GREAT POND FOUNDATION... ANNUAL REPORT 2021





Annual Message from the Foundation



Dear Friends of the Great Pond Foundation,

In the Commonwealth of Massachusetts, a pond (or lake) is denominated as a great pond if it exceeds 10 acres in size, and Martha's Vineyard has 16 great ponds. As we wrote last year, your Foundation seeks to be vigilant as to the health of Edgartown Great Pond (EGP) and to include in its scope bringing together the parties that have an interest in or watch over the Vineyard's other great ponds. Your Foundation has found a receptive audience, as other great pond communities have begun to look to us as a collaborator and source of knowledge and experience as they engage in their own efforts. Some examples will be illustrative.

Our Ecosystem Monitoring Program included Chilmark Great Pond in 2021 in cooperation with that great pond's community. Your Foundation also has been asked to help with monitoring efforts for Tisbury Great Pond and, closer to home, Crackatuxet Pond next door. Read our reports for EGP and these three other bodies of water on the publications page of our website. In 2022, we expect to expand our collaborative efforts with the Chilmark Great Pond community, and in return that community will help fund our efforts on its behalf.

During this past year, we and our Crackatuxet neighbors conducted a year-long study in order better to understand the history and health of Crackatuxet Pond and the Herring Creek, and learned that Crackatuxet would benefit from restoration efforts to increase levels of dissolved oxygen and reduce levels of nitrogen and of cyanobacteria.

Data gathered from our monitoring program last summer specific to cyanobacteria in the Edgartown, Chilmark and Tisbury Great Ponds can be found at GreatPondFoundation.org/ MVCyano/2021Data is an innovative collaboration between your Foundation and the Island Boards of Health. Cyanobacteria blooms produce cyanotoxins, exposure to which may adversely affect humans, pets and livestock. The website proved valuable and popular: it had more than 5000 visits from over 2000 individuals. Your Foundation has recently been awarded an Edey Foundation grant to fund similar monitoring of other Vineyard ponds, including Sengekontacket and Tisbury Springs Pond, in conjunction with the Friends of Sengekontacket and Tisbury Waterways, respectively. Other such efforts may follow.

Our work with the Marine Biological Laboratory (MBL) in Woods Hole continues, and MBL provides its sophisticated testing capabilities to samples gathered and submitted by our science staff. In 2021, a study conducted by Dr. Javier Lloret, a scientist with the MBL, using isotopes to identify sources of nutrients in EGP, identified wastewater as a primary source of increased nitrogen loading in the pond. Further work will follow to pinpoint the location and magnitude of possible wastewater inputs, such as the Wastewater Treatment Facility or development or habitation activities within the watershed.

Dr. Lloret presented his study as part of the Dave and Doris Luening Pond Sustainability Series, held as the opening presentation of the Island Ponds Community Workshop. The workshop was presented by your Foundation in a three-part "Zoom" format last December and January featuring presentations and panel discussions from fellow pond managers, scientists, and advocates. The Martha's Vineyard Commission, Island Boards of Health, MV Shellfish Group, and the Wampanoag Environmental Lab all were participants. Issues that have an impact on ponds and watersheds across the Vineyard were highlighted, and an ancillary goal was to increase Island-

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wide collaboration, communication, and action among pond groups. The Island Ponds Community Workshop was made possible by a grant, also provided by the Edev Foundation.

Your Foundation was instrumental as to a first-time mapping effort by the Massachusetts Department of Enivornmental Protection of the eelgrass on the south shore ponds of Martha's Vineyard. Eelgrass is considered an important indicator of pond health, and often helps inform pond-management decisions at the local, state, and federal levels. By way of example, housing needs and pressures are faced by every community on the Vineyard and knowing accurate nitrogen limits of affected water bodies is a necessary component of sensible land-use planning.

Robust data collection on EGP remains the centerpiece of our endeavors. We collect water sampling data from 12 different stations multiple times a week between late spring and early fall at a variety of locations in the 890 acres of EGP. Much of that data is generated by our Summer Science Interns, who spend several months collecting and processing samples on EGP. As part of our mission, we seek to present our findings at the annual gatherings of neighborhood associations around the EGP, which have resulted in specific collaborative efforts by way of response.

Longtime Edgartown Shellfish Constable Paul Bagnall has retired. The Foundation and all riparian owners owe Paul hearty thanks for his decades of dedication and stewardship of EGP, and welcome new Shellfish Constable Rob Morrison. Rob has been deputy constable for the past 10 years and is a strong advocate for the science-based management of EGP. We've enjoyed our past work with him and look forward to the years ahead.

All of these activities can only happen because of your support. The current financial position of your Foundation is the strongest in its history. We would like to reiterate that the work being done on projects in collaboration with other Vineyard ponds is supported with funds from grants and revenue provided by contributions from other pond communities and foundations. It is inspiring to be able to work with people from multiple organizations dedicated to the good health of the water bodies here on the Vineyard.

We will continue to advocate for the health of EGP and ponds across the Island. We do so with our thanks for your support.

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Look to Land to Increase Pond Resilience

By Emily Reddington, Executive Director

The fate of our ponds is intertwined with the land through which their waters flow.

Raining down upon the land, seeping into the soil, and flowing

into ponds through groundwater and streams, water interacts with land on its way to Island ponds. A pond's watershed can be thought of as the vessel of land that captures all of the water that eventually spills into the pond. As water flows through a watershed, the water soaks up biological (microbes) and chemical (nitrogen and phosphorus) elements, transporting them into the ponds. If we want to protect our ponds, we must look beyond their shores and think critically about what is happening on the land that surrounds them.

TWO CHALLENGES FACE ISLAND PONDS

The two greatest challenges facing Island ponds are warming temperatures and increasing nutrient pollution, triggered by climate change and shrinking natural lands respectively. The globally increasing temperatures of our changing climate are literally turning up the heat and increasing the pressure on ecosystems. Heat speeds up the rate at which biological and chemical processes occur. When ecosystem processes move too quickly, nature cannot maintain its balance and the system becomes unstable. Nitrogen and phosphorus are vital building blocks of life, but in excess, they are detrimental to pond health.

Just as a tomato plant in your garden thrives in summer heat when fed fertilizer, algae in ponds grow out of control or "bloom" when water temperatures are hot and there is an overabundance of nutrients (nitrogen and/or phosphorus). Harmful algal blooms such as cyanobacteria (see photo top right) and macroalgal blooms (see photo bottom right) are examples of uncontrolled or out of balance growth in our ponds. Harmful algal blooms are catalyzed by the combination of heat and excess nutrients.

When humans change an intact native landscape into a developed one (with houses, manicured lawns, wastewater, and fertilizer), more nutrients are being added to the environment than the land can process. Native vegetation and intact landscapes have an innate ability to attenuate nitrogen, whereby living things in the soil transform harmful nitrogen into harmless nitrogen. The biological community of undeveloped land, composed of microbes, fungus, plants, and animals, interacts with the chemistry of the land, and converts nitrogen salts (ammonium and nitrate) into nitrogen gas (N_2) , a normal component of air.

When housing density is low enough, the remaining natural lands are able to transform most of the detrimental nitrogen into nitrogen gas, before it enters a pond through groundwater. The higher the density of the housing, the greater the impact development will have on watersheds and subsequently the health of ponds. One of the reasons Edgartown Great Pond is among the healthiest Island ponds is because of the very low housing density with sufficient natural lands immediately surrounding it.

Climate forecasts predict that water temperatures will continue to rise over the coming decades. In order to protect our ponds we must therefore counteract the pressures of climate change by reducing the concentration of nutrients within them. A watershed-wide reduction of nitrogen and phosphorus will increase the resilience of our ponds by allowing them to thrive even in a warming climate.

GPF HAS INITIATED FIRST STEPS TO INCREASE PONDS' RESILIENCE

Great Pond Foundation has initiated the first steps of watershed-wide nutrient reduction for Edgartown Great Pond by working with colleagues at the Environmental Protection Agency and MV Commission to identify potential nitrogen "hotspots" within the watershed. GPF also is working with colleagues at the Marine Biological Laboratory (MBL) to differentiate the sources of nitrogen with isotopes. From MBL scientist Dr. Javier Lloret's talk, Using Stable Isotopes to Identify Sources and Effects of Nitrogen Pollution in Edgartown Great Pond presented at the Island Ponds Community Workshop in 2021, we know that wastewater is a primary source of nitrogen pollution in the Great Pond. In 2022 we will work with Dr. Lloret and his team at the MBL to expand the scope of this study in Edgartown Great Pond and to begin work in Chilmark Pond as well. To learn more about wastewater in Edgartown Great Pond's watershed, see page 8: Keeping An Eye on Wastewater.

Whether it is the excitement of catching dinner from the living waters of the pond, sailing across the sparkling waves, or diving into the depths for a refreshing swim,

Foundation

those of us lucky enough to know the Island's great ponds have been touched by their magic. While the challenges to preserving pond health are increasingly daunting, thanks to science, we as a community have the tools to identify and remediate the sources of nutrient pollution within our watersheds, building resilience and sustaining their living waters for future generations.



Sale Port

Cyanobacteria blooms, such as this one pictured above in Squibnocket in July 2021, produce cyanotoxins, which when concentrated can be harmful to humans and other animals. Learn about the Island's cyanobacteria monitoring program, MV CYANO, see page 16

Filamentous green algae bloomed in Edgartown Great Pond during the summer of 2018. Macroalgal blooms such as this one are harmful to the environment, but they are not toxic.

Foundation



David Bouck Watershed Outreach Manager

David was born and raised on Martha's Vineyard where he spent summers exploring the rich and diverse ecosystems across the Island. From an early age, he became fascinated with the great ponds and adjoining watersheds. His appreciation for these complex and fragile habitats inspired him to study conservation and ecology across a wide range of environments and circumstances. Throughout his career, he has worked for a diverse group of public and non-profit entities including the Trustees of Reservations in Massachusetts, National Oceanic and Atmospheric Administration in Florida, United States Geological Survey and the National Park Service, both in Hawaii. He received a B.S. in environmental studies from Endicott College and a master's degree in coastal zone management from the University of Miami's Rosenstiel School of Marine and Atmospheric Science. His master's thesis utilized high-resolution water-



quality data and satellite imagery to investigate the relationship between localized land-use trends and diffuse nutrient inputs throughout the Coral Gables canal. Through these academic and professional endeavors, David has also been fortunate to work in Botswana and Mexico in various conservation capacities.

David joined GPF in 2021 as the Watershed Outreach Manager, which includes geospatial analysis and collaborating with the Director of Scientific Programs for the Ecosystem Monitoring Program. David finds liaising between the watersheds and the public to be engaging and is honored to be able to work with his colleagues and the Island community.

David spends time with his family in West Tisbury, participates as an active member of the Millbrook Watershed Management Committee for the Town of West Tisbury and is also on the West Tisbury Land Bank advisory board. He enjoys cooking, gardening and tinkering with electronics or machines. He is a music aficionado who plays the trumpet and frequently enjoys listening to music from the '80s with his office mates.

Erin Hepfner Operations Manager



Erin's early career focused on all aspects of public horticulture following a B.S. in horticulture from the University of Maine and a M.A. in ecological landscape design from the Conway School. She has worked at public gardens across the country including the Polly Hill Arboretum in West Tisbury and Holden Forests & Gardens in Ohio where she served as the Director of Guest Services — her two teams greeted over 300,000 guests annually. In 2018 she furthered her career development and was accepted into the competitive and prestigious Longwood Gardens Fellows Program where,



as a Fellow, she studied nonprofit senior-level leadership, organizational behavior and culture, and learned from global leaders of cultural institutions. In the Fellows Program, she spent two months in Singapore at Fort Canning Park, leading an assessment of a historic spice garden to develop an interpretive plan for the bicentennial celebration. Erin is also a graduate of the National Outdoor Leadership School (NOLS) where she sailed the Sea of Cortez and studied wilderness ethics and communication.

As the Operations Manager at GPF, Erin assists the Executive Director, supports and facilitates projects among the science team, and helps to promote our mission. She finds the process of developing organizations and supporting team members to be very engaging. Most of all, she appreciates the frequent laughter among the GPF team.

Erin is a native New Englander who grew up in Maine and washed ashore on Island in 2011. Having a desire to support others and a passion for seeing the beauty in all things, it's understandable that she is also a business owner of House of Colour, working as an image consultant specializing in personal color and style analysis. Boating, fishing, sailing and beach combing are her favorite Island hobbies.

Julie Pringle Scientific Programs Director

As a native Islander Julie developed a life-long passion for anything waterrelated from an early age. Her time spent sailing and swimming led to a curiosity about the creatures living under the surface, which grew into a desire to study and protect wildlife from the many threats they face. Julie attended Tufts University, where she received a B.S. in biology. Prior to graduate school, Julie worked as the



Water Resources Intern at the Martha's Vinevard Commission and as a Laboratory Assistant at the Woods Hole Oceanographic Institution. Julie completed her master's degree at University of Connecticut Avery Point, where she studied biological oceanography. Julie's master's thesis focused on age and growth patterns of the Atlantic silverside, a small but abundant fish that plays an important role in the food web.

Julie joined GPF in 2019 as the Field Science Coordinator and has since advanced to Scientific Program Director in 2022. She is responsible for leading the MV CYANO, Ecosystems Monitoring Program and Biodiversity Monitoring Projects. She works closely with the Watershed Outreach Manager and enjoys managing the Summer Science interns, as she realizes the critical experience it provides young scientists, having benefited from similar programs herself.

Julie puts as much energy into her hobbies as she does her job. While in college, she was on the Tufts University sailing team and continues to enjoy the sport. She has played in the MV women's softball league for over 10 years. While she studied fish ecology in grad school, she is just now beginning to fish recreationally. In the winter she enjoys ski trips to the mountains with friends. Regardless of the time of year, you are likely to find her kiteboarding if there's a breeze on the water.





Emily has been working as a field and laboratory biologist for 20+ years, studying samples from coastal waters, the desert, and deep-sea hydrothermal vents. A Massachusetts native, Emily's lifelong love of water developed during her childhood spent exploring New England waters. Prior to Great Pond Foundation, Emily worked at the Marine Biological Laboratory in Woods Hole, MA (MBL) and at the Moore Laboratory of Zoology (MLZ), in Los Angeles, CA, and onboard the R/V Vantuna in San Pedro, CA. While at MBL, she served as a scientist on three research voyages, collecting deep-sea hydrothermal vent samples before returning to the lab to culture them and extract their genetic material.

In 2016 Emily joined Great Pond Foundation and developed a year-



Great Pond Foundation is supported by many people including a board of directors and advisory council, and the Chief Financial Officer Barbara Conroy, who all work remotely. We're happy to introduce the team that you'll find in the office or in the field.

Emily Reddington Executive Director

round water-sampling program on Edgartown Great Pond. As Executive Director of Great Pond Foundation, Emily advocates for the data-driven and scientifically informed management of Martha's Vineyard coastal ponds. In her six years at GPF she has been promoted from Science & Education Coordinator to Director of Science & Education to her current leadership role. She enjoys bringing groups of people together through collaborative science and advocacy for Island waters.

Emily has lived on-Island since 2007 and enjoys baking, traveling, yoga, and reading. She is married to Marty Harris and together they have an eight-yearold son, Harold. Their family likes to garden, cook, and explore the Island's shores and ponds with their dog Odie. Emily serves as the Program Director for Chilmark Pond Foundation and on the Board of Directors of Tisbury Great Pond Foundation.



Meet the Team!



Keeping an Eye on Wastewater: Updates from the Edgartown Wastewater Treatment Facility

Water is essential to life, and access to clean water and infrastructure throughout the town, vastly increasing adequate sewer and septic systems are fundamental to a healthy society. Wastewater from our daily lives is one of the principal sources of excess nitrogen entering Edgartown Great Pond (EGP) and with increased population and development, comes increased stress on this ecosystem. Over the past year, GPF staff have been sitting in on the monthly meetings of the Edgartown Board of Wastewater Commissioners, in order to stay informed on the critical role our local wastewater management and infrastructure plays in watershed and pond health.

Community

The Edgartown Wastewater Commission (WWC), is the governing body that implements the rules and regulations surrounding the use of public and private sewers, drains, private sewage disposal, installations, and connections of buildings to sewers, and the discharge of waters and wastes into the public sewer system within the town of Edgartown. Depending on

their location, developers and new residents to the town may have one of two wastewater choices available to them when they build a home: linkage to an existing sewer line, or the installation of a self-contained septic system. To the uninitiated, there may be little difference between these two options, aside from potential cost. However, when considering excess nitrogen, connecting a property to the sewer will do much more

to mitigate ecological impacts than a typical Title V septic system. Title V systems do an excellent job of minimizing the danger posed from bacteria and other pathogens, which was its original design and purpose. Unfortunately, they do not include or require additional treatment for excess nutrients.

The Edgartown Wastewater Treatment Facility (WWTF) is designed to reduce the amount of nitrogen entering EGP through its built-in treatment process. The last plant upgrade, completed in 1996, incorporated tertiary treatment technology that removes excess nitrogen and from wastewater exiting the plant. It also improved and expanded the town's sewage collection systems with the addition of new

its collection area and capacity. This collective investment by the town and taxpayers represented not only a timely and necessary improvement to local infrastructure, but a significant investment in the health of EGP as well.

Almost 30 years have passed since these upgrades were put in place. As development has progressed throughout the town, the annual average flows to the WWTF have increased proportionately. The last two years in particular have seen a marked increase in applications for sewer linkages, a result of demographic changes, lot subdivisions, and renovations in the wake of the COVID-19 pandemic. At this rate, current trends show the WWTF approaching its design and permitted maximum flow rate of 750,000 gallons per day during its peak operational period, which is typically around the July 4th holiday. For the staff and commissioners who manage the WWTF, it is apparent

that larger upgrades to the plant (similar to the 1996 expansion) are required in order to meet the increasing demand.

In late 2021, the Massachusetts Department of Environmental Protection asked the Town of Edgartown to complete a Comprehensive Wastewater Management Plan (CWMP). This was likely triggered due to the steady approach of maximum capacity flow rates at the WWTF, coupled with larger

development requests within the EGP watershed. A CWMP is a detailed process derived from both federal and state environmental laws, requiring a community to assess its current and future wastewater needs, resulting in a 20-year, environmentally friendly and costeffective plan for wastewater management throughout the watershed. As a result of this initiation, new commercial hookups and increases to the WWTF daily flow rate are on hold until a timeline for the CWMP is established. As of the Wastewater Commissioner's meeting on February 24, the state has approved a low or zero interest loan for the town in the amount of \$491,000 in order to proceed with the drafting of this plan.A percentage of this cost will be deferred by the



state as a grant, and the final dollar amount paid by the Town will likely be less.

Ponds, stay active and involved in The initiation of the CWMP is timely, as the Island the development and planning that community begins to grapple with the uncertainties posed by climate change. With rising global tempersurrounds them. atures comes an exacerbation of some of the most extreme impacts of development and excess nutrimany factors that contribute to the health of EGP, of ent pollution in our ponds, such as the incidence of recognized importance is the expansion and upkeep harmful algal blooms and the deterioration of critical of the WWTF. Along with this infrastructure upgrade seagrass habitat. It is of the utmost importance that is an opportunity for us to visit higher levels of suswe, as stewards of our Great Ponds, stay active and tainable development and environmental protection involved in the development and planning that surfor EGP, effectively setting the standard of ecological rounds them. integrity within our community for the next 20 years. GPF will continue to follow this process and advocate A central feature of the CWMP process is collective input from citizens, public officials, and other stakeon behalf of the ponds, and we encourage anyone to stay informed, and to join the action wherever and holders from within the watershed. Several components of the plan require public review and comment whenever you can.

periods before the plan is finalized. While there are

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nutrients and nitrogen,

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ecological impacts than

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system.

do much more to mitigate

It is of the utmost importance that we, as stewards of our Great

Island Ponds Community Workshop

Community



The ponds and bays of Martha's Vineyard are a vital ecological, economic, and cultural resource for the Island community. While every body of water is unique, there are several key features that most ponds on the Vineyard all share.



Martha's Vineyard ponds face several primary challenges that will impact their long-term health and sustainability, derived both from human activity and our changing climate.

The Great Pond Foundation presented a 3-part Zoom series called **Island Pond Community Workshop** (IPCW) featuring presentations and panel discussions from fellow pond managers, scientists, and advocates. The series highlighted issues impacting ponds and watersheds across Martha's Vineyard and promoted Island-wide collaboration, communication, and action among pond groups. These four infographics summarize the main concepts covered in the IPCW presentations. Artwork by John Holladay. The IPCW was funded by the Edey Foundation.



Without scientifically informed planning and management in and around our ponds, these challenges will only be made worse.



There are many actions that the Island community can take now to help reduce the impacts of human-caused stressors to our ponds and mitigate the consequences of climate change, for a sustainable and healthier future.



Community Engagement Beach Seine Days

Great Pond Foundation is continuing our commitment Since 2021 GPF additionally has been working with to education by hosting Beach Seine Science Days in summer 2022. This is building off a successful collaboration with Friends of Sengekontacket Pond and Island Spirit Kayak in 2021, where dozens of families participated in our Sengekontacket Species Roundup to learn about the fish and invertebrates found along the pond's shoreline.

These events center on GPF's 30-foot beach seine net, which is dragged across shallow water and captures animals throughout the water column, from the bottom of the pond up to the surface, replicating our



scientific field work. GPF uses this net to study biodiversity in an ecosystem, as data generated from beach seine hauls can be used to track changes in species composition and abundance over time. However, this net is also an excellent outreach tool, as it allows members of the community to be hands-on with critters in our ponds while learning about the array of life that the pond supports.

This year, our Sengekontacket Species Roundup will be on July 16 at 9:30 a.m. at Little Bridge at State Beach. While this event is geared toward our younger pond advocates, people of any age are encouraged to join us!

> Pictured above: 2021 Summer Science Interns Maggie Sandusky and Kendall Rudolph pull the seine net in Edgartown Great Pond.

Top left: A shrimp captured in a beach seine from Edgartown Great Pond.

Bottom left: A juvenile winter flounder captured in Edgartown Great Pond.

Anne Mazar and Lisa Berkower on the Next Generation Initiative that aims to bring together a young generation of Edgartown Great Pond neighbors and foster an interest in preserving and protecting the Pond. Many of those involved are children or grandchildren of the community members who helped form GPF over 20 years ago. To keep the next generation interested in the pond, GPF hosted an informational and interactive Zoom presentation. In 2022, GPF is

planning multiple Beach Seine Science Days and an inperson meeting of this next generation. If you or someone you know may be interested in joining this initiative, please contact science(a) greatpondfoundation.org.

MARK YOUR CALENDAR!

Beach Seine Science Days 2022

July 16 – Little Bridge July 30 & August 5 – EGP

Get in the water with GPF! Beach seines are one of the best ways to see the life in our ponds. Full details will be available via GPF's newsletter and website.







GPF science staff David Bouck (far left) and Julie Pringle (far right) conduct a beach-seine collection to showcase the local biodiversity found in the water.



New Initiatives and Collaborations **Highlight Local Biodiversity**

Great Pond Foundation is dedicated to documenting the diversity of life living in and around the Island's coastal ponds. While the GPF team regularly evaluates ecosystem health based on physical and chemical parameters such as temperature, salinity and dissolved oxygen, the ultimate measure of a healthy, thriving ecosystem is biodiversity. Biodiversity is the number of species living in a certain area, including plants, animals, and microorganisms. Ecosystems that provide habitat for a large number of species are more resilient and healthier than similar ecosystems that support fewer species. To study the biodiversity of plankton and fish in our coastal ponds, GPF launched a Biodiversity Monitoring Program in 2020.

MARTHA'S VINEYARD ATLAS OF LIFE

To further document coastal marine species, GPF continues to collaborate with local nonprofit BiodiversityWorks on their Martha's Vineyard Atlas of Life project. This project seeks to create a living catalogue of the Island's biodiversity, while fostering a community that actively works to conserve it. The observations for this project utilize a website and free mobile app called iNaturalist, an online platform that enables anyone who is interested in identifying flora and fauna to participate, regardless of their identification skills. The process is simple: take a photo of your observation and upload it to iNaturalist. This creates an entry with location information, which can then be identified by biodiversity experts in the online community.

Both projects further GPF's commitment to studying local coastal ponds while seeking to understand how these ponds are impacted by humans. Collaborations with other organizations and other scientists are a contribution to the scientific community as a whole and enable GPF to have a long-term impact. Additionally, collaborations such as these improve data-driven management techniques, which will help preserve the health of the Island's coastal ponds for future generations. If you would like to be involved GPF encourages everyone to take photos of wildlife, including plants and animals found within the waters in GPF's ongoing efforts to document biodiversity in our ponds, please consider contributing observations of local ponds, and submit them to inaturalist.org/ to the MV Atlas of Life, or attend a community outprojects/martha-s-vineyard-atlas-of-life. reach event in the summer of 2022 see page 12.

Science

GPF WORKED WITH DR. CAROLINE FORTUNATO

Another GPF collaboration went beyond documenting the easily observable diversity of plants and animals and focused on the diversity of microbes in local ponds, such as cyanobacteria. These microscopic organisms are difficult to identify visually, so genetic techniques were used. For this project, GPF worked with Dr. Caroline Fortunato of Widener University. Dr. Fortunato is a marine microbial ecologist and she analyzed samples at numerous stations within Edgartown Great Pond, Tisbury Great Pond, and Chilmark Pond. The results from this analysis will shed light on the bacterial community within our ponds and how this community might vary within ponds with different environmental factors, such as salinity and nutrient concentrations. One of the exciting parts of this work is that scientists believe the biodiversity of microbes in a community (what types and how many) might influence toxin production in cyanobacteria. Stay tuned for the results of this study.



This infographic depicting the classifications of cyanobacteria risk levels is posted online for water bodies that are being monitored for cyanobacteria by GPF staff

Martha's Vineyard Cyanobacteria Monitoring Program (MV CYANO). MV CYANO is a collaborative initiative among Island Boards of Health and scientists from GPF, which brings a comprehensive cyanobacteria monitoring program to Martha's Vineyard.



Science

In response to the rising incidence of cyanobacteria MV CYANO is expanding to include Sengekontacket blooms and in recognition of the need for baseline Pond, Tashmoo Spring Pond, and James Pond. Admonitoring data, the Great Pond Foundation (GPF) ditionally, sampling kits and training materials will be designed and initiated the Martha's Vinevard Cyanoavailable to the public to encourage data collection in additional ponds. The Year 2 expansion is supported bacteria Monitoring Program (MV CYANO). MV CYby a grant from the Edey Foundation, which allows ANO is a collaborative initiative among Island Boards of Health and scientists from GPF, which brings a GPF to hire a Field Crew Leader to facilitate the addicomprehensive cyanobacteria monitoring program to tional sampling and analysis. Additional support is pro-Martha's Vineyard that greatly increases the local cavided by Chilmark Pond Foundation, and the towns of pacity to detect and respond to a cyanobacteria bloom. Edgartown, West Tisbury, and Chilmark.

Cyanobacteria, a.k.a. blue-green algae, are a group of MAPS TO BE POSTED ON MV CYANO WEBSITE microorganisms found in all Vineyard waters. When The basis of the MV CYANO program is a color-coded cyanobacteria grow rapidly or bloom, they can produce risk matrix, with results and maps corresponding to the cvanotoxins, which when concentrated, can cause adcolored risk levels associated with the concentration verse health effects in humans, pets, or livestock who of cyanobacteria in each pond. With Board of Health wade in or ingest blooming waters. Cyanobacteria and approval, these maps are posted on the GPF MV other harmful algal blooms (HABs) pose an immediate CYANO website within 48 hours of sample collection. threat to public health and disrupt the balance of local If a bloom is detected, GPF will coordinate sample ecosystems, jeopardizing the Island economy. shipment to the Cyanobacterial Analysis Laboratory, run by Dr. Christopher Gobler of the University of Year 1 of MV CYANO began in 2021, and included Stonybrook. Further analyses of bloom samples will weekly monitoring of Chilmark Pond, Edgartown identify the species causing the bloom and measure Great Pond and Tisbury Great Pond, and biweekly cyanotoxins, if present. Data and maps are available at monitoring in Crackatuxet Pond. In Year 2 (2022), GreatPondFoundation.org/MVCYANO.



MV CYANO Program Expands in 2022 after Successful Launch

Example of maps generated by GPF to share with Island Boards of Health and local residents.

Tisbury Great Pond Historical Data Digitization Project

The quote: "You can't really know where you are going until you know where you have been," by American author and poet Maya Angelou, holds particular significance in the context of ecosystems such as the great ponds. Long-term planning around our ponds requires a healthy understanding and respect for the past. A robust, local historical baseline of ecosystem monitoring data is key to informing data-driven management decisions. During fall of 2021, GPF was awarded a grant by the Martha's Vineyard Community Foundation to locate, catalogue, and digitize historical documents and data related to the monitoring and management of Tisbury Great Pond (TGP). TGP has benefitted greatly from decades of environmental data recorded by numerous individuals, regulatory entities, and conservation organizations, all committed to the healthy stewardship of the Pond. Due to the extensive timeline of active data collection surrounding TGP, many primary resources exist solely in the form of field notebooks, journals, hand-written graphs and tables, photos, anecdotal accounts, and one-time studies completed by local environmental organizations and private contractors. Conversion of these types of historical data into an accessible, consolidated, digital format, will improve the baseline model for ecosystem monitoring and management of the Pond. In addition, this flexible format will allow scientists to employ modern statistical modeling techniques and analytical software for long-term ecosystem and management trend analysis. Lastly, the effort of digitization of historical data serves as an act of community preservation, documenting the extensive and tireless efforts of the individuals involved in the management of TGP. This project is already underway and will continue throughout 2022. Stay tuned for the results in our next annual report!

Science





Secchi Disk

This is a standardized black-and-white disk connected to a tape measure that is used to measure water clarity and light penetration into the water.

- If the water is murky, the disk will disappear before it hits the bottom. When the water is clear the Secchi disk is visible at a deeper depth, and is often visible at the bottom.
- There are now higher-tech ways of measuring water clarity and light penetration, however Secchi disk measurements have been collected across the globe, and in some locations for over 100 years. Since there is a long-time series, it is useful for historic comparisons.



- & dissolved oxygen.
- change with depth.



Tools of the Trade

The Ecosystem Monitoring Program utilizes many tools and methods to collect water quality data that in turn helps inform recommendations for management practices. These are the three most frequent and useful tools and measurements the GPF science team uses to produce

More information on water quality parameters can be found at GreatPondFoundation.org/



Handheld Water Quality Meter

• GPF uses a YSI ProDSS. This is the industry standard and many other organizations use the same

• This meter can measure numerous different parameters such as temperature, salinity, pH, turbidity,

• Because the probe is attached to a cable, we can measure these parameters throughout the water column to determine if they



Chlorophyll & Cyanobacteria Fluoroprobe

- Chlorophyll is a pigment that plants use for photosynthesis. By measuring the concentration of chlorophyll we can estimate the abundance of microscopic plants (phytoplankton) in the water.
- There are different methods for measuring chlorophyll, but at GPF we most often utilize fluorometry. This involves shining different wavelengths of light at a water sample and measuring how the sample fluoresces, or how light is emitted from phytoplankton cells. The Fluorometer GPF uses is a Fluoroprobe II, made by bbe Moldaenke.
- This method also can estimate the concentration of cyanobacteria in the sample, which is important to monitor because there are types of cyanobacteria that can threaten human health.



Cyanobacteria

Science





ECOSYSTEM MONITORING REPORT CHILMARK POND

GREAT POND FOUNDATION Julie Pringle, Scientific Program Director



ECOSYSTEM MONITORING REPORT TISBURY GREAT POND

GREAT POND FOUNDATION Julie Pringle, Scientific Program Directo





ECOSYSTEM MONITORING REPORT EDGARTOWN GREAT POND

> GREAT POND FOUNDATION Julie Pringle, Scientific Program Director



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Data Reports Available Online

Each year, GPF publishes the results of the Ecosystem Monitoring Program for every pond included in the program. The Ecosystem Monitoring Reports can be found online at GreatPondFoundation.org/About-Us/ News-and-Publications.



CRACKATUXET POND

GREAT POND FOUNDATION Julie Pringle, Scientific Program Director



Earthstar Geographics

Financial

2021 Highlights

"Whether it is the excitement of catching dinner from the living waters of the pond, sailing across the sparkling waves, or diving into the depths for a refreshing swim, those of us lucky enough to know the Island's great ponds have been mity touched by their magic."

OLDWATE 15%

RANTS &

PROJECT

ERVICES 19%

ISLAND-WIDE 4%

TURKEYLAND 11%

2021 Total Revenue

\$627,688

HERRING CREEK 33%







Total expenses rose 43% to \$433,409. Science activities now account for over half (52%). Although Education activities' share of that much larger total declined slightly (2%) to 23%, the actual investment in Education programs rose 29%. Administrative expense declined 3% to 14%, and fundraising expense was halved to just 2%.

(All figures are preliminary and are subject to audit.)

Thank you for your generous support in 2021!

Leadership Circle \$10,000 +

Anonymous (2) Lisa & Michael Bronner Herring Creek Farm Landowners Association Cindy & A.J. Janower Pam Kohlberg & Curt Greer Kohlberg Foundation Martha's Vineyard Community Foundation Anne & Brian Mazar Jacqui & Jeff Morby Catherine Samuels & Jeremy Henderson The John & Inge Stafford Foundation Mary & Timothy Walsh

Blue Carbon Society \$5000 to \$9999

Anne Woodhull

Anonymous Mrs. and Mr. George Bauer Hyannis Air Service, Inc. Susan & Stephen Howell Deborah & Joe Loughrey Randy Luening Caroline & Bob Maruska Kimberly & Brian McCaslin Karen & Alan Muney Yael & Zeev Pearl Liz Potter & Joe Bower Leah & Bob Rukeyser Bette & Richard Saltzman Michael Shalett Melissa Vail & Norman Selby Gail & John Wasson

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Clean Water Coalition \$1000 to \$2499

Anonymous Karen Bressler & Steven Rabin Toni Chute and John O'Keefe George Clark Stefanie & Doug Cronin Hesperia Fund Becky & Tony Hull Linda & Gerald Jones Rosabeth Moss Kanter Steve Levin Doris Luening

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Post Office Box 9000 Edgartown, MA 02539 508-627-7222 www.greatpondfoundation.org

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