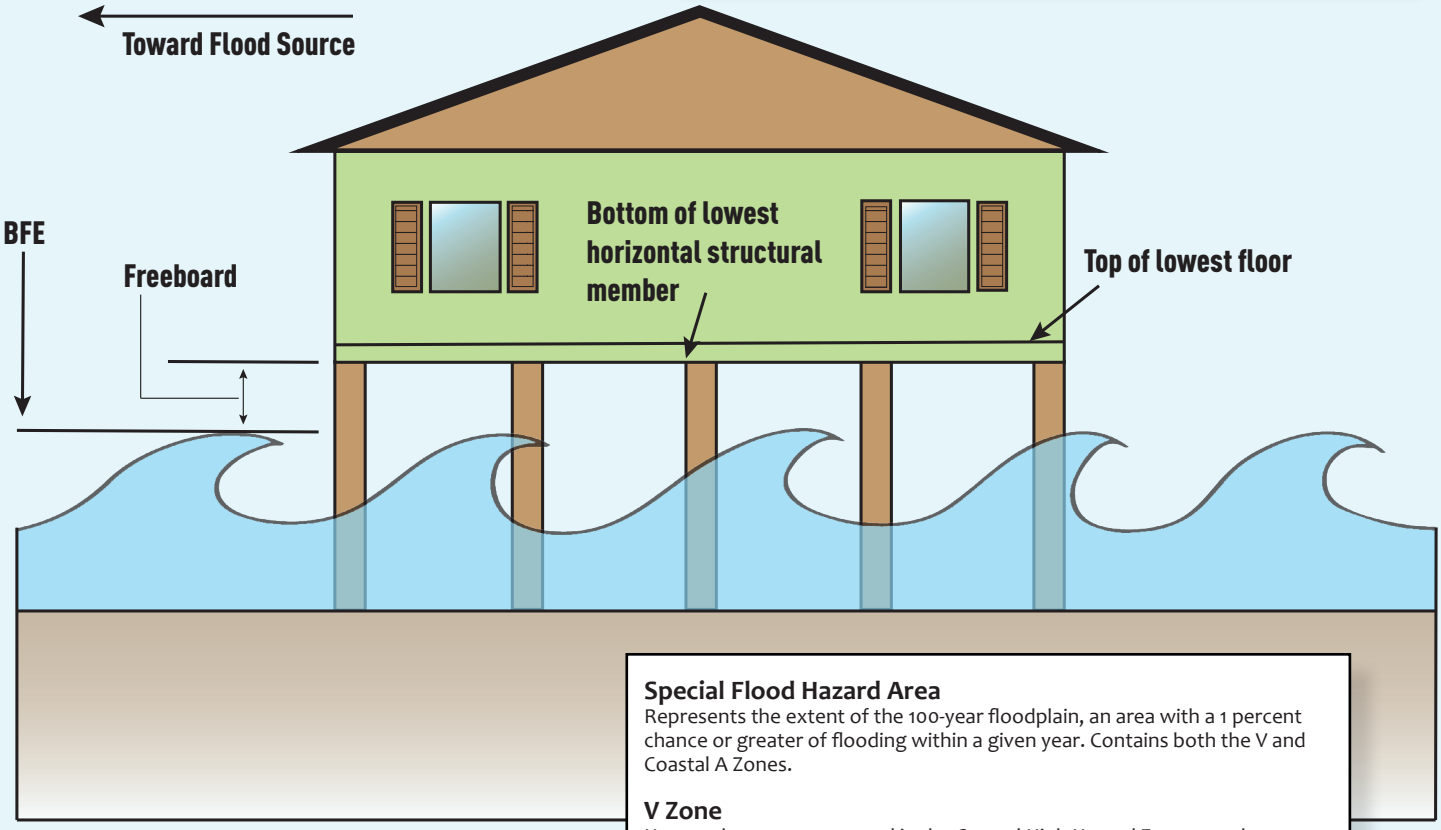
"The concern is that newly elevated homes that once stood two or three stories tall are now standing three or four stories tall, and exposed to greater wind loads," said Laura Ruocco-Pulie, civil engineer with the Town of Fairfield and project collaborator. "While owners must elevate their existing homes to meet flood insurance

Prof. Wei Zhang, third from the right, used this home being elevated in Fairfield as part of his research project. With him are several UConn graduate students, including three who worked on the project. Photo courtesy of Wei Zhang

RECOMMENDED CONSTRUCTION IN COASTAL A AND V ZONES

Base Flood Elevation: The minimum elevation to which floodwater is anticipated to rise during a flood that has a 1 percent chance of occurring in any given year. It is the regulatory requirement for the elevation of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium.

Freeboard: the additional height that a house is elevated above the Base Flood Elevation. It compensates for the uncertainties in determining flood elevations, provides an increased level of flood protection and reduces flood insurance premiums.



Graphic modified from the FEMA Coastal Construction Manual

Special Flood Hazard Area
Represents the extent of the 100-year floodplain, an area with a 1 percent chance or greater of flooding within a given year. Contains both the V and Coastal A Zones.

V Zone
Homes closest to water and in the Coastal High Hazard Zone must be:
- able to withstand high-velocity wave heights of 3 feet or more
- constructed on a pier/pile foundation system
- adequately anchored to the foundation
- elevated so that the bottom of the lowest horizontal structural member is 1 foot or more above the designated Base Flood Elevation (freeboard)
- insured for floods

Coastal A Zone
Homes in the Coastal A Zone (landward of V Zone, not within Coastal High Hazard Zone) must be:
- able to withstand wave heights of 1.5 - 3 feet
- elevated so that the top of the lowest floor is 1 foot or more above the designated Base Flood Elevation (freeboard)
- insured for floods

requirements, current state building codes do not require them to retrofit their roofs at the same time, unless a significant amount of renovation is going on. So they could lose their roof to high winds."

Ruocco-Pulie explained that all new homes built within areas covered by FEMA Flood Insurance Rate Maps must be constructed to minimize the effects of both flood and wind hazards. FEMA designates Special Flood Hazard Areas with two primary flood hazard zone classifications – V and A. Generally, Zone V covers the part of the coastline that is directly exposed to the strongest wave action from storms and is considered a Coastal High Hazard Area. Coastal Zone A is farther inland than Zone V, where the main source of damage is flooding brought by coastal storms (see diagram above).

A home built within the V zone must be able to withstand a three-foot wave height. The bottom lowest horizontal structural brace of the house must be at or above the Base Flood Elevation (the expected minimum height of a flood in a storm with a 1 percent chance of occurring in a given year). In Fairfield this elevation ranges from 13 to 15 feet. With added freeboard (open space between the ground and the first floor), this horizontal structural brace might

be 14 to 17 feet off the ground.

A home built in the Coastal A zone, farther from the water's edge, must be elevated 10 to 11 feet in Fairfield.

"Some homes, depending on the type of funding used to elevate the structures, are required to be elevated to the 500-year flood elevation, which is 25 percent higher than the 100-year level," said Ruocco-Pulie. "These homes really stand out."

These requirements should help minimize the damage to new homes from wind and water loads. However, an owner elevating an existing home above FEMA's prescribed base flood elevation, without undertaking significant renovation, may not realize that failure to retrofit the roof at the same time could mean increased exposure to wind loads.

Could certain structural configurations either increase or reduce vulnerability to stronger wind pressure? Zhang, his colleague Christine Kirchhoff and five graduate students began to tease out some answers, assisted by Fairfield's Ruocco-Pulie and her counterparts from the Town of Milford.

"The challenging question is, 'Can we use science to understand the interactions of natural hazards, building structures and community residents?'" asked Zhang.

This was not just an engineering problem but also a people problem.

Kirchhoff is an assistant professor in the same department as Zhang. Her background is somewhat unusual, blending civil engineering with social science. Kirchhoff uses her training to determine how to engage stakeholders effectively. This could mean collaborating with town officials, water managers, planners and farmers to generate information related to water management and infrastructure that is needed for sound decision-making. They learn together and build trust along the way.

Christine Kirchhoff, assistant professor of civil and environmental engineering at UConn, helped engage town officials and residents of Fairfield and Milford on the project. Photo: Nancy Balcom

"This project involved a different set of stakeholders than I normally work with," she said. "But the same principles I've learned over many years were applicable to this project. We discussed ways to engage town officials and community residents in a meaningful way, and what kinds of (informational) outputs might be most useful."

The research team toured storm-affected areas in Fairfield and Milford, met with town engineers and examined homes undergoing elevation. One way they connected with residents was through an interactive display at a local Earth Day celebration. Using fans to simulate wind, model houses of different types were then exposed to the "wind" to demonstrate the potential damage that could result.

> **'Can we use science to understand the interactions of natural hazards, building structures and community residents?'**
>
> – Prof. Wei Zhang

I met with Zhang in his office as he was finishing the final report that he plans to share with his collaborating towns. As he sat at his computer scrolling through the extensive file, I found the array of acronyms, colorful graphs and figures, data tables, formulas and GIS-generated database layers rather intimidating at first. But as he patiently took me through the report step by step, those bewildering contents began to make sense. I was able to develop both an appreciation for the complexity involved and a basic understanding of the overall results.

Using a database of more than 2000 residential structures from the databases for Milford and Fairfield, the research team identified several parameters – such as year built, number of stories, type of roof, footing size and building materials used – that enabled them to categorize the houses into three representative groups – those built in the 1930s, the 1960s and the 1990s. (You could also think of them as colonial, cape and "McMansion" styles.) The researchers used these building groups, with three elevated and non-elevated prototypes for each, as an approximate representation of all single-family homes in coastal Fairfield and Milford.

Simulations were run on three elevated and three non-elevated homes in each building group to analyze the vulnerability of the seaward and non-seaward walls and roofs to different combinations of wind (70 mph-tropical storm; 120 mph-Category 3 hurricane; or 150 mph-Category 5 hurricane) and flood level (10-year, 100-year or 500-year). For the elevated prototypes, the researchers assumed concrete piles and steel girders were used to elevate each of the homes.

"We assessed the amount of damage based on three types of structural failure," said Zhang, "and used the results of the vulnerability

Two homes in Fairfield illustrate the contrast between those elevated after Superstorm Sandy, like the one at the left, and those that were not, like the one at the right. Photo: Nancy Balcom.

analyses to generate a series of resilience maps."

The maps, he said, "show the anticipated damage to elevated and non-elevated houses in Fairfield and Milford that might be expected under different 'what if' wind and flood hazard scenarios."

Overall, while wind damage was not shown to be as significant as previously assumed as compared to water damage, under certain scenarios, it had the potential to be very destructive.

What do they hope will result from this work?

"Over the short term we hope this provides some basic information on how homes in flood hazard zones in Fairfield and Milford might perform under different natural hazard scenarios," Zhang said. "For the longer term, we hope to demonstrate to all communities that it is possible to integrate knowledge and ideas from scientists, engineers and community residents to systematically enhance community resilience. By sharing these results beyond Fairfield and Milford, we can help other coastal towns realize that something can be done to help improve their resilience."

Kirchhoff added, "In time, I would expect policy changes, like adjusting building codes or better building materials, to emerge that help protect people and property."

Ruocco-Pulie agreed.

"I hope that the state building code is changed, so that when any existing home must be elevated, the roof must be retrofitted at the same time to increase its ability to withstand wind effects," she said.

If that happens, more coastal Connecticut homes could be left standing as beacons of resilience in the aftermath of the next great storm. Let us hope that becomes the reality.

This aerial photo taken by the Civil Air Patrol after Superstorm Sandy shows destruction to homes along the coast in Fairfield.

ASK WRACK LINES

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Along the coast, residents consider how to heed Sandy's warning of what's to come

Story and photos by David Gregorio

Lydia Silvas, who lives in the Seaside Village section of Bridgeport about a quarter mile from Long Island Sound, remembers evacuating her home as Superstorm Sandy approached Connecticut in 2012.

That experience left a lasting impression.

"Every year from June to November my heart is in my mouth," Silvas recalled in a recent interview at Leo's Spanish Restaurant on Main Street in the city's South End. She was sitting with her friend Maisa Tisdale, president of the Mary and Eliza Freeman Center for History and Community, which has renovated two nearby historic homes and hopes the historical and cultural project will help trigger a renaissance in the neighborhood.

To escape Sandy, Silvas headed north to stay with friends in Litchfield County. Her friend Effie Riddick, whose basement had been flooded by Hurricane Irene, evacuated her Main Street house to stay further north in Bridgeport, with 146,000 residents the state's most populous city.

At the time Sandy slammed the coastline with torrential rains and nine-foot waves, hundreds of homes and businesses were still reeling from Hurricane Irene a year earlier. Irene and Sandy dealt a devastating one-two punch to the state's 24 shoreline communities. In the years since, more residents have joined with scientists and policy experts in recognizing that with the climate warming and sea levels rising, shoreline communities need to do more to prepare for "the new normal."

One statewide response came last year, six years after Sandy. The state Legislature updated the pre-existing statutory language used to guide building and development to factor in sea level rise projections of 20 inches by 2050. Those projections are based on work done by the Connecticut Institute for Resilience and Climate Adaptation (CIRCA).

Lydia Silvas, sitting on the front stairway of her home in Bridgeport, holds her hand to the height of the floodwaters during Superstorm Sandy.

Also last year, the state chapter of the American Planning Association issued a report concluding that the changing climate isn't just a future threat.

"Climate Change has already impacted the state through warmer water, erratic weather patterns and rising seas that cause tidal flooding in low-lying neighborhoods even on a sunny day," the organization said in its 2018 "Planning for Resiliency" paper.

For many residents, that planning association's conclusion was old news. Living through Irene and Sandy had already convinced them of the reality of climate change impacts in their own neighborhoods.

In Fairfield, Becky Bunnell recalled that her beach house was flooded "up to the deck" from Irene, which made her "scared of Sandy." As the storm approached, she piled two feet of sandbags on her deck and left to stay with her sister in Wilton.

In West Haven, Mark Paine, assistant manager to the city public works commissioner, recalled that about a dozen families evacuated their homes near Old Field Creek, a salt marsh across Beach Road from Sandy Point. They had been swamped by Irene, and frequently got flooded during Nor'easters.

But at least those folks evacuated. Many other residents got swamped along with their homes. A 2015 study by Yale University researcher Jennifer Marlon found that only 27 percent of coastal Connecticut residents in the zone closest to the shoreline evacuated ahead of Sandy. Her work was funded by the National Oceanic and Atmospheric Administration's Coastal Storm Awareness Program, an initiative that includes Connecticut Sea Grant. Even after Sandy, the study found, most residents remained "ill-prepared for the significant safety and economic threats posed by severe coastal storms."

IMPROVING PREPAREDNESS

The findings made an impression on Juliana Barrett, coastal habitat specialist at Connecticut Sea Grant. Two statistics hit her especially hard: 70 percent of coastal residents remained unsure whether their home was in an evacuation zone and 74 percent of state residents had never even seen a local evacuation map.

"This really bothered me," she said.

In response, Barrett, the Connecticut Sea Grant point person for climate change, joined with Emily Wilson, a UConn Extension educator, and UConn student Zachary Guarino, to address the problem. They started working with state and local officials to reinforce access to storm alerts, online evacuation routes and other information through a Coastal Storm Preparedness Story Map – a kind of digital emergency preparedness guide. Funding from NOAA and Sea Grant supported the project.

Becky Bunnell, seated in the yard of her beach house in Fairfield, recalls that flooding during Hurricane Irene made her 'scared of Sandy' as it approached, prompting her to evacuate.

Barrett, Wilson and Guarino's story map shows details of flood zones, evacuation routes and other information on maps for four coastal towns: Madison, Stonington, East Lyme and Old Lyme. Barrett hopes to expand the pilot project and ultimately include all of the state's coastal communities in the story map.

This was just one of several projects that came out of the Coastal Storm Awareness initiative, which involved several states.

"The National Weather Service really took the results and recommendations that came out of several of the CSAP projects to heart," Barrett said.

For example, a new standardized template for storm briefings used by all Weather Forecasting Offices in the National Weather Service's Eastern Region incorporates recommendations from a CSAP project led by the Nurture Nature Center in Pennsylvania. Based on community feedback, the researchers recommended design changes to improve the visual and graphic clarity of the briefing information to make it more readily understood.

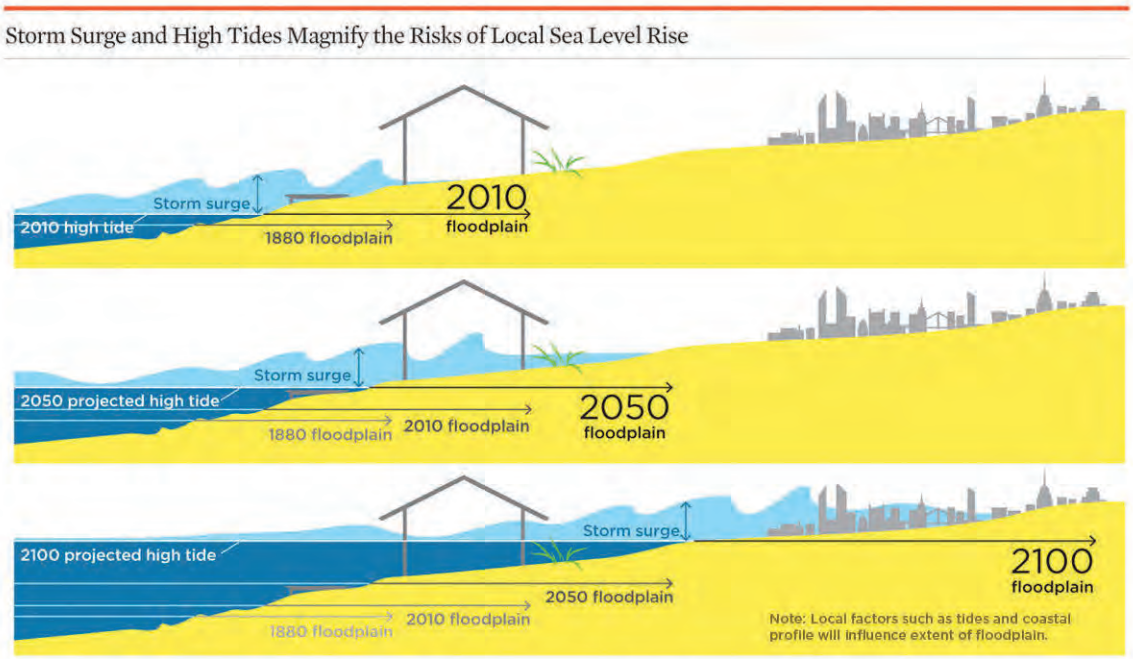
AFTER THE STORM

For now, Sandy remains the frame of reference about the risks of shoreline living for many residents, brought to mind whenever a new storm threatens.

Bunnell recalled how Sandy's waves washed beach sand through houses, out doors and windows and onto Fairfield Beach Road. East of the peninsula and down the road at the town-owned Penfield Beach, the waves lifted the pavilion off its foundation and washed the west wing into the parking lot.

Farther east and a few blocks north of the beach, the water surged through the back door of Dick and Karen Dmochowski's home. The couch in their living room was spared only because they had it up on cinder blocks.

"We got two dumpsters full of stuff you think you need until it gets flooded



Sea level sets a baseline for storm surge—the potentially destructive rise in sea height that occurs during a coastal storm. As local sea level rises, so does that baseline, allowing coastal storm surges to penetrate farther inland. With higher global sea levels in 2050 and 2100, areas much farther inland would be at risk of being flooded. The extent of local flooding also depends on factors like tides, natural and artificial barriers, and the contours of coastal land.

Superstorm Sandy and Hurricane Irene flooded many of the homes that line Fairfield Beach Road on the narrow peninsula between Pine Creek and Long Island Sound. Many homeowners in this neighborhood were among the 69 Fairfield residents who elevated their homes through the Shore Up Connecticut program.

and then you realize you didn't need it," Dick Dmochowski said with a chuckle. His house was among dozens in Fairfield that have been elevated through Shore Up Connecticut, a state assistance program. All the electrical boxes and appliances are now above the 500-year flood line.

After Sandy, Bunnell and her family drove back to their neighborhood, parked their car and hiked across Pine Creek at low tide to their beach house. It was not flooded, thanks to the sandbags, but "the deck was covered with sand" that the tide had pushed all the way to her home. She also took advantage of Shore Up Connecticut to elevate her house. It provided loans for elevation costs and a state reimbursement of 75 percent. During a recent interview, Bunnell stood on the now elevated deck and pointed down the stairs to the beach, where the deck and the sliding doors used to be.

"We got lucky," she said. She and the Dmochowskis were among 69 Fairfield residents who took advantage of the Shore Up program.

Dmochoski, a retired engineer, said his awareness was elevated along with his home; he joined Fairfield's Flood and Erosion Control Board. He believes many homes, especially on the peninsula, need seawalls to prevent the sand from being washed out from beneath the elevated homes. Bunnell laughed and said she believes her elevated beach house has a better chance of surviving than the beach it sits on.

"My feeling is that when I'm 82 my house is elevated so the house will be here but I may have to take a boat to get to it because the beach could all be eroded," she said.

SALT MARSH RETURNS

In West Haven, Paine drove his city vehicle off Beach Road along the Morris Park ball fields, then turned and parked on a bridge looking toward the Sound down Old Field Creek. Just beyond the ball fields was a creek with an osprey platform. From there to the next street was now a wetland with marsh grass and trees. In the years since Sandy, almost every house that stood there has been purchased and demolished by the city under a federal program that paid residents the pre-Sandy value of their homes.

Paine said returning the flood plain to its natural state as a salt marsh will not only conserve wildlife habitat, but also provide a natural buffer to reduce future flooding and storm damage for nearby homes that remain. It will also expand and enhance the habitat and shelter for migrating birds that already flock to Sandy Point.

"We're not doing a park; we're not doing a playground," Paine said. "It's an open space easement. We're going to let this go back to its natural setting. The deer, fox, coyote, turkeys that are already here will have a better habitat."

He said it took a few years of meetings between worried residents and concerned municipal, state and federal officials, but the city was ultimately able to acquire every owner-occupied house in the neighborhood. The few houses that remain are rentals owned by absentee landlords.

"The water was up to these lawns," he said. "Every one of these houses had a full basement. They were

getting flooded out very frequently. The Nor'easters in the wintertime are actually worse than the hurricanes. This whole road was completely underwater during the storm [Sandy]. The waves were basically rolling right across Beach Street and into Chick's Seafood Restaurant. We had four to five feet of water."

"JUST SURREAL"

Just 17 miles to the west in Bridgeport, residents are trying to figure out what it means to become a more resilient community as Sandy's impacts remain fresh in their minds.

Silva recalled returning to her Seaside Village neighborhood in Bridgeport after Sandy to find her basement flooded "to the rafters." She lost her family photo albums and electrical appliances. Tisdale drove down to Main Street from her home in Trumbull to check on the Freeman houses.

"The scene was just surreal," she said.

"People's cars had floated away. … One car had floated on top of a fence," she recalled. "After the water pulled out, it set down the car and squished the fence. There was four feet of water inside a hair salon. The tide went back out from the streets, but the water that went into buildings stayed in there. The sign for this Spanish Restaurant (Leo's) had floated two blocks away to that church way over there."

Tisdale, who has devoted a lot of time and energy to the Freeman Center project, in February helped to organize the neighbors to attend the Resilient Bridgeport Public Hearing and Design Workshop. They gathered at the Schelfhaudt Gallery at the University of Bridgeport for the presentation. Resilient Bridgeport is a state Department of Housing plan developed in response to Sandy "focused on protecting homes, businesses and infrastructure in the South End of Bridgeport from chronic and acute flooding in order to foster long-term prosperity in the neighborhood,"

Dick and Karen Dmochowski's home was raised after Sandy. The experience prompted Dick Dmochowski to join Fairfield's Flood and Erosion Control Board.

> 'Climate resilience and adaptation efforts must balance public use, private property rights and protection of natural resources... In Connecticut, we are seeing individuals, local groups, municipalities, universities and state agencies doing exactly this.'
>
> – Juliana Barrett

according to the program website.

RESILIENT BRIDGEPORT PLAN

At the hearing, Tisdale and other residents looked at scale models and heard officials, architects and urban planners give the project overview. It included water removal from a railroad underpass, and creation of "green streets" to reduce runoff volumes and flooding and channel floodwater to an overflow area at Seaside Park. From there, water can drain back into the Sound at low tide. There are plans to separate storm water from sewer drains and install a pump that removes excess runoff from the lowest-lying areas and reduces flood risk.

The most contentious part of the plan is a 16-foot flood wall in the South End. Main Street residents and businesses want the wall as far to the east as possible. But officials say that option would require an agreement with the electric company PSEG, which owns the Bridgeport Harbor Generating Station.

Riddick and Silvas asked several questions, and worried that building a 16-foot flood wall along Main Street could ruin the character of the neighborhood. Tisdale gave an impassioned speech about how a big wall could hurt plans for the Freeman Center and the South End.

She said the resilience plan needs to serve "current residents who were loyal to Bridgeport and have lived here come hell or high water. My family is six generations here in Bridgeport. We've seen development plans come and go."

Rebecca French, director of resilience at the state housing department, said that the project presents "quite a challenge design-wise to come to a meeting of the minds about how best to protect a community from both storm surge and coastal flooding."

But clearly it's a challenge the state and its residents will have to learn to meet as sea level rise and storm surge continue to accelerate. As a diagram from the Union of Concerned Scientists points out, rising sea levels mean that storm surges will penetrate even farther inland than during Sandy, so more areas are at risk of flooding.

"Climate resilience and adaptation efforts must balance public use, private property rights and protection of natural resources," Barrett said. "While trying to balance these three areas may be seen as one of the most difficult aspects of moving forward, it also presents the opportunity for diverse groups to come together to find creative solutions to issues that are with us for the foreseeable future. Here in Connecticut, we are seeing individuals, local groups, municipalities, universities and state agencies doing exactly this."

All rivers, all lives run to the sea

By Richard Telford

Just shy of sunup on a bitter January morning, I tramped up the lane leading to the 1805 center-chimney Cape Cod home where naturalist Edwin Way Teale spent the final chapter of his writing life. Short of the house, I turned north and climbed the steep path to Monument Pasture. My Pac boots ground granular snow, announcing my presence to every creature for half a mile. But I had come, camera fixed to the tripod slung over my shoulder, to photograph a subject whose life is marked by flux and measured in geological time, demanding no stealth. I had come to capture the movement of Hampton Brook in its passage through Teale's beloved Trail Wood, to open the lens's leaf shutter for a long exposure – the aperture a pinhole – to capture the brook's serpentine lines washed by warm, early light. In truth, I aimed to capture a fragment of time, to freeze flowing water in gelatin emulsion, even as it ran to the confluence of the Shetucket and Quinebaug rivers, then to the estuarine headwaters of the Thames, and finally to spill into Long Island Sound.

That morning, however, I thought less of the intersection of rivers and more of the intersection of lives. In Teale's life I saw connections to my own: the nature ethic that guided him, the events that brought him and his wife Nellie from Baldwin, Long Island, on the New York side of the Sound, to Hampton, Connecticut, to Trail Wood, a place he declared his personal Eden and vowed to leave only in death. My hands ached from the cold as I set my tripod, racing at once against the rising sun and the rapid numbing of fingers. The thermometer hovered around zero degrees Fahrenheit as I took rapid readings with my old Minolta spotmeter. I shot several frames, recomposed, shot several more, threw camera to shoulder, and headed home – a place to which I too was a transplant, having left suburban southwestern Connecticut for an old farmhouse six miles east of Trail Wood, a place where my wife and I can raise our three children closer to the land.

In 1930, Edwin Way Teale still lived in Baldwin, working as a staff writer for *Popular Science Monthly* – a job he loathed, despite his begrudging gratitude for the extraordinary opportunities it provided him. One such opportunity was a trip to New London that year to gather firsthand research for an article slated for the December issue of the magazine. At the U.S. Naval Base at New London, Teale was greeted by Capt. John M. Ocker then boarded a USS O-1 submarine on the Groton shore.

Above, Edwin Way Teale at his desk at *Popular Science Monthly* in New York City, where he worked from 1928 to 1937. Right, the farmhouse at Trail Wood is seen from the footbridge crossing the outflow of the lower pond on the property. Photo: Edwin Way Teale. *Copyright Estate of Edwin Way Teale, University of Connecticut. Used with permission.*

From there, he wrote later, "We slipped down the quiet Thames River to the choppy Long Island Sound." As the vessel submerged, Teale clung to a ladder in the conning tower, the raised navigation and attack center of early submarines. Gazing out a high porthole at the rising waterline, he "could see the sunlight glinting on the waves, the buildings of New London crowding to the distant Connecticut shore, and a dark smudge like smoke – the far tip of Long Island." Beneath the roiling surface, "… long chains of bubbles, large as marbles, drifted by." This was the closest Teale came to wielding his acute eye for natural history, limited by the editorial strictures he disdained at *Popular Science*. He would write again about this dive fifteen years later, and yet again a half-century after that, so strongly did one image of this journey remain fixed in his memory.

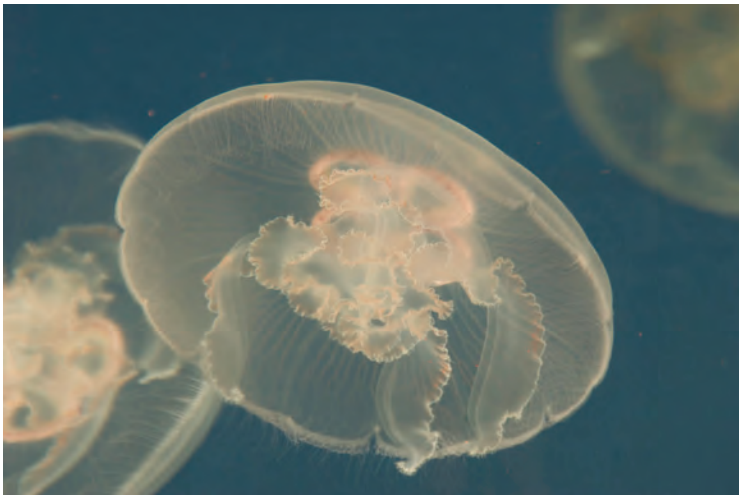
Early in 1945, Teale was at work on *The Lost Woods,* a book of essays slated for publication that fall. He had resigned from *Popular Science* eight years earlier to become a full-time freelance writer. Teale wrote *The Lost Woods* under great strain. David Allen Teale, his only child, was deployed to Germany, fighting in the Battle of the Bulge and the ensuing march to Berlin. As Edwin began the second half of the book, David was declared Missing in Action in March of 1945 and by June confirmed dead. Though strenuous, the writing provided refuge. In a chapter titled "Submarine Butterflies," Teale revisited his 1930 voyage from New London. Now he was free to write about the "terns and herring gulls [that] circled around us as we drifted for a moment with the propeller idle." The "bubbles, large as marbles" in 1930 now "turned and shone like spheres of mercury…."

To this magical underwater world, Teale added one more creature omitted from his 1930 article – the "submarine butterflies" of the chapter's title: "At that moment, into the glowing water around the portholes, there drifted a yellow form, glowing, also. It was filmy and translucent in the rays of the sunlight. It swirled this way and that in currents set up by the moving boat. Like a yellow butterfly, in leisurely flight, it swerved and circled and disappeared to the stern." This first jellyfish was followed by "dozens, scores, half a hundred yellow forms that rode, as though on underwater wings, past the windows of the conning tower." Teale used this anecdote to introduce the reader to the astounding life of the jellyfish, his writing at once an education and an evocation. Through it, the reader, who would never travel, corporeally speaking, to the depths of the sea, could do so in mind, Teale's words the vehicle. In this way, Teale joined with Rachel Carson, who had recently brought readers into oceanic realms through *Under the Sea Wind*. Carson's 1941 book had failed commercially, overshadowed by the United States' entry into the Second World War, but it was later championed to reissuance and commercial success in part through Teale's advocacy.

Later, Teale included several excerpts of Carson's work in the 1952 anthology *Green Treasury*, which he edited. One of these excerpts, drawn from *The Sea Around Us,* included the following lines: "The sea lies all around us.…The continents themselves dissolve and pass to the sea, in grain after grain of eroded land. So the rains that rose from it return again in rivers. In its mysterious past it encompasses all the dim origins of life and receives in the end, after, it may be, many transmutations, the dead husks of that same life. For all at last return to the sea – to Oceanus, the ocean river, like the ever-flowing stream of time, the beginning and the end." Teale understood these cycles well, both ecologically and in the irrevocable losses that time wrought.

Like the Teales' farmhouse, our 1770 Cape Cod was built on the crest of a hill, facing south and bordered to the north by a year-round running brook. Blackwell Brook starts at Baker's Pond, just under a mile from our house, then flows south through a series of meandering natural sluices. It turns briefly to open water, its flow slowed by a simple dam at the Elliot Road bridge, then narrows again, flowing roughly 10 miles before pouring into the Quinebaug. It is the mirror course, in purpose if not length, of Hampton Brook's flow into and out of the northern beaver pond at Trail Wood, then east of the house, exiting the Teales' property near Mulberry Meadow. South of there, it enters the Little River, which in turn flows into the Shetucket. Roughly four miles north of Norwich, the Quinebaug enters the Shetucket, then flows to the Thames Estuary five miles south. This convergence of many waters, of life-teeming waters, flows 15 more miles, then meets the great salt ocean's cusp, where Edwin Way Teale, nearly a century ago, boarded an O-1 submarine. There he was struck most forcefully not by the extraordinary, world-changing technologies of that craft, but by "submarine butterflies" drifting in scores beyond thick porthole glass. That image stayed with him to the end of his life, and now it resides in me. I write in the humbling shadows of Teale and Carson and others, their words frozen, living frames, fleeting waters captured then gone. Writing too, it seems, is a temporal river that runs to a temporal sea where living words are jumbled, lost, and found again.

On September 12, 1979, a half-century after he descended the conning tower at New London, Teale posed a seemingly simple question to an audience



Moon jellies are the most common type of jellyfish found in Long Island Sound. Photo: The Maritime Aquarium at Norwalk

POPULAR SCIENCE MONTHLY

New Safety Under the Sea

Mechanical Aids Protect Lives of Men on Boat Beneath Waves—This First-Hand Story Tells You Exactly How a Submarine Is Now Run

By EDWIN W. TEALE

A CLANGING of sledges, a creaking of timbers, a loud swish, and the U. S. Navy's "safety submarine," the *V-5*, slid into the Atlantic recently at Portsmouth, N. H.

This steel-gray, block-and-a-half-long dreadnaught of the depths inaugurates a new era in submarine security. It can "go to sleep" for forty-eight hours on the ocean floor 200 feet below the waves and can travel a quarter way around the globe without refueling. Equipped with "artificial lungs," escape hatches, automatic steering gear, fume-proof battery compartments, and the latest scientific instruments, it is a $5,200,000 floating laboratory, putting to test the results of more than two years's research by Navy officials.

The opening page of Edwin Way Teale's December 1930 article on submarine safety, published in *Popular Science Monthly. Copyright Estate of Edwin Way Teale, University of Connecticut. Used with permission.*

of philosophers: "What is a lifetime?" Diagnosed with prostate cancer in 1974, he had been given six months to live. A slow-growing cancer elongated six months to six years, but, by the fall of 1979, as he spoke to The School of Philosophy in Concord, Mass., Teale knew his time was waning. To his typed notes, he added a private subscript: "My Last Lecture." In it, he argued that life's value lay largely in deriving meaning and pleasure from simple things, particularly those in nature. He returned again to that submarine ride in Long Island Sound. "The thing I remember most vividly," he told his audience, many of them long-time friends, "is the scores of jellyfish, pale yellow and shining in the backlighting, swirling past like butterflies. Here, too, I was obtaining my pleasure from simple things." Forty years later, we, too, can gather pleasure and meaning from such simple things in nature, but increasingly, exponentially, we threaten these simple things – and the complex, fragile systems they inhabit – through pollution in all forms on all scales: in Long Island Sound, in the greater Atlantic, in all the world's waters, in our own backyards.

What will our lifetimes be? What effect will they have? Teale's writings –and all meaningful writings – pose these questions to us. Where can the rivers, both marine and temporal, take us but to the sea? Edwin Way Teale, a naturalist by the age of six, spent his life asking and answering these questions. Our answers to these questions are profoundly consequential when the sea –and all of nature – is under ecological siege laid largely by our unchecked consumption: millions of tons of plastic waste, ocean acidification, mercury and other toxins bio-accumulated and bio-magnified up and down the trophic levels, global warming, rising sea levels, species loss. We are at once connected to and

"Coming Home," painted by Roxanne Steed as part of the Connecticut Audubon Society's Artist-in-Residence program at Trail Wood, shows the Teale home in July 2015. Used with artist's permission

Left, warm, early light bathes Hampton Brook as it courses through Trail Wood on a cold January morning. Photo: Richard Telford

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UConn student Annalisa Mudahy, left, talks with Prof. Thomas Dabrah during the opening of the *Crosscurrents* exhibit on Jan. 24 about a work about seafaring women created by artists Anastasiia Raina and Rebecca Sittler.

Sarah Patulak, a junior in Prof. Nat Trumbull's class, talks with fellow students Chris Rice, second from left, Oliver Hesketh, center, and Mead Bragdon about the work by artist Sam Ekwurtzel titled, "Costco Bulk Molded Water Package."

Artist Diane Barceló, left, and Cliff Sebastian of Mashantucket share a high-five during the opening of the *Crosscurrents* exhibit. Barcelo and Ashby Carlisle are the creators of the work in the foreground, "They Came by Water," and Sebastian recited Native American words for an audio that accompanied the piece.

Jennifer Wozniak, left, talks with fellow UConn Avery Point senior LIssa Glacalone about the piece, "Swish, Specimen 2.2" by artist Deborah Hesse.

Syma Ebbin, left, research coordinator for Connecticut Sea Grant and co-curator of *Crosscurrents*, looks at one of the "Ghost Whales" created by artist Kristian Brevik as UConn Avery Point student Colleen Franks looks on.

Co-curators Syma Ebbin, left, and Chris Platts stand in front of "Starboard," a work by artist Carla Goldberg that was part of *Crosscurrents.*

All photos: Judy Benson

CROSSCURRENTS

CONNECTICUT SEA GRANT'S RETROSPECTIVE ART EXHIBITION MAKES WAVES By Syma Ebbin

Entangled ghost whales floated in the darkened gallery, the last vestige a 10-year retrospective exhibition showcasing Connecticut Sea Grant-supported artists titled *Crosscurrents*.

The pod of ethereal, illuminated whale effigies — some wrapped in fishing gear and plastics, others with propeller cuts from ship strikes — filled one of four rooms of the Alexey von Schlippe Gallery at UConn Avery Point from January through mid-April. They were retained after the rest of the exhibit had been dismantled to provide a setting for a thought-provoking talk by the artist and a marine mammal biologist. Kristian Brevik, creator of the ghost whales, and Andrea Bogomolni of m the Woods Hole Oceanographic Institute discussed the integration of the arts and sciences focused on the goal of enhancing conservation of North Atlantic right whales and other marine mammals now endangered by a suite of human-induced drivers.

Bogomolni works with fishermen in Cape Cod to increase understanding and communication and reduce antipathy towards these species. Brevik, a doctoral candidate at the University of Vermont and recipient of the 2018 Connecticut Sea Grant Arts Support Award Program, has also shown his work at the New Bedford Whaling Museum. He is interested in empirically measuring whether art can promote stewardship behaviors. After their talks, the audience toured the gallery, inspired by both the art and the conversation.

This was just one example of the many interdisciplinary bridges represented by the artwork displayed in *Crosscurrents* and created through the Arts Support Award Program overall. The seeds of the program were planted 11 years ago when I met artist Susan Schultz, who introduced me to the metaphorical concept of drawing outside the lines. For Connecticut Sea Grant and my role as research coordinator, staying within the lines meant using our grants exclusively to support scientific research. Inspired by Schultz, I now wanted to add a crossover component to Sea Grant's funding portfolio — a competitive award targeting art and artists that would shepherd creation of works with marine-related themes aligned with Sea Grant's mission. Since the first year, the award has given grants of up to $1,000 to one or two artists each year.

The idea for a 10-year retrospective of the work of artists supported through this program came from Ana Flores, an environmental artist who had curated a retrospective show for Rhode Island Sea Grant. Thus it was that last October, with the campus gallery recently reopened, I approached Chris Platts, the newly installed curator of the gallery. Platts, a recently graduated art historian from Yale, has more experience with 15th and 16th century art than with the contemporary styles of the Sea Grant-supported works. Nevertheless he was receptive and planning for the exhibit began. Every artist I contacted agreed to contribute to the show. Ultimately the four rooms of the gallery were filled with the works of 13 artists, which included paintings, films, sculptures, audio visual installations and mixed-media collages. An adjacent hall was hung with paintings created at the Avery Point campus by members of the Connecticut Plein Air Painters Society.

The show opened in January with a lively reception attended by more than 100 people despite gale-force winds. In the following weeks, Platts and I led many tours to a diverse array of classes focusing on the history of the oceans, marine biodiversity and conservation, marine fisheries economics and policy and geographic information systems, among others. We hosted a workshop for teachers of courses in UConn's Early College Experience program, where high school students earn college credit. The session focused on integrating the arts into humanities.

We also gave tours to friends, faculty and community members. Originally scheduled to close in March, it was extended into early April due to its pedagogical relevance. A video of the exhibit is being created. Building on the success of the exhibit, the Connecticut Department of Economic and Community Development's Office of the Arts joined forces with Sea Grant to enhance the award, enabling sponsorship of an additional artist in 2019.

The positive feedback from students, faculty and the community has been tremendous. By the end of June, new artists will have been chosen for the 2019 award cycle, harnessing the power of art to initiate conversations and create new ways of seeing the sea around us, extending Sea Grant's message to new audiences. Perhaps in another decade, we will be able to reprise this retrospective, again filling a gallery with meaningful and provocative art.

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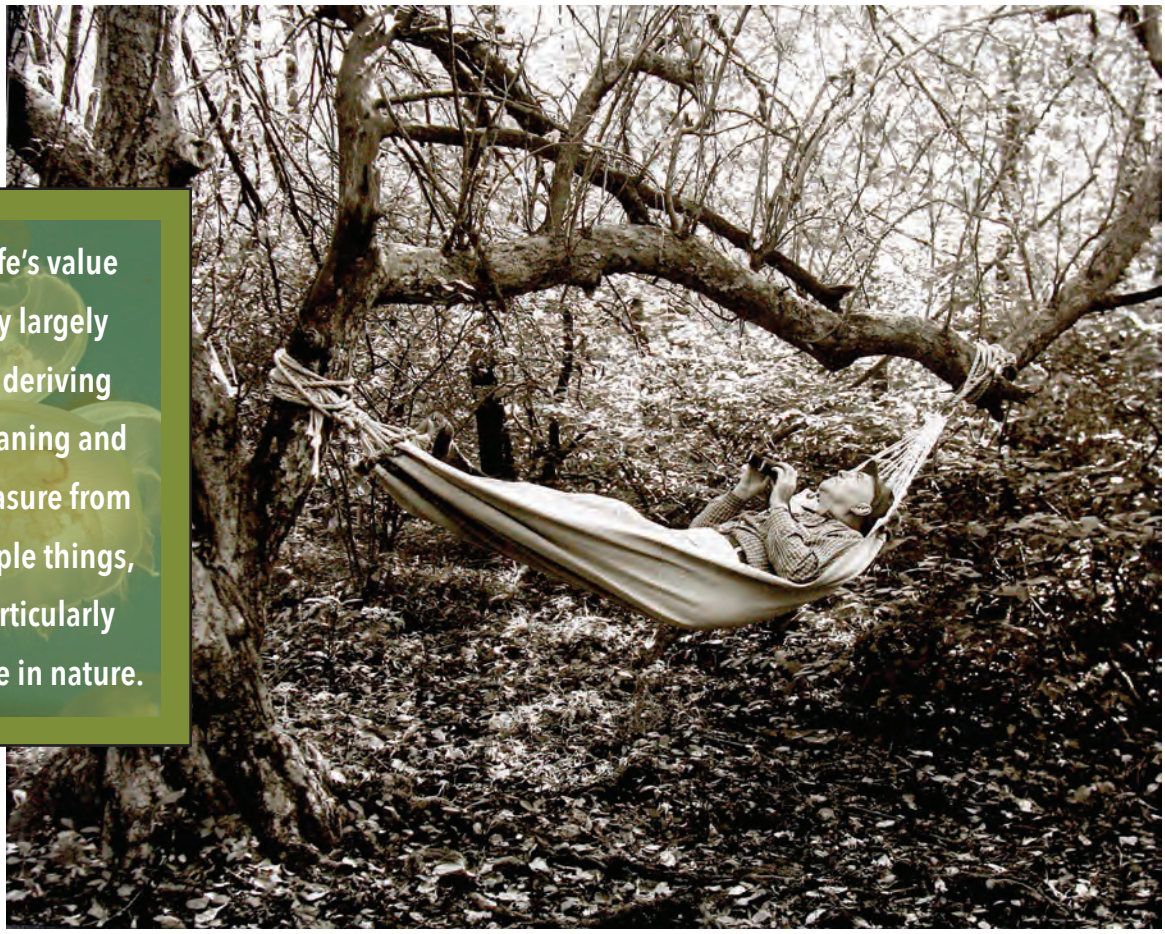
disconnected from the natural world, the former by biological necessity and the latter too often by short-sighted choice.

That winter morning at Hampton Brook, I watched the water's fleeting course, tried to capture several seconds of its sinuous movement. I felt the measured yet stopless passage of time. Edwin Way Teale came to Trail Wood, his Eden, in the summer of 1959. Twenty-one years later he left it to die at The William W. Backus Hospital in Norwich, less than 20 miles from the place he had once watched the gauzy, ephemeral forms of "submarine butterflies." For Teale, Baldwin and Trail Wood were worlds apart, one a suburban sprawl, the other a solitary paradise. Still, he must have stood countless times on the banks of Hampton Brook, understanding its seaward drive, understanding that nature does not truly allow disconnection, understanding that all rivers and all lives run to the sea. Like it or not, our fate is tied to that of nature and that of nature tied to us. When we ourselves return to Oceanus, what world will we have left behind?

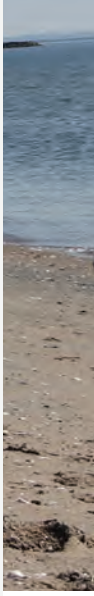
The author wishes to express his gratitude for the long-time and continued support of the staff of the Dodd Research Center at the University of Connecticut, especially Melissa Watterworth Batt.

Above, a nesting Canada goose bathes in the slow-water section of Blackwell Brook above the Elliot Road bridge. Photo: Richard Telford

Below, Edwin Way Teale observes nature at Trail Wood from an Army surplus hammock sometime in the early to mid-1970s. *Copyright Estate of Edwin Way Teale, University of Connecticut. Used with permission.*



...life's value lay largely in deriving meaning and pleasure from simple things, particularly those in nature.



wrack lines

What are wrack lines? Specifically, the lines of organic matter (sea grass, shells, feathers, seaweed and other debris) that are deposited on shore by high tides. More generally, it's where the sea meets the land.

These photos show wrack lines at Hammonasset Beach State Park in Madison and at Jacob's Beach in Guilford. Back cover: Students in the "Global One Health: U.S. and Irish Perspective" class at UConn see kelp harvested from J.P. Vellotti's beds in Groton as part of a visit to the Noank Aquaculture Cooperative on May 16 organized by CT Sea Grant.

All photos: Judy Benson

WHAT'S IN OUR NAMES?

With our magazine *Wrack Lines*, we tell stories about the intersection of the land, sea and Connecticut Sea Grant. So what is Connecticut Sea Grant? One of 34 Sea Grant programs across the country, it helps residents make the most of our coastal resources and inland waterways. It addresses the challenges that come with living by the water or within a Long Island Sound watershed, in a state with 332 miles of shoreline and three major tidal rivers.

This NOAA-state partnership based at UConn's Avery Point campus works with aquaculture farmers, fishermen and seafood purveyors to help their businesses prosper. It funds research essential to understanding and managing our changing coastal and inland environments. It provides communities and local leaders with the information they need to make better land and shoreline decisions that result in more resilient communities and healthier watersheds. It educates students as well as teachers and adults of all ages about the marine environment.

Connected to experts and residents who live, work and recreate in the Sound and its watershed, it brings diverse interests together around a common purpose of working for mutually beneficial solutions to problems. Small in staff but big in impact, Connecticut Sea Grant is like a pilot boat that navigates the way for large vessels toward safe harbors. Since 1988, Connecticut Sea Grant has supported "Science Serving the Connecticut Coast."

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