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# WRACKLINES

WHERE CONNECTICUT MEETS THE SOUND

*All Creatures Great  
and Mostly Small*

*From the Sea to the Sky  
to Your Garden*

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Lawrence Tarprah holds a marine worm he harvested at low tide in Stratford. Photo: Griffin O'Neill

## From the EDITOR

Pitchfork in hand, Lawrence Tarprah mines the mud flats exposed at low tide on the Stratford shore, not far from his home in Bridgeport.

The treasures he seeks are creatures often considered lowly or unlovable, especially compared to more animated species like dolphins, elephants and panda bears. But the slithery brown beasts he harvests—marine worms—are the key ingredient for his favorite pursuit.

“I do it for fishing, almost any time I want to go fishing,” said Tarprah, 68, who emigrated from Ghana 30 years ago. “The bait stores sell them for quite a sum, so I do this to save some money.”

Recently retired from a career as a hospice nurse, he spent many hours tending to the dying and their families, using medicine and compassion to lessen their physical and emotional pain through what he calls “the transition.” He’s witnessed young and old patients go peacefully, and too many others who left this world still full of resentment and anger. Angling from shore or off the side of a charter boat has long been his antidote to the suffering he tried to ease.

“I fish for anything that bites—porgy, striped bass,” he said. “I catch a limited amount—just enough for me to eat fresh, and if I have an extra, I give it to my girlfriend or a friend.”

Early this spring he was looking forward to spending as much time as possible in the coming months collecting worms and catching fish.

“Now I’ll be able to go fishing almost any time I want,” he said.

It’s his way of finding joy by interacting with the sea and other creatures, pursued with an attitude of restraint and appreciation the writer Wendell Berry would find admirable.

In his essay “A Native Hill,” written in 1968 long before the perils of climate change were widely appreciated, Berry expressed what is at stake when we lose contact with nature. Regardless of whether you, like Berry, ascribe a divine hand to the wonders of the world, his words call us to be attentive and respectful of other creatures and the land, ready to experience admiration for their ways of survival and renewal.

*“...we must learn to acknowledge that the creation is full of mystery; we will never entirely understand it,” Berry said. “We must abandon arrogance and stand in awe. We must recover the sense of the majesty of creation, and the ability to be worshipful in its presence. For I do not doubt that it is only on the condition of humility and reverence before the world that our species will be able to remain in it.”*

In this issue of *Wrack Lines*, the stories of scientists, divers, a painter, expert gardener and shellfish enthusiasts are offered to help stir our awe for the creatures that inhabit the Earth with us. From tiny copepods to majestic birds, industrious insects to otherworldly marine creatures and thriving oyster communities, the various animals have inspired fascination and even passion in the people profiled who are paying close attention to them.

But you don’t have to be an ardent researcher or devoted artist to know the rewards of closely observing animals. We can all learn and be spiritually richer by looking outside the human sphere and admitting that our reality alone doesn’t tell all of Earth’s story.



Judy Benson, editor  
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**Cover photo:** A large-eyed feather duster worm is one of the many creatures Robert Bachand photographed during more than 40 years of diving in Long Island Sound. Photo: Robert Bachand

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# About our contributors



### STEPHEN KURCZY

A Connecticut resident, **Stephen Kurczy** has swum, kayaked and fished in Long Island Sound, but never dove below its surface with a scuba tank—which is why he was excited to speak with veteran divers and underwater researchers for his article. An award-winning journalist with credits in *The New York Times*, *New Yorker* and *Christian Science Monitor*, Kurczy's first book, *The Quiet Zone*, was published by HarperCollins imprint Dey Street in 2021. He earned his MS from the Columbia University Graduate School of Journalism.



### ROBERT MILLER

**Robert Miller** is a journalist living in Litchfield County. He has written about the environment for many of his more than 40 years of reporting. He was the environment reporter for *The News-Times* in Danbury from 1998 to 2014, when he retired from daily newspapering chores. He continues to write a weekly column, "Earth Matters," for *The News-Times* and other papers in the Hearst chain in Connecticut. He graduated from the University of Connecticut in 1973. He was an English major. He still reads a lot. He also mucks around in his yard on an almost daily basis, weather permitting...



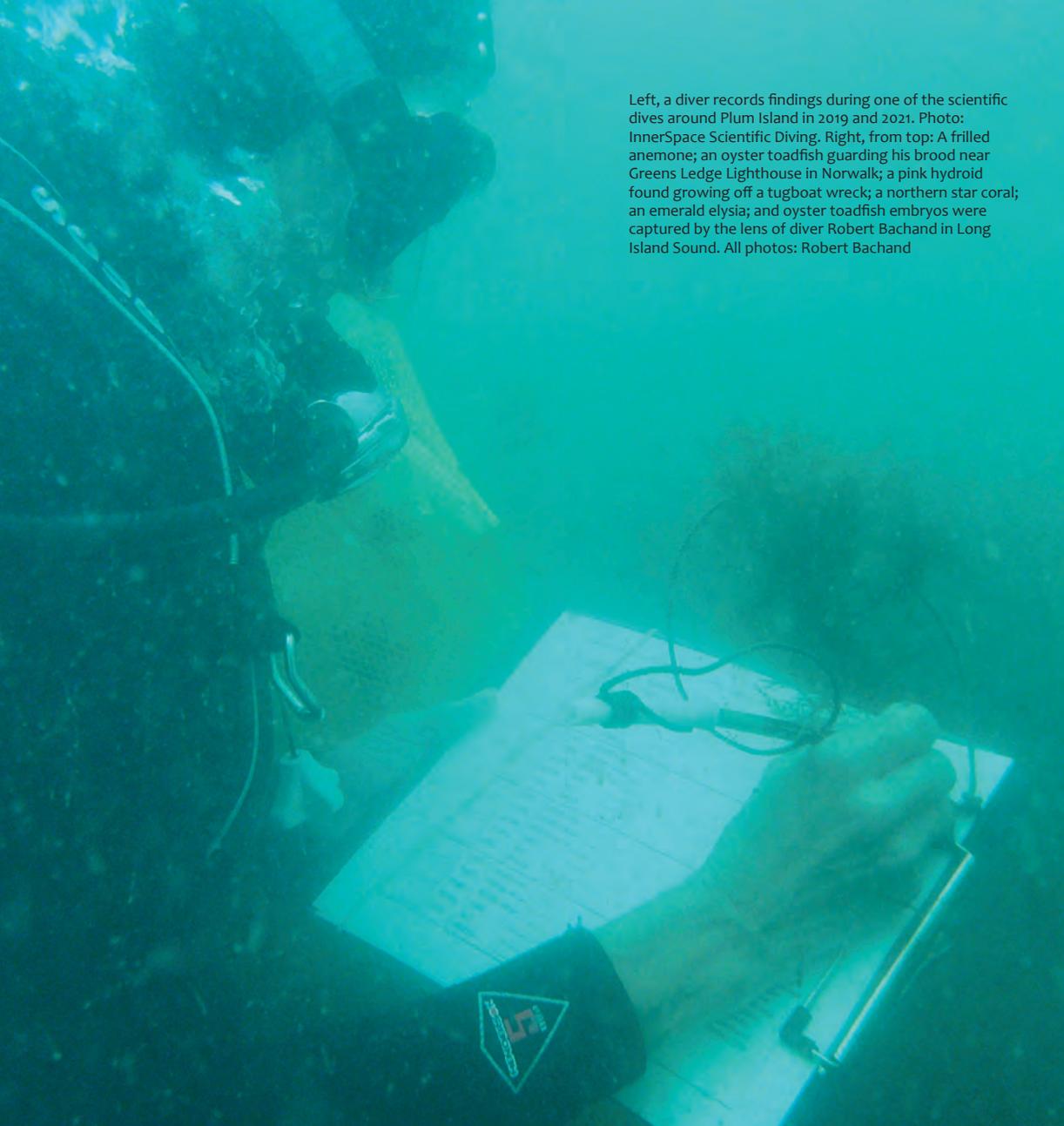
### JUDY PRESTON

**Judy Preston** is recently retired from the EPA Long Island Sound Study and CT Sea Grant, where she worked as the Connecticut Public Engagement and Outreach Coordinator for 12 years. She is a longtime environmental professional in Connecticut, where she focuses on community-based conservation in the Connecticut River estuary. Judy has taught at Three Rivers Community College, founded a local conservation nonprofit, and directed the Science and Stewardship program for the Nature Conservancy. She writes about the intersection of people and nature.

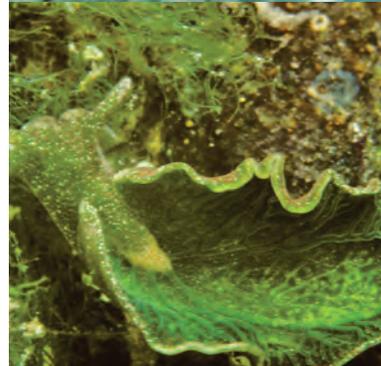


### JUDY BENSON

**Judy Benson** has been communications coordinator at Connecticut Sea Grant and editor of *Wrack Lines* since 2017. Before that, she was a newspaper reporter and editor, concluding her journalism career at *The Day* of New London covering health and the environment. She is the author of a book created in collaboration with artist Roxanne Steed: *Earth and Sky: Nature Meditations in Word and Watercolor*, published in 2021 by New London Librarium ([nllibrarium.com](http://nllibrarium.com)). She earned both a bachelor's degree in journalism and a Master of Science in natural resources from UConn.



Left, a diver records findings during one of the scientific dives around Plum Island in 2019 and 2021. Photo: InnerSpace Scientific Diving. Right, from top: A frilled anemone; an oyster toadfish guarding his brood near Greens Ledge Lighthouse in Norwalk; a pink hydroid found growing off a tugboat wreck; a northern star coral; an emerald elysia; and oyster toadfish embryos were captured by the lens of diver Robert Bachand in Long Island Sound. All photos: Robert Bachand



# A Scuba View of the Sound

**DIVERS DOCUMENT RICH VARIETY OF MARINE LIFE AROUND PLUM ISLAND AND BEYOND**

By Stephen Kurczy

If you've heard of Plum Island, you'd be forgiven for wondering if the surrounding waters of Long Island Sound teem with anthrax-belching fish and Frankensteinian creations of crossbred animal monsters.

Home since 1954 to a high-security government lab for combating infectious livestock diseases, Plum Island is rumored to have been everything from a staging ground for bioweapons terror plots to a sinister laboratory for a Dr. Moreau-type animal breeding program, with enough intrigue to inspire an episode of the television series *Conspiracy Theory with Jesse Ventura*.

With the government now preparing to shut down the laboratory and potentially open all or part of Plum Island to the public, dive researchers have

begun documenting what exactly lives there, helping to dispel some of the conspiracies as well as shed light on a unique environment that is thriving precisely because the area has remained largely off-limits to humans. While the prohibited area officially starts at the high tide line, often those who ventured too close to the island in a kayak or small motor boat found themselves warded off by the glare of security personnel.

On a greater level, the marine diversity around the dynamic waters of Plum Island underscores the richness of aquatic life throughout Long Island Sound. More than just a murky graveyard of shipwrecks, the Sound has long excited scientific researchers and diving enthusiasts who are willing to battle strong currents, extreme swings in visibility and mischievous seals to put their own eyes underwater.

“Understanding the landscape from the point of view of individual organisms and how they’re distributed and how they interact is a critically important part to understanding how the underwater world works,” said Peter Auster, an emeritus professor of marine sciences at the University of Connecticut who has logged more than 2,000 dives over his career, many of them research-related in the Sound, including near Plum Island. “Making observations in nature, if you’re going to work on marine life, is somehow directly or remotely putting your head underwater.”

#### A PLUM SITE

Thirty minutes by boat from New London in New York waters of the Sound, Plum Island holds a unique place in the ecology and mythology of the estuary. As host to the U.S. Department of Homeland Security’s Plum Island Animal Disease Center, considered the nation’s most important lab for combating infectious animal diseases, the island is strictly off-limits to visitors—fueling some suspicion about what’s *really* going on there. In a 2008 website post, Homeland Security itself noted how the island had been supposedly linked “to germ warfare, anthrax, and even a purported ‘monster’ found earlier this summer on a beach in nearby Montauk, N.Y.” (The monster turned out to be a decaying animal carcass.)

The Disease Center is slated to close next year—it’s moving to Kansas—and for more than a decade a battle has been playing out for the island’s future. An initial plan to sell Plum Island rallied opposition from more than 100 organizations who called for keeping the island in public hands as an environmental resource and historical site. In 2020, then-President Donald Trump—who once expressed interest in building a luxury golf course on Plum Island—signed a bill that included a provision to halt its privatization. At the moment, it’s still owned and managed by the Department of Homeland Security, while Save the Sound and other groups continue working for permanent protection.

Home to a decommissioned lighthouse and former military fort, both listed on the National Register of Historic Places, Plum Island is where the sandy coast of Long Island transitions

toward the rockier shores of New England. It’s also where the waters of Long Island Sound mix in a physically and biologically dynamic manner with Peconic Bay and Gardiners Bay, Block Island Sound and the Atlantic Ocean at an opening called Plum Gut. As part of assessing the island’s resources, Save the Sound, the Nature Conservancy and the New York State Department of Environmental Conservation have been funding research that might inform an environmental management plan.

Matthew Schlesinger, chief zoologist for the New York Natural Heritage Program, has contributed to four biodiversity surveys of Plum Island, starting with an initial assessment in 2012. In 2015, he led a team that conducted a four-season survey of the island, discovering 215 bird species and more than 450 plant types, but delving only into the marine life of shallow eelgrass meadows. To go deeper into the aquatic environment, Schlesinger returned in 2019 and 2021 with Steven Resler, owner and principal scientific diver of Albany-based InnerSpace Scientific Diving and HydroSpace Research, to conduct some of the first underwater surveys around Plum Island.

“The biodiversity inventory work broadly that we’ve done on Plum Island has helped make the case for its importance as a place to protect and not sell out of federal ownership,” said Schlesinger, who has been accompanied in his research by Emily S. Runnells, Gregory J. Edinger and Meaghan McCormack of the New York Natural Heritage Program.

Over nine days and a cumulative 75 hours underwater, Resler and three other scientific divers scoured the seafloor to create an inventory of marine life at depths of 10 to 30 feet. Highlights from their 2019 survey included the observation of northern star coral—the Sound’s only coral species—as well as dense coverage of bryozoans, seaweed and other organisms that demonstrated a highly productive marine environment. The team’s 2021 data were yet to be published at press time, but Resler didn’t hold back excitement about the preliminary findings.

“I’ve never seen the abundance of anemones, sponges, corals and bryozoans—so many species, packed into such a relatively small area, like we did at Plum Island,” said Resler, who has been diving in the Sound for a half-century. He spotted no garbage, fishing lines or other signs of human impact, aside from a couple of lobster buoys.

#### DIVING CULTURE

Divers have long recognized the waters around Plum Island as diverse in marine life and with clearer visibility than the more trafficked areas of the Sound. Robert Bachand, a former president of the National Oceanic Society’s Long Island Sound Task Force who dove around Plum Island through the 1980s and 1990s, recalls seeing flower-like cerianthid anemones in the soft mud, broccoli-shaped frilled anemones and mushroom-esque ghost anemones on boulders and a huge number of lentil sea spiders.

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“Scuba diving in the Sound, I feel, can be as rewarding as being in the Caribbean or any tropical sea,” said Bachand, author of four books about the coastal Northeast, including his 1994 *Coastal Atlantic Sea Creatures: A Natural History* (published by The Maritime Aquarium at Norwalk). “Ten to 30 feet below the surface you can encounter some of the Sound’s beautiful creatures.”

Bachand conducted more than 500 dives in the Sound from 1972 until 2019, when lung cancer forced him to retire from the water. But he can still wax poetic about long tube worms swimming around ocean pilings, shell-less snails known as nudibranchs crawling on the seabed and bay scallops peering at him with their 40 baby blue eyes. He’s the kind of marine enthusiast who can even love the oyster toadfish, a particularly ugly mud dweller with a venomous dorsal fin.

While diving near Greens Ledge Lighthouse near Norwalk around 1988, Bachand followed the recognizable “boat whistle” sound of a grunting toadfish and discovered a male guarding its nest beneath a rock. Bachand visited the toadfish for weeks, even bringing a clam so he could hand-feed the fish while he photographed its embryos, then its hatchlings, then its school of some 100 tiny toadfish.

Piers and lighthouses are great areas for observing marine life, as is another structure prevalent in Long Island Sound: sunken ships. In his 1987 book *Scuba Northeast*, a survey of diveable wrecks from New Jersey to Rhode Island, Bachand described going 90 feet underwater to see the remains of the SS Black Point. The freighter was torpedoed on May 5, 1945, near Point Judith by a German submarine (which itself was sunk later that day off Block Island). The stern was covered with frilled anemones, pink hydroids and bryozoans. Sea raven, large cunner, eel and lobster made a home inside.

Some wrecks can be great training areas for divers, too. Every fall Jeff Godfrey, UConn diving safety officer, brings students into the protected waters off Bluff Point to practice diving on a WWII-era P-47 Thunderbolt. About 20 feet underwater, it’s still possible to see the plane’s wing stubs, landing gear and engine. Missing, however, is a propeller that was removed in the early 1980s by wreck diver Bill Palmer of Connecticut. (See *sidebar on Palmer*.) Students practice conducting underwater tasks and identifying marine species, such as the black sea bass, tautog and porgy that feed around the wreckage.

“There’s a strong diving culture in New England,” Godfrey said. “It’s more of a commitment, more challenging, and takes more time in the water to get comfortable to do the big dives here.”

In support of UConn’s marine research, Godfrey conducts dives for the Long Island Sound Integrated Coastal Observing System—coordinated by Marine Sciences Professor James O’Donnell—which maintains a series of buoys and sensors to

measure weather, water quality and other data. Godfrey also dives on behalf of the Long Island Sound Habitat Mapping Initiative, a multiyear project led by UConn research scientist Ivar Babb to combine videos, images, sediment samples and acoustic maps to create more comprehensive maps of the Sound, including around Plum Island.

“One of the questions we’re trying to answer with this project is, what were the communities like decades ago? How have they changed with regard to climate change and the overall impacts of human activities?” said Auster, who does research for the Habitat Mapping Initiative and conducts research dives with Godfrey. “By going underwater, we can see changes in sponge communities and coral communities and bivalve-dominated communities like mussels and slipper shells. Being able to put my head underwater, and I certainly encourage students to put their heads underwater, you can create your own baseline for change by seeing viscerally what’s going on.”

#### ‘MORE TO LEARN’

With work ongoing to assess Plum Island’s environment and develop a management plan, scientific divers are on standby to continue their research.

“We’re all somewhat concerned about Plum Island,” said Resler, the research diver. “It hasn’t had visitors in a long time, and very few people use the water around it. We would hope whoever goes out there would do so sensitively.”

Resler might add that visitors should also beware of the large seal population. During one dive, a seal playfully nipped Resler’s fin and yanked hard enough that he yelled aloud, startling his diving partner. Another time, Resler’s survey sample bag disappeared, and he found his objects strewn about the ocean floor. When he resurfaced, he discovered a seal family waiting for him, their dark crowns popping above the water, their big eyes looking guilty.

But despite all the conspiracies around Plum Island, the researchers were never concerned about discovering more nefarious creatures.

“It gave us some amusement,” said Schlesinger of the New York Natural Heritage Program. “But we were never afraid we might uncover a three-headed whatever.”

Still, Schlesinger added, “There’s plenty more to learn.”

#### MORE INFORMATION:

<https://www.dhs.gov/science-and-technology/plum-island-story>  
[https://www.nynhp.org/documents/140/plum\\_island\\_inventory.pdf](https://www.nynhp.org/documents/140/plum_island_inventory.pdf)  
[https://static1.squarespace.com/static/5924e222bf629a1367aa831d/t/5ebc67120a7db915d87d7b21/1589405502138/PlumIslandMarine\\_20Apr2020.pdf](https://static1.squarespace.com/static/5924e222bf629a1367aa831d/t/5ebc67120a7db915d87d7b21/1589405502138/PlumIslandMarine_20Apr2020.pdf)  
<https://www.savethesound.org/2021/08/06/press-release-scientists-dive-to-grow-understanding-of-plum-island-biodiversity/>



Bill Palmer stands at the doorway to his basement "museum" where he displays artifacts he found while diving on wrecks, many in Long Island Sound and Block Island Sound.

## BILL PALMER: DIVING INTO HISTORY

Few divers are as familiar with the netherworld of Long Island Sound as Bill Palmer, a regular speaker at the annual New England Wreck Symposium hosted by the UConn Avery Point Scuba Club.

Jumping into the ocean nearly every weekend from April to November for the past half-century, Palmer estimates he has logged more than 3,000 dives over his career, most of them in Long Island Sound and Block Island Sound, where he has been a pioneer in locating historical shipwrecks.

The Connecticut resident was among the first recreational divers on the U-853, a German submarine that prowled the Northeast and attacked several U.S. ships before being sunk by the Navy off the coast of Block Island. Palmer began searching for the sub in 1972, finding it after a year of dragging a grapple hook along the seafloor.

"I was obsessed with finding remnants of World War II in our backyard, and the biggest remnant of the war was the U-boat," he said. Over a number of dives he retrieved and restored a leather jacket, gas mask, life vest, pistol, cutlery and other items emblazoned with the swastika.

"It's history," he said. "And it's a shame just to let it rot underwater."



A mannequin stands at a submarine wheel from a WWII German U-boat wreck. Palmer retrieved the wheel along with the gear that adorns the mannequin. Photos: Stephen Kurczy

Today, those artifacts and thousands more from shipwrecks around the Northeast are displayed at Palmer's house in Wallingford. In his yard stands a 5,000-pound, 8-foot-tall, bronze propeller from the SS Black Point, which was sunk by the U-853. His TV cabinet is adorned with a sextant from the U-853 and stanchions from the passenger-freighter Grecian that sank in 1932 off Block Island. A museum-like room in Palmer's basement holds two six-foot-long bronze torpedo tubes from the USS L-8, sunk in 1926 off Narragansett. Also on display are dishware from the USS Onondaga, rock-encrusted silverware from the steamer Atlantic and teak shutters from the Italian ocean liner Andrea Doria, which lays 250 feet deep about 50 miles off the coast of Nantucket and has been the scene of numerous diver deaths over the decades.

The dangers of wreck diving don't always end once the diver resurfaces. While cleaning the German pistol found on the U-853, Palmer accidentally triggered a bullet's primer, and bits of metal backfired into his face. "I had my head in a vise for what seemed like an eternity while a doctor dug the shrapnel out of my eye," says the former Army paratrooper.

Palmer, who continues to dive in his mid-70s, maintains that all his artifacts have been legally obtained, either in international waters or prior to the 1988 Abandoned Shipwrecked Law, which says that all wrecks within three miles of the U.S. coast belong to the government. "I am preserving a piece of our coastal history," he said.

—Stephen Kurczy

### MORE INFORMATION:

<https://www.boston.com/news/local-news/2017/08/02/the-lures-and-dangers-of-diving-to-the-andrea-doria/>



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# REX BRASHER:

**CONNECTICUT'S GREATEST UNKNOWN ARTIST**  
**LEFT A LEGACY OF BIRD MASTERPIECES**

By Robert Miller



Top photo: Goldfinch print from *Birds and Trees of North America*, by Rex Brasher. Image courtesy of the Rex Brasher Association Inc.

Above: Elf owl print from *Birds and Trees of North America*. Image courtesy of Rex Brasher Association Inc.

Left: Rex Brasher, seated on the porch of his home, gave his address as Chickadee Valley, Kent, CT. Photo courtesy of Cynthis Carter Ayres

You can't see the ivory-billed woodpecker or the passenger pigeon, the heath hen or the Eskimo curlew anymore. They're all extinct, gone from the planet.

Rex Brasher saw them, sketched them then painted them with skill, delicacy and exactness in the early decades of the 20<sup>th</sup> century.

Today, when you see his watercolor of the passenger pigeon, with its subtle, dappled plumage, you stare in admiration—both of the bird that was and its beautiful likeness.

His ivory-billed woodpecker takes you into the southern swamps—the Great God bird, grand and startling as it used to be. (True believers still hunt the woods for it, but the federal government declared the ivory-billed extinct in October of 2021.)

In all, Brasher—an almost-Connecticut native who claimed the town of Kent as his home—painted 874 watercolors, more than twice as many as John James Audubon.

He did what he set out to do as a young man, painting all the birds listed by the American Ornithological Union and their subspecies, an effort that took 47 years of travel, walking, watching and sketching.

Then, in a herculean effort, Brasher shepherded those paintings into his monumental 12-volume *Birds and Trees of North America*.

Brasher sold 100 complete sets. Using stencils and an air brush, he hand-colored each print in every book in every set—about 90,000 prints in all.

He is Connecticut's Audubon and maybe, its greatest unknown artist.

T. Gilbert Pearson, president of the National Audubon Society from 1920 to 1934, called Brasher's paintings "the most beautiful things I have ever seen."

"When you see a Brasher bird, you have

seen the bird itself, lifelike and in its natural habitat," Pearson said.

The great problem is, it's hard to see any of this today. Rex Brasher has been stored away, out of sight.

The state owns his paintings—it bought the entire collection in 1941 for \$72,290, or about \$85 a painting. They are our heritage.

But they are out of sight at least for the present.

They had been shown on a rotating basis at Eolia, the mansion at Harkness Memorial State Park in Waterford from 1953 to 1988. But when curators realized the salt air was damaging the watercolors, they removed them.

The Connecticut Museum of Natural History, headquartered at the University of Connecticut, now owns them. But the museum is a collection, including the northeast's largest mastodon skeleton, without a home. It has an office and sponsors school educational programs but lacks a building to house its collections. That may change, and Brasher's reputation with it.

Until then, they've been properly conserved at the Thomas Dodd Research Center at the University of Connecticut at Storrs. People must make an appointment to see them and can only view a few at a time.

Three Connecticut university libraries—at UConn, Yale and Trinity College—own complete sets of *Birds and Trees of North America*. But again, they are kept in the special collections departments and not on display for the general public.

Melissa Watterworth Batt, an archivist at the Dodd center—which has an extensive ornithological collection including the papers of naturalist and writer Edwin Way Teale—said that a small but regular number of people visit to see the Brasher collection.

"Bird illustrators are interested in his methods," she said. "Most people are

interested in his life story."

Some of this is due to Brasher's colossal bad timing.

He finished his work just as the Great Depression took hold in the 1930s and had to hustle to sell the 100 sets of *Birds and Trees of North America* that he managed to complete. Between the depression and the onset of World War II, the state's plans to build a Brasher Museum at Kent Falls State Park fell by the wayside.

The publication of easy-to-use field guides, most notably Roger Tory Peterson's 1934 *Guide to the Birds* also helped democratize birding. Rather than depending on large, expensive illustrations, people bought binoculars and went out to see them in the living world.

And some of it has to do with the overwhelming impression and value the public has of the nation's first great bird artist John James Audubon's work. His paintings are big and dramatic. They strike the grand chord.

As a result, Audubon wears the crown. There is the National Audubon Society. There are Audubon calendars and writing cards and tote bags.

Trinity College's Ostram and Alice Talcott Enders Ornithology collection is the second largest in the United States.

Eric Johnson-DeBaufre, director of Trinity's rare books and special collections, said there are seldom requests to see Basher's *Birds and Tree of North America*. The star of the Enders collection is Audubon's *Birds of America* with its huge Double Elephant folio prints measuring 40 inches by 30 inches.

"It's hard to compete with a Double Elephant folio," Johnson-DeBaufre said.

And yet it was a slight by John James Audubon that drove Brasher to do what he did.

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This is the family story:

Rex Brasher was born Reginald Brasher in Brooklyn, N.Y., in 1869. His father, Philip, was a Wall Street stockbroker and enthusiastic amateur ornithologist who passed his love of birds on to his son.

Once, learning that Audubon was in residence in New York City, Philip Brasher made an appointment to meet the great artist. He arrived on time, only to be rudely turned away—the occupied Audubon, using a dead bird as his model, said loudly he was too busy to bother with him.

Rex Brasher heard the story and determined as a young man to avenge the insult. He would paint more birds than Audubon. He would paint them more realistically and in their natural settings. He would outdo the master.

Although he trained with Tiffany & Co. as an engraver as a teenager, and later mastered the craft of photo engraving, he was a self-taught artist. He also learned, along the way, to be a jack-of-all trades.

In his 20s, he earned enough in the engraving trade to buy a sloop, which he named “The Phalarope.” He and a friend sailed it from Maine to Florida. He later shipped out on a fishing boat and spent two years plying the waters of the Canadian Maritimes.

He played the horses and won big often enough to pay for his rambles to the American South, the Rockies and the Pacific Northwest. (Audubon never made it west of the Mississippi River.)

All these trips, paid for on Brasher’s own dime, were made to see birds, to sketch birds, and take extensive field notes on where and how they lived.

In Brooklyn, he gathered all this material and began to paint. By chance he met and befriended Louis Agassiz Fuertes—Audubon’s successor as America’s great bird painter. After seeing Fuertes’ work, Brasher went home, burnt the 400 paintings he’d completed and started over.

He knew he had to do better. He started again, destroyed his paintings a second time, and returned to the easel.

Eventually, he began to earn a reputation as an artist. He was hired to illustrate a book on the birds of North Carolina. With the \$700 he earned from the work, he bought an abandoned farmhouse in Amenia, N.Y., three or four miles west of Kent.

That town was where he bought his art supplies and socialized. In *Birds and Trees of North America* he gave his address as Chickadee Valley, Kent, Connecticut.

The house he lived in had no electricity and for the first years, no indoor plumbing. He heated it with a wood stove. He never owned a car. When he needed something in Kent, he walked there and back, accepting rides if people offered.

Along the way, he befriended people here and there. He gave them paintings as presents. He helped found the Kent Art Association.



Juliana Barrett, coastal habitat specialist and extension educator for Connecticut Sea Grant, shows the Rex Brasher prints she received after volunteering to distribute black-and-white prints to teachers when the Brasher collection was being moved out of the mansion at Harkness Memorial State Park in 1988. Photo: Judy Benson

“He wasn’t a recluse,” said Cynthia Carter Ayres, vice-president of the Rex Brasher Association, whose grandparents were Brasher’s friends. “He was just very focused on what he had to do.”

In Brooklyn, and later in Amenia, his greatest supporter was his niece, Marie Brasher. She earned money when his own funds ran low, did ornithological research for him and typed up all his notes for *Birds and Trees of North America*. She lived with him and urged him on. They were partners in his great enterprise.

“She was executive secretary to the mayor of New York City,” said Janet Reagon, president of the Rex Brasher Association, formed to foster Brasher’s reputation. “She was not a slouch. She was the love of his life.”

Brasher finished his 875 watercolors in 1924, 47 years after he began the work. He and Marie began work on *Birds and Trees of North America* in 1928, completing the 100 sets in 1932, shortly before she died.

His plan was to sell the 12 volumes for \$1,200. He got 100 subscribers. When the Great Depression hit, many of them cancelled. He doubled the price to \$2,400, found new, wealthy patrons and completed 100 sets.

Brasher offered to give his watercolors to the state for free, if, in turn, Connecticut would build a place to show them. He ended up selling the state the collection to keep it intact. Brasher did show all his paintings once, in Washington, D.C., at Explorer’s Hall at the National Geographic Society in 1938. People lined up around the block to see them and the closing date of the show had to be extended to meet the public demand.

The state bought the Brasher collection in 1941. It took another 12 years before it found a place to show them at

Harkness Park. Brasher skipped the opening—he'd seen the paintings already, he said.

When the state moved the paintings out of the Harkness Park mansion in 1988, Juliana Barrett—then a graduate student, now an extension educator with Connecticut Sea Grant—spent a day volunteering there.

The museum had offered black-and-white Brasher prints to any teacher who wanted a set. Barrett's job was to sign the teachers in and help disperse the prints. When the day was done, she was rewarded with some black-and-white Brashers of her own.

"They'd been up in the attic for years," she said. "It was really fun. I had the run of the whole mansion."

Brasher died in 1960 in the Gaylordville section of New Milford at age 91. He painted until the last years of his life when his eyesight began to fail. His last direct descendant—a grandniece—died in 2021. The Rex Brasher Association has hopes the fate of his estate—now in the New York probate court—will be decided soon.

Because he did all the work on his own, there was no institution to make sure his work would be remembered. And while he knew his own worth, he was indifferent to the commerce of art. He fell out of the public view.

That may change.

Janine Caira, the director of the state Museum of Natural History, said there are now plans under way to construct an environmentally strong "living building" at Storrs, in part to house the museum's collection.

Caira said she envisions a Rex Brasher gallery in the building—a permanent place to show his watercolors on a rotating basis.

The gallery could show how he developed as an artist, exhibiting his earlier work with his later paintings, Caira said.



Top, Melissa Watterworth Batt, archivist at the Thomas Dodd Research Center at UConn, shows an original Brasher watercolor of passenger pigeons from the Rex Brasher Collection, Archives and Special Collections, University of Connecticut. Photo: Judy Benson

Above, detail from the painting of passenger pigeons, one of several now extinct species Brasher saw and sketched in their native habitats. From the Rex Brasher Collection, Archives and Special Collections, University of Connecticut. Photo: Judy Benson

It could have natural history exhibits of birds and trees to complement his work.

"It gets better and better," she said of the way the museum, the gallery and the building itself could draw people to the Storrs campus.

There is, however, a sizable problem to surmount.

Caira said the museum will have to raise a large share of the building's construction costs through private donations. She said a fundraising campaign for it will begin this year. So, as in the past, money will determine whether people get to see Brasher's paintings.

In the meantime, the Rex Brasher Association is trying to keep the flame alive. Its website at [www.rexbrasher.org](http://www.rexbrasher.org) has now posted digital images of many of his paintings.

Reagon, the association president—whose grandparents and parents knew Brasher—said her dream is that the New York Historical Society, which owns all of Audubon's watercolors, would hold a joint exhibition.

"Have one of Audubon's with the same bird painted by Rex," she said. "Side by side."

Inca doves, found in the Southwest, are shown in their desert habitat in this print from *Birds and Trees of North America*. Image courtesy of the Rex Brasher Association Inc.





UConn Marine Science Professor Hans Dam uses a microscope to examine a sample of copepods grown in his lab. Photo: Nancy Balcom

# Experiment with tiny marine creatures reveals future cost of climate change

by Judy Benson

*Acartia tonsa* is smaller than a grain of rice and barely visible to the naked eye in the marine waters where it lives. Nonetheless it is an important little creature.

“You have to train your eye to be able to see it,” said Hans Dam. “But it’s superabundant almost everywhere in coastal zones around the world, especially in estuaries.”

These torpedo-shape organisms are one of the many species of copepods, a group of zooplankton that can be thought of roughly as the sea’s equivalent of insects— “the little things that run the world,” in the oft-quoted words of biologist E.O. Wilson. Like other copepods, it has a uniquely florid physique, with long curving tentacles, bristly appendages on its sides and hairlike structures that cascade from its tail like the flowing fur of a Pekingese.

“It’s eaten by a lot of forage fish,” Dam said. “If this species went extinct, you’d have a serious problem for fish and for the food base the little fish support. They’re one of the things that makes the ocean ecosystem function.”

Dam is a biological oceanographer and professor of marine sciences at UConn. Six years ago, he and several colleagues embarked on a research project with these copepods that took them physically no farther than the lab at UConn Avery Point where they are based and the waters of Long Island Sound at the southern edge of the campus, where



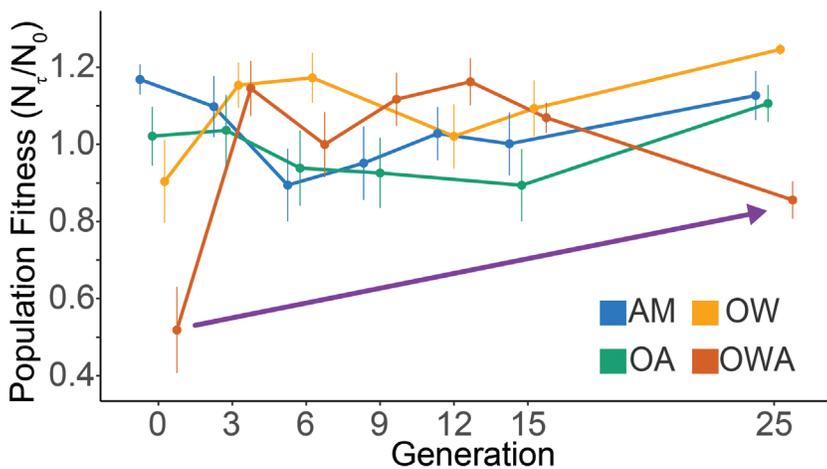
The copepod *Acartia tonsa* as seen under a microscope. Photo: Pelagic Invertebrate Collection at UC San Diego's Scripps Institution of Oceanography

they collected the base population. The research showed that over 25 generations, with exposure to simultaneous stressors of warming water temperatures and higher levels of acidification as greenhouse gas emissions elevate earth’s CO<sub>2</sub> levels, these copepods can adapt—for a while. It documented evolution of a species in real time, providing a complex picture of how nature is changing with the climate, but at a cost.

“It’s like if you lose your job, and then the bank forecloses on your mortgage,” said James deMayo, who was a leading member of the research team, while completing his doctorate in oceanography at UConn. “There are things you can do to sustain yourself in the short term, but you can’t continue long term.”

These findings have far-reaching implications as a lens into the future ocean under climate change. It generated attention around the world after the first article about it was published in the journal *Nature Climate Change* last year and versions translated into Italian, French and other languages.

“This was a once-in-a-career publication for most of the people involved,” said Michael Finiguerra, UConn associate professor in residence of ecology and evolutionary biology and one of the



Population fitness of the copepod *Acartia tonsa* versus generation under ambient (current) average temperature and CO<sub>2</sub> levels (AM); ocean warming conditions (OW); ocean acidification conditions (OA); and both ocean warming and acidification conditions (OWA). The purple line shows that while fitness decreased after the 12th generation, it was still considerably higher than at generation zero. Fitness is a measure of the ability of the population to increase. Above 1 the population grows, and below 1 it decreases with time. Shown are the mean and 95% confidence error around the mean. Adapted from Dam et al, 2021.

continued on page 14 ►

nine authors of the article. These included deMayo, Dam, their UConn colleague Hannes Baumann and Xuejia He of Jinan University in China. Two researchers from the University of Vermont, Melissa Pespeni and Reid Brennan, also collaborated on the project and joined the other four in exploring other aspects of the findings in a second article recently published in *Nature Communications*.

Baumann began working with Dam in 2016, using funding from Connecticut Sea Grant to design and pilot the project. Dam had worked with copepods in the past, but this undertaking required building new types of equipment and creating new experimental protocols to allow multiple generations of copepods to be grown in the lab, subjected to different temperatures and water chemistry, then compared. That's where Baumann's expertise working with fish populations came in.

"We developed the basic rearing enclosures to make this even feasible," said Baumann, associate professor of marine sciences at UConn.

These were four plexiglass chambers, each about the size of a stack of three large pizza boxes. In each were 60 petri dishes where copepod eggs grew into adults over their two- to three-week life spans. Each of the incubators mimicked a different set of climate conditions: one for current average water temperature of 18° C (about 64° F) and atmospheric CO<sub>2</sub> levels of 400 parts per million; one for water temperature of 22° C (about 72° F) and current CO<sub>2</sub> levels. A third had the current average temperature but CO<sub>2</sub> levels of 2,000 parts per million, and the fourth had both the higher temperature and the higher CO<sub>2</sub>.

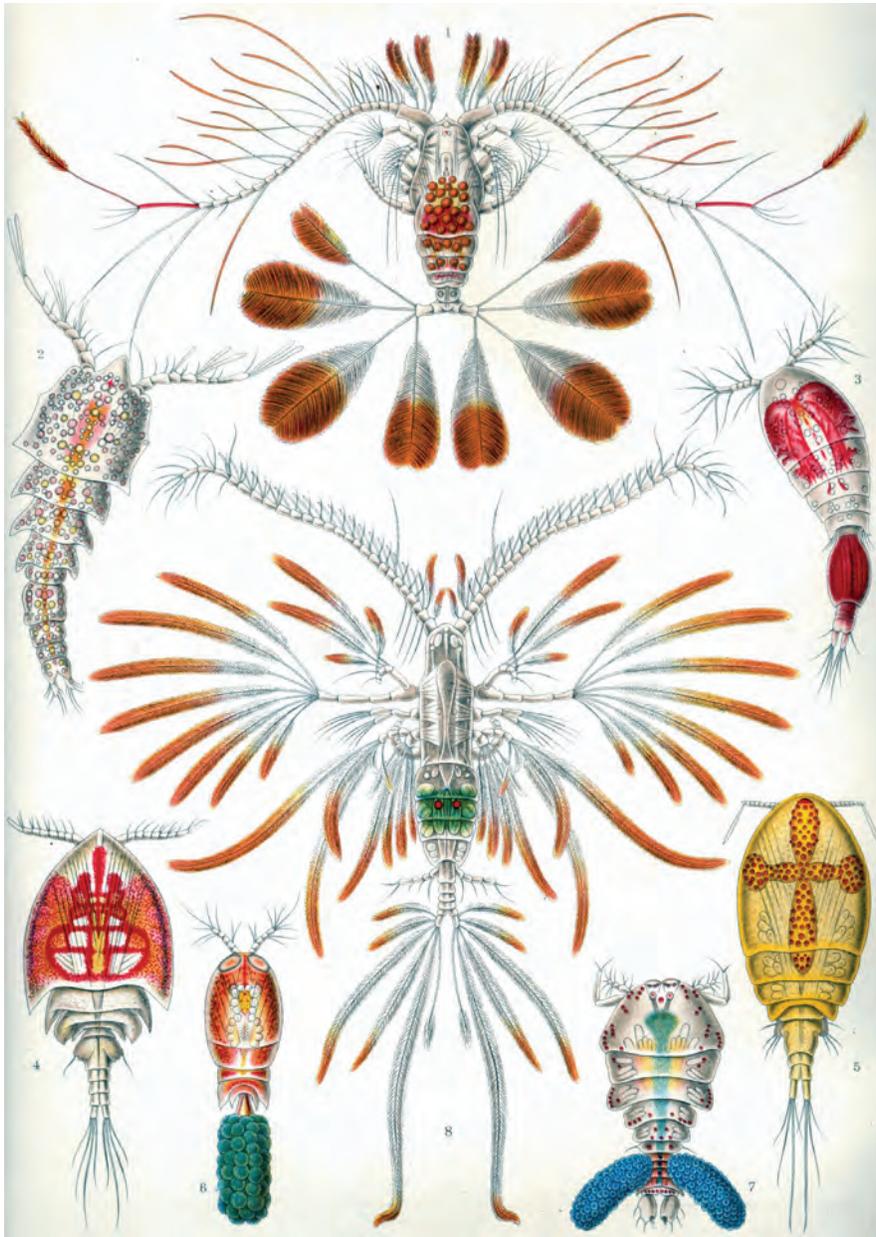
"We blew streams of air with higher CO<sub>2</sub> content into the boxes, and it would dissolve passively into the petri dishes," Baumann explained.

Once validated, the project received National Science Foundation funding that supported it over the next five years. It was a "massive undertaking, a huge team effort," Finiguerra

said, requiring multiple generations of copepods being kept alive in the lab, then collecting data for each generation on five species fitness traits—survival to maturity; egg production; egg hatching survival; development; and male-female ratio. That was deMayo's main responsibility, with the help of several others including UConn Marine Sciences Research Assistant Lydia Norton and Postdoctoral Research Associate Gihong Park, who were also co-authors of the *Nature Climate Change* article. Now a post-doctoral fellow at the University of Colorado, deMayo said the copepods required attention daily over the five years he worked on the project.

The often-painstaking work yielded important information for understanding how creatures are adapting to the changing environment. In sum, the research

showed copepods subjected to just one variable—either higher temperature or higher CO<sub>2</sub>—were able to adapt and maintain population health within the first few generations. But when both variables were introduced in tandem, the population declined sharply in the first generation, with half of hatched eggs not surviving to maturity compared to more than 75 percent survival in current conditions.



This illustration of several species of copepods was one of more than 100 of terrestrial and marine animals created by German scientist and artist Ernst Haeckel in the late 1800s. Source: Wikimedia Commons

By the third generation, survival rates recovered close to original rates. But the phenomenon was short-lived. By the 25<sup>th</sup> generation, the research showed, only about one-third of the animals survived to maturity. In the wild, predation, pollution and other stressors would be added to the mix, setting up a world with too few copepods to support healthy populations of fish and other marine life.

“There are limitations to their ability to maintain their adaptation response,” deMayo said. “This puts into perspective that when you pile stressors on top of each other, you get unexpected results.”

Baumann said the study was unique not only in the number of generations of copepods involved, but also in tracking their response to two stressors in tandem. As scientists, government leaders and the public try to understand and respond to climate change, he said, this study provides a better guide for the future because it avoids simplistic all-or-nothing conclusions.

“It’s not all gloom and doom, but we don’t want to come off saying ‘don’t worry about it,’” he said. “It’s more complicated. We have copepods adapting rapidly to these new conditions, but the adaptation is not complete.”

Over the course of the project, volumes of data were collected on the copepods that will continue to be analyzed and are likely to yield more significant findings, Baumann said, some of it involving molecular DNA analysis to determine how copepod genes adapted. That work is being led by Pespeni and Brennan of the University of Vermont.

“This is evidence of the unpredictability in the responses of marine populations to changing ocean conditions,”



Marine Sciences Research Assistant Lydia Norton draws phytoplankton from the cultures to feed copepods for the experiments. Photo: Nancy Balcom

said Cristian Vargas, marine biologist and professor of environmental sciences at the Universidad de Concepción in Chile. “It is important that stakeholders, policymakers and the general society be aware that the ocean is changing in multiple ways, through changes in ocean temperature, oxygen content, ocean acidity and other ways, and it is extremely important to conduct realistic experiments on temporal scales relevant to animal biology and evolution and dramatic changes in the ocean realm.”

**MORE INFORMATION:**

“Rapid, but limited, zooplankton adaptation to simultaneous warming and acidification,” in Nature Climate Change: <https://www.nature.com/articles/s41558-021-01131-5>

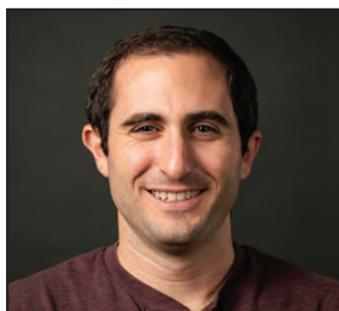
“Loss of transcriptional plasticity but sustained adaptive capacity after adaptation to global change conditions in a marine copepod,” in Nature Communications: <https://rdcu.be/cH8GO>



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**Hans Dam**



**James deMayo**  
Photo: Jake Snyder, Redskies Photography



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# Beyond Butterflies and Bumblebees

Many lesser known but common insects are beneficial, indeed essential, to a healthy garden and planet

Story and photos by Judy Preston



Not just for monarchs: more than 450 insects, including this wasp, are known to rely on the common milkweed.

The grass-carrying wasp has found a niche in suburban neighborhoods by nesting in window runners. Unlike the more familiar yellowjacket, this solitary species is unlikely to sting.



These are exciting times to be a gardener, especially if you're interested in helping the planet. Doug Tallamy, an entomologist from Delaware, has almost single-handedly changed the way gardeners and others think about insects.

His message: rethink your relationship with these heretofore less-than-lovable organisms, for they make our world not only livable, but enjoyable. To ignore their plight is to do so at great risk.

Insects are the largest and most diverse group of organisms on Earth. Out of the nearly one million insects that we know about, less than four percent are considered pests. The rest go about their way making many of the things we consider important (in my case that would be the lowly midges that pollinate the cocoa plant). We rely on the collective services of insects to make the planet habitable.

Insects create the foundation for the world's terrestrial ecosystems. They break down leaf litter and wood, recycle dead bodies and aerate and mix the soil while returning essential nutrients that ultimately feed plants. These are "the little things that run the world," as the late biologist and ant specialist E.O. Wilson declared, representing the very base of the food web that so many other species—including the birds we invite to our gardens—rely on.

And humans rely on insects for pollination. An estimated three-quarters of our global food supply depends on this often-overlooked service.

Who among us is not familiar with the monarch butterfly, the bumblebee, our native ladybug? (Not to be confused with the nonnative nuisance variety.) These members of the insect world have become cultural icons, endearing for their colors and the playful roles we have assigned to them over time. The honeybee is synonymous with pollination, and yet they represent only a tiny fraction of all bees and are relative newcomers to our part of the world, having been imported in Colonial days expressly to ensure a supply of honey.

Worldwide there are an estimated 20,000 bee species, with 3,600 bee species that are native to North America. And despite our association of bees with hives, 90% of our native bees lead solitary lives (and are less inclined to sting because they're not defending a colony).

Despite the popularity of the homegrown "Pollinator Pathways" initiative that has taken many towns and garden enthusiasts by storm, just a handful of insects—pollinators and other beneficial species, remain familiar to many. But there are numerous fascinating and surprisingly common insects that can make our gardens and home grounds part of a greater understanding of the infinite possibilities that nature provides. Let's take a look at just a few.

## Unlikely habitat

I stumbled upon *Isodontia mexicana* only after repeated discoveries of grass stuffed into the runners of my window screens. Through the magic of Google, and, oddly enough, the perfect common name for this insect, I found the grass-carrying wasp. These small, black insects have a thin waist (giving them another common name: thread-waisted wasp). They will use any number of pre-existing cavities to nest but have discovered that in suburban neighborhoods window runners work just fine. The collected grass lines a nest where the female wasp will provision her young with a small cricket that she paralyzes (reminding us that while nature is efficient, it can also be the stuff of Stephen King novels).

Wasps are often reviled because they are associated with the more familiar



The syrphid fly has cleverly adapted the look of more aggressive insects (bees and wasps) to discourage predators. It is a common beneficial pollinator in our gardens.

yellowjacket that will readily sting in defense of its collective nest. *Isodontia mexicana* is one of the far more abundant group of solitary wasps that will only sting if it is handled. They don't actively defend their nest. And these wasps pollinate a variety of flowering native plants, with a preference for white flowers such as those of the common boneset (*Eupatorium perfoliatum*).

### Looks like a bee to me

If you spend just a short time looking closely at your garden in flower on a warm summer day, you will likely come across a syrphid fly, only you may initially assume it's a bee or wasp. That is because this insect has capitalized on taking on the appearance of another to mimic the defenses that it doesn't have, namely the ability to sting.

Look closely and you will be able to make the distinctions: this fly has only a single pair of wings, unlike bees and wasps that have two sets. They also have large eyes characteristic of flies and short antenna, unlike the species that they mimic. Commonly known as a "hover fly," you can observe them lingering over flowers, only to abruptly change course when disturbed.

Of the nearly 900 species of these flies in North America, most have the characteristic black and yellow stripes across their abdomens that help them easily blend in with their stinging neighbors. While they have no specific equipment to hold pollen, these flies nonetheless pick it up as they move about the garden seeking nectar to consume, therefore helping to ensure pollination.

Similar to our more familiar ladybug, in its larval stage the syrphid fly is an effective predator of aphids and other insects, making it a welcomed addition to any garden.



The burying beetle is a rarely seen nighttime visitor that is essential to recycling important nutrients in our gardens and home landscapes.

### The overnight clean-up crew

The burying beetle is a nighttime garden guest not often seen, explaining its lack of familiarity. But its recycling services are essential in our gardens and indeed all our terrestrial ecosystems. Its Latin name, *Nicrophorus tomentosus*, provides a clue: 'carrier of the dead.' Before you question why you would ever want such a character in your yard, remember that nature is the ultimate recycler: nothing is ever wasted.

This small red-orange and black beetle cleans up small dead rodents and birds, helping to explain why you probably don't see many of those in your yard, either.

Familiar names are telling: burying beetle or sexton beetle (historically church sextons' duties included digging graves) are both used for this species. This is because under the protection of darkness both the male and female will locate (via small clubbed antennae outfitted with the far-reaching capability of detecting a dead animal) and painstakingly bury a carcass to beat the competition. From there, these beetles will slow the decay of flesh with special secretions, while removing fur or feathers, using this to line the "nest."

I discovered this beetle quite unexpectedly when I decided to see how

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quickly a dead bird in my yard would be taken by a predator. Exploring at night with a flashlight, I was surprised to see movement in the sandy soil around the carcass, only to uncover this insect in the slow process of excavating a hole below it.

With the exception of social insects such as ants and honeybees, parental care is considered rare in insects. In this species, however, both parents remain to digest and regurgitate the food source for the larvae to feed on.

### You Can make a Difference

Expanding our understanding, appreciation and tolerance for insects has never been more important. In 2019 the United Nations issued a report on the status of global insect life. Among its conclusions: while global trends are not fully understood, rapid declines have been well-documented in those areas studied. These include the results of investigations from Germany and Puerto Rico looking at global data, all of which point to “*a serious, dramatic decline of insect abundance.*”

Some among us will remember there was a time when summertime was synonymous with clouds of insects in the car headlights at night, and windshields needing to be cleaned regularly. The alarming silence of our summers—both visual and auditory, is a palpable red flag.

But our backyard and community landscapes can be home to a wide assortment of beneficial insects, especially if we commit to sustainable garden practices such as planting native species, backing off on pesticides, and acknowledging that leaves and other organic debris aren't waste. They are the very source of food and shelter that provide for nature's most abundant, and often overlooked species—the insects.

### MORE INFORMATION:

The Xerces Society for Invertebrate Conservation, <https://xerces.org>  
Wild Ones: Native plants, Natural Landscapes, <https://wildones.org>  
Connecticut Chapter: [wild.native.plants@gmail.com](mailto:wild.native.plants@gmail.com)  
Heather Holm, Bee and Pollinator Books: <https://www.pollinatorsnativeplants.com>

## WHAT YOU CAN DO:

PLANT NATIVE PLANTS THAT INSECTS HAVE EVOLVED WITH

LEAVE THE LEAVES: THEY PROVIDE IMPORTANT FOOD AND HABITAT FOR INSECTS

BUY ORGANIC COTTON; CONVENTIONAL COTTON USES LARGE AMOUNTS OF INSECT HARMING PESTICIDES

HOLES IN YOUR LEAVES MEANS YOU'RE SHARING WITH INSECTS

REPLACE OR REDUCE YOUR LAWN WITH A DIVERSE GARDEN OR WILDLIFE HABITAT

SPREAD THE WORD!



The bright blue eyes of a bay scallop are clearly visible in the eelgrass beds of Niantic Bay. Photo: Robert Bachand



## TALK TO US

Send comments and questions about this issue to:

[judy.benson@uconn.edu](mailto:judy.benson@uconn.edu)

We'll share as many as possible, along with our responses, at: [seagrant.uconn.edu](https://seagrant.uconn.edu)

# Ash Creek in Fairfield: ‘shellfish paradise’ that can guide future restoration

By Judy Benson

Lifting the heavy mesh bag from the brackish waters of Ash Creek in Fairfield, Tim Macklin laid it on the wooden dock and smiled.

John Short stood nearby, smiling, too, at the bag bulging with 100 or more oysters, which had grown over the last year from dime-sized juveniles into adults that would fill their palms.

As water dripped off the bag, a dozen or so tiny grass shrimp and miniature crabs fell out onto the dock, evidence of how oyster communities make habitat for other sea creatures.

“It’s still a work in progress, and we’ve been learning as we go,” Short, chairman of the Fairfield Shellfish Commission, said on this mild January morning. Macklin is the vice chairman.

As part of that work, the two grabbed opposite ends of the bag and carried it off the dock to the edge of the creek, both shod in rubber boots to ably navigate across the exposed tidal mud. At a thick cluster of oysters that extended several yards into the creek, they emptied the bag, a musical clinking sound heard as the shells tumbled onto each other and the oysters already in the bed.



This map shows the location of Ash Creek, which forms part of the border between Fairfield and Bridgeport and flows into Long Island Sound. Graphic: Maxine Marcy



Spat collectors installed in Ash Creek by Fairfield Shellfish Commission volunteers were part of the efforts to restore the oyster beds there. Photo: Tim Macklin

“Over the last seven years, the number of oysters in the creek is probably tenfold what it was,” Short said.

The two became friends when their sons played Little League together. Short, owner of a commercial refrigeration and food equipment business, invited Macklin, producer of a culinary TV show, to join the commission in 2015 after learning he had studied marine science in college. Soon they began leading fellow commission members and other volunteers in a multi-pronged long-term effort to rebuild the natural oyster beds in Ash Creek, which forms the town’s southeastern border with Bridgeport as it flows into Long Island Sound. Equipment and supplies have cost the commission about \$5,000 so far, with funds coming from sales of recreational shellfishing permits.

“We’re just volunteers. We’re not scientists,” said Macklin. “But we’ve learned how to attract and grow oysters.”

Now, what’s happening in Fairfield is setting the example for other communities for shellfish restoration projects, with Short, Macklin and their team of volunteers serving as pioneers blazing a trail others can follow.

“They show how this can work on a small scale, and have big impacts,” said Tessa Getchis, aquaculture extension specialist at Connecticut Sea Grant. “They worked with state agriculture and environmental officials early on for regulatory guidance and to gain support for the effort, and then lined up a great group of public and private sector partners to initiate the program. It’s a really nice model other communities can use with volunteers or do on a larger scale.”

Working with colleagues at the state aquaculture bureau and other groups, Getchis is involved in several projects to foster conservation and restoration of the state’s natural shellfish beds. The purpose, ultimately, is to maximize the ecosystem services provided by oysters and other shellfish populations for the

*continued on page 20* ►



Left, Fairfield Shellfish Commission Chairman John Short, left, looks on as Vice Chairman Tim Macklin pulls a bag of oysters grown off a dock that will be replanted in Ash Creek. Above, Short and Macklin carry the bag to one of the beds in the creek. Photos: Judy Benson

health of the Sound for both wildlife and humans. That means taking actions that work with nature so that more places come to look like Ash Creek.

“Ash Creek is a shellfish paradise,” said Zofia Baumann, assistant research professor in the UConn Department of Marine Sciences.

She is part of a project using drones to survey oyster populations in the creek and other locations along the state’s shoreline.

“We need to show the potential for other sites in Long Island Sound,” she said.

What’s so special about Ash Creek? You might think of it as something like a trendy little city for shellfish.

There, the nutrient-rich fresh waters of the Rooster River mix with salty tides from the Sound and clams, mussels and oysters are thriving. The most abundant of these are the oysters, packed shell-to-shell in clusters expanding like old neighborhoods being gentrified and spreading into new neighborhoods nearby. The new and established oyster reefs are visible twice a day at low tide by local residents walking through the park along Ash Creek.

Among shellfish native to the Sound, Eastern oysters in particular are prized as a nutritious, commercially valuable food source and as highly effective filter feeders that help improve water clarity and quality by removing excess nutrients. Oyster reefs also serve as habitat for other marine animals and have been shown to have higher fish production rates than non-reef areas. They also act as natural speed bumps to buffer shorelines against wave action that causes erosion and flooding.

Short recalled that in 2015, state Bureau of Aquaculture Director David Carey met with the commission to encourage shellfish restoration projects. Ash Creek immediately came to mind as a place with the foundation already in place—an established population of oysters with potential for growth.

“We knew there were these two big beds already there, and a few other reefs,” Short said.

For starters, they wanted to build off the two big beds by bridging them together with new oyster growth. But to do that, they would need oyster shells to create the surfaces larval oysters need to grow on.

Obtaining that critical ingredient required starting a shell recycling program. Short drew on his many contacts in the restaurant industry to find willing suppliers—five or six local restaurants that serve raw oysters and were willing to collect and donate the used shell.

“We’ve collected 68,000 pounds of shell so far,” Short said.

After collection, the shell is piled at a site next to the town transfer station and sanitized by air drying for six months

before being distributed with the help of the municipal conservation crew in Ash Creek. Having a place to store and dry shell, plus equipment and manpower to move it is a critical piece of the puzzle, Getchis noted. Eventually, she hopes a network of shell recycling programs will be established across the state, so the Fairfield program is in effect serving as a pilot.

“We’re trying to learn from their program to help facilitate other programs,” she said.

In addition to adding shell to Ash Creek, the Fairfield team has also used spat collectors—devices that resemble enlarged versions of the concertina accordions played by sea shanty singers, turned on their sides and planted upright in the creek. Larval shellfish attach to the collectors and start growing, then are scraped off by volunteers and transplanted into cages or directly into shellfish beds in Ash Creek and other town waters to mature. They’ve also tried raising oysters in special devices called downwellers, more often used by commercial shellfish farmers than volunteer shellfish commission members.

“We’ve got a good group of people who want to be involved in this work,” Short said.

Macklin and Short said not every project they’ve tried has worked out, but overall, they’ve been encouraged by their success in Ash Creek. They also see potential for a lot more growth.

“We’ve had some successes and some failures,” Macklin said. “And we see changes from year-to-year in the areas of new growth.”

Added Short: “The amount of area that’s been restored is hard for a volunteer commission to measure, but we suspect it is minimal compared to the entire expanse of the reef.”

Staff from the Bureau of Aquaculture, Connecticut Sea Grant and scientists including Baumann and others are now working to help gather those measurements and make surveying oyster beds easier and more efficient.

## Six ecosystem services provided by oysters:

**Shellfish production**

**Habitat provision**

**Water filtration**

**Nutrient mitigation**

**Fisheries production**

**Shoreline stabilization**

Source:  
*Connecticut Shellfish Restoration Guide*



This photo taken by a drone shows a portion of the oyster beds in Ash Creek. Photo courtesy of Chandi Witharana

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# DRONE TECHNOLOGY could help advance shellfish restoration efforts

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Tessa Getchis of Connecticut Sea Grant, left, Kristin DeRosia-Banick formerly of the state Department of Agriculture-Bureau of Aquaculture and Clinton Shellfish Commission Chairman Wayne Church survey a natural oyster bed in Clinton in the summer of 2021. Photo: Judy Benson



**F**irst, find where the oysters are living now. Then start building on the existing populations.

That's the premise behind one of the keystone efforts to conserve and restore the state's natural oyster beds—valued highly for their ecosystem services.

“We surveyed 67 intertidal sites in 2021, and there are plans to continue that work,” said Tessa Getchis, aquaculture extension specialist at Connecticut Sea Grant.

The surveys thus far were done on foot, with Getchis and members of the state Bureau of Aquaculture led by town officials or members of local shellfish commissions to known locations of wild and public oyster beds. They photographed, collected data and assessed the overall condition of each. Ultimately, they used this information to create the first map of Connecticut's natural oyster beds in more than 100 years.

But the map is still a work in progress, with more sites to survey. There are areas that are inaccessible by foot, Getchis said. Many other beds are tucked along small meandering streams hidden behind marshes, or hug mud flats that would swallow up anything heavier than a seagull. Even areas like Ash Creek in Fairfield that may seem easy to reach have many sections that aren't.

The survey team is hoping cameras mounted on drones can be used to complete the picture.

“We want to understand if we can use drone technology to survey areas that are inaccessible by foot, and also to provide other measurements that aren't readily conducted on other surveys, such as the vertical relief and spatial coverage of the reef,” said Alissa Dragan, supervising environmental analyst at the state Department of Agriculture's Bureau of Aquaculture. In other words, drones could be used to collect data that could be used to determine the depth and surface dimensions of a reef, then estimate the number of oysters, in areas that can't be reached by on-the-ground techniques.

“What the use of drones would do is help expand coverage to areas we cannot access due to trespassing on private property, mud, railroad tracks, or any barrier to physically getting to a site,” Dragan said. “We might also be able to use drones to find hidden pockets of oysters that we were unaware of and potentially be able to get some underwater footage.”

In December, Zofia Baumann and Chandi Witharana, respectively professors in UConn’s departments of Marine Sciences and Natural Resources and the Environment, oversaw a drone flight over Ash Creek piloted by NRE doctoral student Durga Joshi. They wanted to learn whether this technology would help increase spatial coverage of the surveys and create more accurate maps. Though the area they surveyed wasn’t large—a nearby airport limited their flight path—the trial revealed that drones could be a very useful tool in shellfish restoration.

“We were able to visually document how extensive the reef was,” said Baumann. “During my previous visit to the site, I could see only a small portion of it. I had no idea how far the reef stretches, and the drone images revealed that. We are lucky here in Connecticut to have these intertidal reefs and to conserve them we must document them meticulously.

“We need to know what is there to protect it,” she added.

Baumann and Witharana are hoping to use the information gathered in this trial run to find funding and partners for a thorough drone survey of Connecticut’s intertidal oyster reefs. Such a survey could be a key addition to the *Connecticut Shellfish Restoration Guide*, an instruction manual being created by a statewide committee, Baumann said. She also hopes the drone images will be of use to local volunteers who understand the value of healthy shellfish populations.

“We will share these with the shellfish commission members in Fairfield so they can use the images in advocating for oyster conservation there,” Baumann said. “I think anyone who views the drone images will be blown away. The reefs in Ash Creek are simply stunning and the oysters there are doing incredible work in maintaining a healthy ecosystem.”

—Judy Benson



Drones equipped with cameras can help advance shellfish restoration efforts. Photo: Chandi Witharana



Eel grass, seaweed and slipper shells make up the wrack line at Harkness Memorial State Park in Waterford. Photo: Judy Benson

## What's in our names?

What are wrack lines? The word wrack is a term for various kinds of seaweed, and wrack lines are the collections of organic matter (sea grass, shells, feathers, seaweed and other debris) that are deposited on shore by high tides. More generally, wrack lines are where the sea meets the land.

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 the 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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