RESURGENCE

2023 ANNUAL REPORT

CORAL RESTORATION FOUNDATION™

CORAL
RESTORATION
FOUNDATION™

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

On Florida's Coral Reef, coral coverage is **below 2%** in many places.

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

CRF™ is perfecting techniques for actively restoring coral reefs on an **ecologically significant** scale.

We are **safeguarding and promoting genetic diversity** in coral populations around the world.

Our evolving **methods and high-tech tools are accesible** to the international restoration community.

We are working to advance **ecosystem restoration, science, and collaboration** in the field.

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

TABLE OF CONTENTS

Image contributors: Alexander Neufeld, Granger Eltringham, Jack Harris, Madalen Howard, Zach Ransom, & Sara Nilsson

RESURGENCE

We are living in unprecedented times, with the natural world facing grave, existential threats as a result of human activity.

If we want humanity to thrive on this planet, it has never been more important that we work to support the resurgence of the life-support systems that we rely on.

To achieve this, it's imperative that ecosystem restoration programs cultivate the ability to bounce back in the face of adversity.

At Coral Restoration Foundation™, we have faced setbacks over the years. But each challenge has given us an increased capacity for recovery.

By anticipating risks, proactively developing mitigation strategies, and investing in R&D, we are staying ahead of emerging threats – and now we have the capacity to bounce back quickly when they hit.

This organizational capacity for recovery underpins our unwavering commitment to the resurgence of coral reefs around the world.

FROM OUR CEO

Reflecting on the environmental challenges coral reefs faced in 2023, I am reminded of the capacity we have built into the heart of our work at Coral Restoration Foundation™ (CRF™): a capacity to facilitate RESURGENCE.

In the face of escalating threats to our coral reefs and the increasing frequency of significant disturbance events, our steadfast commitment to restoration and conservation is unwavering – our capacity to mitigate and manage these kinds of risks is the standard by which we evaluate our operations. To this end, 2023 taught us many valuable lessons, not least of which is that our approach works and is more important than ever.

Without the efforts of CRF™ over the last 16 years, the Fourth Global Bleaching Event would have resulted in the extinction of Florida's reef-building corals. However, thanks to our preparation, the scale at which we work, and our focus on genetic and species diversity, we safeguarded critical biodiversity. And, we ensured that corals in Florida still have a fighting chance.

But coral reef loss is not just a local problem; it is a global problem. A global problem that affects millions of people every day; as sources of income diminish, as they face increased food insecurity, and as communities lose their cultural connections to the environment.

CRF™ has a leading voice in the world of coral restoration, and in 2023, we fully embraced both the privilege and responsibility that this entails. Through the new CRF™ Global Program, we can provide more comprehensive access to our resources, knowledge, and networks, tailoring our involvement to the unique needs of communities and organizations operating in diverse environments. Our Science Program also has a new focus: developing scalable tools available to restoration practitioners worldwide. We are investing in technology-based solutions to enhance efficiency in the field and will provide access to these cutting-edge solutions in the form of the "CRF™ Toolkit."

These developments and our inherent capacity to bounce back from adversity are only possible with the support of our community. Together, we are standing on the front lines of the battle to save our coral reefs, and it is only through collective efforts that we will secure the future of these invaluable ecosystems.

As we look ahead, we carry forward the lessons learned in 2023. We know that while our challenges are immense, they are not insurmountable. With determination, grit, and a shared commitment to action, we can ensure that coral reefs also have the opportunity to experience a powerful resurgence, thriving once again for generations to come.

Thank you for your continued support and belief in our mission.

R. Scott Winters
Chief Executive Officer

Image: Alexander Neufeld for CRF™

2023

JANUARY
MALDIVES
CRF™ team is in the Maldives for a restoration workshop

MARCH
RAISE THE REEF 2023
Our annual fundraiser generates critical support for the mission

MAY
CORAL BUS
We unveil a first-of-its-kind coral transport system

JUNE
GENE BANKING
We begin banking coral genets in preparation for the summer

JULY
FOURTH GLOBAL BLEACHING EVENT
Ocean temps reach 93F and we begin coral evacuations

AUGUST
CORAL SPAWNING
Corals in Florida spawn but the gametes are poor quality due to the high temperatues

SEPTEMBER
SER CONFERENCE
CRF™ shares restoration practices with SER

DECEMBER
CORAL RETURN
All evacuated corals return to our in-situ nurseries

THE REGENERATIVE POWER OF THE RESTORATION ECONOMY

Coral Restoration Foundation™ has begun conducting analyses on the socioeconomic impact of coral reef restoration — a pioneering effort in the field. The data show that investment in ecosystem restoration has the power to help communities bounce back from economic uncertainty.

Socioeconomics is the relationship between social factors (such as culture, education, and demographics) and economic factors (such as income, employment, and wealth). Socioeconomic studies at CRF™ are now quantifying the financial value that the community gains when money is invested in reef restoration by CRF™. And the results are impressive: the data show that local coral restoration activities can have a profound stimulus effect on local economies. This comes as a result of direct employment and organizational spending, but also due to a "multiplier effect", a measure that shows how spending or investment in one sector leads to additional economic activity in other parts of the community.

Our in-depth analysis of annual data from 2018 to 2023 reveals that money that comes to CRF™ has an average economic multiplier of 1.4. This means that for every dollar injected into CRF™, the local economy reaps, on average, an impressive $1.40 in benefits. This is a testament to the transformative power of restoration activity on local communities beyond the restoration of the ecosystem.

As a result of these analyses, coral restoration activity that follows the CRF™ model emerges as a potentially potent economic driver. And, the capacity to run these kinds of assessments will help CRF™ ensure that – in every place we work – we are bringing as much economic stimulus to the local community as possible. But this approach sets CRF™ apart.

Our research also shows that not all restoration groups demonstrate an economic impact equal to that of CRF™. For example, other coral restoration organizations may end up channeling more socioeconomic benefits to the location where their headquarters are based, rather than the location in which their reef restoration activities are being conducted.

But CRF™ is shining a light – showing that when undertaken responsibly, there are quantifiable economic justifications for increasing investment in ecosystem restoration. We are demonstrating that when conducted at scale, this vital work can be an important source of financial security for coastal communities around the world.

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

In 2023, the CRF™ mission was shared by national and international media including **The New York Times, The Washington Post, The LA Times, CNN, Fox, Vox, Deutsche Welle (DW), CBS, The Verge, and NBC.**

ENGAGING THE WORLD

In 2023, we reached almost **650,000 people** every month with our messaging on social media alone!

Inspiring content, world-class images, and creative collaborations with corporate sponsors have resulted in the extraordinary organic growth of our social media audience.

- **170,700+**
- **41,000+**
- **25,200+**
- **6,500+**
- **21,900+**

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 are **safeguarding and enhancing the genetic diversity** of corals in Florida and around the world.
- We grow and return an abundance of **genetically diverse, critically endangered** corals to the wild in order to help ensure that coral reefs have the best chance of surviving into the future.
- Our outplanted corals **spawn,** 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

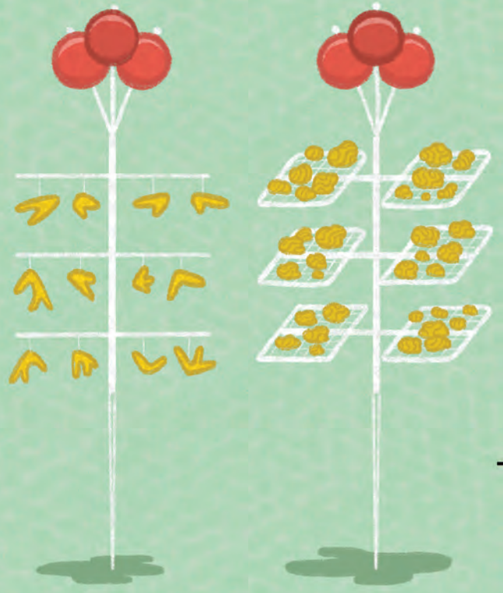
Our first corals came from wild colonies. We still occasionally rescue corals during infrastructure projects, but our nurseries are mostly self-sustaining.

GENE BANK

Preserving coral genotypes for the future

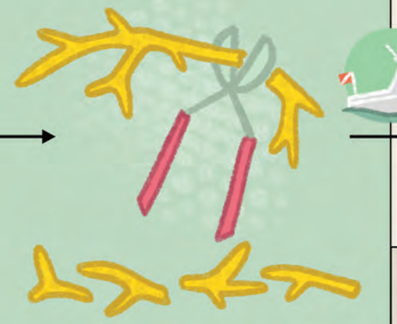
PRODUCTION NURSERY

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.



SIX TO NINE MONTHS OF GROWTH

HARVESTING

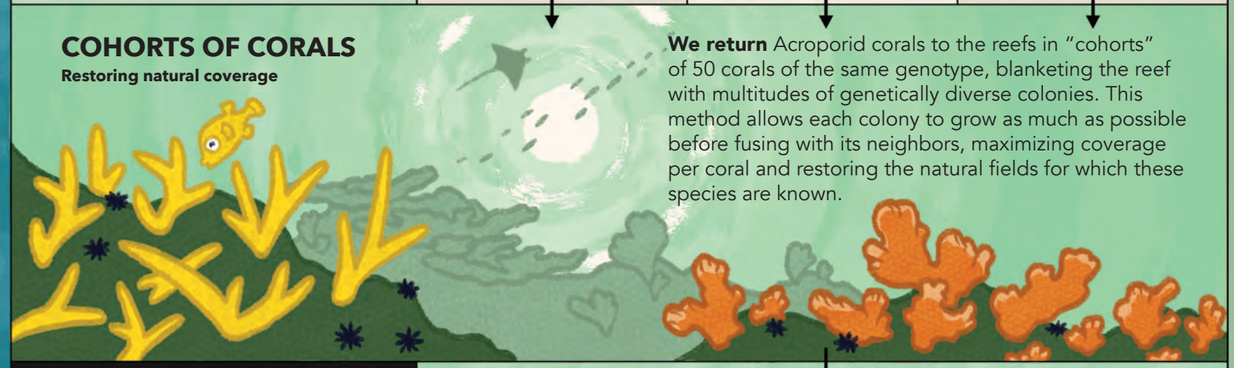


OUTPLANTING TECHNIQUES

STAGHORN	ELKHORN	BOULDER
three points of attachment	one point of attachment	attached to a dome

COHORTS OF CORALS

Restoring natural coverage



We return Acroporid corals to the reefs in "cohorts" of 50 corals of the same genotype, blanketing the reef with multitudes of genetically diverse colonies. This method allows each colony to grow as much as possible before fusing with its neighbors, maximizing coverage per coral and restoring the natural fields for which these species are known.

SPAWNING

MONITORING

FUSION

MORTALITY

WAVES OF OUTPLANTING

STABILIZED CORAL POPULATIONS

Self-sustaining ecosystem

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.

Our Tavernier Coral Tree™ Nursery covers **1.5 acres** of seafloor, and contains **494** Coral Trees™

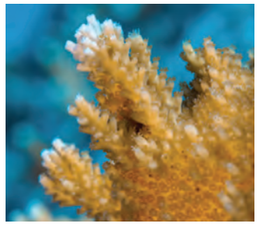
CRF™ has **4** principle production nurseries, and a total of **958** Coral Trees™ throughout Florida

RESTORING A CORAL REEF ECOSYSTEM EFFECTIVELY MEANS RETURNING BOTH SPECIES AND GENETIC DIVERSITY TO THE WILD.

Our nurseries are home to **574** different genotypes across **20** coral species

In production: ACROPORIDS

The majority of our production stock consists of the branching corals *Acropora cervicornis* and *Acropora palmata*. These were once the dominant reef-building 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.



In production: BOULDER CORALS

In 2023, we continued scaling up our propagation and restoration program for two species of bouldering star corals: *Orbicella annularis* and *Orbicella faveolata*.

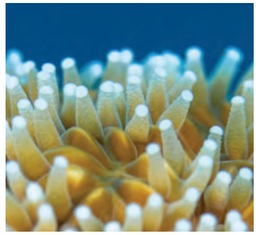
Bouldering species like star corals are important reef stabilizers. Within the past 20 years, *Orbicella annularis* has seen a greater than 50% decrease in its population and is now listed as "Endangered" on the IUCN Red List.

In production: OTHER SPECIES

We are now propagating non-acroporid corals like *Diploria labyrinthiformis*, *Montastrea cavernosa*, and others, to boost the species diversity and resilience of our coral restoration efforts. This approach enriches nursery stocks, enhancing ecosystem stability and recovery capabilities, and underscores the integration of conservation and restoration efforts for sustainable reef ecosystems.

In production: PILLAR CORALS

We are one of a handful of organizations that has a propogation program for pillar coral, *Dendrogyra cylindrus*. We currently have 20+ pillar coral genotypes in the Tavernier Nursery. This species is now functionally extinct in the wild in Florida. In 2023, we aquired five new sexually recruited pillar coral fragments from the Florida Aquarium's spawning endeavors, enriching the genetic diversity of our pillar corals' brood stock.



THE WORLD-FAMOUS CORAL TREES™

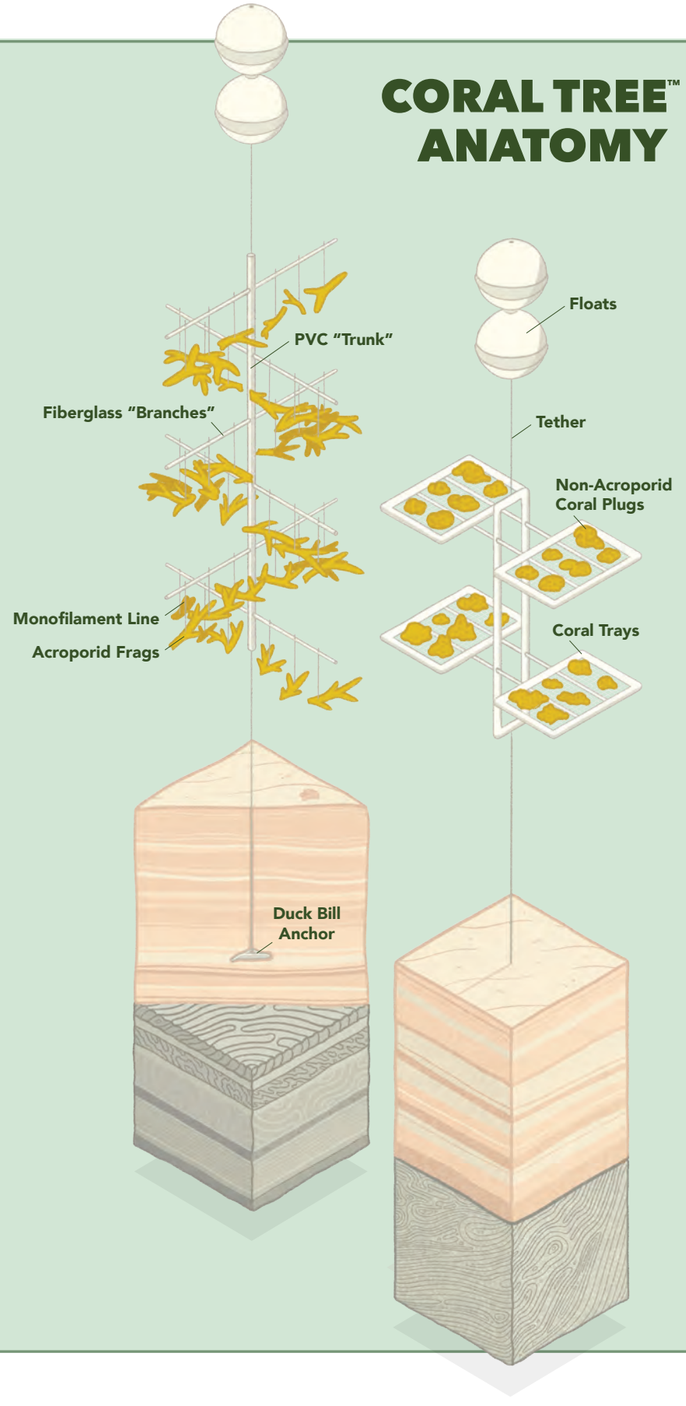
After years of R&D, the Coral Tree™ was born at CRF™. This simple, cost-effective technology is now used by groups around the world.

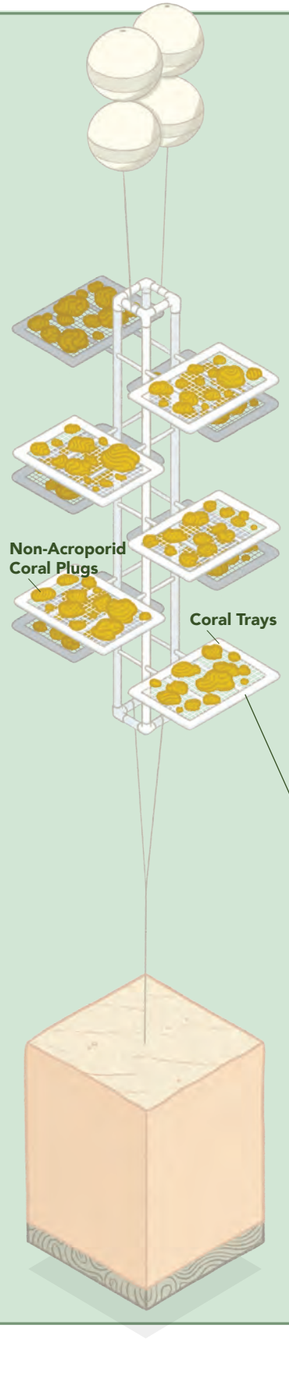
Coral Trees™ are tethered to the ocean floor and buoyed with a subsurface float. They are suspended in the water column and move freely with wave surges and currents. This helps prevent damage to the tree structures and corals by absorbing the wave energy.

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.

CORAL TREE™ ANATOMY





SPIRAL TREE

Moving into 2024, we will be transitioning to Spiral Coral Trees to produce our non-Acroporid coral stock. The Spiral Tree was developed by Mote Marine Laboratory as a new way of incorporating coral plugs into the CRF™ Coral Tree™ design. It was then refined by SeaVentures in Puerto Rico .

The Spiral Trees enhance our efficiency in non-acroporid coral production:

- With 20 straight branches available to receive plugs, our production capacity increases to 400 plugs per tree—160 more than our traditional Boulder Coral Tree.

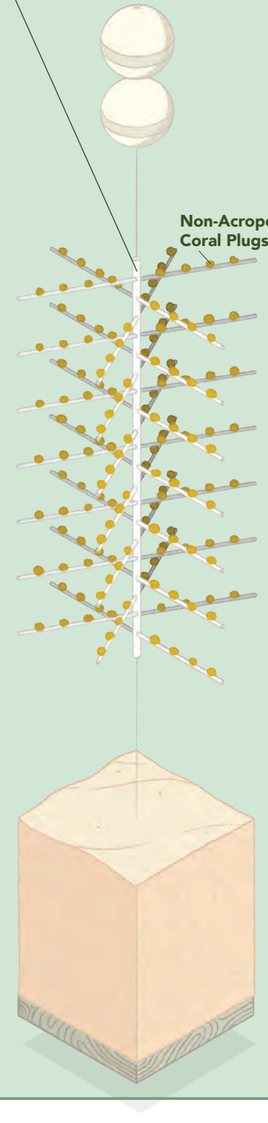
- The lack of trays means that there is less surface area for the accumulation of biofoul. Removing this biofoul before outplanting is labor intensive, and so the Spiral Trees save us at least one addition day of diving per outplanting event.

MEGA TREE

Designed by CRF™ Interns, Mega Trees will now be used as the main nursery structures for holding non-Acroporid broodstock in our ocean-based gene bank.

As we adapt our restoration strategies to include more coral species, we challenged our interns to modify our standard Boulder Coral Tree™ to enhance its capacity. The result was the addition of new branches to the trunk, allowing for four additional trays, which increased our capacity per tree from 240 to 480 plugs.

With large, robust surfaces for bouldering corals to grow on, this new Mega Tree is ideal for holding larger, broodstock fragments of non-Acroporid corals in the CRF™ in-situ gene bank.



2023: NURSERY RESILIENCE, INNOVATION, & ADAPTATION

In 2023, the CRF™ Restoration Team continued working to improve and expand our coral husbandry infrastructure, with a focus on risk mitgation, improving efficiencies, and bolstering restoration capacity.

Despite the setbacks of the Fourth Global Bleaching Event, our restoration team made incredible progress towards bolstering resilience in our world-famous coral nurseries.

Duckbills are the anchors that hold the Coral Trees™ in the seabed. Strong duckbills are vital in ensuring our nurseries are resilient in the face of high energy storm events. In 2023, we installed a total of 571 new duckbills at the Tavernier Nursery, and 107 at Carysfort, replacing all of those at the end of their lifespan. Our Tavernier Coral Tree™ Nursery now contains enough operational duckbill anchors for 631 Coral Trees™, ready for expansion in 2024.

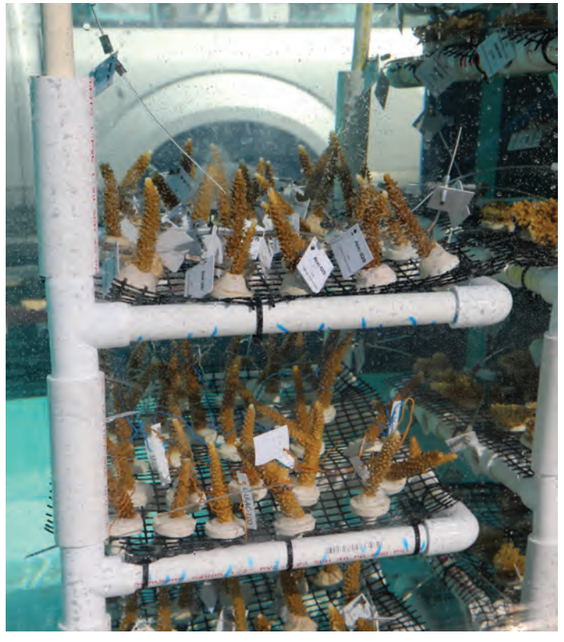
We innovated our propagation techniques, pioneering the use of pyramid plugs for the boulder and star corals we work with. We also conducted trials with boat-based diamond saws and generators, opening up the possibility for undertaking coral fragmenting on our boats – another way in which we are improving efficiencies so that we can continue to scale.

We also reached a bittersweet milestone at the Looe Key Nursery in May 2023, installing its 100th Coral Tree™. The Looe Key Nursery was one of the hardest hit by the bleaching event just a few months later. As temperatures dropped towards the end of 2023, the work in our nurseries intensified. We began fragging surviving corals and re-filling empty Coral Trees™, rebuilding our lost coral stock.

In anticipation of more potential disturbance events in 2024, particularly given the ongoing El Niño-Southern Oscillation, we proactively began implementing mitigation strategies. These efforts included:

- Reorganizing the Tavernier Coral Tree™ Nursery, separating trees of the same genotype to mitigate risks of disease transmission.
- Testing a preliminary adaptive shading solution for the Coral Trees™ that seamlessly integrates with the tree structure and can be deployed as needed to mitigate coral bleaching risks by regulating light exposure.

Despite the adversities of 2023, CRF™ remains steadfast in its commitment to advancing coral restoration, persistently seeking innovative solutions, and building risk mitgation strategies into the core of our programs.



DRIVING CORAL RECOVERY: INTRODUCING THE CORAL BUS

In May 2023, in partnership with Georgia Aquarium, CRF™ proudly unveiled the 'Coral Bus', a cutting-edge aquarium trailer system designed to transport nursery-raised corals safely to their new homes within the Florida Keys National Marine Sanctuary.

With the world's coral reefs facing unprecedented challenges from climate change, pollution, and other human-induced stressors, the need for innovative solutions in coral restoration and conservation has never been more urgent. The Coral Bus was developed to address the issue of coral stress during transport – removing as many stressors as possible gives these endangered animals an even better chance of survival in the wild.

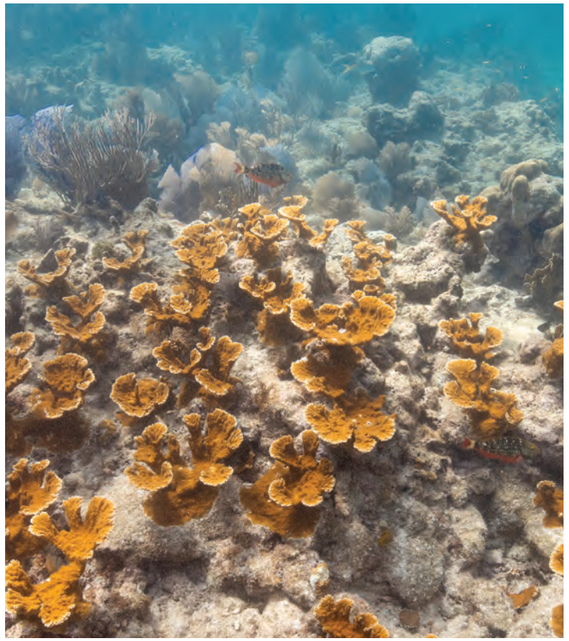
The Coral Bus is a first-of-its-kind coral transport technology that closely replicates the open ocean conditions to which the corals are already acclimated. The state-of-the-art aquarium trailer enables practitioners to monitor and regulate water temperature, pH, filtration, and water flow to ensure the well-being of corals during transport, minimizing the stress experienced by these fragile animals while they are on the move.

The Coral Bus now constitutes an incredible tool for our daily operations at CRF™, offering us year-round transport capabilities that can adapt to seasonal in-situ conditions. By closely replicating the natural environment during transport, this system will help ensure the comfort and well-being of the corals we are moving. By reducing shock to these little creatures, we are giving them an even better chance of surviving and thriving in the wild.

Once the Fourth Global Bleaching Event hit, CRF™ quickly set in motion our NOAA-led plan to bank the maximum possible genetic diversity of Florida's corals by transferring them to land-based facilities.

The Coral Bus was critical in our successful move of 417 of our elkhorn and staghorn corals, spanning 83 and 118 unique genotypes respectively, as well as 484 colonies of our brain, pillar, and star corals. But we also made space in the Bus available to our partners. Together with NOAA and fellow restoration experts, we managed to safeguard a total of 350 genotypes of the critically endangered staghorn and elkhorn corals, banking duplicate representatives of each genet at both Mote Marine Laboratory in Sarasota and the The Reef Institute in West Palm. With all genotypes represented in both institutions, we are ensuring that this precious genetic material is safeguarded in redundant systems.

The Coral Bus was designed and built by Coral Restoration Foundation™ and Georgia Aquarium with funding from NOAA's Coral Reef Conservation Program through the *Mission: Iconic Reefs* Capacity Building Grant awarded by the National Marine Sanctuary Foundation.



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 re-establish 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.

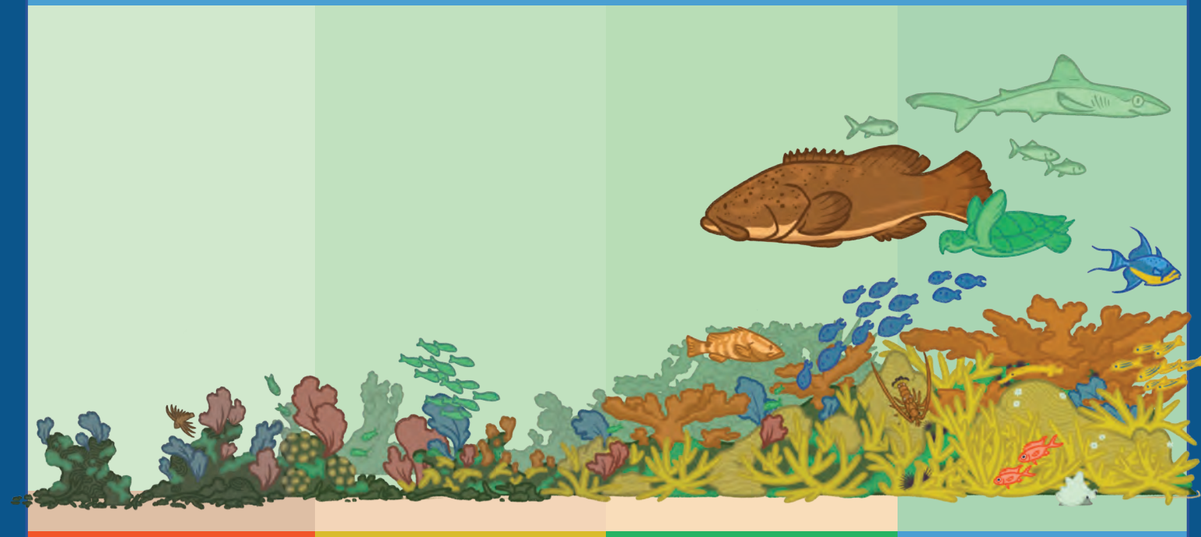
Divers waft water over the new outplants to ensure they are secure.

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

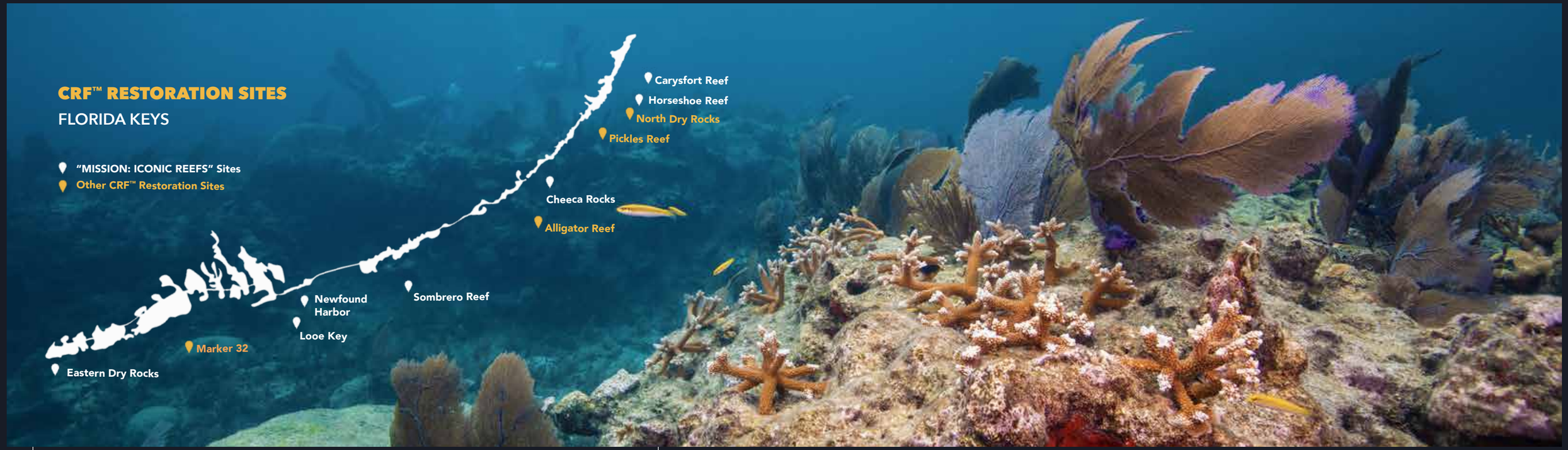
- Large areas of reef receive the first phase of coral cohorts. Survivorship beyond one year is low.
- At around one year post-outplanting, surviving thickets begin to fuse.
- The presence of healthy coral tissue begins to attract other marine life and coral planula.

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 colonize the substrate.
- Fish and invertebrate life is abundant and apex predators are present in significant numbers.



OUTPLANTING AT SCALE

Between January and June of 2023, CRF™ returned

20,559

corals to the reefs of the Florida Keys

This brings our total corals returned to the wild to more than **243,875**

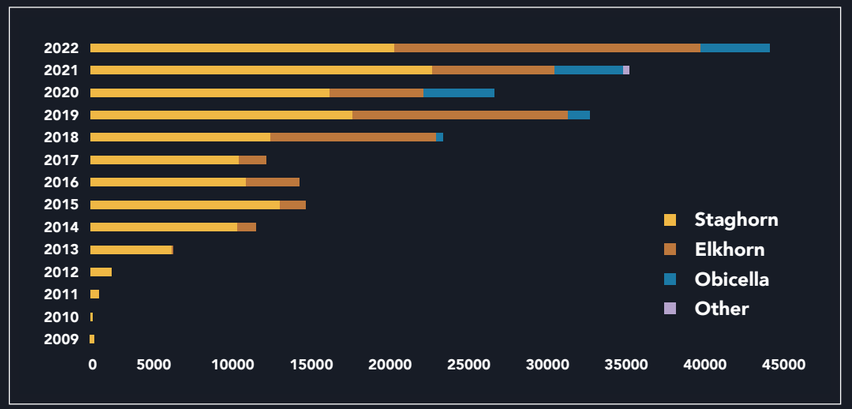
With more than 16 years of experience in restoring coral reefs, CRF™ is proving that we have the capacity to do this work at an ever-increasing scale.

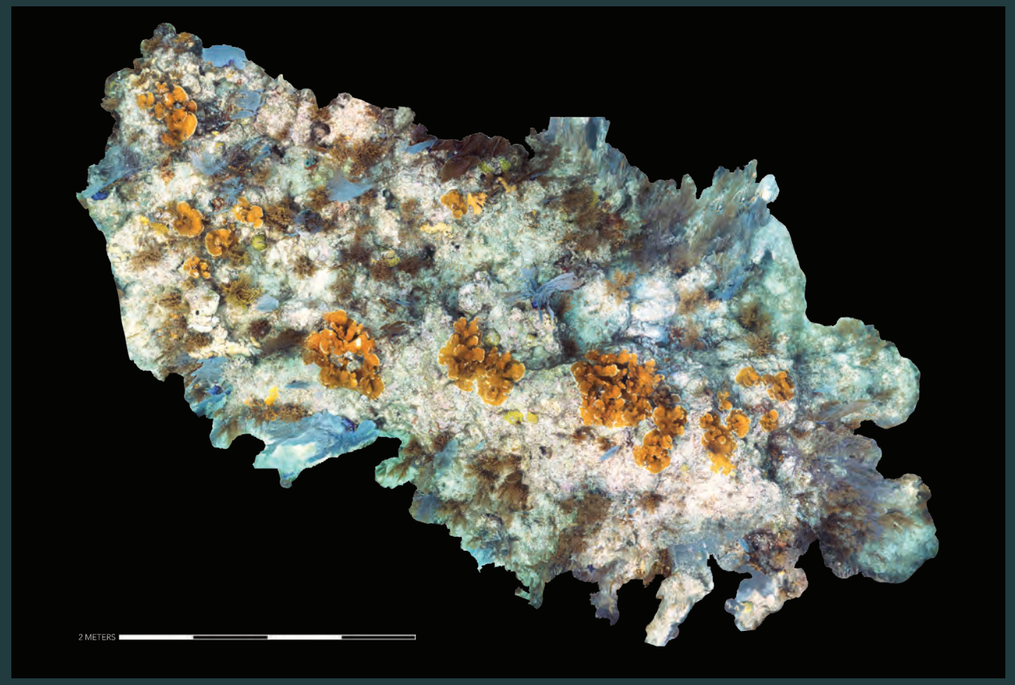
In the wake of our record-breaking restoration efforts in 2022, CRF™ continued its steadfast commitment to actively restoring the reefs of the Florida Keys in 2023: between January 1st and June 28th, we successfully returned 20,559 corals to the reefs of the Florida Keys. This brings our total number of corals returned to the wild to 243,875.

CRF™ voluntarily halted all outplanting activity when our team identified the onset of the Fourth Global Bleaching Event in June 2023.

Despite the impact of the 2023 mass-bleaching event, with our capacity for doing this work at ever-increasing scale, we know that it won't be long before we are outplanting in even greater abundances, and replacing everything that was lost to the heat in 2023.

CRF™ OUTPLANT NUMBERS BY YEAR





TRACKING IMPACT

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.

Our data indicate that up to June 2023, the corals we returned to the wild had restored

39,670+m²

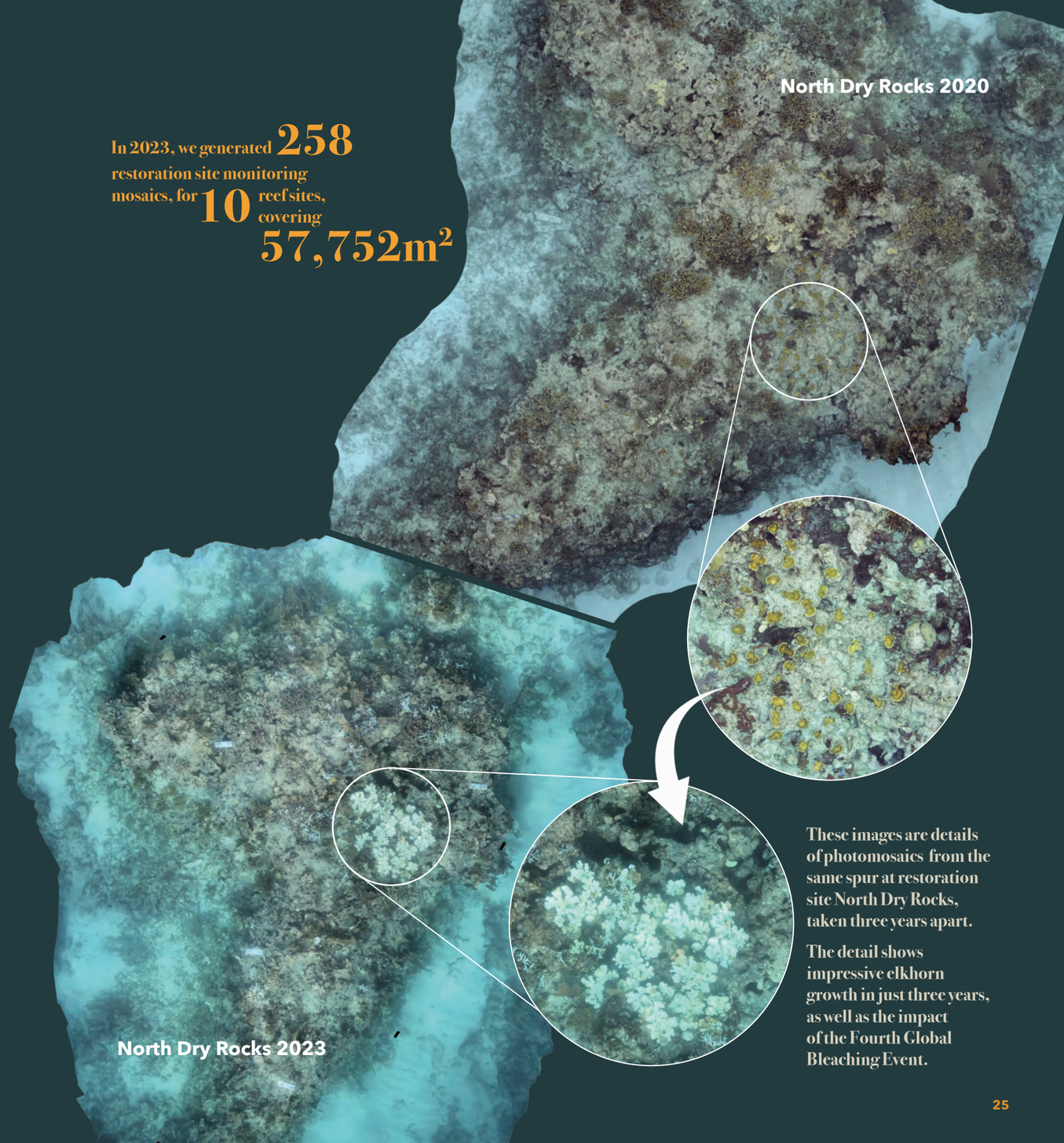
of coral reef in the Florida Keys National Marine Sanctuary as of June 2023

Our photomosaics 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 images can also be shared with other groups looking to answer additional questions about coral reef ecology.

Recording increases in coral coverage on restoration sites, rather than tracking the survivorship of individual corals, provides 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 any obvious success of the restoration effort.

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

In 2023, we generated 258 restoration site monitoring mosaics, for 10 reef sites, covering 57,752m²



These images are details of photomosaics from the same spur at restoration site North Dry Rocks, taken three years apart.

The detail shows impressive elkhorn growth in just three years, as well as the impact of the Fourth Global Bleaching Event.

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.

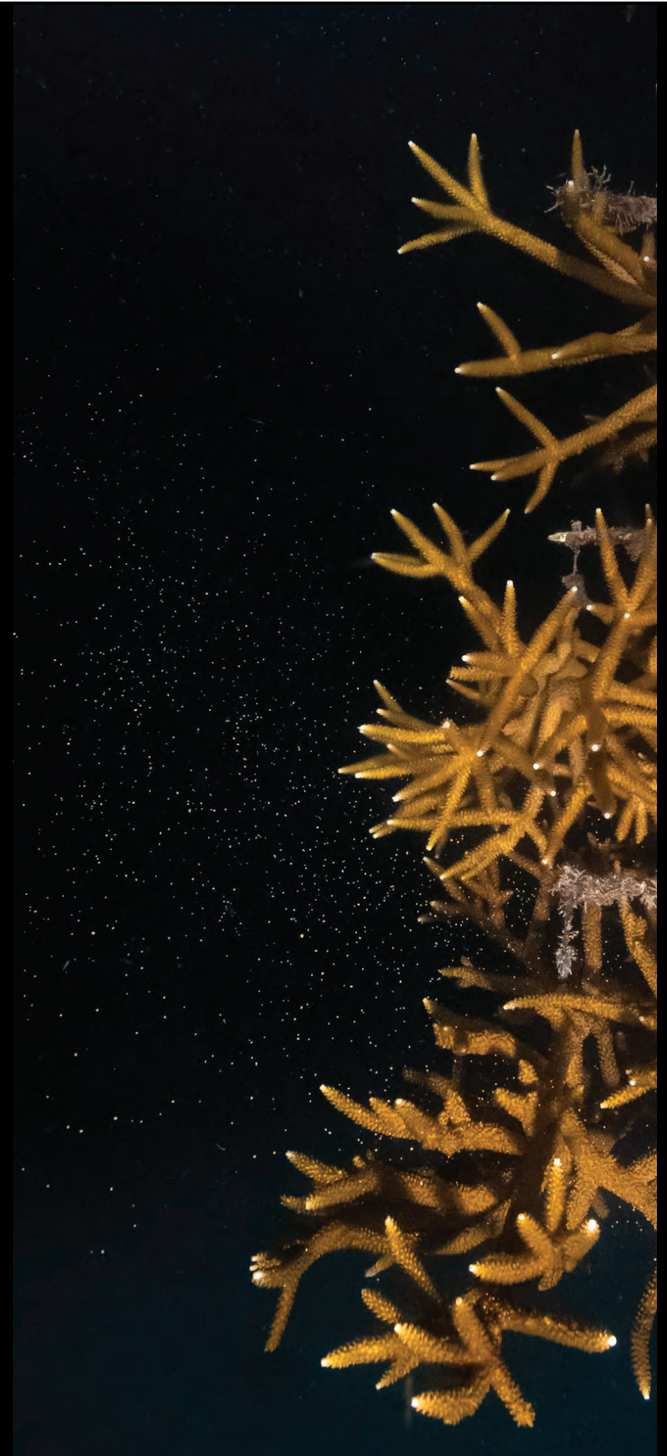
2018
Broodstock corals were moved to holding tanks at Keys Marine Lab and gametes were collected by scientists from multiple institutions for cross-fertilization. Florida Aquarium bred over 3,000 *Acropora cervicornis* larvae from these gametes, yielding thousands of new genotypes.

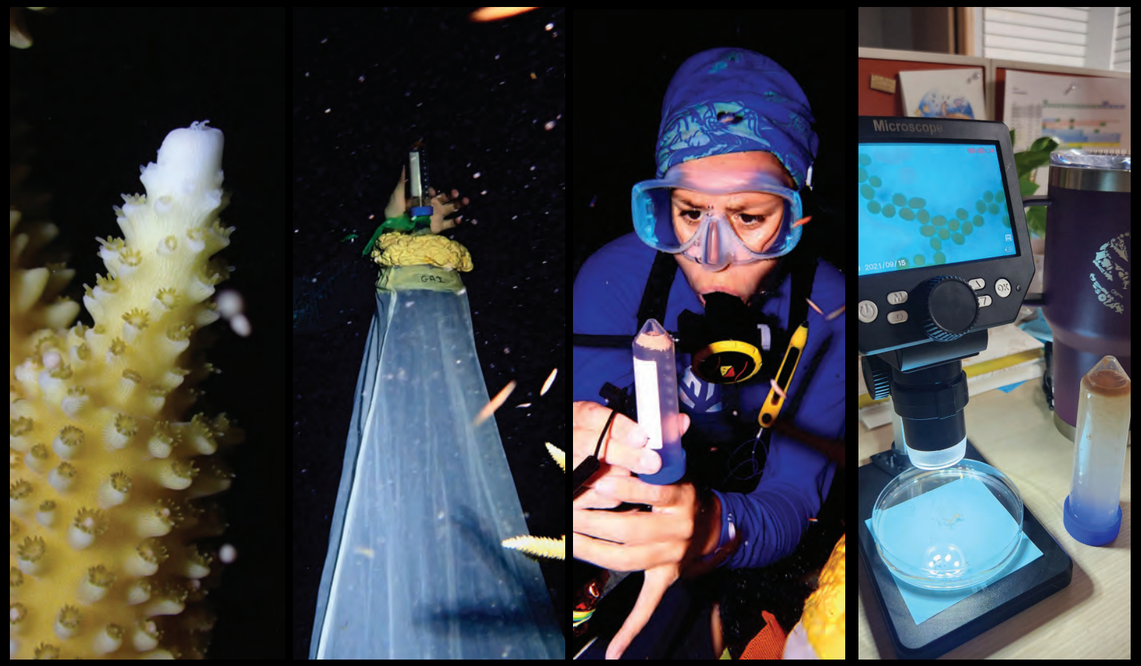
2019
Divers transferred colonies of 12 *A. cervicornis* and 7 *A. palmata* genotypes to holding tanks at Keys Marine Lab, where gametes were cross-fertilized and cryopreserved by a research team from multiple institutions. Over 1,500 of the new genotypes created by Florida Aquarium in 2018 were rehomed 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 cross-fertilized 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.

2022
In 2022, CRF™ dive teams observed coral spawning at North Dry Rocks Reef, gathering crucial data alongside NOAA researchers. Simultaneously, spawning events were monitored in the Tavernier Coral Tree™ Nursery, where genetic material was cryopreserved in collaboration with SEZARC. These data are vital for future research and underscore the importance of natural reef recovery and genetic diversity in ecosystem restoration efforts.





SPAWNING 2023

CRF™ corals were observed spawning through the Fourth Global Bleaching Event, though the gamete quality was poor.

In 2023, CRF™ teams ran two spawning observation trips to the Tavernier Coral Tree™ Nursery on August 6th and 7th. Despite elevated water temperatures, our divers observed spawning by eight genotypes of staghorn, some of which were bleached. One of these staghorn genotypes was a sexual recruit from our assisted geneflow work in collaboration the Florida Aquarium that we began in 2018. The other coral genotypes included spawners from previous years and some new spawners.

At North Dry Rocks, researchers from the University of Miami and NOAA observed seven genotypes of bleached CRF™ elkhorn and five genotypes of staghorn outplanted by CRF™ spawning at the same time over two nights. Our land-based teams also observed spawning of some staghorn colonies that had been evacuated from the ocean on August 4th and were being cared for in tanks at Keys Marine Lab.

Spawning researchers concluded that the 2023 gamete bundle quality was poor, likely to due to the stressed nature of the corals as a result of the incredibly high water temperatures. In technical terms, the gametes were smaller and had lower lipid (fat) content than normal.

Thankfully, as a result of our ongoing collaborations around the annual spawning event, CRF™ has been instrumental in helping to preserve a large amount of genetic diversity in the form of gametes. This material is being held in various institutions and will be invaluable in boosting coral populations in the future.

THE FOURTH GLOBAL BLEACHING EVENT

Text by Harley Wahl
Images by CRF™

In the vast expanse of our oceans, an extraordinary concentration of biodiversity has endured in shallow, tropical seas for over 500 million years: the coral reef.

The history of coral reefs on our planet dates to before the time of dinosaurs, terrestrial plants, and even sharks. Corals are incredibly resilient animals, stubbornly persisting throughout all five of Earth's mass extinction events. However, rapid and unprecedented shifts in climate, driven by human activities, pose an imminent threat to their survival on our planet.

In the face of this reality, Coral Restoration Foundation™ is more dedicated than ever before to bridging the gap between historical endurance and the urgent need for conservation of corals. In the summer of 2023, however, an especially poignant chapter unfolded in our fight to prevent the extinction of Florida's Coral Reef.

Prior to the summer of 2023, Sombrero Reef was a shining example of coral resilience and resurgance. Until July of that year, Sombrero housed some of the last wild colonies of elkhorn corals on Florida's Coral Reef, and coral cover was expanding rapidly through the work of CRF™ and other *Mission: Iconic Reefs* practitioners. It was widely considered one of the most stunning dive sites in the Florida Keys — a beacon of biodiversity and hope on a heavily degraded barrier reef system.

But, in July 2023, when a team of CRF™ divers visited Sombrero on a preemptive gene banking mission, they discovered that every single Acroporid on the reef had already died. The dead included three founder colonies of elkhorn that CRF™ teams had intended to sample as part of the NOAA-led effort to safeguard remaining genotypes on Florida's Coral Reef. There were likely the progenitors of many of the corals currently found in local restoration programs. Genetic material from these colonies had not previously been brought into any restoration program and are now lost to science forever. Some corals at Sombrero had died before they could bleach, with their zooxanthellae-filled tissue already sloughing off their skeletons.

Less than a month later, Florida's restoration practitioners would report mass bleaching and mortality on all reefs throughout the Keys and South Florida.

MAY 18

CRF™ meets with NOAA and other restoration partners at the 2023 Disturbance Response and Recovery Technical Workshop to discuss disease and bleaching forecasts for 2023.

JUNE 16

NOAA, Florida Keys National Marine Sanctuary, and *Mission: Iconic Reefs* develop a survey to report bleaching and disease observations given the reports that start to trickle in from practitioners in the Keys.

JUNE 29

After considering a notable disease outbreak and confirming four degree heating weeks, CRF™ decides to enter a voluntary outplanting hold. The Florida Keys National Marine Sanctuary is notified.

JULY 19

CRF™ moves 128 unique genets of Acroporid corals to land-based holding at Mote Marine Gene Bank in Sarasota, FL. Transportation of corals is carried out by Florida Aquarium.

JULY 20

CRF™ visits Sombrero Reef and reports 100% coral mortality, including the death of the three, unsampled founder colonies of elkhorn coral.

JULY 26

CRF™ transports 450 Acropora genotypes to The Reef Institute in West Palm Beach using the Coral Bus for long-term gene banking.

JUNE 12

NOAA leads discussions to bring representative samples of elkhorn and staghorn corals to two land-based facilities outside the Florida Keys to safeguard genetic diversity in anticipation of high summer water temperatures.

JUNE 18

CRF™ begins efforts to conduct live gene banking of all known elkhorn and staghorn genets under the coordination of NOAA. This action is identified as an urgent need in response to reports of ongoing disease and bleaching, and the predicted bleaching conditions later in the summer.

JULY 16

Ocean temperatures in the Florida Keys reach 93°F – nine degrees warmer than the recorded value on July 16, 2022.

JULY 20

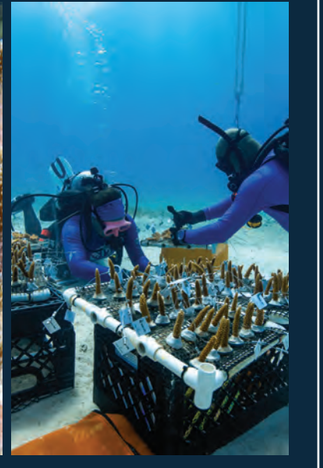
CRF™ initiates the gene banking of corals at Keys Marine Lab (KML). Corals begin to be moved from our in-situ nurseries to land-based holding tanks at KML in Layton, FL.

JULY 21

CRF™ visits Looe Key Nursery and reports 90% mortality of all Acroporid corals.

JULY 21 - 28

CRF™ evacuates stressed corals from Tavernier Nursery for holding at KML.



In early 2023, with an El Niño Southern Oscillation (ENSO) cycle looming, CRF™ began to prepare for an unusually hot summer. We met with NOAA and other restoration practitioners to discuss bleaching and disturbance forecasts for the upcoming months. Shortly after, planning began to bring representative samples of all remaining elkhorn and staghorn corals to two land-based facilities outside of the Florida Keys to safeguard the precious remaining genetic diversity of Florida's Coral Reef.

The summer arrived with temperatures warmer than even the most extreme predictions, with the water in some parts of South Florida exceeding 100°F as early as July. This is just one example of how the effects of climate change exacerbating natural phenomena (such as the ENSO cycle) are not just a concern for the future – they are upon us now.

Yet, in the face of these challenges, CRF™ is unwavering in its mission to restore reefs in Florida, the Caribbean and around the world. Aware of the escalating frequency and severity of large-scale disturbance events, risk management, mitigation, and adaptation are built into the heart of our programs. And, in 2023, thanks to climate modeling analyses, 16 years of experience and preparation, and the help of restoration practitioners throughout Florida, CRF™ was able to respond to the heatwave quicky, evacuating high risk coral genotypes to safety and safeguarding the irreplaceable genetic diversity of Florida's corals.

JULY 30
Coral husbandry at KML is incorporated into daily operations at CRF™.

AUGUST 26
CRF™ meets with the Association of Zoos and Aquariums Heat Response Team (AZA HeaRT). Experts give crucial input on coral husbandry and acclimation to land-based systems.

OCTOBER 13
Final day of ocean temperature values in the Florida Keys reading above 84°F. CRF™ begins process of veterinary clearance in preparation for returning evacuated corals to the ocean.

OCTOBER 30
CRF™ returns the first batch of over 300 corals from KML to the Tavernier Coral Tree™ Nursery.

NOVEMBER 27
CRF™ makes the third return transport of corals from KML back to our Tavernier Nursery.

DECEMBER 27
CRF™ completes transport of corals from Sea Base Brinton Environmental Center to Key West Nursery. All safeguarded corals placed in temporary land-based holding tanks over the summer are now returned to CRF™ in-situ nurseries.

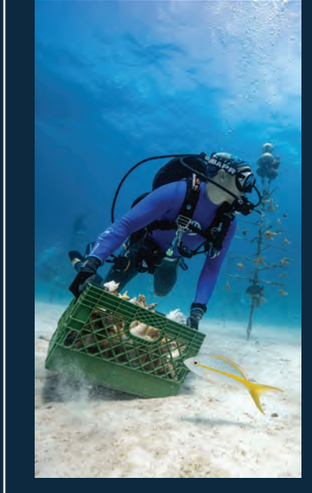
AUGUST 8
CRF™ makes largest coral rescue mission of the summer. Approximately 1500 fragments from five species across 100 genotypes are brought from in-situ nurseries to KML. CRF™ staghorn broodstock spawns in land-based systems at KML.

SEPTEMBER
Ongoing care for corals in land-based systems, with the support of the AZA HeaRT.

OCTOBER 20
Cold front hits the Florida Keys and drops ocean temperature down to 77°F.

NOVEMBER 20
CRF™ makes second transport of corals from KML back to Tavernier Nursery.

DECEMBER 19
CRF™ completes fourth and final transport of corals from KML to the Tavernier Nursery. Over 4,500 coral fragments across 23 species and 661 genotypes are returned to the ocean within a 2-month period.



Coral Restoration Foundation™ has always maintained a proactive, solutions-based approach at the center of our decision making. In 2020, we worked at the epicenter of the world's first large-scale "coral swap", collaborating with other restoration practitioners to create vital genetic repositories of unique coral genotypes to preserve that material in the event of disturbance events like storms, heat waves, and disease outbreaks.

In May of 2023, Coral Restoration Foundation™, in partnership with Georgia Aquarium, unveiled the first-of-its-kind Coral Bus. This cutting-edge trailer system is equipped with technology that can closely replicate the open ocean conditions to which corals are already acclimated, enabling the successful transport of corals over previously unimaginable distances. *(See page 17 for more details.)*

During the unprecedented marine heat wave of 2023, these experiences and technologies proved vital in supporting the success of our coral rescue efforts throughout the summer. As waters began to warm early in the summer, Coral Restoration Foundation™ expanded our partnerships with local organizations, restoration practitioners, and land-based coral facilities. Keys Marine Laboratory and Sea Base Brinton Environmental Center allowed us to use their tanks as temporary landside homes for our corals. The Coral Bus proved indispensable in successfully transporting corals from our nurseries to land-based facilities, and eventually, back.

Nevertheless, our large rescue missions would not have been possible without the generous help of local businesses. In early August, Rainbow Reef Dive Center and Key Largo Fisheries provided a boat and a refrigerated truck, respectively, to help us bring 1,500 coral fragments from Tavernier Nursery to Keys Marine Laboratory. Shortly after, the Association of Zoos and Aquariums sent their Heat Response Team to provide additional support, sharing their expertise in land-based coral husbandry.

Ultimately, these collaborations helped us return over 4,500 healthy fragments of coral across 23 species and 661 genotypes to the ocean. While this summer was challenging, it was a salient reminder of how collective action can help us accomplish extraordinary milestones in the restoration of coral reefs — even amidst the throes of climate change.

In the face of escalating challenges like the Fourth Global Bleaching Event we remain steadfast in our commitment to a world in which coral reefs persist, providing hope for marine life and the coastal communities that depend on them. In 2023, we were reminded of the palpable significance of outreach and advocacy. Despite the extra hands on deck required to evacuate and care for our corals this summer, CRF™ worked tirelessly to continue educating others on the importance of coral reefs around the world. Our Internship, Dive & Snorkel Programs, and interactive outreach events underwent dynamic transformations to ensure that we could share crucial knowledge about the increasingly fragile state of coral reefs in Florida this summer. Additionally, CRF™ expanded our global impact by actively supporting restoration efforts in the U.S. Virgin Islands, Puerto Rico, and the Maldives.

We are more prepared than ever to take on the unforeseen challenges of the future, building stronger partnerships with land-based practitioners, developing innovative bleaching mitigation strategies, and adjusting our operations to respond to a changing world.

Yet, the journey is far from over. The looming threat of climate change persists. Reef restoration is a vital component of a necessary three-pronged response to the ongoing loss of our coral reefs. Along with reducing greenhouse gas emissions, and the removal of local stressors (including pollution and overfishing), restoration work is crucial – it is currently preventing the extinction of these animals, ensuring the survival of genetic diversity, and developing the scalable techniques that we need to restore the ecological function of reef sites that we are losing. Ecosystem restoration work is also emerging as an important economic driver for coastal communities; a benefit that extends beyond the survival of the animals or plants whose populations are being recovered.

Despite the hardships of this summer, stories of immense success at CRF™ stand out as a testament to the power of unity and support. The resolute backing of our donors, partners, and supporters were the foundation upon which we built our response, allowing us to face unprecedented challenges head-on and emerge with a renewed determination to protect and restore coral reefs.

INTO 2024

The Fourth Global Bleaching Event resulted in the loss of about 50% of our coral stock across all nurseries, and the near total mortality of recent and historical Acroporid outplants on many of our restoration sites.

But all is not lost – we still have hundreds of surviving corals at both Carysfort and Elbow Reef. And, more importantly, we have more than 16 years of experience doing this work at scale and the infrastructure and coral stock to recover these reefs relatively quickly.

When Hurricane Irma hit the Keys in 2017, it took out around 50% of all the corals we had returned to the reef. But, in the two years following the storm we rehomed more corals on Florida's Coral Reef than we had in the 10 years leading up to it. The lessons we learned helped us improve our nursery infrastructure, making it increasingly resilient to high energy weather events. The same will be true after the Fourth Global Bleaching Event – the lessons we learned in 2023 will make our programs more resilient to these kinds of disturbances in the future.

No genotype performed in the same way across all locations, showing us that resilience to stressors is a complex issue involving other factors including water quality, turbidity, and community structure. We learned that there is resilience in abundance and diversity.

In 2024, our work will be guided by lessons learned in 2023. Given that we will still be in an ENSO cycle and anticipating more potential disturbances, our restoration program in 2024 will look slightly different:

- **FOCUS ON PRODUCTION NURSERIES:** We will be rebuilding and strengthening our production stock, ensuring a robust foundation for future restoration efforts.
- **TEMPORARY HALT IN ACROPORID OUTPLANTING:** In a strategic move, there will be no outplanting of Acroporid corals throughout 2024, to allow our reduced stock of these species to grow and recover, ensuring their long-term viability.
- **SCALING UP NON-ACROPORID PRODUCTION AND OUTPLANTING:** Recognizing the importance of non-Acroporid corals, there will be a concerted effort to increase both the production and outplanting capacity of these species. We will focus on outplanting just under 9,000 non-Acroporid corals, selected based on their demonstrated resilience during the Fourth Global Bleaching Event. This shift not only diversifies our approach but also leverages the natural resilience of these species. This strategy is in line with our adaptive management approach, focusing on species that are more likely to withstand environmental stressors.
- **ESTABLISHING STRONG PARTNERSHIPS FOR DIVERSIFICATION:** We will be developing an increasing diversity of collaborations to enhance our capacity to effectively respond to future disturbance events.

FAQs

What is climate change?
The term “climate change” refers to significant shifts in Earth’s climate patterns, primarily caused by human activities that produce large amounts of greenhouse gases. These gases, including carbon dioxide and methane, trap heat in the Earth’s atmosphere and are leading to the warming of the planet. The effect of this phenomenon includes major changes in temperature, precipitation, humidity, ocean heat, sea level, and wind patterns.

What is coral bleaching?
Coral depends on a symbiotic relationship with a photosynthetic alga called zooxanthellae. Zooxanthellae reside within the safety of coral tissue and in turn provide energy to the coral through photosynthesis. However, when water temperatures deviate outside the optimal range for coral growth (73-84°F) for an extended period, this relationship breaks down, leading to coral bleaching. Both low and high temperatures can disrupt this symbiosis, which results in up to a 90% loss of nutrients in some species. In recent years, exceptionally warm ocean temperatures have been the primary cause of coral bleaching around the world.

What is a Degree Heating Week?
A degree heating week (DHW) is a way to measure the heat stress that high sea temperatures impose on coral reefs. It calculates the running sum of heat exposure over a 12-week period, with each degree Celsius above a threshold considered a “heating degree.” The higher the DHW value, the greater the risk of coral bleaching. This metric helps scientists and researchers monitor and predict the impact of prolonged warm water conditions on coral reefs, a crucial tool in understanding the health of these ecosystems.

What is El Niño?
The El Niño Southern Oscillation (ENSO) Cycle is a natural climate phenomenon in the Pacific Ocean that disrupts normal weather patterns globally. Under normal conditions, trade winds blow from east to west across the Pacific, pushing warm surface water towards Asia. However, during an El Niño event these winds weaken, causing the warm water to move eastward towards the Americas. This can lead to varied impacts, including increased rainfall in some regions and droughts in others. Typically, El Niño events occur every two to seven years and can last nine to twelve months. Climate change has been linked to intensifying El Niño events, making them more frequent and severe. In the Florida Keys, the warming brought by El Niño contributes to coral bleaching. Warmer sea temperatures exacerbated by climate change make corals more vulnerable to bleaching, posing a threat to the delicate balance of marine ecosystems.

Can corals adapt to the heat?
Scientific research collaborations at CRF™ provide an additional glimmer of hope for the future of corals. A recent study with our staghorn coral led by Dr. Matthew Gilg suggests that previous heat stress can help coral better tolerate a second heat stress. In other words, coral may be able to adapt to incremental increases in water temperatures year by year. This year, we were forced to pull our coral out of the ocean due to an anomalously large jump in temperature over a one-year period—El Niño brought a near-10°F increase from last year’s summer ocean temperatures in the Keys. However, for the corals that were able to withstand the heat before we brought them to land-based systems, the “memory” of this summer could mean increased resilience in the face of future warming events. This promising scientific insight provides a glimpse into the benefits of allowing our corals to endure heat stress up to a certain threshold to adapt to a warming marine environment. While we cannot rely on heat adaptation alone, Dr. Gilg’s research provides a promising insight into coral’s natural ability to withstand incremental increases in ocean temperature over time.

MISSION: ICONIC REEFS

In 2018, the success of Coral Restoration Foundation™ work at Carysfort Reef provided a basis for the most ambitious reef restoration plan in the world, *Mission: Iconic Reefs*. This is an unprecedented, multi-agency 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 decades-long project has an estimated cost of $97 million.

In 2023, CRF™ rehomed a total of 20,622 nursery-grown corals across all seven M:IR reef sites. At the end of Phase 1 (10 years), the project plans to increase coral coverage across these sites from 2% to 15%. As a result of such lofty goals, M:IR sites will continue to be the primary focus for the CRF™ restoration program into 2024 and beyond.

2023 US-BASED RESTORATION PROGRAM PARTNERS

AZA HeART Team

Offered support and expertise in land-based systems for initial care of corals.

BRINTON ENVIRONMENT CENTER (SEA BASE SUMMERLAND)

Donated the use of 3 seawater tables for corals rescued from Looe and KW nurseries during the bleaching event.

COLLEGE OF THE FLORIDA KEYS

Ongoing dive program partnership throughout the year with their coral restoration class to Key West Nursery and outplanting at Eastern Dry Rocks.

FLORIDA KEYS NATIONAL MARINE SANCTUARY FOUNDATION (NMSF)

Provided emergency financial support for the Fourth Global Bleaching Event

THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION & NMSF

Provide permits that make CRF™ work possible.

GEORGIA AQUARIUM

Led the build-out of the Coral Bus with all water quality equipment.

KEYS MARINE LAB

Housed corals from nurseries in support of the Fourth Global Bleaching Event and offered knowledge in caring for land-based systems.

MOTE MARINE LABORATORY (SARASOTA)

Intake of staghorn and elkhorn fragments for bleaching genetic banking effort.

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

Provides support to increase coral nursery capacity for *Mission: Iconic Reefs.*

NOAA FLORIDA KEYS NATIONAL MARINE SANCTUARY

The Federal management body that provides the permits that make CRF™ work possible.

NOVA SOUTHEASTERN UNIVERSITY

Supports the management of the second CRF™ offshore genebank.

SHERWIN-WILLIAMS

Donated anti-fouling paint to test on nursery trees.

THE REEF INSTITUTE

Intake of fragments from six species of coral for gene banking in land-based systems.

TOURIST DEVELOPMENT COUNCIL

Provides support for ongoing CRF™ ongoing restoration efforts from Carysfort Reef to Eastern Dry Rocks.

UNITED WAY OF COLLIER AND THE KEYS

Funding partner for restoration work on the Carysfort Reef Complex.

US ARMY CORPS OF ENGINEERS

Provides permits for CRF™ in-situ coral nurseries.

CRF™ GLOBAL

At CRF™ we recognize the urgency of the coral reef crisis and its profound impact on coastal communities around the world. We are committed to supporting the scaling up of international coral restoration efforts through CRF™ Global.

- **CRF™ Satellite Programs** are extensions of CRF™ that build operations locally to meet the needs of the ecosystem and community.
- **CRF™ Global Partnerships** entail collaboration with existing practitioners who have independent operations.
- **CRF™ Learning Exchanges** involve connecting with other practitioners to exchange knowledge on coral propagation, monitoring, reporting, outreach, and more.

SUPPORTING THE WORLD OF CORAL RESTORATION

CRF™ Global aims to increase international coral restoration capacity by leveraging everything that CRF™ has built over the last two decades, enhancing access to resources, knowledge, and collaborative networks.

Although practitioners worldwide have a shared objective, we are impacted by unique circumstances. There is no universal solution to the coral crisis; restoration methodologies must adapt to each community and environment.

To support restoration initiatives in ecologically and culturally distinct locations, on request, CRF™ Global can provide foundational knowledge to coral restoration practitioners, leveraging local expertise, and adapting our time-tested techniques to different regional conditions.

The imminent threat to our planet's coral reefs necessitates immediate, collaborative action across diverse regions to safeguard these threatened ecosystems and the people that rely on them. Through the CRF™ Global Program we are now placing increasing emphasis on our engagement with international restoration efforts.

CRF™ Satellite Programs are developed and directly managed by CRF™. We build these initiatives from the ground up, applying established CRF™ techniques, expertise, and resources to the unique needs of each community. Working hand-in-hand with local governments and communities, we ensure that our efforts align with local priorities and contribute to the long-term health of specific marine ecosystems.

Through **CRF™ Global Partnerships**, we work in collaboration with local groups who already have their own operations in place, providing increased access to resources and knowledge. We tailor techniques to suit these different practitioners' specific circumstances and cultural contexts, aligning our efforts around shared aspirations.

CRF™ Learning Exchanges enrich both our organization and the broader coral restoration community. As part of these exchanges, we meet and exchange knowledge with international practitioners. These exchanges happen both at CRF™ Headquarters in Florida, and in other places around the world. The CRF™ Learning Exchange program also involves our staff contributing to international conferences and meetings, fostering connections and gathering firsthand knowledge about the state of coral reefs and the unique challenges facing regional communities.

CRF™ is now actively supporting the US Virgin Islands coral restoration plan, working on the ground with a CRF™ Satellite Program in St. Croix and a CRF™ Global Partnership in St. Thomas.

CRF™ SATELLITE PROGRAM: ST. CROIX, USVI

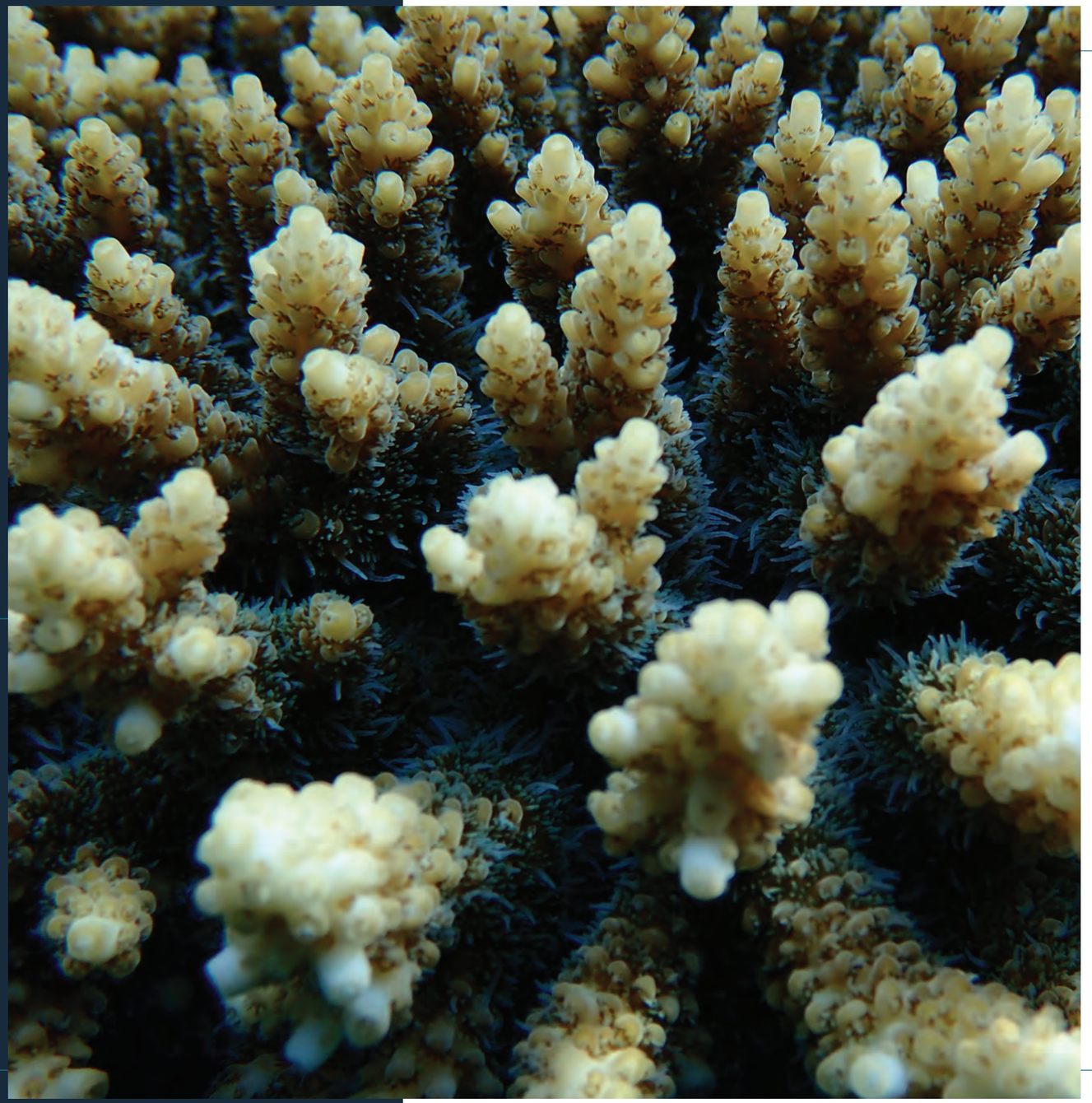
At Long Reef, St. Croix, our expertise is contributing to nursery establishment, coral collection, and the outplanting of around 7,000 corals across different species.

In September of 2023, the CRF™ Global team conducted surveys along nearly two miles of Long Reef in St. Croix. This effort resulted in photomosaics covering approximately 4,439m². We also identified four promising locations for future in-situ Coral Tree™ Nurseries, paving the way for expansion of our restoration efforts in the US Virgin Islands.

CRF™ GLOBAL PARNERSHIP: ST. THOMAS, USVI

At Coki Beach, St. Thomas, we are collaborating with Coral World Ocean and Reef Initiative, helping to lay the groundwork for in-situ nursery propagation and subsequent outplanting of 2,300-3,000 coral colonies.

In 2023, we engaged with local partners, conducted site visits, and collaboratively identified the annual scope of work. These efforts laid the groundwork for hiring staff under the sub-award in early 2024, setting the stage for further progress in our restoration endeavors in the region.



In partnership with local organizations, CRF™ is helping expand in-situ nursery coral production, supporting training initiatives, and promoting genetic sequencing projects to contribute to advancing coral reef conservation efforts in Puerto Rico.

CRF™ GLOBAL PARTNERSHIP: PUERTO RICO

In 2023, CRF™ forged a partnership with the Institute for Socio-Ecological Research and Sea Ventures Marine Response Unit in Puerto Rico to bolster in-situ nursery production.

Our primary objective is to help propagate 1,000 pillar corals and support the outplanting of 9,000 elkhorn corals across various strategic locations, including Cayo Largo, Palominos, and Los Corchos – all of which fall within NOAA's Caribbean Habitat Focus Area. Concurrently, we are also supporting a multi-species genetic sequencing initiative, targeting approximately 30 genets per species from a diverse array of corals housed in ex-situ facilities. This sequencing endeavor, which includes an additional elkhorn sequencing project, aims to help contribute to restoration strategies for both Puerto Rico and the USVI.

In September 2023, CRF™ initiated photomosaic training sessions with Sea Ventures. In just one week, we helped to expand the monitoring capacity of local teams from an average of 100m² to an impressive 13,200m². This milestone signifies a leap forward in our collective efforts to monitor and help local communities manage their coral reef ecosystems in Puerto Rico.

CRF™ GLOBAL LEARNING EXCHANGES

In 2023, we organized four learning exchanges, lending our expertise to restoration efforts around the world, and ensuring we are continuously evolving and applying the world's best practices to our mission.

MALDIVES

University of Milano-Bicocca's Marine Research and High Education Center (MaRHE) Maldivian Coral Reef Restoration Workshop (4th Edition)

The 4th Edition of the Maldivian Coral Reef Restoration Workshop was hosted by MaRHE, who operates offshore coral nurseries containing around 400 corals across a variety of nursery structures.

The workshop, managed by two staff members of CRF™ and four staff instructors from MaRHE, reached 20 participants for an 80-hour, hands-on, in-water training. Participants came from a variety of backgrounds including students at the University of Milano-Bicocca, the Maldivian Ministry of Environment, and other individuals from around the world working in the field of reef restoration.

MEXICO

Takata Research Center Mosaics for Restoration Monitoring

This virtual workshop, lead by the CRF™ Science Program Manager, detailed photomosaic techniques for reef restoration site monitoring. The workshop series included six hours of training over three days and covered topics such as in-water image acquisition, stitching and scaling, analysis, and 3D rendering for bouldering corals. Participants included researchers and resource managers from Takata Research Center, Technology Institute of Chetumal, and the National Polytechnical Institute Research Center.

PUERTO RICO

Sea Ventures Marine Response Unit & NOAA's Restoration Center Large-scale Photomosaic Training and Implementation

CRF™ partnered with the team of SVMRU, who have been active in reef restoration efforts around Puerto Rico for numerous years. As their program has evolved and increased in scale they were seeking to learn monitoring methods that would support the scale of their restoration.

With support from NOAA's Restoration Center, the CRF™ team implemented a week-long training program for SVMRU divers. During that time, the local team increased their monitoring capacity from an average of 100m^2 to 13,200m^2 using photomosaic monitoring techniques developed by CRF™.

ROATAN

Roatan Marine Park Authority (RMPA) Scaling-up Restoration Techniques for Non-Acroporid Corals

RMPA staff first participated in the virtual mosaic workshop and then later joined CRF™ restoration staff in the Florida Keys for a multi-day, hands-on learning experience.

The main goals of the exchange focused on developing in-situ nursery techniques for non-Acropora coral propagation as well as ways to scale up Acropora outplanting, and photomosaic monitoring. At the time of the exchange, CRF™ was still managing its coral stock through the Fourth Global Bleaching Event. This provided an additional opportunity for visitors to get hands-on experience with ex-situ coral management and husbandry techniques.

CRF™ PUTS CORAL ON THE GLOBAL AGENDA

CRF™ participation at the Society of Ecological Restoration's 10th Annual World Conference marks a critical shift at an international level towards a focus on the restoration of our marine ecosystems.

In 2023, in a groundbreaking collaboration, CRF™ joined forces with MARS, KAUST, and the Coral Nurture Program to deliver the first coral restoration session at SER's 10th World Conference on Ecological Restoration. This signals a pioneering shift in focus toward marine restoration within what has traditionally been a conference with a terrestrial focus.

The conference, themed around the vital connection between culture and nature, attracted over 1,000 delegates from diverse backgrounds spanning natural and social sciences, environmental engineering, urban planning, and more. As the launch platform for the 10 guiding principles of the UN Decade on Ecosystem Restoration, the event provided a pivotal opportunity to advocate for the protection and revival of ecosystems worldwide. CRF™ participation included four presentations showcasing global perspectives on restoration, socioeconomic successes, scalability, and innovative interventions. Alongside MARS Sustainable Solutions, CRF™ also hosted a special session on coral reef restoration, spotlighting interventions, impact, and scale in this critical field.

In addition to our session and presentations, CRF™ co-hosted a workshop organized by MARS, exploring lessons learned from terrestrial restoration and their applicability to marine and coral reef restoration. This collaborative effort aimed to harness cross-disciplinary insights to advance restoration practices and amplify impact.

As the UN Decade on Ecosystem Restoration gains momentum, CRF™ remains at the forefront of coral restoration efforts, leveraging partnerships and knowledge exchanges to build a global movement toward a sustainable future for people and nature.

INTERNATIONAL CONFERENCES & MEETINGS

MAY 2023
Association of Marine Labs of the Caribbean (AMLC) Conference
ST. KITTS

CRF™ engagement at the AMLC conference included two CRF™ presentations covering topics including the Genetic Registry and Metaportal, and the restructuring of the CRC with a focus on wider regional participation and connection with local restoration practitioners, and a co-led photomosaic workshop with the University of Miami.

JUNE 2023
Asia Pacific Coral Reef (APCR) Symposium
SINGAPORE

Marking the inaugural CRF™ presence at the conference, CRF™ made significant contributions at the APCR Symposium, including one presentation by the CRF™ Director of Restoration Strategy highlighting the Coral Restoration Consortium's revamp and relaunch, emphasizing greater participation from Southeast Asia, and participation in a workshop focusing on incorporating coral restoration efforts in Indonesia.

JULY 2023
EU - Ocean Governance
INDONESIA

Held at the Coral Triangle Center, CRF™ was invited to participate in discussions regarding the incorporation of coral restoration efforts into Marine Protected Area planning for the Coral Triangle. Activities included a presentation by CRF™ Director of Restoration Strategy on coral restoration fundamentals and the CRC as a potential organizing body, and participation in a visit to Nusa Penida, an island community off Bali specializing in eco-tourism, sustainability, and alternative livelihood programs.

SEPTEMBER 2023
International Coral Reef Initiative ICRI 37th General Meeting
HAWAII

CRF™ was officially welcomed as a member of ICRI, an internationally recognized global partnership between nations and coral reef organizations dedicated to the protection of the world's coral reefs and associated ecosystems.

SEPTEMBER 2023
Society for Ecological Restoration (SER) Biennial World Conference
AUSTRALIA

CRF™ contributed to the SER Conference with four CRF™ presentations, a special session organized by CRF™ in collaboration with MARS, Coral Nurture Program, and KAUST, and participation in a workshop organized by MARS exploring parallels and lessons learned from terrestrial restoration to inform coral restoration.

OCTOBER 2023
Coral Reef Task Force Meeting
ST. THOMAS

CRF™ participated in the US Coral Reef Task Force meeting, highlighting new and upcoming work in St. Croix, St. Thomas, and Puerto Rico, and conducting an outreach event at Coral World.

In 2017, CRF™, in collaboration with NOAA, co-founded the Coral Restoration Consortium (CRC), a global 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.

Throughout 2022, in recognition of the coral restoration field's evolving landscape and emerging challenges, the CRC revised its internal structure; in 2023, Dr. Tali Vardi was appointed as the interim executive director, marking a pivotal moment for the consortium's leadership. Jessica Levy, CRF™ Director of Restoration Strategy, remains on board as one of two CRC Coordinators, with a focus on CRC Regional Groups.

In April, the CRC executive team convened to articulate new priorities and develop a strategic vision for the future. This included: a renewed focus on key goals (to listen, to share, and to elevate); the redesign of internal programs; and an analysis of the CRC website to find ways to better serve the needs of its members and the broader coral restoration community.

Throughout the year, CRC representatives showcased the consortium's progress and initiatives on various platforms. In May and July, CRF™ leadership highlighted the CRC's evolving structure and strategic revisions at various international conferences. Meanwhile, CRC Chair Scott Winters and Advisory Board Chair Joe Pollock spearheaded efforts to enhance collaboration and coordination within the consortium.

In August, the CRC organized a webinar titled "Coping with the 2023 Bleaching Event," featuring panelists Jessica Levy and Dr. Tali Vardi. This webinar shared insights and lessons learned from the onset of the bleaching event, providing valuable guidance to coral restoration practitioners worldwide in advance of the arrival of the marine heat wave in the Southern Hemisphere.

As the year progressed, the CRC continued to amplify its presence and impact on a global scale. CRF™ leadership and Dr. Tali Vardi were invited to review and provide comments on the Indonesian government's coral restoration guide.

In September, representatives from CRF™ and the CRC attended the International Coral Reef Initiative in Hawaii, underscoring their commitment to advancing coral restoration efforts internationally.

In November, the CRC launched its first global practitioner survey to better understand the needs of the coral restoration community. This initiative reflects the consortium's ongoing commitment to listening to its members and adapting its strategies to meet their needs.

By December, the CRC had further solidified its position as a leading authority in coral restoration, with Dr. Tali Vardi representing the consortium at the Conference of the Parties in the UAE.

Additionally, the CRC, in collaboration with key partners, launched a number of innovative solutions in 2023, including a storytelling hub and a restoration solutions toolbox.

Looking ahead, the CRC remains dedicated to its mission of uniting the world's coral restoration community to enable coral reef ecosystems to thrive in the face of the unprecedented challenges of our modern world.

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

REEF FUTURES 2024

Reef Futures, convened by the Coral Restoration Consortium, is the only global symposium focused solely on the interventions and actions necessary to allow coral reefs to thrive into the next century. *Reef Futures* is a conference of hope, action, opportunity, and diversity.

Taking a fresh approach to the typical scientific conference, our goal is to develop new ideas by facilitating diverse international participation and multi-disciplinary perspectives; as such, the stage will be open to all.

Reef Futures is the only venue that brings together coral restoration practitioners, researchers, students, and resource managers from around the world to share the latest techniques, technologies, and science to dramatically scale-up the impact and reach of coral reef restoration. Whether you are a local resource manager from a small island looking to learn from seasoned hands, or a topical expert looking to make your work meaningful to a local community, *Reef Futures* is the place to be. Leave your sadness and despair about the state of coral reefs at the door and come help shape the future you want coral reefs to have!

The next *Reef Futures* is scheduled for December 9-13, 2024 in Mexico, in collaboration with local host Iberostar Group. Visit ***reeffutures.com*** for more!

SCIENCE

Our science program focuses on research, development, and the application and dissemination of best practices in coral restoration.

- With a growing R&D arm, we develop **publicly available tools and techniques** that can be used by other groups around the world.
- We share our data and 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.

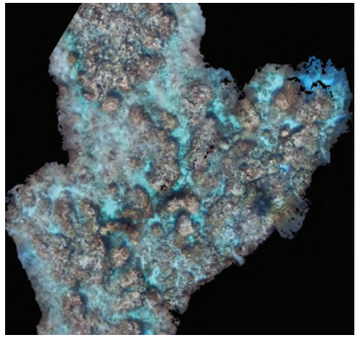
OUR RESEARCH PRIORITIES

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.

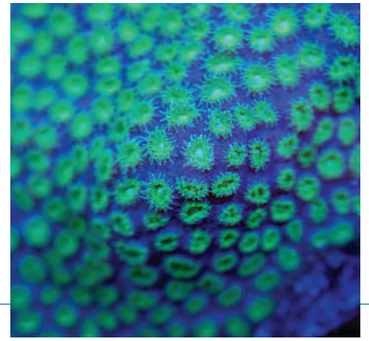


MONITORING TECHNIQUES

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 one peer-reviewed journal in 2023.

Marine Ecology Progress Series

June 29 2023

Seascape connectivity modeling predicts hotspots of fish-derived nutrient provisioning to restored coral reefs

Courtney Stuart et al (Moura from CRF™)

2023 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.

CORAL RESTORATION ECOLOGY

Dr. Andrew Baker
University of Miami

Using samples of *Acropora prolifera* from the CRF™ Carysfort Nursery, Baker is studying the feasability of using the hybrid species for coral restoration, comparing its growth and hardiness to staghorn and elkhorn.

Dr. Michael Gerdes
Capital Coral

Gerdes is testing how fire coral (*Millepora complanata*) can be used to reduce biofouling on nursery structures. He is also working on characterizing growth and reproduction of *Porites astreoides* (mustard hill coral) using samples collected from the CRF™ nursery, which then spawned ex-situ.

CORAL MONITORING

Stephanie Green
University of Alberta

Green is partnering with CRF™ to assess fish recruitment rates and reef habitat complexity on restoration sites using diver surveys and photogrammetry; this work will inform the long-term impacts of coral restoration and how outplating by CRF™ changes the physical structure and biological communities of reefs.

CORAL DISEASE AND IMMUNOLOGY

David Ehrens
University of Miami

Ehrens' experiments will investigate how intracellular interactions between cells from different coral genotypes respond immunologically. By studying the phagocytosis and cytotoxicity activity between corals of different genotypes and cells interacting with themselves, we can comprehend the extent of allogeneic response in corals at a cellular level. This understanding will inform us about the potential use of coral stem cell transplants as a tool for enhancing coral immune resilience.

CRF™ provided six corals from each of five different genotypes (30 fragments in total) of *Acropora cervicornis* to the study.

GENETIC PERFORMANCE

Hayley Bedwell
University of Texas

Bedwell is using CRF™ data to understand why different coral genotypes perform differently across different reef sites; this will help CRF™ understand why some restoration efforts are more succesful than others, and identify the strongest abiotic contributors (eg. reef site, time of year etc.) to overall restoration success.

A NEW FOCUS:
RESEARCH & DEVELOPMENT

We recognize that coral restoration is not just a US-based issue, it is a global one. At CRF™, we have the privilege of resources to push the field forward, and the responsibility to bring others along with us as we do so. And the new R&D focus in the CRF™ Science Program will help us accomplish both.

In 2023, the CRF™ Science Program underwent a radical transformation. We moved some of the previous in-water functions of the Science Program, including restoration site monitoring and select logistics of our research collaborations, to be managed by the Restoration Program. This will also allow the restoration team to gain a more more holistic view of the restoration process, and enable us to and more efficiently incorporate the best coral restoration knowledge into our daily practice.

This shift frees up the Science Program to begin investing in a new area of expertise at CRF™: the research, development, and deployment of technology-based solutions to increase efficiencies in all aspects of our work. The Science Program will also be working to prepare these solutions for adoption by groups outside of CRF™ and outside of the USA.

These solutions comprise a growing 'CRF™ Toolkit'.

The first of these tools are the Coral Sample Registry and CeruleanAI. By focusing on these solutions and the ways in which they can help new and underserved restoration organizations around the world, the Science Program hopes to democratize the coral restoration space, providing access to best practices and technologies regardless of location or means.

This new direction reflects the growing influence of CRF™ throughout the global restoration community.

CRF™ TOOLKIT

CeruleanAI

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

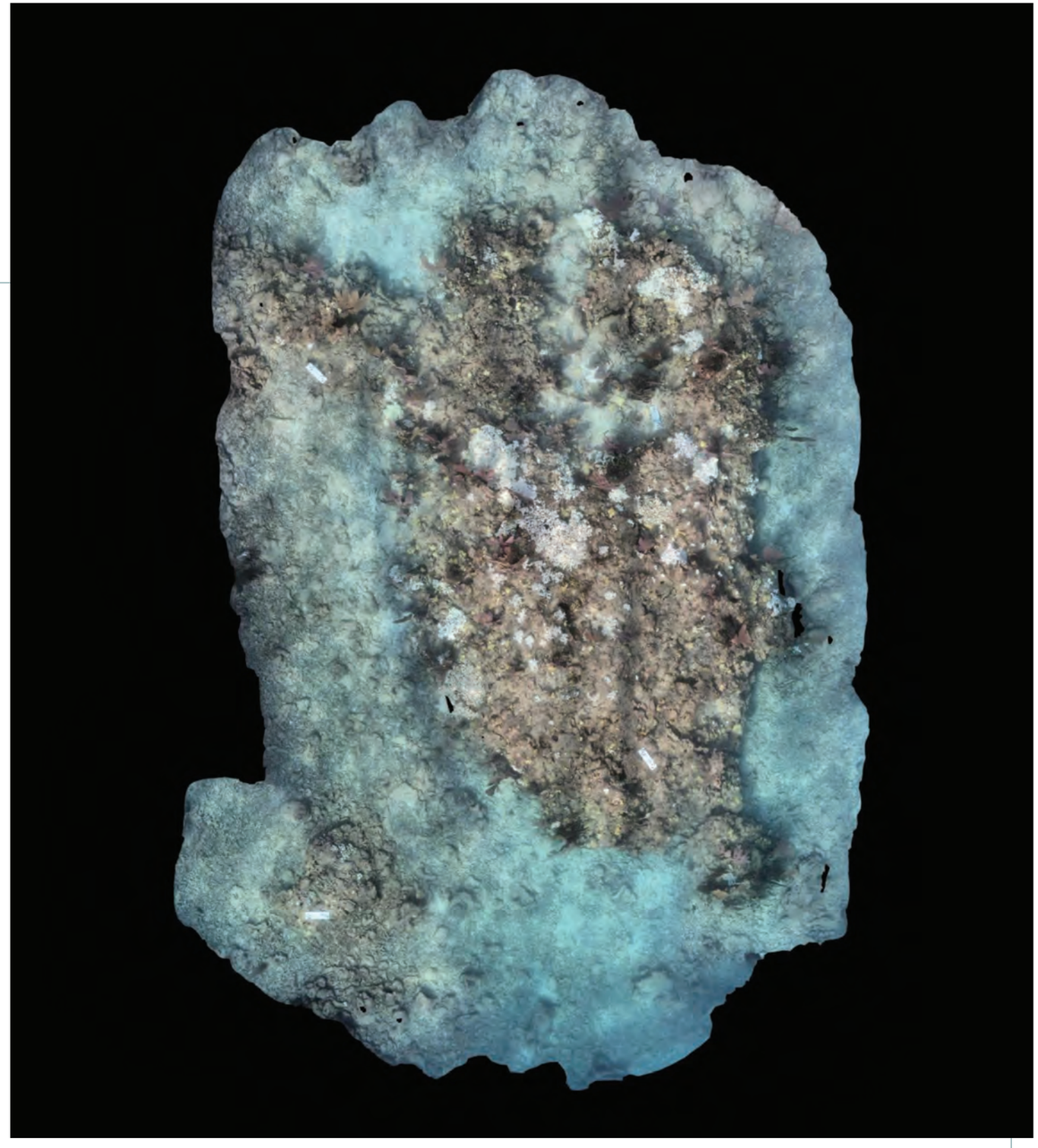
In 2023, Coral Restoration Foundation™ made remarkable progress with CeruleanAI, an advanced software platform set to revolutionize the world of coral reef monitoring through automation and artificial intelligence. This versatile tool processes images, generates accurate photomosaics, and will soon provide AI-powered analysis of reef sites. CRF™ will soon be offering access to the platfrom at little to no cost, democratizing access to a cutting-edge resource for coral restoration practitioners everywhere.

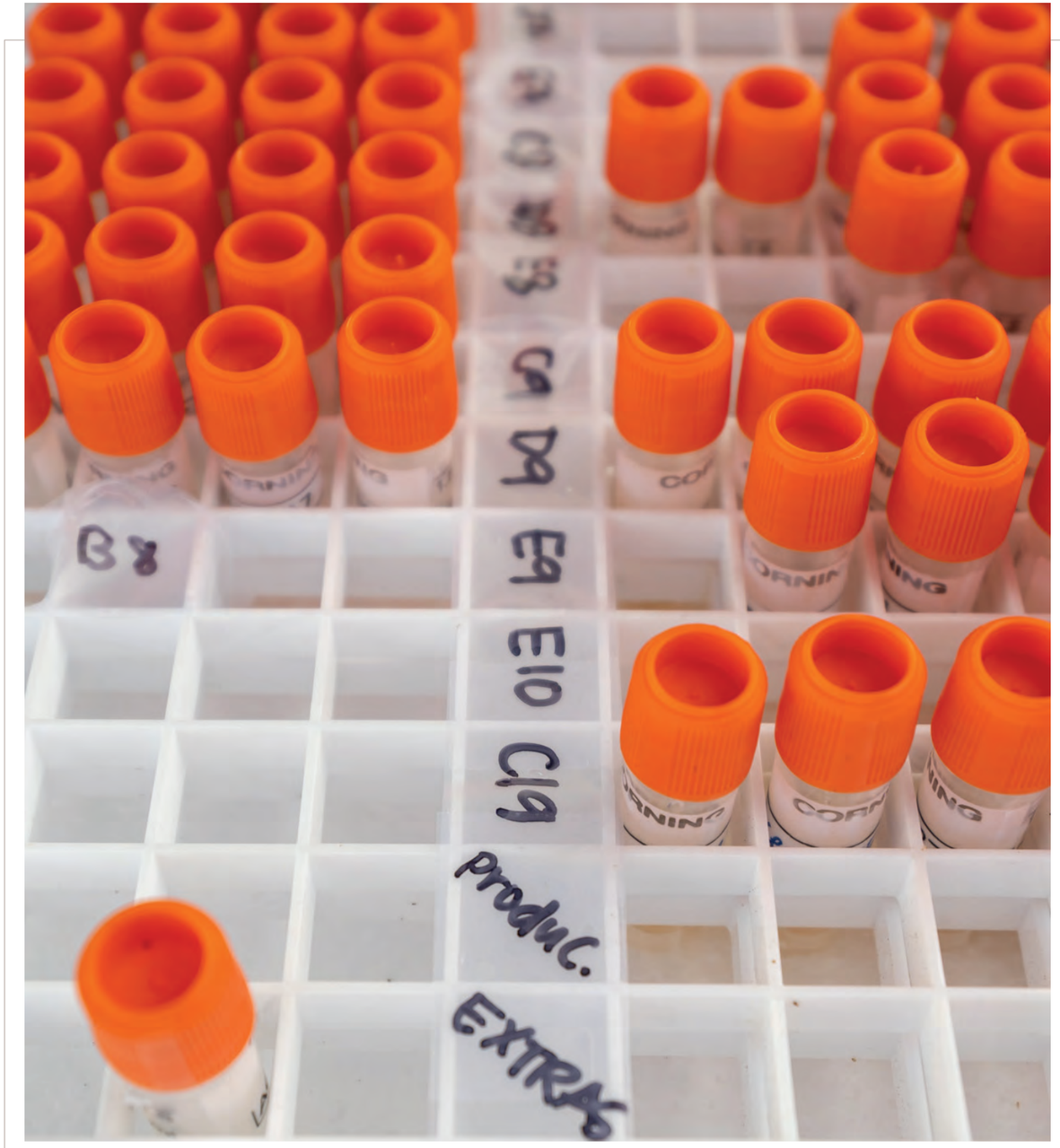
By the middle of 2023, CRF™ had transitioned the majority of our in-house monitoring mosaics to Cerulean. This pivotal shift enabled our Key West office to independently capture, stitch, and analyze mosaics from the Lower Keys, significantly reducing the workload for Upper Keys staff and interns.

In 2023, we also initiated the development of the payment processing and administrative systems that will support external use of Cerulean's stitching components. This crucial infrastructure is nearing completion, with expectations for external accessibility by May 2024.

Looking ahead, our focus will soon shift to finalizing the AI analysis components of CeruleanAI, slated for deployment by the end of 2024.

This milestone represents a significant advancement in our mission to both restore coral reefs and provide practitioners around the world with equitable access to innovative technologies.





The Coral Sample Registry & CRF™ Metaportal

The CRF™ Metaportal is a revolutionary interface that will link discrete databases, addressing the challenge of siloed datasets, fostering collaboration among stakeholders, and offering valuable insights for global coral restoration efforts.

For the past several years, CRF™ has been working towards the widespread adoption of the Coral Sample Registry and the development of the CRF™ Metaportal. Since its publication in 2022, the Coral Sample Registry (CSR) has helped establish industry standards for coral collection metadata. The CSR now houses data on 5,011 unique coral samples from 71 coral species, submitted by 15 organizations across five countries.

The CSR was developed in collaboration with leading agencies and organizations, including the NOAA Coral Reef Conservation Program, the Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute, SECORE International, and the NOAA National Marine Fisheries Service. Now, with partners including NOAA, FWC, AGRRA, and restoration practitioners throughout the world, CRF™ is working on the CRF™ Metaportal which will link diverse, unique, in-house datasets through the common denominator of a CSR Accession Number.

In simple terms, the CSR's Accession Numbers function as unique bar codes for different coral samples in use around the world. Whenever these bar codes are incorporated into organizations' internal data systems (for example, a gene sequencing laboratory's database on coral genetics), the Metaportal will act as a 'search bar' capable of locating the bar codes in any connected databases. When Metaportal users search for a specific kind of coral sample, the Metaportal searches its connections and pulls any data that matches the requested information, sending it back to the user like a list of returns from a Google search.

By utilizing the Accession Number information in the CSR, the Metaportal streamlines data management and analysis, granting unprecedented access to a decade's worth of coral restoration and research data. It addresses the challenge of siloed datasets, fostering collaboration among stakeholders and offering valuable insights for global coral restoration efforts. Since 2023, CRF™ has been working to identify organizations and databases with important coral data (including genetics, phenotypic data, spawning information, restoration monitoring, etc.) so that we can begin designing the connections that will allow the Metaportal to search them.

Through the collaborative efforts of all contributors, the Coral Sample Registry and CRF™ Metaportal aim to shape the future of coral restoration science. Its development supports collective action in addressing the challenges facing coral reef ecosystems.

EDUCATION

At CRF™, we provide practical, meaningful ways for everyone to learn about and get actively involved with our mission to bring 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 planet's life support systems.

- Our publicly available **educational materials** uphold 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 related fields.
- **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.

EMPOWERING THE NEXT GENERATION

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.

We worked with **6,372** students in 2023, with **14** virtual sessions, **76** in-person events, workshops, and presentations, and at **15** outreach booths

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 hands-on, STEAM-focused "Learning Labs" follow state standards, enrich the curriculum, and are a blast 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 edutainment 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 problem-based curriculum. We introduce students to oceanography and ecology, while delivering a hopeful message about our capacity to save our coral reefs.

2023 CRF™ EDUCATION PROGRAM HIGHLIGHTS

JANUARY
CRF™ sent a member of the Education Team to the Maldives to participate in a coral restoration workshop, thanks to the University of Milano-Bicocca and the MaRHE station.

FEBRUARY
With assistance from Jessica Levy, CRF™ Director of Restoration Strategy, our team connected with Coral Vita Coral Farm in the Bahamas, reinforcing the idea that there is no one right way to restore a reef.

MARCH
We led a massive hands-on mission to inspire 500 people and build 200 boulder trays at the worldwide MasterCard Sales Associate Conference. These trays were instrumental in our coral nursery expansion and rescue efforts during Fourth Global Bleaching Event.

APRIL
Celebrating the second year of our Every Kid Outdoors Program, funded by the National Park Trust, we inspired 150+ students through 900+ hours of outdoor exploration and increased environmental literacy through hands-on coral restoration training.

MAY
We launched our first-ever Plant A Coral Competition among all schools of the Upper and Middle Keys, inspiring creativity and engagement among 3rd graders. The winning art work was used for the Tom Thumb Plant a Coral fundraising campaign.

JUNE
Our Education Department launched a new teacher development workshop called "Inspiring Instruction", engaging teachers from Title I schools of Orange County, Florida with hands-on curriculum and immersive experiences. See page 74 for more!

JULY
We helped our lead interns gain their National Safe Boating Council certificates! This training enhances their general safety and knowledge of watercrafts and enables them to diversify their skillset.

AUGUST
We hosted our first Coral Spawning Celebration in collaboration with Vizcaya Museum and Gardens, engaging nearly 500 attendees with interactive learning stations and restoration activities.

SEPTEMBER
The CRF™ ReefHero Presentation for Girl Scouts of Tropical Florida reached nearly 200 attendees virtually, inspiring young leaders to become ocean stewards.

OCTOBER
In just one week, CRF™ impacted over 2,000 people through outreach events, engaging the community with educational activities and winning "Best Booth" at the John Pennekamp State Park Trunk or Treat.

NOVEMBER
Our school-wide Edutainment Workshop in Orlando engaged 645 students with Captain Coral shows and educational science experiments.

DECEMBER
We provided educational experiences for nearly 300 students at Zoo Miami Summer Camp and Winter Camp, fostering environmental awareness through Captain Coral shows and Edutainment Slime workshops.

OUTREACH MATTERS

The CRF™ Education team reached thousands of people with our mission in 2023, igniting passion for coral reef restoration and inspiring environmental stewardship.

In 2023, we reached 19,103 members of the general public with 144 activations

Outreach activities at CRF™ are vital for educating and engaging diverse audiences, from local communities to global stakeholders, in the urgent need for coral reef conservation and restoration.

From setting up booths at community events like farmers markets and boat shows to engaging with local businesses and organizations, such as the Postcard Inn Beach Resort's monthly full moon yoga collaboration, our outreach efforts span a variety of activations. In August, we worked with Vizcaya Museum and Gardens for a special evening in Miami, celebrating coral spawning and learning about coral reefs with interactive activities —from art-making and games to dance and music. We also took part in the Zoo Miami's award-winning Zoo Camp series with a series of interactive workshops facilitated by our dedicated interns. This was in addition to our permanent monthly spot at Zoo Miami's Conservation Action Center.

In an ever-evolving landscape, strategic outreach remains integral to driving meaningful change and ensuring the long-term resilience of coral reefs worldwide.

KIDS' CREATIVITY FUELS CORAL CONSERVATION

Third grade students used their creative talents to shine a spotlight on coral restoration efforts and rally community support for our reefs.

In 2023, third graders in the Florida Keys teamed up with Tom Thumb Food Stores to support Coral Restoration Foundation™ efforts to restore coral reefs in the Florida Keys National Marine Sanctuary. Through the 'Plant a Coral Campaign', kids contributed their creativity, drawing attention to the cause and helping to raise funds from the community.

During May, customers at Tom Thumb Food Stores across the region donated one dollar to 'plant a coral' in-store, with all proceeds going to CRF™. The "corals" these customers "planted" were created by local third graders who participated in a coral drawing contest, showcasing their artistic talents while learning about threats to our coral reefs and the ongoing mission to bring this ecosystem back.

The winning students and teachers received prizes and a special classroom visit from CRF™ ambassador, Captain Coral. This fundraising initiative, now in its fourth year, continues to demonstrate Tom Thumb Food Stores' unwavering support for CRF™ and environmental education in the Florida Keys. But in 2023, the "Plant a Coral Campaign" not only raised vital funds for coral reef restoration work, it also helped to nurture a sense of environmental stewardship among the younger generation.

GROWING ENVIRONMENTAL HEROES

In the realm of marine conservation, partnerships are as vital as the ecosystems themselves. In November 2023, the collaboration between the Girl Scouts of Tropical Florida and CRF™ took another significant step forward.

In 2021, CRF™ launched the patch program, followed by the "Be a Reef Hero" program at the *Reef Futures* symposium in 2022. These initiatives aim to create a pathway for Girl Scouts, fostering their knowledge of coral reefs. The programs contribute to the council-wide service project, showing a commitment by the Girl Scouts of Tropical Florida to marine conservation. Currently, 128 Girl Scouts have completed the patch program.

In November 2023, CRF™ and the Girl Scouts of Tropical Florida announced the evolution of the patch program into a series of "badges" in 2024. This signifies a deepening engagement with marine ecosystems, designed to cultivate appreciation for coral reefs and inspire stewardship among all age groups.

These badges can be earned through participation in interactive programs offered by CRF™, with requirements tailored to each Girl Scout level. Activities range from crafting coral models to exploring Florida's Coral Reef by boat.

At introductory levels, scouts grasp the basics of coral and its importance. As they advance, they explore marine ecosystems and delve into monitoring and restoration. Advanced and expert badges offer insights into coral nursery techniques and cutting-edge technologies driving reef restoration.

This partnership between CRF™ and the Girl Scouts of Tropical Florida transforms badges into symbols of environmental stewardship, shaping a generation of reef heroes. So, stay tuned, for this adventure is just beginning.

In 2023, CRF™ and SeaBase deepened their partnership, amplifying efforts to educate and engage Boy Scouts in marine conservation. With specialized staff training and active involvement from scouts, their stewardship of Alligator Reef continues to flourish.

In 2021, we established an official partnership with SeaBase and the Boy Scouts of America, offering a comprehensive summer program aimed at involving Boy Scouts in coral reef conservation efforts. This unique program at SeaBase aligns with the aims of the Boy Scouts of America to build character and foster citizenship while developing physical, mental, and emotional fitness.

Throughout the summer of 2023, our collaboration with SeaBase continued to thrive. We began by training SeaBase staff to work alongside us and the scouts during the summer months. From the end of May onwards, we conducted a total of 11 programs over 22 days, engaging 245 scouts in education sessions, hands-on workshops, and in-water restoration work.

Thanks to this partnership, scouts at SeaBase successfully helped CRF™ meet our Alligator Reef outplanting requirements, returning over 400 corals to the reef. The success of this program led to the dedication of two lead interns to oversee the SeaBase program, ensuring its smooth operation and educational impact.

Meanwhile, SeaBase remains committed to transforming scouts into ocean stewards through their SCUBA Advanced Marine Exploration Adventure program, further solidifying our joint mission to instill environmental stewardship in the next generation.

TRAINING TEACHERS: PEDAGOGICAL INNOVATIONS

In early 2023, the CRF™ Education Department proudly unveiled its groundbreaking teacher development workshop, 'Inspiring Instruction'.

'Inspiring Instruction', piloted with educators from Authentic Exploration Matters, sets a new standard in pedagogical innovation.

The day started with a tour of the CRF™ Tavernier Coral Tree™ Nursery and Pickles Reef, offering firsthand insights into marine conservation. Transitioning to the CRF™ Exploration Center, participants immersed themselves in the art of CRF™ edutainment, discovering our world-class approaches to engaging students in ecosystem stewardship.

Teacher development workshops, such as 'Inspiring Instruction', play a pivotal role in equipping educators with innovative pedagogical techniques. Through these new Train-the-Trainer programs, CRF™ is ensuring the dissemination of best practices, fostering a ripple effect of impactful teaching methodologies across communities. By investing in capacity development, we are empowering teachers to instill a deep sense of environmental responsibility in their students, catalyzing sustainable change for the future.

With enthusiastic participation from educators statewide, this inaugural workshop signaled the beginning of a global educational movement.

CAPTAIN CORAL'S 2023 SCAVENGER EXTRAVAGANZA

Captain Coral and his Coral Crew brought the unique CRF™ brand of hope for coral reefs to Zoo Miami, kicking off our World Oceans Day celebrations.

Once again, in 2023, CRF™ took over Zoo Miami as part of our World Oceans Day celebrations. With over 3,000 eager participants flooding the park that day, CRF™ teams were stationed throughout the Zoo with six interactive activity stations, all part of the CRF™ Captain Coral Scavenger Extravaganza. Zoo-goers were dared to embark on an adventure, exploring the zoo's nooks and crannies, completing activities to unlock the secrets of coral reefs. Almost 100 intrepid souls rose to the challenge!

From unraveling environmental stressors in the captivating 'Coral Chaos' game to testing their oceanic knowledge in a spirited round of trivia, and even engaging in a restoration diver relay race, attendees not only learned a plethora of information but relished every minute of it!

Captain Coral performed

12

shows in 2023, at locations including Summerville Advantage Academy, Key Largo School, Blankner School, and John Pennekamp State Park

CORALPALOOZA™

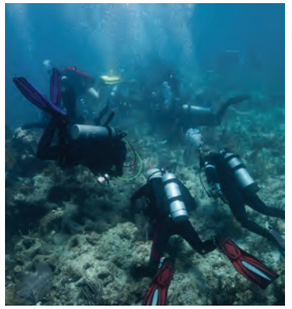
In 2023, CRF™ took Coralpalooza™ global, launching an international movement on behalf of our planet's coral reefs.

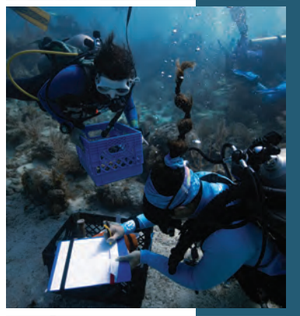
Coralpalooza™ is the annual CRF™ World Oceans Day celebration. Originating as a local initiative to restore coral reefs in the Florida Keys in 2014, Coralpalooza™ has now grown into an international call to action.

In 2023, Coralpalooza™ resulted in more than 15,200 new corals returned to wild habitats in a single day, thanks to over 20 organizations from 13 countries, mobilizing more than 960 staff and volunteers. These efforts were recognized as part of the UN Decade on Ecosystem Restoration, highlighting the global significance of coral reef restoration.

In the Florida Keys, CRF™ Coral Crew took more than 200 passionate recreational scuba divers out on 10 boats, planting over 1,815 Acroporid fragments across six reef sites in the Florida Keys National Marine Sanctuary, four of which are sites included in the *Mission: Iconic Reefs* plan. CRF™ also hosted two land-based Coralpalooza™ Festivals – in Islamorada and Key West – where families had a chance to join the fun with educational games, creative activities, kayaking, and a beach clean up.

Coralpalooza™ is a testament to our dedicated community, and to the passion and commitment of people around the world.





HIGHLIGHTS FROM THE 2023 INTERNATIONAL CORALPALOOZA™ COMMUNITY:

- Coral Nurture Program in Australia, supported by the Great Barrier Reef Foundation, mobilized 56 divers to return 6,726 corals to 13 sites on the Great Barrier Reef.
- Fundación CIM Caribe in Colombia, continued to contribute to the "A Million Corals for Colombia" initiative by outplanting over 950 corals.
- Kuleana Coral Restoration in Hawaii outplanted 480 fragments with 280 participants at the Disney Aulani Resort. They also held a fragmentation event for the general public and an educational event at Waiamea Bay.
- Misool Foundation in Indonesia deployed 100 "spider web" reef frames populated with 2,000 coral fragments to stabilize the reef area and to jump start the restoration process.
- Mote Marine Laboratories in Florida returned over 500 corals to the local reefs.
- Planhotel & MaRHE Center in Maldives installed one mid-water rope nursery structure and populated it with 350 fragments, cleaned and repaired other nursery structures, took baseline coral cover data for six reef transects, prepared 22 educational "coral cookies" with resort staff, carried out two desert island clean ups, gave two presentations, one coral workshop, served one ocean cocktail, had a screening of one educational documentary, and live streamed the UN Oceans Day online event.
- Raising Coral Costa Rica conducted a beach clean-up.
- Reef Renewal USA outplanted 2,133 coral pieces with the help of three boats and a team of 15 people. The outplants were distributed across Mustique, Tavernier, and Looe Key.
- Sheba Hope Grows Collective hosted a virtual outreach event with 50 participants.
- University of Miami in Florida outplanted 200 corals.

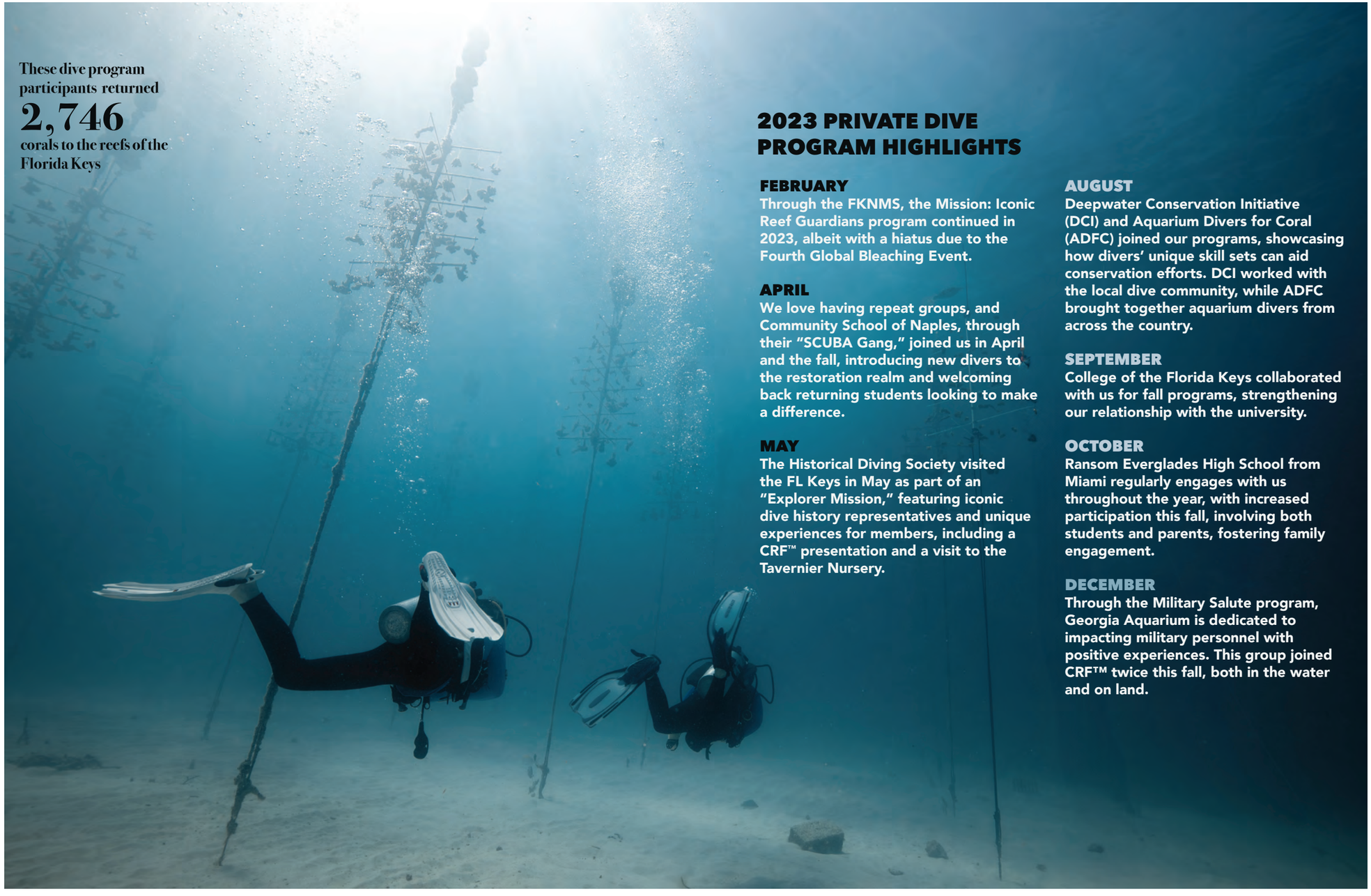
In 2023, we welcomed **950+** recreational divers and snorkelers to **120** dive & snorkel programs

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 participants returned **2,746** corals to the reefs of the Florida Keys

2023 PRIVATE DIVE PROGRAM HIGHLIGHTS

FEBRUARY
Through the FKNMS, the Mission: Iconic Reef Guardians program continued in 2023, albeit with a hiatus due to the Fourth Global Bleaching Event.

APRIL
We love having repeat groups, and Community School of Naples, through their "SCUBA Gang," joined us in April and the fall, introducing new divers to the restoration realm and welcoming back returning students looking to make a difference.

MAY
The Historical Diving Society visited the FL Keys in May as part of an "Explorer Mission," featuring iconic dive history representatives and unique experiences for members, including a CRF™ presentation and a visit to the Tavernier Nursery.

AUGUST
Deepwater Conservation Initiative (DCI) and Aquarium Divers for Coral (ADFC) joined our programs, showcasing how divers' unique skill sets can aid conservation efforts. DCI worked with the local dive community, while ADFC brought together aquarium divers from across the country.

SEPTEMBER
College of the Florida Keys collaborated with us for fall programs, strengthening our relationship with the university.

OCTOBER
Ransom Everglades High School from Miami regularly engages with us throughout the year, with increased participation this fall, involving both students and parents, fostering family engagement.

DECEMBER
Through the Military Salute program, Georgia Aquarium is dedicated to impacting military personnel with positive experiences. This group joined CRF™ twice this fall, both in the water and on land.

INTERNSHIPS

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

We offer vocational training to university-level 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 to a changing world.

In 2023, we saw a significant increase in our intern intake, largely due to our expansion into Key West. This expansion allowed interns to actively contribute to the establishment and development of a new office and warehouse, fostering our organization's growth.

We're excited to have offered six different intern positions in this new office space, which played a crucial role in facilitating the expansion of our initiatives. Additionally, we've welcomed dedicated land-based interns, aiming to broaden access to marine science opportunities beyond traditional dive-based roles.

This innovative approach not only supports our mission, but also opens up the field of coral conservation to a wider audience, enriching our intern program and advancing our efforts towards marine conservation.

We welcomed 35 individuals to our internship program in 2023

Interns were responsible for returning more than 7,000 corals to Florida's reefs in 2023

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 2023, for the first time, the Education Department rolled out standardized training programs that ensure all volunteers are trained to the same level of competency as our interns. This means we were able to introduce specialized "Coral Crew" trainings to equip volunteers for Dive Programs and other boat activities, empowering them to become trainers themselves. This initiative was a great help for Corapalooza™ 2023, underscoring the importance of the continuous growth and expansion of our volunteer program.

Amidst the challenges posed by the Fourth Global Bleaching Event, our volunteers demonstrated remarkable dedication by actively assisting with the establishment of onshore nurseries. They tirelessly responded to urgent calls for additional support on the water, playing a crucial role in our ongoing efforts. We are incredibly grateful to everyone who generously offered their assistance during this critical period. The invaluable contributions of our community are truly the backbone of our success.

In 2023, we worked with 95 active volunteers, providing 33 pool training sessions and 42 boat training sessions

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.

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.

Platinum Transparency 2024 Candid.

CHARITY NAVIGATOR ★★★★ Four Star Charity

CORPORATE SPONSORSHIPS

It is consistent support from like-minded 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.

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.

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.

DONATING CRYPTOCURRENCY

There's nothing cryptic about the benefits of saving coral reefs. Investing in the future of our oceans is easier than ever by donating your cryptocurrency to CRF™. The IRS classifies cryptocurrencies as property, so cryptocurrency donations to 501(c)(3) charities can often reduce your tax burden.

GIFT & ESTATE PLANNING

A 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.

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?

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, 2023 and December 31, 2023.

We strive for accuracy and are appreciative of the generosity of our many supporters. Please accept our sincere apology for any omissions or errors and feel free to bring corrections to the attention of our Development Department by sending an email to donors@coralrestoration.org.

- 3rd Reef Line LLC
- Akasha Superfoods
- Julie Alexander
- Amazon Smile
- American Sealants, Inc.
- Kristina Andersen
- Andrew R. and Janet F. Miller Foundation
- Anonymous (157)
- Aquarium at the Boardwalk
- The Arthur Vining Davis Foundations
- Corwin and Virginia Atwood
- Bajío Sunglasses
- Baker's Cay Resort, Key Largo
- Victoria and Jacob Balthazor
- New Hampshire Charitable Foundation's Barrette Family Fund
- Hays Bassett
- Bastion Management
- The Batchelor Foundation
- Dr. Sally E. Bauer
- Don & Marta Baum
- Beachside Community Acupuncture PLLC
- Jennifer Bell
- Katherine Belsky & Nathaniel Baimel
- Benevity
- The Betsy and Clarke Moody Fund
- BNY Mellon Charitable Gift Fund
- James J. and Mary L. Boilini
- The Boston Foundation
- Amy Bourne
- Wade and Brenda Brickhouse
- Nicole and William Bridges
- Bright Funds Foundation
- Brinker Family Foundation
- Neal and Colleen Brown
- Steven Bufferd and Jennifer Benson
- Buoy Up Styles
- David and Sherri Campbell
- CANUSA TOURISTIK
- Crystal Carnahan, Zenfully Aware Performance Coaching and Yoga
- Kim Carpenter
- Lisa & Kevin Cassidy; The Dive Shop @ Ocean Reef
- Paul and Pamela Caswell
- Michele Chan
- The Charles Hazlehurst Moura Family Foundation
- Clarendon Partners
- Clicta Digital Agency
- Clif Family Foundation
- Jack Coen
- Jill Cohen, MD and Justina Cotter
- Community Foundation of the Florida Keys
- Christopher and Lesley Cooper
- Joel and Pam Copeland
- Coral Ethical Wine - an Entrecanales Domecq E Hijos brand
- The Christopher H. Covington and Bonnie G. Covington Fund at the Boston Foundation
- The Crickenberger Vance Family Foundation
- Karen Crouse in memory of Steve Harms
- CuriOdyssey
- The Curtis and Edith Munson Foundation
- Daily Karma Foundation at Simple Generosity
- Daniels Family Foundation
- Stephen M. Daoust & Michelle G. Birnbaum
- John C. Davidson
- Nick Davies
- Nathaniel Deknatel
- Michael Devlin
- DiamondRock Hospitality and Margaritaville Beach House Key West
- Tom Dickey
- Anne L. Doubilet
- Dr. Plants
- Mr. and Mrs. James Drinkwater
- The Edgemont Foundation
- The Edward and Gale McBride Foundation Inc.
- Jennifer Egan
- Elevate
- Essex Avenue Foundation
- Anne Estevez & Joaquin Luaces
- Michael and Nancy Evans
- Facebook
- Sarah Fangman
- Fidelity Charitable
- The Fikes Family
- Firth-Link Family Foundation
- Jeffrey Flanagan
- Florida Federation of Garden Clubs
- Fluval, a division of Rolf C. Hagen Inc.
- The Foley Family Giving Fund
- Robert and Lisa Forsyth
- The Frank & Marta Jager Foundation
- Franklin Philanthropic Foundation
- The Fullgraf Foundation
- The Garden Group at Ocean Reef
- John and Karen Gardner
- George and Marlisa Garrett
- Kristin and Cory Gilchrist
- Michael and Suzanne Gilson
- Give Lively Foundation
- The Giving Block
- Erik & Carol Goldman
- Goldman Sachs Philanthropy Fund
- John and Denise Gordon
- Virginia and Richard Gorelick
- Stephanie Graeler
- Great Lakes Tea & Spice
- Green Family Fund
- Steve Greenwell
- Dr. Steven and Tara Grekin
- Fritz Grimm
- David and Patti Gross
- Will and Cheryl Harman
- Julie Harrison and Dr. Stephen Watts
- Laura and Fred Hartner
- Helen and Ritter Shumway Foundation
- Henshel Foundation
- The Henson Family
- Caryn Hoadley
- Peggy Hoburg in memory of her husband, Jim
- HollyJolly Foundation
- Kathryn Howd and Edward Rucks
- Ava Huffman and her dad, Matt
- Raphaèle Hunter
- The Hyatt Family Charitable Fund
- Innovation Bound
- Joel and Kathy Janco
- Jupiter Scuba Diving
- Michael and Linda Katz
- The Keeley Family
- Robert and Jane Kervin
- Key Largo Fisheries
- Mark and Nancy Kisicki
- Klein Family
- Kirk & Andrea Klopfenstein
- Andy and Cathy Knudsen
- Jack & Allison Kostiuk
- Kyle Lauderdale
- The Lehman-Walker Family
- Keith and Tammy Leonard
- Suzanne Lewis
- Lightmoney.com, Dianna Burkholder
- M. Locke
- Lonnie and Saundra Ledbetter Family Foundation
- The Loudermilk Family Foundation
- The Lucking Family
- The Lyndonwood Foundation
- Marianne and Tri MacDonald
- Paul D. MacDougal
- Poonam, Ted, Setara, and Nikhil Manasa
- Alex and Dudley Mason
- The McCance Foundation
- Sandy McCarthy
- Tom McCarthy
- Laurene McKillop
- The Meeker Rom Family Foundation
- Jose Melendez
- Mary and Barry Menne
- Mesh Digital LLC
- The Miami Foundation
- Ray and Becky Middleton
- Moffett Family Foundation
- Monroe County Tourist Development Council
- Douglas Morrison
- The Mortenson Family
- Dominic Napolitano
- National Christian Foundation
- National Christian Foundation Northwest
- National Christian Foundation South Florida
- National Marine Sanctuary Foundation
- NOAA's Office for Habitat Conservation
- National Park Trust and USDA Forest Service
- The Negley Flinn Charitable Foundation
- Andrea Aleff Nelson
- Network for Good
- Newport Aquarium Retail Staff
- Nexions
- Northstar Sustainability Fund
- Kevin M. Nuccitelli
- Ocean Reef Club
- Ocean Reef Community Foundation
- Ocean Reef Conservation Association
- OceanTech
- David and Leslie Ornstein
- The Palms Hotel & Spa
- Michael and Patricia Pape
- William and Lynne Pauly
- PayPal Giving Fund
- Peek Family Charitable Foundation

- James Peppler in honor of Ethan Glassworks
- Petco Animal Supplies
- David and Samantha Petty
- David and Pamela Phillips
- Mark and April Pierce
- Greg and Sheila Pietig
- Michael Pochyba
- Emily & Greg Poole, III
- Rainbow Fund at the Rochester Area Community Foundation
- Audrey and Jim Rawus
- Russ Post - Ocean Sotheby's International Realty
- Doug and Donna Reichert
- Michael Reynolds
- The Reynolds Family
- The Richard Laurence Parish Foundation
- The Richardson Family
- David Rivera
- Rochester Area Community Foundation
- Crista Ryan
- Saie
- Sand Cloud
- Santa Fe Natural Tobacco Company
- Schwab Charitable Foundation
- The Scrooby Foundation
- SeaWorld & Busch Gardens Conservation Fund
- Seder Family Foundation
- Carol and Ronald Sekura
- SEMINOLE SCUBA
- The Shumway Fund of the Ocean Reef Community Foundation
- Sascha and Anka Simon
- Skiff Dogs
- Dr. Susanne Skyrm
- Martha Slocum
- Dave Smith
- Ryan Snodgrass - Slide-Loc.com
- Adam and Molly Spector
- David Splitt
- SpongeBob SquarePants: Operation Sea Change
- Tina Steelman Duckels
- Senator and Mrs. Paul Steinberg
- The Stevens Family Foundation
- STRANG
- Susan Kay Matthew Foundation
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- Tom Thumb Food Stores, Inc.
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- Chris Tresslar
- Triad Foundation
- Rob Unruh
- David and Sally Vangeison
- Vanguard Charitable
- Ron VanOeveren
- Tony Vento, in honor of Kat and Nick Benenati
- Vere Initiatives
- Veza Sur Brewing Co.
- Virginia Wellington Cabot Foundation
- The Vista Foundation
- Philip and Betsey Walker
- Washington DC Area Marine Aquarist Society
- Waterbox Aquariums
- Roberta Watson
- Samantha Weinstein
- Karl F. and Teryn B. Weintz
- Mike Willcox
- David Wing
- Dr. R. Scott and Janice Winters
- The Wong Family
- Woodbury Foundation
- Fiona and Randy Woods in memory of Carol Rachel Finlay
- Suzanne Wootten
- The Woroch/Vobach Family
- Kevin and Lindsay Wylie-Werner
- Xtinctio
- YourCause

IN KIND & SERVICE DONATIONS

We are grateful to those who have donated goods and/or services to support our mission between January 1, 2023 and December 31, 2023.

- Ace Hardware
- Capital Coral
- Captain Slate's Scuba Adventures
- Caribee Boat Sales and Marina
- Clif Bar
- Dive Rite
- The Dive Shop
- Eye Catchers Signs
- Florida Keys Dive Center
- Horizon Divers
- Huish Outdoors, Inc.
- Innovative Scuba Concepts
- Key Largo Fisheries
- Keys Marine Laboratory
- Liquid IV
- Looe Key Dive Resort
- Lost Reef Dive Adventures
- Margins USA
- Mind Blown™ by The Plant Based Seafood Co.
- National Safe Boating Council
- Ocean Wonders
- Pilot House Marina & Restaurant
- Pirates Cove Watersports
- Quiescence Diving Services Inc
- Rainbow Reef Dive Center
- ReefBreeders.com
- The Riviera Towel Company
- Saie
- Sand Cloud
- Sea Dwellers
- SeaBase
- Sherwin-Williams
- Silent World Dive Center
- Stream2Sea
- Tinsley Advertising
- XS Scuba

INCOME & EXPENSES

Coral Restoration Foundation™ is supported by individuals, corporations, private foundations, and government agencies. The sources and allocation of our funding in 2023 are broken down as follows:

SOURCES OF INCOME

Total Income: $5,934,733

- Government **$1,900,918**
- Foundations **$1,872,404**
- Corporations **$649,554**
- Individuals **$1,269,500**
- Other **$242,357**

EXPENSES

Total Expenses: $5,269,811

- Program Expenses **$4,221,527**
- General & Admin **$622,131**
- Fundraising **$426,153**

PERCENTAGE EXPENSES BY PROGRAM

Restoration **48%**

Global **8%**

Science **19%**

Education **25%**

2023 IN NUMBERS

CORAL RESTORATION FOUNDATION™

39,670+m²
of reef restored in Florida as of June 2023

20,500+
Corals returned to Florida's Coral Reef in 2023

243,800+
Corals returned to the reefs of the Florida Keys since 2007

10
Reef sites received corals in 2023

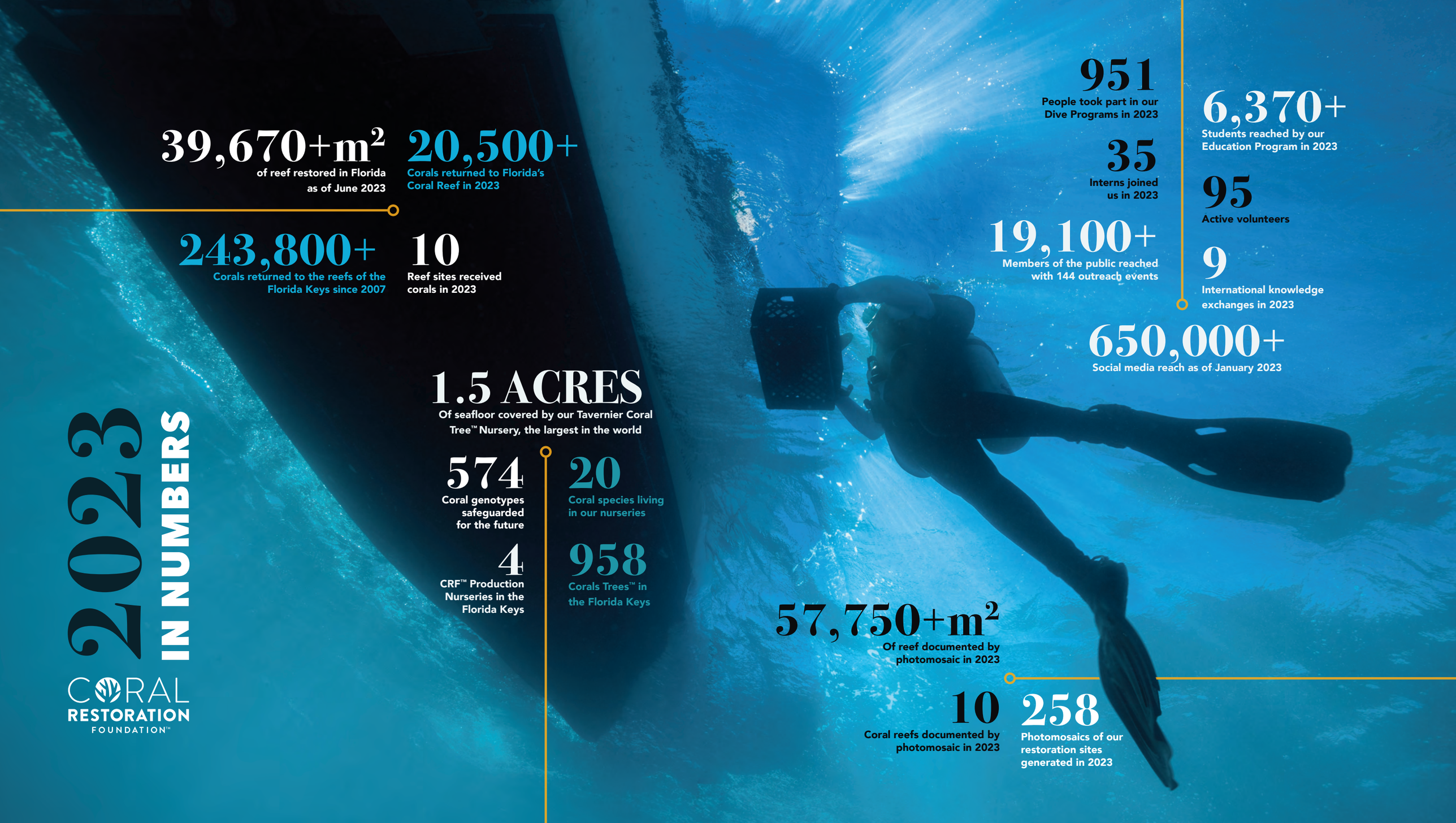
1.5 ACRES
Of seafloor covered by our Tavernier Coral Tree™ Nursery, the largest in the world

574
Coral genotypes safeguarded for the future

20
Coral species living in our nurseries

4
CRF™ Production Nurseries in the Florida Keys

958
Corals Trees™ in the Florida Keys



951
People took part in our Dive Programs in 2023

35
Interns joined us in 2023

19,100+
Members of the public reached with 144 outreach events

6,370+
Students reached by our Education Program in 2023

95
Active volunteers

9
International knowledge exchanges in 2023

650,000+
Social media reach as of January 2023

57,750+m²
Of reef documented by photomosaic in 2023

10
Coral reefs documented by photomosaic in 2023

258
Photomosaics of our restoration sites generated in 2023

CORAL RESTORATION FOUNDATION™

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, The Washington Post, The Verge, and Deutsche Welle (DW)

coralrestoration.org

DONATE TODAY!