



2022 ANNUAL REPORT

RESTORATION







More than 50% of the world's coral reefs have been lost since the 1990s.

On Florida's Coral Reef, coral coverage is at just 2%

Without action, we could lose all shallow-water coral reefs by 2100.

CRF[™] is actively restoring coral reefs on an ecologically significant scale.

We are working to advance coral reef restoration science around the world.

We are engaging the public in the mission and inspiring change.



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HOPE

Hope is not just an abstract concept; it is a tangible force that drives us forward and gives us the strength and determination we need to succeed.

Coral Restoration Foundation[™] seeks to be a beacon of hope in a world that all too often seems to be lacking it. Our work to restore the world's coral reefs is driven by a deep belief in the power of human determination and ingenuity to overcome even the most daunting challenges.

Despite the tremendous obstacles we face in the fight to save these critical ecosystems, we remain steadfast in our commitment to the cause. Our efforts to restore species and genetic diversity to degraded reefs are just the beginning of what we believe will be a legacy of optimism in the face of seemingly insurmountable odds.



RESTORATION page 8

We are actively restoring coral reefs on a large scale. Our innovative methods are costeffective and scalable, and we are sharing them with groups around the world.

SCIENCE page 24

Our approach is guided by rigorous scientific research into coral reproduction, growth, and survivorship.

EDUCATION page 40

We work with schools, the public, and other NGOs to generate engagement around marine conservation.

WAYS OF GIVING page 60

THANK YOU page 62

FINANCIALS page 65

All images by Alexander Neufeld for Coral Restoration Foundation[™], except where noted.

We also thank other image contributors Madalen Howard, Granger Eltringham, Zach Ransom Sara Nilsson, and Jenny Adler for Vox.

FROM OUR CEO

Coral reefs worldwide continue to be imperiled, inundated by myriad stressors, and disappearing at an alarming rate. At CRF™, our successes in 2022 give us reason to be hopeful. Our work is expanding, increasing our confidence that we can positively impact the future of life on our planet. We remain – steadfastly – optimistic.

We restored a record reef area in the Florida Keys in 2022, over 8,800 square meters, by returning more than 45,000 corals.

But all of the world's tropical coral reefs need help. It is an ecological and humanitarian crisis as an increasing number of families who depend on coral reefs for their livelihood are imperiled. At CRF™, we are deeply committed to taking the tools, methods, and technologies that we have pioneered in Florida and making them freely available to all who can use them.

The democratization of coral restoration will be essential. To that end, CRF[™] has invested in the development of resources for the international community. CeruleanAI is a perfect example. It will provide grassroot practitioners with cutting-edge photomosaic technology to visualize their reefs. Technology that, without this investment from CRF[™], would be unaffordable to many.

Looking ahead, CRF[™] will continue demonstrating coral restoration's power for positive change in the Florida Keys. We are committed to making these innovations available throughout the world. We will expand our efforts by focusing on teaching and training restoration practitioners globally. And we will continue to further the cause of how coral restoration can be a force for positive ecological change and socioeconomic benefits to humanity.

And so, we are incredibly grateful to have dedicated supporters who understand the importance of the mission to restore our reefs. Thanks to our community, we can continue to look ahead with hope, encouraged that our efforts are turning the tide for our coral reefs.

R. Scott Winters Chief Executive Officer

BOARD OF DIRECTORS

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2022

JANUARY

ZOO MIAMI We launch our monthly activation at the Zoo

FEBRUARY

EVERY KID OUTDOORS

A week long program brings underserved kids to the reef

MARCH

RAISE THE REEF 2022

Our annual fundraiser generates critical support for the mission

JUNE

BREAKING RECORDS

We return more than 11,000 corals to the wild in June

AUGUST

CORAL SPAWNING

We document our corals spawning in the wild

SEPTEMBER

REEF FUTURES 2022

We co-host the third iteration of this critical event

OCTOBER

PILLAR PROPAGATION

The first big steps towards pillar coral restoration

DECEMBER

CORAL CARNIVAL

A family-friendly celebration of coral reefs and community





To address the urgent crisis facing our coral reefs, it is imperative that we work together, simultaneously, at multiple scales.

To accomplish this, CRF[™] co-founded the Coral Restoration Consortium with NOAA in 2017.

The Coral Restoration Consortium (CRC) is a community of scientists, managers, coral restoration practitioners, and educators dedicated to enabling coral reef ecosystems to survive the 21st century and beyond.

The CRC serves as a coordinating body that disseminates best practices, identifies and addresses key research gaps, fosters collaboration and technology transfer among participants, and facilitates scientific and practical ingenuity.

A BODY OF ACTION

The Coral Restoration Consortium is driven by action and results. We believe that through innovation, open access to data and education, and creating resources to restore coral reefs in an ecologically meaningful manner we can help ensure their sustainability for future generations.

In September, Coral Restoration Foundation^m co-hosted *Reef Futures 2022* for the CRC, bringing together over 500 participants from around the world.

The CRC currently has over 1,800 members around the world, all working towards the goal of ensuring that coral reefs will continue to be a feature of life on Earth.

EXECUTIVE TEAM

R. Scott Winters (Co-Chair) Coral Restoration Foundation[™]

Tom Moore (Co-Chair) KAUST

Tali Vardi (Executive Coordinator) ECS for NOAA Fisheries Office of Science and Technology

Michelle Loewe (Coordinator) ERT for NOAA Restoration Center

Jessica Levy (Coordinator) Coral Restoration Foundation[™]

Petra MacGowan Reef Resilience Network

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Les Kaufman Boston University

Phanor Montoya-Maya Coral Restoration Foundation[™]

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Sandrine Pivard UN Environment - Caribbean Environment Programme

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Anastazia Banaszak The National Autonomous University of Mexico

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Eastern Tropical Pacific Tatiana Villalobos Raising Coral Costa Rica

Middle East Dr. Sebastian Schmidt-Roach KAUST

Dr. Rebecca Klaus Consultant

Mesoamerica Ana Giró Petersen Healthy Reefs

To learn more and to join the CRC, please visit **WWW.crc.world**



In September, *Reef Futures 2022* convened over 500 passionate global specialists at the Ocean Reef Club in Key Largo, FL, to share the most recent techniques, technologies, and research in the field of coral reef restoration. This unique meeting aims to encourage the scaling up of international reef restoration efforts, which is critical in an era of climate change and biodiversity collapse.

Restoration funding has increased dramatically since the inaugural *Reef Futures 2018*. Tom Moore, Co-Chair of the Coral Restoration Consortium (CRC), highlighted the launch of large-scale projects in the intervening years, as well as the many smaller efforts that have benefited from the CRC community's assistance.

Among the notable presentations was Dr. Nikki Traylor-Knowles' research on coral immunity, Dr. Tries Blandine Razak's warning about ill-informed restoration projects in Indonesia, KAUST's northern Red Sea restoration plans, and Alex Neufeld of CRF[™] introducing CeruleanAl for coral reef monitoring, democratizing access to advanced restoration technologies.

CRF[™] CEO, Dr. R. Scott Winters underlined the need to integrate socioeconomics into ecosystem restoration, providing equity and opportunity for coral reefdependent communities, incorporating indigenous knowledge, and redefining success in this field to including positive impacts on the lives of coastal populations.



Reef Futures 2022 was organized by the CRC with Coral Restoration Foundation[™] as the local host. The event was supported by the United Arab Emirates, United Way of Collier and the Keys, and the King Abdullah University of Science and Technology. Scholarships from generous sponsors facilitated the attendance of students, practitioners, and researchers from developing countries around the world.



RESTORATION

We manage one of the biggest coral restoration efforts in the world. Taking an ecosystem-wide approach, we are restoring both abundance and genetic diversity to Florida's reefs.

We grow and return genetically diverse, critically endangered corals in order to help ensure that coral
reefs have the best chance of surviving into the future.

• Our outplanted corals are **spawning**, kick-starting the reefs' natural processes of recovery.

• Our **program partners** include government agencies, non-profits, academic institutions, and private enterprises.

• We are a **resource for other organizations** around the world seeking to implement reef restoration programs.

THE PROCESS OF REEF RESTORATION

CORALS OF OPPORTUNITY



Our first corals came from wild colonies. We still occasionally rescue corals during infrastructure projects, but our nurseries are mostly self sustaining.

GENE BANK Preserving coral genotypes for the future



STABILIZED CORAL POPULATIONS Self-sustaining ecosystem

PRODUCTION NURSERY

In our production nurseries we raise tens of thousands of corals to return to the reef. The species and genotypes we move into production are carefully selected to ensure we are restoring both diversity and functionality to the wild.

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RESTORATION PROGRAM







In 2022, CRF[™] returned 45,534 corals to the reefs of the Florida Keys

This brings our total corals returned to the wild to more than **220,000**

RECORD-BREAKING OUTPLANTING

When we are scaling at this pace, there is every reason to be hopeful for the future of our planet's corals.

In 2022, CRF[™] divers, including staff, interns, volunteers, and Dive Program participants, worked to restore 10 reef sites across the Florida Keys, with 75% of the corals going to the seven reef sites designated by NOAA's Mission: Iconic Reefs plan.

We returned a record-breaking 45,534 corals to these reefs in the Florida Keys National Marine Sanctuary in 2022, surpassing our previous record by over 10,000 corals. This brings our total number of outplanted corals to over 220,000 from at least four coral species. Our team broke another record in June, rehoming 11,000 corals in one month alone.



RESTORATION PROGRAM

"MISSION: ICONIC REEFS" Sites ♥ Other CRF[™] Restoration Sites

THE LARGEST CORAL NURSERIES IN THE WORLD

Our in-situ (ocean-based) coral nurseries are the world's largest, capable of producing over 50,000 "reef-ready" corals each year.

We take advantage of the way coral reproduces asexually through a process called fragmentation; when a coral breaks, the fragments grow into new colonies, genetic clones of the "parent".

We collected our first "corals of opportunity" - fractured coral fragments retrieved from the sandy seafloor - more than a decade ago. We also collected clippings from a few wild coral colonies. We transferred these little corals to a nursery program and began propagating them. Our nurseries are now self-sustaining.

Unfortunately, many of the genotypes that we originally obtained are now only present in our restoration program, demonstrating the importance of this work.

14

Our Tavernier Coral Tree[™] _____Nursery covers

1.5 acres of seafloor, and contains

500+ Coral Trees™

CRF[™] has 4 principle production nurseries with a total of

> 740+ Coral Trees™

We can produce **5000**+ reef-ready corals

every year

EXPANDING CAPACITY

We added 180 Coral Trees[™] to our nurseries in 2022, building the infrastructure that allows us to raise thousands more corals every year.

We must prepare our nurseries to hold enough coral stock to boost restoration capacity each year. In 2022, we significantly expanded our massive in-situ nurseries.

In an effort supported by United Way of Collier and the Keys, Force Blue helped us install 60 Coral Trees[™] to the Upper Keys Carysfort Nursery. The Carysfort Nursery also now includes non-branching corals for the first time.

We also scaled up our restoration operations in the Lower Keys, adding more than 50 Coral Trees[™] to our Key West nursery – primarily used to restore coral cover at Eastern Dry Rocks – and building out our newest nursery near Looe Key, adding around 70 Coral Trees[™] with the goal of reaching 100 by early 2023. Our first boulder coral trees in the Lower Keys will help us rebuild diverse and resilient reefs in the southernmost part of the Florida Keys National Marine Sanctuary.

We can now raise over 50,000 reef-ready corals annually, and will be adding even more capacity in 2023.



Restoring a coral reef ecosystem effectively means returning both species and genetic diversity to the wild

Our nurseries are home to



ACROPORIDS

The majority of our nursery stock consists of the branching corals *Acropora cervicornis* and *Acropora palmata*.

These were once the dominant reefbuilding species in the Caribbean. Their populations have declined by around 98% in the last 40 years. Both are listed as "Threatened" under the U.S. Endangered Species Act, and as "Critically Endangered" on the IUCN Red List of Endangered Species, one step away from "Extinct in the Wild".

BOULDER CORALS

In 2022, we continued scaling up our propagation and restoration program for two species of bouldering star corals: *Orbicella annularis* and *Orbicella faveolata*.

Bouldering species like star corals are important reef stabilizers. Within the past 20 years, *Orbicella annularis* has seen a greater than 50% decrease in its population and is now listed as "Endangered" on the IUCN Red List.

THE WORLD-FAMOUS CORAL TREES

After years of R&D, the Coral Tree[™] was born at CRF[™]. This simple, cost-effective technology is now used by groups around the world.

Coral Trees[™] are tethered to the ocean floor and buoyed with a subsurface float. They are suspended in the water column and move freely with wave surges and currents. This helps prevent damage to the tree structures and corals by absorbing the wave energy.

Coral fragments are hung from the branches of the trees using monofilament line. Suspended in the sunlit and nutrient-rich water column, Acroporid fragments grow into "reef ready" colonies in just six to nine months.

We clean the trees regularly so that the corals do not have to compete with any other organisms for space or food.







PILLAR CORALS

We are one of a handful of organizations that cares for living colonies of pillar coral, *Dendrogyra cylindrus*.

We currently care for 20 pillar coral genotypes in the Tavernier Nursery. This species is now functionally extinct in the wild in Florida.

In 2022, we started working to include pillar corals in our large scale husbandry and restoration program, building the infrastructure to begin propagating these iconic species.

OTHER SPECIES

As a result of ongoing relocation work with Florida Keys Electric Cooperative, we are continuously welcoming more species into our nursery systems. We now care for colonies of: Diploria labyrinthiformis, Montastrea cavernosa, Occulina diffusa, Porites astreoides, Porites porites, Siderastrea siderea, Siderastrea radians, Millepora complanata, Dichocoenia stokesii, Favia fragum, Pseudodiploria strigosa, Solenastrea bournoni, Solenastrea hyades, Isophyllia sinuosa, Stephanocoenia intersepta, Pseudiploria clivosa, and Colpophyllia natans.





CORAL OUTPLANTING

Corals in our nurseries are harvested from the Coral Trees[™] and moved to a carefully selected spot when they are "reef-ready". We track which genotypes are rehomed on each site.

CORAL COHORTS: MAXIMIZING COVERAGE

On healthy reef systems, Acroporid corals grow to cover the substrate in huge swaths of 100% coverage. We rehome corals on the reef in "cohorts" of 50 to 70 fragments spaced 30 centimeters apart to reestablish these natural blanketing structures. This maximizes our "coverage per coral," giving each nascent colony time to grow before becoming part of a merged thicket. We cover large reefs with dozens of genetically different cohorts.

We are continually developing novel outplanting strategies for different species as we scale up the restoration of this complex ecosystem.

ACROPORID OUTPLANTING

We remove algae from the substrate with a masonry hammer before outplanting Acroporid corals. Two-part marine epoxy then fixes corals to the substrate. Three points attach staghorn corals. Elkhorn corals have one large connection.

Divers waft water over the new outplants to ensure they are secure.



BOULDER CORAL DOMES

Custom cast domes help us restore boulder coral populations quickly. They are composed of a cement mix used in artificial reef structures.

The 6" and 11" domes accommodate 35 or 75 boulder coral plugs. Corals grow and fuse, their tissue quickly covering the dome.



PHASES OF REEF RESTORATION



DEGRADED REEF SYSTEM

- A degraded reef system is dominated by algae and sea fans. Young corals have no substrate on which to settle.
- The environment lacks color and topographic complexity.
- Fish biomass and diversity is low, with few, if any, apex predators.

EARLY RESTORATION

- Large areas of reef receive the first phase of coral cohorts. Survivorship beyond one year is low.
- At around one year post outplanting, surviving thickets begin to fuse.
- The presence of healthy coral tissue begins to attract other marine life and coral planula.



RESTORATION PROGRAM

RECOVERING ECOSYSTEM

- With repeated waves of coral outplanting, coral populations begin to stabilize and survivorship increases.
- Fused colonies create complex habitats for other marine life; species diversity and biomass increases.
- Predators return to the environment.
- Corals spawn, combining DNA to create new genotypes.

RESTORED ECOSYSTEM

- Coral cover reaches and begins to exceed 25%.
- Corals spawn every year, seeding the environment with new coral genotypes.
- Herbivorous species including sea urchins keep algal populations in check, allowing new corals to settle and colonise the substrate.
- Fish and invertebrate life is abundant and apex predators are present in significant numbers.

SAUDI ARABIA

King Abdullah University of Science and Technology (KAUST) Reef Restoration Initiative at Shushah Island

Coral Restoration Foundation[™] was hired as a consultant to join the KAUSTbased team on the initial development of the coral restoration and habitat enhancement strategy for Shushah Island, located in the northern Red Sea, off the NEOM region of Saudi Arabia. CRF[™] provided support including guidance on in-situ nursery methods, site selection, collecting mosaic imagery, standardizing terms and naming conventions, leading planning workshops and meetings, and in-person support for the development of the master plan behind the KAUST reefscape initiative.

PHILIPPINES

Atlantis Dive Resort Restoration Program Expansion and Support

CRF[™] was invited to join Atlantis Dive Resort in the Philippines to assist in nursery expansion and outplanting efforts as part of their in-house restoration program. This was a multi-agency effort and included other collaborators such as the Mead Foundation, Loveland Living Planet Aquarium Coral Rescue, and Haka Dive Center in Panglao, Bohol. CRF[™] served as the coral restoration expert and functioned as a resource for the guests attending the week-long project, providing educational sessions and presentations.

HAWAII

YO CO

The Nature Conservancy Non-Acroporid Restoration Techniques

Staff from the Nature Conservancy Hawaii joined the CRF[™] restoration team in Key Largo, Florida as they began developing a program for non-Acroporid coral restoration. The focus of the training with CRF[™] was a review of CRF[™] Boulder Coral Tree[™] methods. They received land-based training in Coral Tree[™] construction, and fieldbased training in coral propagation, coral installation, Coral Tree[™] cleaning and maintenance, and coral harvesting for outplanting. During the training, divers placed 136 boulder coral plugs onto dead boulder heads at Carysfort Reef.

Participants were also exposed to CRF[™] monitoring techniques and approaches to genet selection.



GUAM

National Park Service Boulder Coral Propagation Techniques

CRF[™] restoration staff were joined by members of Guam's National Park Service, who are currently working to develop their own restoration program. They joined us to review boulder coral propagation techniques, including original coral collection efforts and creating brood stock corals to establish initial stalk nurseries. The training involved fragmenting 350 new boulder coral plugs and installing them on a new Coral Tree[™]. The CRF[™] team also shared information about photomosaic monitoring and the collection of novel species.

GLOBAL LEARNING EXCHANGES

In 2022, we organized six learning exchanges, aimed at serving restoration efforts around the world by lending our expertise and support, as well as ensuring we are continuously evolving and applying the world's best practices to our mission.

AUSTRALIA

Coral Nurture Program Testing Acroporid Outplant Methods

This training exercise, organized by CRF[™] and Australia's Coral Nurture Program, supported participants from CRF[™], Coral Nurture Program, MARRS, and KAUST divers in learning how to use the "coral clip" as an outplant strategy for Acroporid corals. The exercise involved some epoxy-based outplanting in order to compare outplanting speed as well as rates of attachment and long-term attachment success. Participants included divers from Saudi Arabia, Indonesia, Australia, and the United States.

PACIFIC ISLANDS

NOAA Pacific Island Partners Knowledge Exchange Boulder Coral Restoration Techniques

This collaboration between NOAA, CRF[™] and the CRC (Coral Restoration Consortium), funded by NOAA through the CRC, was focused on boulder coral propagation and outplanting techniques. Participants from the NOAA Restoration Center Hawaii, Hawaii Division of Aquatic Resources, Kuleana Coral (Hawaii), the Commonwealth of the Northern Mariana Islands (CNMI) Marine Management Program, The Nature Conservancy Guam, and the American Samoa Department of Marine and Wildlife worked with the CRF[™] team to propagate over 400 boulder corals in our open ocean nursery and then return over 300 reef-ready boulder coral colonies to the wild. The second part of this exchange will take place in Fall 2023, when CRF[™] staff will travel to Hawaii and continue working with members of this team to understand local challenges and support their restoration programs.

2022 RESTORATION PROGRAM PARTNERS

CARIBEE BOAT SALES & MARINA

Invaluable support for our infrastructure has been provided by the team at Caribee. They helped facilitate the purchase of new engines in 2019, and regularly provide routine maintenance for our working vessels, free of charge.

THE COLLEGE OF THE FLORIDA KEYS (CFK)

CFK enables three interns to assist with our Key West nursery and restoration operations, which include guiding divers, outreach events, and monitoring efforts.

CORAL RESTORATION CONSORTIUM (CRC)

Through our leadership role in the CRC, we have been helping to facilitate information exchanges and build on the opportunities presented by this community of collaboration.

FLORIDA KEYS ELECTRIC COOPERATIVE (FKEC)

Corals we relocate from FKEC structures are contributing to diversity in our restoration programs.

THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION & THE FLORIDA KEYS NATIONAL MARINE SANCTUARY

The Florida Fish and Wildlife Conservation Commission and the Florida Keys National Marine Sancturary provide the permits that make our work possible.

FLORIDA KEYS NATIONAL MARINE SANCTUARY FOUNDATION

The Foundation administers a collaborative grant that supports our restoration work and expansion at Eastern Dry Rocks.

MISSION: ICONIC REEFS

As we work towards the Mission: Iconic Reefs plan we will be collaborating with NOAA, The Nature Conservancy, SECORE, University of Florida, University of Miami, Nova Southeastern University, and Mote Marine Laboratory, among others.

NATIONAL FISH AND WILDLIFE FOUNDATION

NFWF supports our restoration work at four reef sites as well as the development of our pillar coral propagation methods.

NOAA & NOAA RESTORATION CENTER

NOAA RC has been pivotal in providing funding, guidance, advice, and input on decision-making.

UNITED WAY OF COLLIER AND THE KEYS (UWCK)

UWCK is supporting our ongoing restoration efforts at Carysfort Reef with a grant of just under two million dollars.

US ARMY CORPS OF ENGINEERS

The US Army Corps of Engineers provides the permits for our in-situ coral nurseries.





In 2018, Coral Restoration Foundation[™] provided a basis for the most ambitious reef restoration plan in the world, *Mission: Iconic Reefs.* This is an unprecedented, multiagency effort with the goal of restoring seven iconic reefs throughout the Florida Keys to near-historic coral cover. These sites will become refugia of biodiversity that will help to seed the rest of Florida's Coral Reef with life.

Mission: Iconic Reefs unites the work of NOAA, CRF[™], MOTE, the Florida Keys National Marine Sanctuary, TNC, University of Miami, DEP, the Florida Aquarium, Reef Renewal, FWC, and University of Florida under one collective phased plan to restore corals and lost herbivores to Florida's Coral Reef.

This is the world's largest and most holistic coral restoration plan and has been partly modeled on Coral Restoration Foundation[™] successes of the past few years, building on our restoration strategy and efforts to date across the target sites. The two decadeslong project has an estimated budget of \$97 million.

For the next several decades, most of our restoration work will be focused on the seven iconic reefs of the Florida Keys targeted by this plan, and carried out in collaboration with the best coral restoration practitioners and marine biologists in Florida and beyond.

SCIENCE

Our science program tracks the progress of our restoration work, supports the development and use of best practices, and provides a vital knowledge base resource for restoration practitioners around the world.

- We rigorously monitor our restoration reef sites, applying **proven methodologies and the latest technology** to track our impact.
- We develop **publicly available techniques** and generate data that can be used by other groups around the world.
- We are involved in **research** into the wider ecological impact of our work, collaborating with scientists around clearly defined areas of investigation.
- We provide the research and restoration communities with **unique and invaluable resources** including field-based infrastructure, corals, gametes, genetic data, and cutting-edge tools.
- Our data inform our **strategic development** and our research provides a focal point for **collaborations** with government agencies including NOAA, universities, NGOs, and others.





PHOTOMOSAICS

We monitor the progress of our restoration work using photomosaics. Photomosaics are huge, composite images of reef sites created by stitching together thousands of smaller images. The high-resolution image that is produced allows us to measure increases in coral coverage with an incredible degree of accuracy.

These mosaics encompass several thousand square meters of reef area and can be used to compare the growth and health of outplanted corals over time, while also documenting changes to the reefscape and other underwater habitats.

These mosaics can be shared with other groups looking to answer additional questions about coral reef ecology.

Our photomosaic techniques and our methods are comprehensively detailed in regularly updated white papers on our website.



In 2022, we generated 314restoration site monitoring mosaics, for 6 reef sites, $47,505m^2$

RECORDING SUCCESS

Recording increases in coral coverage on restoration sites, rather than tracking the survivorship of individual corals, is giving us a much better picture of the impact of our restoration work.

Tracking individual survivorship doesn't take into consideration the way in which corals grow and fuse together. As healthy corals grow, they fuse with neighboring colonies of the same species, forming a single, expansive colony - a "thicket". Simply calculating survivorship as one living colony out of the many that were originally outplanted would imply massive mortality, despite the obvious success of the restoration effort.

In 2022, we recorded average increases in coral coverage on all sites between one month and one year post-outplanting. The numbers are incredibly encouraging:

• Acropora cervicornis **58.4% increase**

• Acropora palmata 38.24% increase*

*Acropora cervicornis (staghorn) is a faster growing species than A. palmata (elkhorn)

Our data indicate that the corals we have returned to the wild have restored

 $34,000+m^2$

of coral reef in the Florida Keys National Marine Sanctuary





These images are details of photomosaics from restoration site Marker 32, showing coral growth between 2018 and 2022.

CeruleanAl

We are advancing and democratizing machine learning technology to support coral restoration site monitoring around the world.

2022 marked a year of remarkable progress for Coral Restoration Foundation[™] in the development of CeruleanAI, an advanced software platform that brings the power of automation and artificial intelligence to photomosaic generation and analysis. This technology is a game changer for coral reef monitoring.

CeruleanAI is a web-based platform with versatile capabilities. It processes images, tags them with metadata, and converts them into an accurate, scaled, photomosaic. In addition to storing original images and metadata, it also allows in-depth viewing and analysis of the photomosaic.

To increase the precision of the AI analysis, we've started creating an enhanced model based on

recent images from our restoration program. By 2023, this improved model will replace the current one within the CeruleanAI system.

We also built out Cerulean's multi-user system in 2022. This feature gives third party organizations secure access to the platform, control of their data, and the capacity to store details about their reef sites and mosaic settings.

Our ambition is to make the photomosaic feature of CeruleanAI available to selected partners and practitioners by mid-2023.

The release of CeruleanAI will mark an important step forward in democratizing access to advanced tools for coral restoration.





DOUBLING DOWN ON DNA

We are expanding the capacity to conduct SNP chip analysis on more disappearing coral species.

CRF[™] is dedicated to preserving and understanding the genetic diversity of our corals to enhance our restoration and research efforts. In 2020, we participated in a state-wide staghorn coral exchange and helped coordinate the sequencing and analysis of the swapped samples.

In 2022, this work took a significant leap with the application of SNP (Single Nucleotide Polymorphism) chip technology. This advanced tool helps us identify genetic variations among our corals, ensuring that we are working with the most diverse samples.

We provided unique samples of Orbicella annularis coral to Pennsylvania State University, which will help develop this SNP chip technology specifically for Orbicellid corals. Once established, we will utilize this tool to sequence all our Orbicellid corals, enhancing our understanding of their genetic makeup.

Additionally, we're developing SNP chip technology for corals vulnerable to Stony Coral Tissue Loss Disease (SCTLD), focusing particularly on pillar corals. In collaboration with the Florida Fish and Wildlife Conservation Commission (FWC), we've contributed all our pillar coral genotypes for sequencing.

Our pillar coral samples join a state-wide collection from various holding facilities as part of the Coral Rescue project. This collective effort helps us identify genetic relationships and uniqueness among individual corals, which will guide our coral management strategies. By spreading unique genotypes across different nurseries and facilities, we can better safeguard them from natural disasters or facility disruptions, thus protecting our precious coral diversity.

*SNP genetic testing is a way to study DNA and look at specific points (single nucleotide polymorphisms) to understand variations in the genetic code.



PREPPING PILLARS FOR PRODUCTION

We are now moving pillar corals into production and banking their genetic diversity, bringing Florida's lost unicorns a few steps closer to recovery.

Coral Restoration Foundation[™] has been prioritizin pillar coral research and propagation in 2022. In January 2021, we conducted a pilot fragmentation event and have since been monitoring the growth of the colonies on their substrates, taking monthly photos to assess this species' growth rates and any genotype-specific differences. This research also he us understand which mediums are best for growing pillar tissue quickly in our in-situ nursery.

In the fall, CRF[™] began a new round of fragmentat The effort marked the beginning of a pillar coral genetic bank and a pillar coral production section

ng n y elps	in the nursery. To date, pillar corals have only been monitored and maintained within nursery programs, but have not yet been propagated with the purpose of outplanting. As a key species in the <i>Mission: Iconic</i> <i>Reefs</i> plan, it is crucial that Florida groups invest in propagation and outplanting plans for this delicate species.
g tion.	CRF [™] will be scaling up our pillar coral program in 2023, with the goal of creating full Coral Trees [™] of each pillar coral genotype – mirroring our nursery production sections for the other species we are actively restoring.

CORAL SPAWNING

Every year across Florida and the Caribbean, around the late-summer full moon, Acroporid corals simultaneously release gametes - bundles of eggs and sperm - into the water. This is a process of sexual reproduction called "spawning" and it is vital for ensuring the genetic diversity of wild coral populations.

More than ten years ago, in a historic first, corals CRF[™] returned to the "Wellwood Site" on Molasses Reef became the world's first outplanted corals documented to spawn. Since then, we have recorded spawning at multiple restoration sites – strong evidence that our methods are working; spawning is an energy intensive activity and seeing this sexual reproduction indicates that our corals are happy and healthy.

The broodstock corals in our nursery also spawn every year. By carefully monitoring our corals, we determine gamete maturity, which helps us to predict when spawning will occur. As a result, our infrastructure, corals, and the data we have available – including comprehensive genetic information – provide a unique resource for researchers from around the world looking to study this extraordinary event.

Corals raised from gametes collected at our facilities are living with organizations around the world, helping a whole community of researchers better understand coral sexual reproduction to improve monitoring, to enhance the impact of spawning events, and to create new coral genotypes. Coral sperm and eggs from our nurseries have also been cryopreserved, securing a future for unique genetic strains of these disappearing animals.

Upscaling restoration means ensuring that spawning corals can seed the reefs with new genetic strains and avoid local extinctions of these critically endangered species.



SPAWNING THROUGH THE YEARS

2017

Acropora cervicornis colonies were observed spawning in the Tavernier Coral Tree[™] Nursery and on our restoration sites. Scientists from various institutions, including SEZARC, collected and cryopreserved gametes from nursery broodstock.

2018

Broodstock corals were moved to holding tanks at Keys Marine Lab and gametes were collected by scientists from multiple institutions for cross-fertilization. Florida Aquarium bred over 3,000 *Acropora cervicornis* larvae from these gametes, yielding thousands of new genotypes.

2019

Divers transferred colonies of 12 A. cervicornis and 7 A. palmata genotypes to holding tanks at Keys Marine Lab, where gametes were cross-fertilized and cryopreserved by a research team from multiple institutions. Over 1,500 of the new genotypes created by Florida Aquarium in 2018 were rehomed on Florida's reefs, boosting genetic diversity in the wild. CRF[™] assisted a team from Nova Southeastern University to collect gametes from pillar coral spawning in the wild and crossfertilized them to increase genetic diversity.

2020

CRF[™] observed spawning of *A. palmata* and *A. cervicornis* at North Dry Rocks, a first for nursery-raised *A. palmata* in the wild. Spawning was also observed at the Tavernier Coral Tree[™] Nursery and gametes were collected by SEZARC, resulting in the cryopreservation of nine new genotypes. CRF[™] assisted NOAA and U-Miami with spawning observations for grooved brain corals, which were seen spawning on Florida reefs for the first time.

2021

A combination of a split spawning event and poor weather hampered spawning monitoring efforts.



SPAWNING 2022

We are contributing both DNA and spawning data to the coral restoration community.

In 2022, our Coral Tree[™] Nurseries and restoration sites, home to over 660 diverse genotypes, once again proved to be invaluable sources of data and DNA.

On August 13th, our CRF[™] dive team embarked on a mission at North Dry Rocks Reef, one of our most successful restoration sites. The goal was to observe the coral spawn and record crucial data for future prediction models. They were not to be disappointed. Sharing the site with NOAA researchers collecting coral gametes, our team meticulously noted the genotype of each colony and the precise timing of the spawning event.

Meanwhile, in the Tavernier Coral Tree[™] Nursery, our divers closely monitored another spawning event in an area known as "spawning alley". In collaboration with the South-East Zoo Alliance for Reproduction & Conservation (SEZARC), we gathered and cryopreserved coral gametes from several genotypes. This invaluable genetic material will be crucial for future research.

By Monday night, the corals on the reef had finished spawning. However, the nursery continued to buzz with activity, with over 50% of our Coral Trees[™] still releasing eggs and sperm into the water.

The occurrence of coral spawning in the wild is vital for the natural recovery of our reefs and the restoration of a genetically diverse ecosystem. With continued outplanting events, these reefs will soon be thriving hubs of biodiversity once again, stepping stones for a larger-scale recovery, sowing the seeds of new life on Florida's Coral Reef.



2022 RESEARCH COLLABORATIONS

We are in the unique position of being able to provide scientists with corals from our nurseries, as well as limited field support, for experimental work that is aligned with our research priorities.

DISEASE & BLEACHING

Serena Hackerott (1), Dr. Eirin-Lopez (1), Dr. Martell (2) Florida International University (1) **University of British Columbia (2)**

This research seeks to better understand the potential benefits and applications of coral stress hardening within the scope of large-scale field restoration applications using a combination of laboratory and field experiments. This work will identify any potential benefits or tradeoffs associated with pre-outplanting thermal stress exposure and assess their applicability in a restoration setting.

Dr. Matthew Gilg **University of North Florida**

This research will test whether some genotypes are tolerant or resistant to multiple stressors. This builds on previous work Dr. Gilg conducted with CRF's genotypes to understand thermal stress tolerance; these same genotypes are now being studied with high light intensity.

CORAL MONITORING

Rick Hudson University of North Carolina at Charlotte

Building off the work of last year's machine learning and computer vision courses, Rick Hudson led undergraduate and graduate level students at UNCC in exploring AI models that may be able to automatically detect coral colonies in photomosaic imagery.

ECOLOGY

Dr. Cheryl Woodley NOAA National Center for Coastal Ocean Science

Dr. Woodley and her team returned to the Keys again this August for coral spawning. In the Tavernier nursery, they collected gametes from spawning A. cervicornis colonies that originated from throughout the Keys. Dr. Woodley's team used this diverse set of genotypes to attempt reciprocal crosses, studying the compatibility of different genotypes with one another.

Dr. Iliana Baums **Pennsylvania State University**

CRF[™] provided samples to Penn State to support additional CBASS studies, building on previous work in 2020 and 2021. Fragments of elkhorn, staghorn, and mountainous star coral were transferred to the Coral Reef II research vessel offshore of the Tavernier Nursery. These short-term thermal stress assays are providing a baseline understanding of how different species and different genotypes react to heat stress events.

CORAL NURSERIES

Dr. Michael Gerdes **Capital Coral**

With non-Acroporids, plugs and the trays on which they are propagated become biofouled very quickly, sometimes inhibiting growth of small frags. CRF[™] has been testing new plugs and tiles from Capital Coral that have been designed to reduce the amount of biofouling and therefore allow for better growth of corals on plugs and an acceleration of the propagation process.

GENETIC RESILIENCE

OUR RESEARCH FOCUS



CORAL NURSERIES

The coral propagation data we collect in our nurseries help us increase the number of nursery-raised corals that can be successfully rehomed on the reef.



OUTPLANTING METHODS

We are currently experimenting with new outplanting techniques that will help move the overabundance of corals we are cultivating into the wild. MONITORING TECHNIQUES We are constantly looking to improve the ways we analyze nursery-raised corals and evaluate their wider impact on

the ecosystem.



RESTORATION SITES

Ongoing research at CRF[™] seeks to better understand why some sites exhibit a higher survival rate for outplanted corals than others.



GENETIC RESILIENCE

Our research tracks how different coral genotypes (and their associated microbes and symbionts) survive and grow and how different outplanting techniques correlate with success.



COMMUNITY STRUCTURE

By monitoring our outplanting sites, CRF™ is demonstrating how ecology impacts coral restoration; we show how other organisms and reef conditions can affect the health of rehomed corals.



PUBLICATIONS

CRF[™] expertise and infrastructure supported studies published in three peer-reviewed journals in 2022.

NOAA Fisheries

February, 2022 Quicklook Report: Coral Spawning 2021: Activities and Observations

Allan Bright, Mark Ladd, Lydia Wasmer, Dana Williams

Frontiers in Marine Science

June, 2022

An Integrative Method For Enhancing the Ecological Realism of Aquatic Artificial Habitat Designs Using 3D Scanning, Printing, Moulding and Casting Aneri Garg, Stephanie Green

Science Direct

September, 2022

Intra-habitat structural complexity drives the distribution of fish trait groups on coral reefs

Noelle Helder, John Burns, Stephanie Green



EDUCATION

At CRF[™], we provide practical, meaningful ways for everyone to learn from and get actively involved with our mission to bring our coral reefs back from the brink of extinction.

Our goal is to educate, entertain, and empower - to inspire the world to become stewards of our

- Our publicly available **educational materials** complement state standards, and can be easily incorporated into lesson plans.
 - **Presentations** at our Exploration Center, or online, can be tailored for any group.
- Internships provide university-level students with vocational training and experience. Our interns go on to launch exciting careers in marine science and
- Recreational Dive Programs let all ocean lovers make a difference, while enjoying fun days out on the water working alongside our team.
- Volunteers from the local community contribute to our daily work, both on and off the water.

EDUCATION & OUTREACH

In the face of massive ecosystem degradation, the coming generations have unique and complex challenges ahead. At Coral Restoration Foundation[™], we are giving them the tools they need to learn how to thrive in the world we are handing them.

We have built a practical, future-focused path of engagement with science and ecosystem restoration. Our STEAM-based learning resources unite the fields of science, technology, engineering, and mathematics with the arts, and introduce learners of all levels to complex problem solving, science, and interdisciplinary studies.

PRESENTATIONS

We offer tailored presentations for diverse classes and groups. We hold in-person sessions in schools and we beam our young educators to classrooms around the world.

WORKSHOPS

Our 66 STEAM-focused "Learning Labs" follow state standards and enrich the curriculum for all students from grades K through 12. We can deliver these workshops in person and remotely.

ACTIVITY PACKS

Our publicly available lesson plans, derived from our workshops, follow Florida state standards and can be integrated into any classroom from grades K through 12.

CAPTAIN CORAL

Demonstrating the power of edu-tainment at its best, the Captain Coral Show is a swashbuckling performance and an explosive journey into marine science. It has become a hit with audiences of all ages.

AFTER SCHOOL CLUBS

Our After School Club provides students with a holistic educational experience. Activity sessions combine elements of project-based, team-based, and problembased curriculum. We introduce students to oceanography and ecology, while delivering a hopeful message about our capacity to save our coral reefs.



We worked with 6,571 students in 2022, with 28 virtual sessions and 282 in-person events

EDUCATION PROGRAM

2022 CRF[™] EDUCATION PROGRAM HIGHLIGHTS

JANUARY

We kicked off the year with our first monthly activation at Zoo Miami's Conservation Action Center, reaching over 300 people per month with engaging, hands-on exhibits.

FEBRUARY

We took students from Key Largo School out to experience coral restoration up close. For more details, check out page 46.

MARCH

In March, we reached 300 attendees at Plantation Key School's Career Day with interactive demonstrations of our coral restoration efforts. Then, at the Manatee Fest, our team engaged almost 400 people with our outplanting station, coral tree activity, and immersive virtual reality dives.

APRIL

At Turtle Fest, at the Loggerhead Marine Center, we reached 370 people with our outplanting station, mini-coral tree, and educational materials. We also took part in the Key Largo School Earth Week, inspiring more than 400 K-8th graders with our mission.

MAY

At the Community School of Naples Earth Day event, we manned an educational booth, sharing information about out mission with 163 attendees.

JUNE

June saw us at the Ocean Reef Club Nature Exploration Camp, where we educated a group of children about coral and hosted engaging slime activities.

JULY

Throughout the summer, we gave presentations 2-3 times a week at the Florida SeaBase, run by the Boy Scouts. Each presentation shared our work with approximately 50 Boy Scouts.

SEPTEMBER

We launched our impactful Generation Coral: Be a HERo initiative this month. For more information, see page 49.

OCTOBER

The spooky season brought our team to Trunk or Treat events at Founders, Pennekamp, and Key Largo School. Our interns showcased their creativity, decorating their trunks for three separate events and reaching over 1000 people.

DECEMBER

We wrapped up the year with the Coral Carnival. See page 51 for all the highlights.



CATALYZING **CHANGE: KIDS DIVE IN**

Fostering the next generation of ocean stewards, this week-long, immersive educational initiative imparts hope for a brighter, more resilient future for communities in the Florida Keys.

In 2022, Coral Restoration Foundation[™] sparked a wave of ocean enthusiasm among 4th graders at the Title One Key Largo School with a dynamic, week-long exploration of the world of coral reefs.

Fueled by the Every Kid Outdoors Transportation Grant supported by the National Park Trust, this immersive program navigated students through the intriguing waters of coral biology and ecology. Designed in alignment with Ocean Literacy, Next Generation Science, and Florida CPALMS state standards, the program engaged students with lively, handson activities, from crafting polyp dioramas to conducting experiments that illuminated climate change impacts on coral.

The week's highlight was a snorkeling field trip on Florida's Coral Reef, followed by a reflective day where students consolidated their learning. This involved crafting conservation strategies, designing awareness posters, and earning an ocean conservation patch — a recognition of their first steps towards becoming dedicated ocean stewards.









CAPTAIN CORAL'S SCAVENGER EXTRAVAGANZA

Captain Coral and his Coral Crewbring hope for coral reefs to Zoo Miami, kicking off the CRF[™] World Oceans Day celebrations

Proving that science does not always have to be serious, the CRF[™] Captain Coral's Scavenger Extravaganza made a splash during Memorial Day weekend at Zoo Miami. The Coral Crew, led by Captain Coral, turned the zoo into an educational treasure map filled with interactive, coral-themed booths, each offering its own conservation activity.

A specially designed EventZee app transformed the zoo into a thrilling scavenger hunt. Visitors journeyed from station to station, earning a unique, pirate-

themed eye patch upon completion of each activity. Standouts included trivia, fun fact Jenga, and a mock coral outplanting exercise, all of which sparked enthusiastic engagement and learning.

Engaging over 4,000 active participants, the Scavenger Extravaganza encapsulated the CRF[™] vision of combining education, empowerment, and fun, affirming that fun-filled activities are an essential tool for spreading conservation awareness.

GIRL SCOUTS OF TROPICAL FLORIDA

We worked to consolidate our relationship with the Girl Scouts of Tropical Florida, embedding a future-focused learning journey within their programs. With the roll out of coral restoration badges and regular events, we are working to provide these inspiring young women with the tools they need to face an uncertain future with optimism.

In 2022, CRF[™] continued investing in the unique journey into the world of coral restoration that we built for the Girl Scouts of Tropical Florida. We have created a suite of coral restoration badges and workshops for every Girl Scout level, from Daisies to Ambassadors, ensuring a continuous and immersive learning experience throughout their Scouting adventures. We also brought an adapted program to the Girl Scout Festival in September where our team engaged nearly 300 scouts with hands-on activities. Highlights included a virtual reality scuba dive, an interactive outplanting station, and educational trivia games that brought the underwater world to life.









In September, Coral Restoration Foundation[™], in collaboration with American Association for Advancement of Sciences If/Then Ambassador Adele Luta and Heirs to Our Oceans, launched "Generation Coral: Be a Reef HERo". This unique event, part of *Reef Futures 2022*, was designed to empower, inspire and educate young conservationists, particularly aspiring women in STEM, from underserved communities in Southeast Florida.

Despite their proximity to the ocean, many of these Miami-native Girl Scouts had never encountered a coral reef firsthand. The event featured various exploration stations, each delving into a critical aspect of marine conservation, from plastic pollution to SCUBA diving, and from field research to coral restoration.

The most inspiring moment was a virtual meetup with a global panel of young conservationists from Heirs to Our Oceans. The participants heard firsthand accounts of impactful initiatives from representatives in Germany, Uganda, the U.S., and El Salvador.

The event concluded with a snorkeling excursion over Carysfort Reef, where the Scouts witnessed thriving elkhorn corals, restored by CRF[™] in past years. This initiative continues our commitment to nurturing the next generation of ocean stewards and future leaders in marine conservation. But most importantly, we want to build programs that ensure equity of access to these kinds of opportunities.









The 8th annual Coralpalooza[™] – our annual World Oceans Day celebration – was set for June 4th, with an expanded land event planned in addition to the traditional Coralpalooza[™] Dive Day. The Dive Day included 167 divers from the Upper, Middle, and Lower Keys, as well as 12 different operators and 13 vessels. A Captain Coral show, community booths, and a treasure hunt were all scheduled to be part of the land-based celebrations. Unfortunately, the event was canceled due to the year's first named tropical storm. So, later in the year, we introduced the Coral Carnival.

CORAL CARNIVAL

The CRF[™] Coral Carnival celebrated the transformative power of community engagem

On December 10th, to make up for having to cancel Coralpalooza[™] 2022, Coral Restoration Foundation[™] hosted the first Coral Carnival, celebration of coral reefs, stressing the value community engagement.

The free, family-focused event was packed w educational activities, games, and food, at th Murray E. Nelson Government Center. Atter embarked on a unique educational journey, guided by a CRF[™] Pirate Treasure Map that I them through various activity booths.

EDUCATION PROGRAM

ent.

o on a e of	These included Biodiversity Jenga, Restoration Diver Relay Races, Coral Ecology Trivia, and Coral Slime Creation - each highlighting different aspects of coral ecosystems and restoration.
vith he ndees	Enriched by community booths from local organizations and schools, the carnival peaked with Captain Coral's grand entrance and his engaging live science show.
led	Attracting over 500 attendees, the Coral Carnival was an incredibly rewarding way to give back to the community that supports our mission.

INTERNSHIPS

Nurturing tomorrow's leading marine scientists remains a focal point for Coral Restoration Foundation[™].

We offer vocational training to universitylevel interns, creating a structured learning environment where they can contribute to a world-class non-profit, and in the process gain the skills and experience that will set them up for success as they launch their careers.

Interns can expect to be mentored, challenged, and inspired as they work with our dedicated team, assisting them in defining their focus. Our intern training program includes Scientific Diver accreditation and the opportunity to become members of the world-famous Explorers Club. We make every effort to continue raising the standard of this essential program, adapting and evolving, even in the face of challenges like the global pandemic.

In 2022, we began the process of revamping our Intern Online Training Academy to an Internal Online Training Academy. This redesign aims for a more holistic approach, featuring all our updated methodologies, supplemental videos for enhanced training, and courses to further staff and intern development.

We also extended our internship program into Key West this year, recruiting designated interns to live and work in the Lower Keys, supporting the expansion of our restoration efforts. We welcomed **30** individuals to our internship program in 2022

Interns were responsible for returning more than

18,000 corals to Florida's reefs in 2022



VOLUNTEERS

Year round, our dedicated volunteers work alongside the CRF[™] team, on land and beneath the waves, helping further the mission to restore our coral reefs.

In 2022, we revamped our volunteer onboarding process to focus on boosting skills and confidence. This included 41 pool training sessions that helped 43 volunteers hone their underwater skills, followed by workboat training that familiarized them with our day-to-day operations. Thanks to these measures, we were able to clear 15 new volunteers for workboat operations.

This tiered approach not only enables volunteers to gradually build their abilities, but also allows us to better gauge everyone's unique capacities and requirements. As a result, we're now offering an average of six dive-based and approximately 50 total volunteer opportunities per month.

Crucial to these developments were our partnerships with local diving communities, which assisted volunteers in achieving necessary certifications and provided invaluable coaching. Their support demonstrates the collective commitment required to safeguard and restore our coral reefs.

In 2022, we **95** worked with **95** active volunteers In 2022, we welcomed 850+ recreational divers and snorkelers to dive & 101 dive & snorkel

programs

DIVE & SNORKEL PROGRAMS

Year-round public programs, set by local dive operators, have made it incredibly easy for recreational scuba divers and snorkelers to experience a restoration adventure.

We also tailor private programs for groups from all over the country, including specialized programs for organizations and clubs that work with children, adults, and veterans with disabilities.

Our interns and select long-term volunteers have been trained to guide Coral Restoration Adventures as "Coral Crew". Their leadership enriches our Dive Programs immensely, giving the public a chance to engage with some of the world's most promising young marine scientists.

These dive program particpants returned

corals to the reefs of the Florida Keys

2022 PRÍVATE DIVE PROGRAM HIGHLIGHTS

MARCH & APRIL

Coral Shores High School, a local Upper Keys high school, engaged in recurring dive programs as part of their curriculum. restoration activities.

MAY

Rotary Club Chapter of Miami joined as snorkelers following a virtual presentation.

JUNE TO AUGUST

SeaBase held two-week summer camps featuring coral restoration as a highlight of the experience. SeaBase scouts were responsible for outplanting more than 400 corals to Alligator Reef.

JUNE & JULY

WestCoast Connection Summer Camp, a community hour-driven summer camp, joined us for a land-based education experience with a snorkel component.

JULY

We were joined by Dive with a Purpose, a nonprofit focused on locating and documenting shipwrecks, predominantly those related to the Atlantic slave trade.

EDUCATION PROGRAM

JULY

Dive with a Purpose Youth, an international program, took part in our

JULY & AUGUST

Travel For Teens joined us for a landbased educational experience with a snorkel trip to the nursery and a restoration site.

AUGUST

Camp Open SEAS/Therapeutic SCUBA, an adaptive diver program, took part in our restoration work.

OCTOBER

Community School of Naples, a multiyear participant in our dive programs, booked several trips for high school students and their families to assist with our field work.

DECEMBER

The Dive Shop at Ocean Reef Club[®], in coordination with new CRF[™] board member, Nick Davies, arranged a sponsored dive program for select invited guests.



ICONIC REEF GUARDIANS

CRF[™] spreads hope in 2022, amplifying public engagement with *Mission: Iconic Reefs* through BlueStar Operators.

Coral Restoration Foundation[™] played a pivotal role this year in expanding the influence of both the BlueStar program and the reach of the *Mission: Iconic Reefs (M:IR)* plan. We were instrumental in shaping a new *M:IR* initiative within the BlueStar program called the Iconic Reef Guardians program. CRF[™] helped lead the development of this program and its materials, with the pilot taking place in the CRF[™] Tavernier Coral Tree[™] Nursery.

The Iconic Reef Guardians program provides BlueStar operators and their guests with an opportunity to engage with and contribute to the *M:IR* effort.

The BlueStar program was originally established by the Florida Keys National Marine Sanctuary (FKNMS) to recognize dive, snorkel, and fishing operators dedicated to sustainability. The Iconic Reefs Guardians program is now giving these operators an enriched platform for responsible marine engagement. To participate, operators must complete an educational course, during which time they unlock more opportunities for engagement with *M:IR* activities, beginning with nursery and restoration site visits.

Every operator participating in the BlueStar program is now required to provide comprehensive education about Florida's Coral Reef before any interaction with the marine environment. This CRF[™]-backed initiative aims to reduce the local stress on the reef, promoting healthier and more resilient coral ecosystems. Numerous studies support the effectiveness of this approach, indicating a significant decrease in diver-coral interaction following the conservationthemed briefings that are now mandatory for BlueStar operators.

The 2022 launch of the Iconic Reef Guardians program is a testament to the visionary approach that CRF[™] takes to public education and engagement in coral restoration.



For more information, go to floridakeys.noaa.gov/iconic-reef-guardians





FREE LEARNING RESOURCES

DIGITAL CLASSROOM PRESENTATIONS

Free digital presentations bring us to your classroom, wherever you are.

Email us at: education@coralrestoration.org

ACTIVITY PACKS: FREE LESSON PLANS

Anyone can download our STEAM-focused Activity Packs that follow CPalm and Florida state standards for grades K-12.

Go to: coralrestoration.org/activity-packs

DIVE WITH US!

AN UNFORGETTABLE EXPERIENCE

Join the CRF[™] team out on the water for a day of diving unlike any other.

We run public dive programs all year-round and you can sign up at the click of a button!

We also tailor private programs for groups.

We even offer PADI Coral Restoration Certifications!

FOR MORE INFORMATION, VISIT coralrestoration.org/dive-programs



A swashbuckling adventure in marine science!

Learn more at coralrestoration.org/captain-coral



Millions of people around the world are using our mission of hope as inspiration for creating positive change.

In 2022, the CRF[™] mission was shared by national and international media including Vox, Insider, Smithsonian Magazine, Financial Times, Forbes, CBS and The Washington Post.

ENGAGING THE WORLD

We reach more than **1,700,000 people** every month with our messaging on social media alone!

Inspiring content, worldclass images, and creative collaborations with corporate sponsors have resulted in the extraordinary organic growth of our social media audience. 166,000+
37,000+
20,000+
5,800+

6 20,000+

WAYS OF GIVING

Would you like to help us preserve the legacy of our reefs? Our work is made possible by committed, mutually-beneficial relationships with visionary, practical, and passionate people.

CAUSE-RELATED COLLABORATIONS

Credibility is critical. Our sponsors and donors can rely on our reputation to position themselves publicly as genuine ocean advocates.

GIVING WITH IMPACT

We have the capacity to scale and to absorb significant funding, putting it to work to produce tangible results backed by scientific research.



No amount is too small to make a difference. Our monthly donors provide a secure source of unrestricted funding that helps us forecast the future for Earth's coral reefs.

To discuss how your

philanthropic goals can make a difference for our coral reefs, please contact our Development Department by phone at (305) 453-7030, or send an email to donors@coralrestoration.org.

CORPORATE SPONSORSHIPS

It is consistent support from likeminded companies that gives CRF™ the ability to provide security for the future of our coral reefs. CRF™ is a non-profit partner of 1% for the Planet. Join us in making a difference for a threatened ecosystem.

To learn more, visit: coralrestoration.org/corporate-sponsorships

DONATING CRYPTOCURRENCY

Investing in the future of our oceans

is easier than ever by donating your

classifies cryptocurrencies as property,

so cryptocurrency donations to 501(c)

(3) charities can often reduce your

To learn more or make a donation, visit:

coralrestoration.org/crypto-donations

tax burden.

cryptocurrency to CRF[™]. The IRS

There's nothing cryptic about the

benefits of saving coral reefs.

GIFTS OF STOCK

If you have appreciated assets, you can restore our reefs with a stock donation. Avoid paying capital gains tax and join our most tax-savvy donors by using our new, online tool to transfer your stocks to CRF[™] so that you can make a powerful impact on our work today.

Give a stock gift at: FreeWill.com/Stocks/CRF

GIFT & ESTATE PLANNING

gift in your will or living trust allows you to have an incredible impact on our natural world. We have partnered with FreeWill to provide you with simple tools to protect the people and causes you love. You can now write your legal will in less than 20 minutes, at no personal cost, while creating a legacy gift to support our oceans.

Get started at: FreeWill.com/CRF

HONORARY & MEMORIAL GIFTS

Commemorate someone special while making a meaningful impact for the reefs we all depend on. CRF™ welcomes such gifts, as they help support our work to restore coral reefs and create a legacy of hope for healthy, thriving reef systems around the world.

To make a donation that will have an immediate impact, visit: coralrestoration.org/donate

DONOR-ADVISED FUNDS

Donor-advised funds are one of the fastest growing charitable giving vehicles in the United States today because they are easy, flexible, and tax-smart. CRF[™] routinely receives gifts from our supporters through their DAFs established at Fidelity Charitable, Schwab Charitable, and other sponsoring organizations. Ready to direct a grant to save our reefs?

Get started at: coralrestoration.org/donor-advised-funds



THANK YOU

Our goals are ambitious, but thanks to the generous support of individuals, corporations, and foundations we are achieving our vision - to inspire hope and restore our reefs to healthy, thriving ecosystems.

Although space does not permit the listing of every donation, each contribution makes a crucial difference for our reefs. Thank you to the following supporters who have made gifts of \$500 or more between January 1, 2022 and December 31, 2022.

Alliance Bernstein

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- American Association of Zookeepers, Beardsley Zoo Chapter
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- **Cirque Colors**
- **Clarendon Partners**
- Michele Clarke
- **Clif Family Foundation**
- Kathleen Close ٠
- Jack Coen
- Jill Cohen, MD and Justina Cotter
- Michael Coit
- Evan Golden in honor of Daniella Castellon Goldman Sachs Philanthropy

Glunz Ocean Beach Hotel &

THANK YOU

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The Colina Foundation

The Crickenberger Vance

The Curtis and Edith Munson

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Davidson Family Foundation

DiamondRock Hospitality and

Margaritaville Beach House

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The Garden Group at Ocean

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- William Goodchild
- John and Denise Gordon •
- Entrecanales Domecq E Hijos Stephanie Graeler •
 - Greater Kansas City Community Foundation
 - Dr. Steven and Tara Grekin
 - Fritz Grimm
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 - David and Patti Gross
 - Jean Gruss
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 - Steven and Carole Levin and • Levin Riback Adelman and Flangel, PC
 - Suzanne Lewis
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 - Lobster Trap Art in memory of • Nadine Lahti
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- Charles Lynch Jr. •

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- Marianne and Tri MacDonald •
- Paul D. MacDougal •
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- Poonam, Ted, Setara, and • Nikhil Manasa
- Chip and Anne Matthews
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- Ocean Reef Community • Foundation
- Ocean Reef Conservation Association
- OceanTech ٠
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- O'Malley-Dion Family Charitable Fund
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- Rochester Area Community •
- Foundation
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- Royce Family Fund
- Dora and Steve Rubin
- May and Samuel Rudin Family Foundation
- Russ Post Ocean Sotheby's International Realty
- Crista Ryan

64

- SaltFishTV and Community
- Sand Cloud
- SAVY: The Society for the Advancement of Volunteer Youth at Moody Gardens
- Schwab Charitable Foundation
- Seder Family Foundation
- Shodeen Family Foundation
- The Shumway Fund of the Ocean Reef Community

Foundation

- Sascha and Anka Simon
- Skellyfish Aquarium
- Dr. Susanne Skyrm
- South Miami Garden Club
- Adam and Molly Spector
- David Splitt and Laurene McKillop
- SpongeBob SquarePants: **Operation Sea Change**
- Tina Steelman Duckels
- Senator and Mrs. Paul
- Steinberg Stephen Frink Photographic, • Inc.
- SucculentScribbles
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- Robert and Carmen Wright • Kevin and Lindsay Wylie-•
- Werner
- Steven Yantorni
- YourCause
- Natasha and Dirk Ziff
- Jodi & Scott Zifferer

IN KIND & SERVICE DONATIONS

We are grateful to those who have donated goods and/ or services to support our mission between January 1, 2022 and December 31, 2022.

Ace Hardware

Dive Rite

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Caribee Boat Sales and • Marina

Dawson Marine Services LLC

Innovative Scuba Concepts

Clif Family Foundation Nick Davies •

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Restaurant

Sand Cloud

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XS Scuba

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National Safe Boating

Pilot House Marina &

Tinsley Advertising

We strive for accuracy and are

appreciative of the generosity of our

many supporters. Please accept our

sincere apology for any omissions or

to the attention of our Development

Department by sending an email to

donors@coralrestoration.org.

errors and feel free to bring corrections

Rainbow Reef Dive Center

The Riviera Towel Company

Ocean Wonders

INCOME & EXPENSES

Coral Restoration Foundation[™] is supported by individuals, corporations, private foundations, and government agencies. The sources and allocation of our funding in 2022 are broken down as follows:

SOURCES OF INCOME

Total Income: \$6,106,937

- Government \$2,401,517
- Foundations \$1,682,941
- Corporations \$394,923
- Individuals \$1,069,067
- Other **\$558,489**

EXPENSES

Total Expenses: \$4,864,799

- Program Expenses \$3,978,063
- General & Admin \$483,430
- Fundraising \$403,306

PERCENTAGE EXPENSES BY PROGRAM

Restoration 54% Science 17% Education 29%









At Coral Restoration Foundation[™] we have now returned more than 220,000 corals to Florida's Coral Reef, restoring over 34,000 square meters of endangered ecosystem and bringing it back to life.

You can join this mission at Raise the Reef, our most glamorous night of the year. And when you do, you will be helping to secure the future of coral reefs on our planet, as well as the lives of the millions of people that depend on them.

> For more details or to sponsor the event, contact: Michelle Jensen at michelle@coralrestoration.org



10TH ANNUAL GALA 2024

OCEAN REEF CLUB® KEY LARGO, FLORIDA

850

People took part in our Dive Programs in 2022

6,500+Students reached by our Education Program in 2022

Interns joined us in 2022

34,000+m² Of reef restored in Florida Greef restored in Florida

since 2012

Coral Reef in 2022

220,000+

Corals returned to the reefs of the Florida Keys since 2007

Reef sites received corals in 2022



Of seafloor covered by our Tavernier Coral Tree[™] Nursery, the largest in the world

661 Coral genotypes safeguarded for the future

CRF[™] Coral Tree Production Nurseries in the Florida Keys 23 Coral species living in our nurseries

50,000+Corals growing to a reef-ready

size every year





Outreach events held by our **Education Program in 2022**













photomosaic in 2022

Photomosaics of our restoration sites generated in 2022

Coral reefs documented by Average increase in coral coverage across





As seen on Vox, Insider, Channel 4, FOX, CBS, ABC, BBC, NBC, PBS, Animal Planet, Forbes, The Guardian, NBC Nightly News, The History Channel, CNN, National Geographic, Miami Herald, NowThis, Yahoo Finance, The LA Times, Oceanographic Magazine, USA Today, The New York Times, and The Washington Post.



