



Annual Message from the Foundation



Dear Neighbors, Friends and Supporters,

In May of 2020 our marvelous Executive Director Emily Reddington penned an op-ed piece for the Vineyard Gazette. In it she wrote, "The water that divides us from the mainland, unites us as a community. Our physical isolation from the mainland reminds us of the essential role our community and its resources play in our ability to respond in times of crisis." She added, "Our coastal ponds are ecologically fragile treasures whose preservation and restoration are vital to the resilience and long-term sustainability of the Island community." Those words served as an inspiration for Great Pond Foundation this past year, even as the pandemic thwarted or limited many activities.

The Foundation is collaborating with the Chilmark Pond, Tisbury Great Pond, and Crackatuxet Cove communities in an effort to share common concerns as to estuary water-quality and expects to enlarge its collaborative circle. A science-based conversation with multiple communities raises island-wide awareness of problems encountered, in one degree or another, at a variety of locations on the Vineyard.

Under Ms. Reddington's guidance, the Foundation spearheaded MV CYANO_{TM}, a collaborative initiative with Island Boards of Health, with scientific and financial support provided by the Chilmark Pond and Great Pond Foundations, to monitor cyanobacteria (a.k.a. blue-green algae) on Chilmark, Tisbury, and Edgartown Great Ponds, and Crackatuxet Cove. With heightened concern about cyanobacteria blooms and their pernicious effects on water quality and community safety, an outreach program posts regularly on the Foundation's web site. The Foundation, with guidance from Island Boards of Health, also created clear, picture-based signage clarifying which pond-use activates were safe or advised against. [page 10]

The Foundation continues its efforts with the regional scientific community. By way of example, Marine Biological Laboratory in Woods Hole assists the Foundation's investigations of sources of nutrient pollution. Working together with MBL provides results of laboratory nutrient analysis on a rapid-turnaround basis.

The Foundation staff continues to coordinate with the appropriate Town of Edgartown entities as to Edgartown Great Pond dredging activities, and the need for and timing of "cuts" opening the pond to the sea. Adjusting water levels, flushing the pond, and salinity management are critical for maintaining a healthy pond. The success to date of these activities has not gone unnoticed elsewhere on the island. The officials of Edgartown have proven to be sensitive to our collective concerns about Edgartown Great Pond and have been immensely helpful.

The Foundation has added to the Foundation's scientific staff: David Bouck, a native Vineyarder, is now our Watershed Outreach Manager. He joins the staff after having worked with Trustees of Reservations, NOAA, USGS, and the National Park Service, and brings an appreciation for complex and fragile habitats. Erin Hepfner also joins the staff part-time as the Communication Coordinator. Being familiar with non-profits, she has worked at public gardens across the country. She spent many years at the Polly Hill Arboretum and was recently a Fellow in the prestigious Longwood Gardens Fellows Program. Emily, David and Scientific Program Manager, Julie Pringle, another born-and-raised Islander, are now working from new Foundation offices near the Martha's Vineyard Airport. The new space offers adequate office and laboratory space for our current and expected near-term needs.

There have been changes to our Board of Directors and our Advisory Council as well. Brendan O'Neill, after two decades of board service, finally persuaded the Foundation to let him step down. He has the Foundation's everlasting thanks. We have been fortunate to welcome new board members added from the Martha's Vineyard community: Jeremy Houser brings scientific expertise and communications capabilities. He currently serves as an Ecologist and Communications staff member for the Vineyard Conservation Society. We are also delighted to welcome Melani Nardone, Zeev Pearl and Richard Saltzman. Melani lives year-round in Boldwater and follows Edgartown matters with great attention. Zeev Pearl, whose home is on Jobs Neck Cove, has both technical and legal training and is an intellectual property lawyer. Richard Saltzman, with a long career in finance, has a King Point home on Slough Cove.

The GPF Advisory Council continued to expand, and, with the addition of Glenn Larsen and Lisa MacKenty, now has seven members. The Council works together with staff and the Board to focus the future directions of the Foundation's activities. See right-hand inset for a listing of all members of the Advisory Council, to whom great gratitude is owed.

Finally, it is with sadness that we once again acknowledge the passing of our former colleague, Dave Luening, last September. A long-term leader on the Great Pond, Dave helped to establish the Foundation, and through his efforts helped to return this beloved body of water to good health. Dave's legacy of pond stewardship lives on through the Dave and Doris Luening Pond Sustainability Series [page 18].

As always, we thank you for your continued support.

Alfren AC Greer

Chair of the Board of Directors

Michae (Michael Shalett President





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Watershed Outreach Manager



Ecologcial Time Capsule

By Emily Reddington, Executive Director

When you are alone on the shores of one of the Island's great ponds, do you ever feel that you are apart from time, as if you are experiencing a nature of centuries past? To be able to step away from the normal confines of time and technology and simply experience the pleasure and purity of time in nature is something precious and rare indeed. The conservation of open, undeveloped spaces as well as a conscious choice by Island leaders to preserve the rural character of the Island has made Martha's Vineyard somewhat of an ecological time capsule.

While most coastal ponds in the northeast are struggling for survival, many of the Island's great ponds not only give us reason to be hopeful for restoration—some of them are even thriving. Take Edgartown Great Pond for example, eelgrass and widgeon grass can be found in nearly every region of the pond and this vibrant ecosystem is teeming with diverse life. Tisbury Great Pond, although it has challenges with water clarity, still boasts a healthy phytoplankton community, floral diversity, and abundant waterfowl. Chilmark Pond, although it has experienced cyanobacteria blooms in the past, did not experience a single bloom in 2021. By contrast, comparable ponds that dot the southern coast of Long Island experience annual harmful algal blooms.

Because the pressures of development and ecological change have been slower to manifest on Martha's Vineyard, our ponds are like Cape Cod ponds 30-50 years ago. How fortunate we are to be able to learn from our neighbors on the Cape and Long Island and to make changes now, while there is still much life in our coastal ponds.

The Island depends on clean and healthy coastal waters to feed families and support the local economy. Our coastal ponds are rare, ecologically fragile treasures whose preservation and restoration are vital to the resilience and long-term sustainability of the Island community. Elevated nitrogen and phosphorus levels, rising temperatures, and other challenges associated with climate change are problems for which every pond on Martha's Vineyard must prepare.

The solution to protecting our ponds is neither singular nor static. Restoration is a continual process of adapting the changing needs of a living system. Please join Great Pond Foundation in our efforts to restore the ecological health of our coastal ponds through scientifically informed management, public education, and community collaboration. It is going to take an Island of informed and engaged community members to protect our precious ponds.



With the unique gift of foresight, now is the time to time to act to protect our vulnerable waters. The choices we make as an Island community over the next few years will shape the fate of our waters for generations. Time is of the essence, if we don't act now, our ecological time capsule will be no more. To preserve our coastal ponds we need to limit and reduce the nutrient pollution (nitrogen and phosphorus) within our watersheds; we need to think strategically about development with ecological integrity, focusing on sustainability of our community and our waters; and we need to work together to create Island-wide solutions, because waters and watersheds do not follow town boundaries.

What You Can Do:

Sign up for our newsletter and stay informed about pond news and events. Follow us on Instagram to stay connected.

PARTICIPATE:

Attend the Island Ponds Community Workshop [page 11], or watch the recordings to learn about critical Island pond issues.

ADVOCATE:

Speak to your local select boards, boards of health, planning boards, and advocate for the protection Island ponds and watersheds. Excess nitrogen, watershed development, and climate change are increasing the ecological pressure on our ponds.

DONATE:

Your support enables GPF to continue advocating for the science-based management of the Island's great ponds and to enhance our understanding of the sources of nutrient pollution causing impairment, specifically recent algal blooms, and ultimately make strides towards targeted remediation.



Documenting Biodiversity in Edgartown Great Pond

By Julie Pringle, Scientific Program Manager

Great Pond Foundation's extensive water quality monitoring program recently got an upgrade thanks to a grant from the Permanent Endowment of Martha's Vineyard, now the Martha's Vineyard Community Foundation. This grant allowed us to purchase the equipment necessary to start a Biodiversity Monitoring Program on Edgartown Great Pond. In addition to measuring chemical parameters of the water such as pH, salinity, and dissolved oxygen, we are now able to collect data on what species are found in the pond at all levels of the food web. This fills an important gap in our understanding of the health of the Pond and allows us to detect shifts in species over time.

Biodiversity is often used as an indicator of ecosystem health and resilience, as healthy and vibrant ecosystems can support a larger number of species. Clean, healthy waters support many species such as eelgrass, plankton, shellfish and finfish. In order to assess these biological resources, we used grant funds to purchase equipment such as a beach seine net, plankton nets and two microscopes.

What is this new equipment?

Beach Seine Net

The beach seine net has formed the core of our Biodiversity Monitoring Program. This net, 30 feet long and 6 feet tall, is dragged across shallow water capturing animals from the bottom of the water up to the surface. Primarily fish are captured (see photos below), however invertebrates such as crabs and shrimp are also commonly caught. These data are useful for tracking changes in species composition and abundance over time. Additionally, since Edgartown Great Pond is opened to the ocean, the beach seine net can be used to observe on how biodiversity shifts after these openings.











Plankton Nets

Two plankton nets were purchased with this grant. One has a mesh size of 50 micrometers, while the other has larger pores with a mesh size of 150 micrometers. The smaller mesh captures microscopic plants called phytoplankton. The net with larger mesh captures microscopic invertebrates called zooplankton. These plankton form the base of the food web, providing food and energy for fish and other larger animals. It is important to understand which species are present, and how species abundance shifts seasonally. Additionally, the phytoplankton net can be used in the MV CYANO program GPF recently developed with local Boards of Health.

Microscopes

GPF is the proud new owner of two microscopes. One microscope is a stereomicroscope, also called a dissecting microscope, which is useful for observing whole specimens of larger organisms, such as invertebrates and fish larvae. The second microscope is a compound microscope, which has greater magnification and is used to look at smaller organisms such as phytoplankton. This compound microscope can be used to identify cyanobacteria, which is useful to GPF's MV CYANO program. Both microscopes can attach to a camera, which allows photos of specimens to be taken and catalogued.











It is necessary to collect data on these living resources of the ecosystem to gain a more complete understanding of the efficacy of policies and management strategies, such as how Pond cuts affect fish and crab migrations. Observing biodiversity within the pond will elucidate links in the food chain, providing important data on the food sources of fish and shellfish. Additionally, monitoring the seasonal changes in plankton and finfish species composition, abundance, and distribution will further enhance our internship and outreach programs, providing valuable skills to young scientists and local students. Further, knowledge of the biodiversity within Edgartown Great Pond is useful to managers and stakeholders of other Island waterways and will provide invaluable data on how Martha's Vineyard's estuarine resources shift due to climate change. Thank you Martha's Vineyard Community Foundation!

Field Team 2021

Summer is an exciting and busy time on Edgartown Great Pond. Despite a second summer working with limitations due to COVID-19, we were able to have three interns helping with our monitoring programs. We expanded to monitoring Chilmark Pond, Tisbury Great Pond and Craxatuxet Cove, so we greatly appreciated the extra help! This year we had one intern focusing on the MV CYANO_{TM} program and two supporting our Ecosystem Monitoring Program. It was a busy summer, but we had a great field team!

GPF's Public Health Intern: Rebecca Eyrick

Rebecca Eyrick is a junior at Purdue University in Indiana studying Public Health with a concentration in environmental health. Rebecca has always cared about nature and environmentalism, participating in several college clubs and organization focused on climate change and nature conservation. She grew up in Indiana with yearly trips to the Vineyard which deepened her passion for nature and environmental biology. She was excited to work with GPF and help contribute to the health of the Great Ponds of Martha's Vineyard.



GPF's Summer Science Intern: Maggie Sandusky

Maggie Sandusky recently graduated from the State University of New York College of Environmental Science and Forestry with a degree in Conservation Biology focusing on Marine Science and Environmental Writing and Rhetoric. She strived to access research opportunities throughout her college experience and assisted in two research labs during her undergraduate career; one focusing on Humpback Whale dive behavior and Southern Right Whale call frequency and the other investigating the relationship between hypoxic conditions detected via manganese concentrations in the inner ear bone of fishes and parasite load. In addition to research, Maggie has experience in education via working for the Maria Mitchell Association on the neighboring island of Nantucket. She has a love for brackish systems due to her childhood on Cape Cod exploring the salt marshes and tidal ponds near her home. Joining the GPF team allowed her to give back to these ecosystems that instilled her passion for biology and conservation.



GPF's Summer Science Intern: Kendall Rudolph

Kendall Rudolph is junior at Iowa State University majoring in Animal Ecology, Fisheries and Aquatic Sciences. She has been coming to Martha's Vineyard every summer since she was 3 weeks old. During her time on the island, Kendall developed a deep appreciation for the aquatic ecosystems on and around the island. She has taken classes at Iowa State like Fish Biology, Natural History of Iowa Vertebrates and Aquaculture and was able to apply what she is learned in her classes as a Summer Science Intern at the Great Pond Foundation. In Iowa she works as the Aquatic Specialist at a local pet store maintaining over 75 freshwater and marine habitats. In her spare time she enjoys spending time with her friends and caring for her two guinea pigs and chameleon.



Thank you to all our interns for all your hard work and dedication this past summer!

GPF Community Engagement

This past summer GPF cohosted an event on Sengekontacket Pond with Friends of Sengekontacket and Island Spirit Kayak. This 'Species Roundup' was an opportunity for the island community to learn about the fish and invertebrates that live in our local coastal ponds.

Representatives from all organizations helped conduct the seine tows, haul in the critters that were caught, and identify the organisms for curious onlookers. This event had over 50 participants, most of whom were children. It was a fantastic learning opportunity for the next generation of Island pond advocates, whose eyes were opened to the array of life living beneath the water's surface. We received positive feedback from many parents in attendance, and plan on making this an annual event. In the future, we hope to do events like this on other ponds as well.













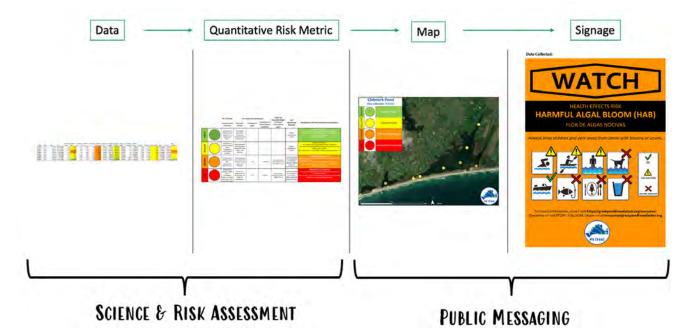


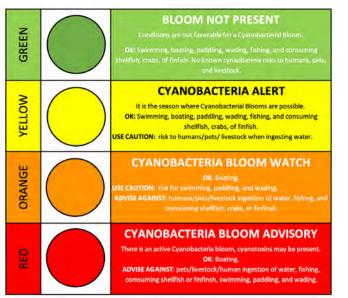
MV CYANO_{TM} - GPF's cyanobacteria monitoring program

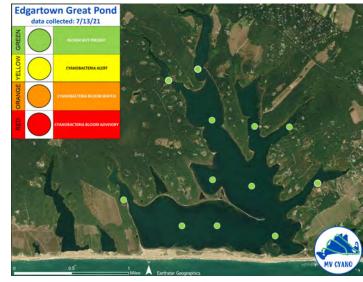


MV CYANO_{TM} is a collaborative initiative among Island Boards of Health and scientists from Great Pond Foundation to bring a first of its kind cyanobacteria monitoring program to Martha's Vineyard. Cyanobacteria, a.k.a. blue-green algae, are a group of microorganisms found in all Vineyard waters. When cyanobacteria grow rapidly or bloom, they can produce cyanotoxins, which when concentrated, can cause adverse health effects in humans, pets, or livestock who wade in or ingest blooming waters.

In 2021 this coordinated pilot program monitored cyanobacteria presence and potential for toxic blooms in Chilmark Pond, Tisbury Great Pond, Edgartown Great Pond, and Crackatuxet Cove. Updates were posted on a weekly basis on respective Town, Chilmark Pond Foundation, and Great Pond Foundation, websites. This program will continue in 2022.







Island Ponds Community Workshop

The Great Pond Foundation presented a 3-part Zoom workshop featuring presentations and panel discussions from fellow pond managers, scientists, and advocates. This series highlighted issues that impact ponds and watersheds across Martha's Vineyard and supports Island-wide collaboration, communication, and action among pond groups. This series was made possible through a grant from the Edey Foundation. Recordings of each webinar can be found at https://greatpondfoundation.org/ipcw/.

Dec. 2nd - Excess Nitrogen & Land Use Change

Our ponds are struggling! Why, and how do we fix it?

Keynote Speaker **Dr. Javier Lloret** of Marine Biological Laboratory will discuss the use of isotopes to identify nitrogen pollution sources. *A Presentation of the Dave and Doris Luening Pond Sustainability Series*.

A panel discussion of local experts, including Dave Grunden, Paul Bagnall, Melinda and Michael Loberg, Chris Seidel and Javier Lloret will follow.

Dec. 9th - Pond Systems Out Of Whack

Increasing environmental pressures are causing extreme conditions in our ponds. What are the risks?

Part I – Keynote Speaker **Dr. Christopher Gobler** of Stony Brook University will discuss Harmful Algal Blooms (HABs).

Part II – Invasive Species Information Session

Jan. 13th '22 - Pond Data & Climate Change

Keynote Speaker **Liz Durkee**, Climate Change Planner for the Martha's Vineyard Commission will discuss planning for climate change with a focus on pond management. A panel discussion on how scientists and managers can work together to combat the impacts of a changing climate using data driven management will follow.

Mapping Seagrass and Blue Carbon in Slough Cove, **Edgartown Great Pond**

By David Bouck, Watershed Outreach Manager

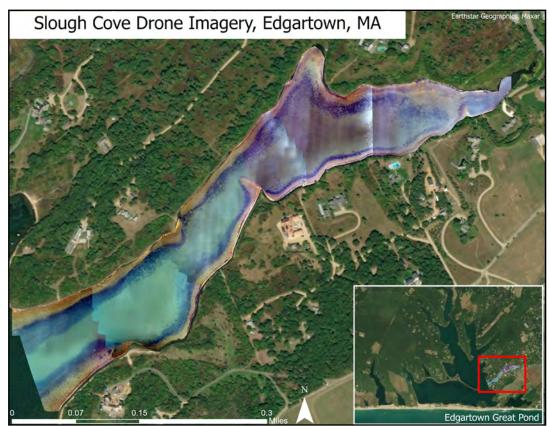
Through a grant provided by the Edey Foundation and in partnership with Chris Seidel of the Martha's Vineyard Commission (MVC), GPF scientists conducted a drone photography survey of Slough Cove in Edgartown Great Pond during the summer of 2020. The purpose of this collaborative effort was to map eelgrass (Zostera marina) and widgeon grass (Ruppia maritima) beds in Slough Cove and calculate the amount of buried carbon, called Blue

BLUE CARBON is the carbon sequestered by coastal marine ecosystems. Coastal ecosystems are capable of removing large amounts of carbon from the atmosphere and storing it for centuries to millennia.

Carbon, stored in this part of the Great Pond. Carbon can be buried or sequestered in the sediments below eelgrass meadows for hundreds to thousands of years.

The 2020 drone survey resulted in a collection of nearly 1,500 high-resolution images of the entire cove. Chris Seidel then stitched these together into a single composite mosaic. High-resolution imagery captured by a low-flying drone can provide much more information than standard aerial and satellite images. A single pixel within imagery such as this may translate into a square inch of geographic space, or lower. In comparison, publicly available satellite or aerial imagery typically result in resolutions of 1-20 square feet, per pixel. This incredible amount of detail enabled the use of geographic Information Systems (GIS), and image analysis software to generate representative estimates of seagrass habitat area and distribution throughout Slough

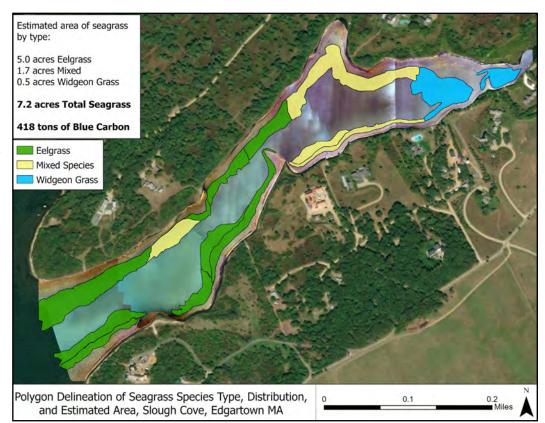
Utilizing this imagery, GPF employed two geospatial techniques to estimate the total area of seagrass habitat throughout the cove, using ESRI's ArcGIS software. The first method employed a more traditional tactic of seagrass habitat delineation by eye. Visual inspection of the mosaic imagery for tell-tale signs of shading under the water, indicative of seagrass beds, allowed us to hand-draw the approximate boundaries of the habitat. The resulting polygons were two-dimensional representations of geographic area. These shapes were then cross-referenced with field survey data to indicate which species of seagrass have been previously identified within those areas. Total area of seagrass habitat was calculated from the total area of each polygon.

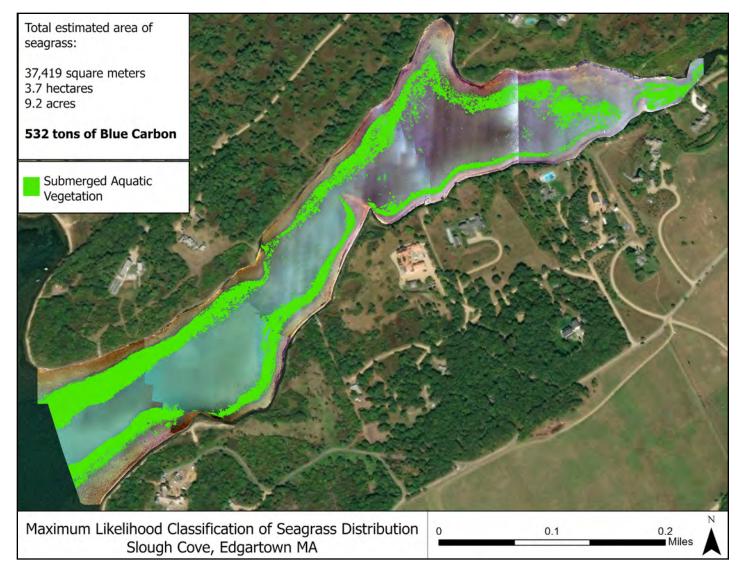


The second method used ES-RI's Image Analysis software to perform a Maximum Likelihood Classification (MLC) to estimate and delineate seagrass habitat. MLC is a probability technique used to assess the relationships between multiple features in geographic space. Training samples are created to teach the computer to recognize the spectrum of color that is associated with a "class", or in this case, the shadows that indicate submerged vegetation. The computer then reviews every single pixel of the mosaicked imagery and assigns it as either vegetation, or not. A MLC can produce a much more detailed, and nuanced representation of the seagrass beds than the hand and eye can create in the same amount of time. This

method also generates a total area estimate but cannot discern between different species of seagrass.

With our total area estimates in-hand, the amount of Blue Carbon these habitats might contain were derived with some help from our partner, Phil Collarusso, a scientist with the Environmental Protection Agency. Carbon storage estimates from Ninigret Pond in Rhode Island, which has similar conditions to EGP, were factored into our total habitat area in Slough cove to estimate its Blue Carbon potential. The results for each method are illustrated in our maps.





History of Mattakeset Creek

By Michael Shalett, GPF President

"I think living in harmony with a place, with the land, is still a powerful tradition here. But the future holds great challenges. The beauty of the island draws more people from many places, and the lure of remaking this place in their own image is great. Awareness of and understanding of the past will hopefully help us sustain some kind of balance in the future."

Linsey Lee -- Curator of Oral History at the MV Museum.

At the southeast corner of the Edgartown Great Pond one finds a permanent cement sluiceway, reconstructed in March of 2003, that connects to Crackatuxet Cove, an adjacent coastal pond. The sluiceway enables the Pond's water table to be maintained at a height sufficient to allow for the breaching of the Pond to the ocean, like a dam, while also allowing for the Pond to be drained when required by weather conditions.

At one time this corner of the pond was connected via the Mattakeset Herring Creek, through Crackatuxet Cove then part of the Great Pond, all the way east to the waters of Katama Bay. The first Mattakeset Creek was dug in the early 1700's. The original creek was abandoned to be replaced in 1889 by a straight ditch from the Bay to Edgartown Great Pond. This access enabled the establishment of a productive, private alewife fishery. The Mattakeset Creek Company was then created and given undisputed control of the herring fishery by the State of Massachusetts.

Herring would enter from the bay and head west toward fresh water for spawning. By the mid-19th century, the fishery was netting \$4,000 to \$5,000 of herring a season. Herring were being used as bait by "smacks" or schooners that came down from Boston and Gloucester. The herring were also being shipped to the West Indies to feed slaves. In the 1920's Ralph Bodman, a chemist from Hyannis, created a process to remove the glittery substance in the herring's scales to make strong synthetic pearls; Priscilla's pearls as they were named in Edgartown.

However, after 1954 there was little demand for herring. The connection between Crackatuxet Cove and Edgartown Great Pond filled in and, with no passage available and little flow down the creek, the run no longer existed. With passage of legislation from the State that gave the Town control of pond openings, the salinity of pond was managed for shellfish.

In March of 2002, Charlie Blair, harbor master in Edgartown, announced an ambitious \$600,000 project to rebuild the herring run. It was titled as the "Great Ponds and Herring Creek Restoration Project". The Town of Edgartown with the cooperation of state and Federal agencies and NGOs proposed to reestablish the connection with a control structure (sluiceway) that would allow regulation of salinities within Crackatuxet Cove and provide restored spawning habitat in this 38-acre pond. At that time \$250,000 had already been raised, from a grant from Fish America, and donations from the Herring Creek Trust and Great Pond Foundation. A year later the reconstruction of the permanent cement sluiceway to connect Great Pond to Crackatuxet Cove was completed.

However, since that time, the creek has been allowed to fill with phragmites and there is little flow. While the sluiceway can be used when needed to reduce pond height on EGP, the salinity of the water would not be conducive for the spawning of herring. Data collected on Crackatuxet Cove by the Foundation shows signs of a body of water in some distress.

It could be that it is time to revisit a renewed project to re-establish the Mattakeset Creek. As we are reminded by the opening quote of Ms. Lee, there is a great history to the creek in southeast corner of the Vineyard. Awareness of those facts, and an understanding of the role that the creek played in the health of the ponds and the island in the past, beckons us to review its viability moving forward.







2020 Financial Highlights

Total revenue for 2020 were \$467,559, below 2019's record of \$579,890, which benefited from a large grant. In 2020, the Great Pond Foundation continued to strengthen its financial position.

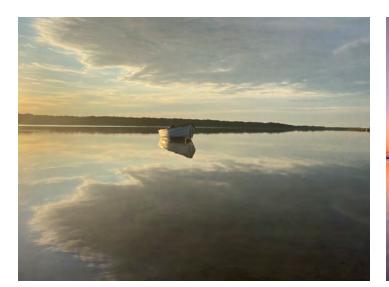
- Revenue exceeded total expenses of \$302,213 by \$277,677
- Net assets grew by 25%
- These financial bellwethers were achieved even as the Foundation continued to transition its principal activities from dredging to science and education programs

When Covid-19 created an Island-wide need for resources early in 2020, GPF intentionally abstained from applying for Island-based grants so that people and organizations most in need would be supported locally. The exception to this was a grant from the Edey Foundation which resulted in the Island Ponds Community Workshop series.

Looking ahead to 2021, despite the global disruption related to COVID-19, the generosity of our donors has been particularly encouraging and appreciated. We will continue to focus on enhancing and protecting the Great Pond, supporting solutions to environmental problems affecting it and similar coastal ponds through an array of activities informed by











In Memory of Dave Luening



In fall of 2020, we lost a founder of the Foundation and a pillar of the pond community, Dave Luening. In honor of Dave and his immeasurable and enduring contributions to Edgartown Great Pond, Great Pond Foundation establishes the Dave and Doris Luening Pond Sustainability Series. The purpose of this annual speaker series is to inform and unite the community in order to support the sustained protection of the Great Pond and assure that future generations can experience the profound natural beauty and thriving ecosystem that Dave and his family fell in love with 50 years ago.

Dave and Doris Luening Pond Sustainabilty Series speakers:



2020 Speaker: Dr. Christopher Gobler -Cyanobaceria and Pond Health



2021 Speaker: Dr. Javier Lloret - Using stable isotopes to identify sources and effects of nitrogen pollution in Great Pond

Thank you to the following donors who made contributions in honor and memory of Dave Luening: George Bauer, Susan and Richard Bell, Cape Air Foundation, Stefanie and Douglas Cronin, Katharine and John Culbert, Margaret Hessler, Patricia Hughes, Linda and Gerald Jones, Kanomika Point Association, Joseph Loughrey, Doris Luening, Kimberly and Richard McCaslin, Mark Patinikin, Leah and Bob Rukeyser, and Bob Woodruff.







Thank you for your generous support in 2020!

Leadership Circle - \$10,000 +

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John & Inge Stafford Foundation
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Kohlberg Foundation
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Clean Water Coalition - \$1000 to \$2499

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