EXPANSION

2024 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 accessible** 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**.

Image contributors: Alexander Neufeld, Granger Eltringham, Jackson Harris, Karley Feather, Jessica Levy, & Sara Nilsson

EXPANSION

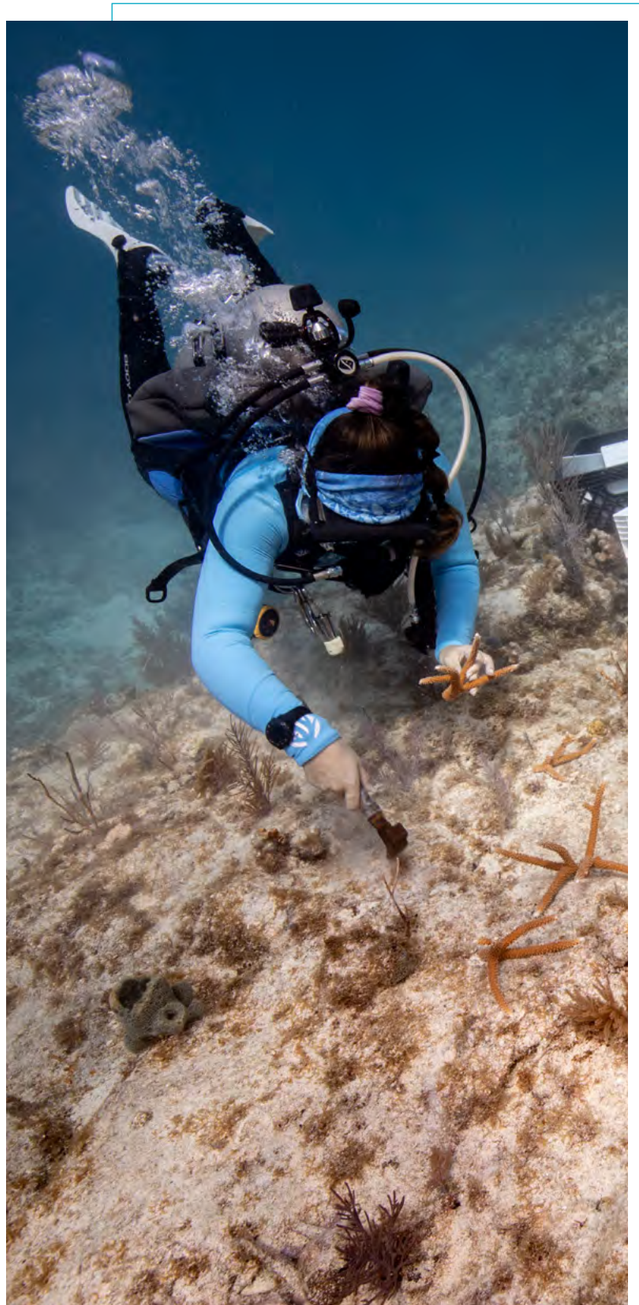
We find ourselves in an era marked by dramatic ecosystem transformation, where our life-support systems teeter under growing pressures driven by human activity.

Yet, on our dynamic planet, nature has always demonstrated a remarkable ability to expand—filling available niches with new species and evolving in extraordinary ways.

At Coral Restoration Foundation™, we harness this same spirit of expansion to remain a driving force in coral reef restoration.

By constantly scaling our field-based efforts, forging increasingly global partnerships, and innovating with cutting-edge research, we are having more impact every year. This constant push to broaden both our capabilities and our vision means that our work remains enduringly relevant in a rapidly changing world.

Our unwavering commitment to the expansion of our efforts across the board fuels hope for coral reefs—and for the future of life in our oceans as a whole.



FROM OUR CEO

In hindsight, 2024 was pivotal for the world's coral reefs, and for CRF™.

The prior year, 2023, was marked by the Fourth Global Bleaching Event. Record-setting ocean temperatures led to the death of countless reef-building corals in Florida, throughout the Caribbean, and across the globe. It was devastating.

But while the accounts of what we lost are critical, they do not tell the whole story. The rest of the narrative does not receive as much attention but is equally, if not more, important. It focuses on the corals that survived and the essential role of coral restoration on our changing planet.

The question I was asked most often in 2024 was, "Why bother? What's the point in continuing if ocean temperatures continue to rise and years of work are wiped away in one summer?" It's a valid question.

So, how do I respond? Like this...

First, I remind people that the story of 2023 includes an essential narrative about the corals that *did* survive, and the role of CRF™ and others in ensuring that all was not lost. Thanks to nearly two decades of capacity building, we saved nearly all of the remaining genetic diversity of Florida's reef-building corals, including strains that were lost in the wild during 2023. And some of the corals on our restoration sites did survive—not as much as we would have liked—but more than most. In fact, at Carysfort Reef, our principal demonstration site, more CRF™-outplanted Acroporid corals survived the 2023 bleaching event than existed on the reef in 2016, when we began working there.

Then, I explain that tropical coral reefs and their reef-building corals face two challenges. One is climate change, increasing the frequency of bleaching events. The second is the risk of the functional extinction of local populations, as they become ever smaller due to the impact of local pressures. We must address both challenges for tropical coral reefs to have a future. Coral restoration activities do exactly that: we are buying time for corals by preserving genetic diversity, while we work collectively to address climate change; and we are simultaneously increasing the size and diversity of local populations to prevent a downward spiral to local extinction.

And then finally, and most importantly, I propose that the reason why we need coral restoration efforts depends on why and how we value corals and tropical coral reefs in the first place. For some, coral reefs are abstract, "out there," hidden beneath the waves, part of a distant wild. In that case giving up on any particular reef might not matter if some coral reef survives somewhere. But at CRF™ we believe differently. We understand that every reef is different, and that every reef matters and has value in different but very tangible and grounded ways. We know that we can't consider the future of coral reefs without considering the local people who depend on their specific, local reefs. To give up on coral restoration is to abandon these communities to an impoverished future.

2024 was pivotal for CRF™ in expanding and sharpening our beliefs about why corals matter and what we must do to restore tropical reefs and to support their integrated, local communities.

As 2025 begins, our shared environment faces new threats. Federal support for coral restoration is uncertain, as are the protections for critically endangered species, including corals. Coral reef ecosystems in all U.S. territories are at heightened risk, and this turmoil is impacting the international landscape of reef restoration.

But, where others see loss and obstacles, CRF™ sees opportunity. With clarity of value and vision, CRF™ is ready and able to fill the emerging gaps in global leadership, to face these new challenges that coral restoration is confronting, and to expand our work into these new horizons. Not only are we ready and able, but we also have a deep sense of responsibility for corals, reef communities, and future generations.

And because CRF™ *can* do something, we have to embrace the moral obligation *to* do something.

Thank you for standing with us.

R. Scott Winters
Chief Executive Officer

2024

JANUARY
ZOO MIAMI CAMP
We hold slime workshops and more for the Zoo's Winter Camp

MARCH
RAISE THE REEF
CRF™ raises critical funds at our 10th annual gala

MAY
iSENSYS COLLAB
Buoy V2.0 installed, first live data points accessible on app

MAY
UZELA COLLAB
Ohio State University install first UZELAs in our nursery

JUNE
CORALPALOOZA™
Our global movement mobilizes around 1,000 people

AUGUST
SPAWNING
Partners bank gametes from a new genotype

AUGUST
BIOBALL
The first bioball streamers installed in our nursery for Diadema settlement

OCTOBER
KML PROPAGATION
We begin land-based fragging at Keys Marine Lab

DECEMBER
REEF FUTURES 2024
We head to Mexico for the restoration symposium

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 reefs in Florida and beyond.

- 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.

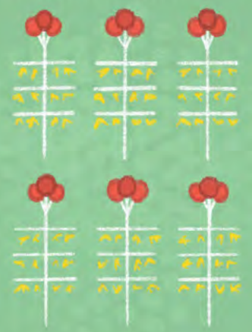
THE PROCESS OF REEF RESTORATION

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.

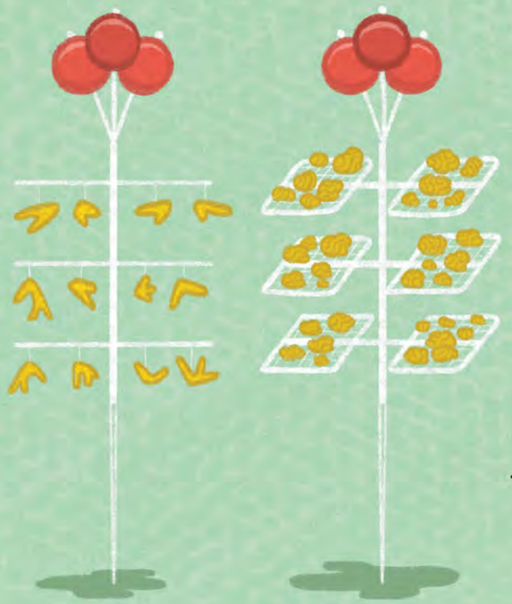
GENE BANK

Preserving coral genotypes for the future



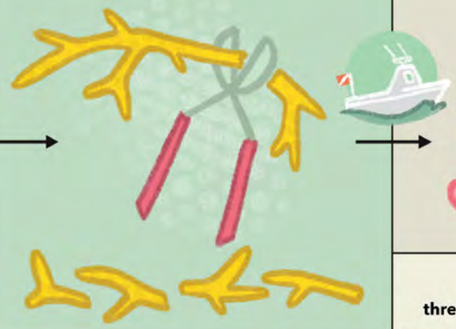
PRODUCTION NURSERY

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
three points of attachment

ELKHORN
one point of attachment

BOULDER
attached to a dome

OUTPLANTING: APPLIED NUCLEATION

Restoring natural coverage

We return corals to the reef using an "applied nucleation" approach. This involves creating high-density, high-diversity clusters of different coral species and genotypes, mirroring the natural assemblages seen in resilient coral communities.

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.

PREVENTING EXTINCTION

Unfortunately, many of the coral genotypes that we originally sampled from in the wild have disappeared from the reefs and are now only present in various restoration programs.

To prevent the complete extinction of this critical biodiversity, every genotype we work with is safeguarded. We have banked representative samples of every genet in four seperate locations in the state of Florida: in two offshore gene banks (in Tavernier and Broward) and in two land-based facilities managed by our partners—Mote in Sarasota and The Reef Institute in West Palm Beach.

Our Tavernier Coral Tree™ Nursery covers

1.5 acres

of seafloor, and contains around

500

Coral Trees™

CRF™ has 3 principle production nurseries, and a total of

870

Coral Trees™ in the Florida Keys

CORALS IN PRODUCTION

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

Our nurseries are home to

650

genotypes across

20

coral species

BRANCHING CORALS

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.

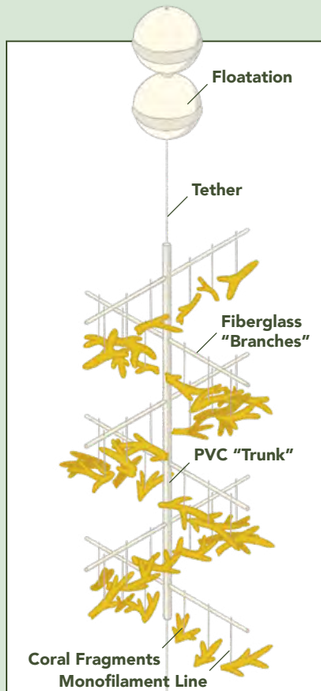
STAR CORALS

In 2024, we continued scaling up our propagation and restoration program three species of bouldering star corals: *Orbicella annularis, Orbicella faveolata,* and *Montastrea cavernosa.* 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.

OTHER SPECIES

We are now propagating other massive corals like *Diploria labyrinthiformis*, *Meandrina jacksonii*, 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.

THE CORAL TREES™
OF CORAL RESTORATION FOUNDATION™

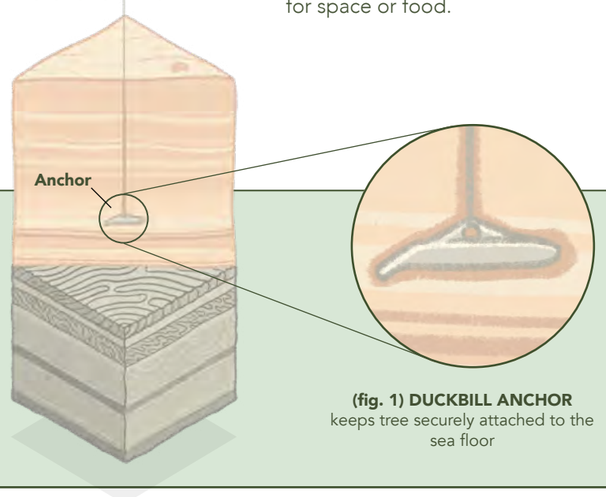


Acroporid Tree

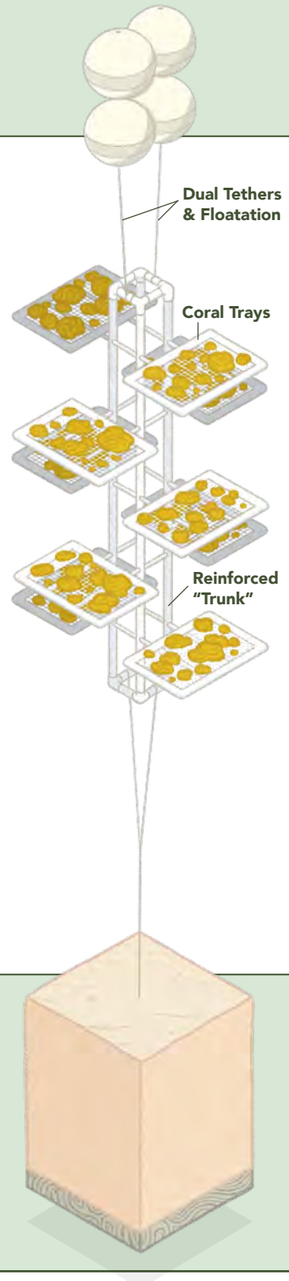
After years of R&D, CRF™ pioneered the Coral Tree™. A simple, cost effective design, that is perfectly suited to fast growing Acroporid corals and is now used around the world. The trees are tethered to the ocean floor (see fig.1), and buoyed with a float, allowing the trees to float freely with surge and currents. This helps prevent damage to the tree structures and corals.

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

We clean the trees regularly to remove biofouling, so the corals do not have to compete with other marine organisms for space or food.



(fig. 1) DUCKBILL ANCHOR
keeps tree securely attached to the sea floor



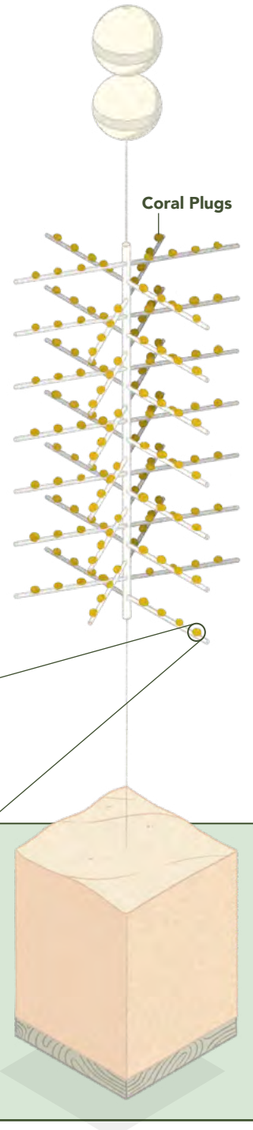
Mega Tree

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. While the Spiral Tree is built with maximized production in mind, the Mega Tree acts as a long term home for non-acroporid genotypes.

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.

(fig. 2) BOULDER CORAL PLUG
A specially designed ceramic plug with a threaded stem that screws directly into the Spiral Tree, these plugs can also be placed in coral trays.



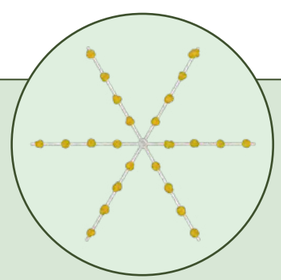
Spiral Tree

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

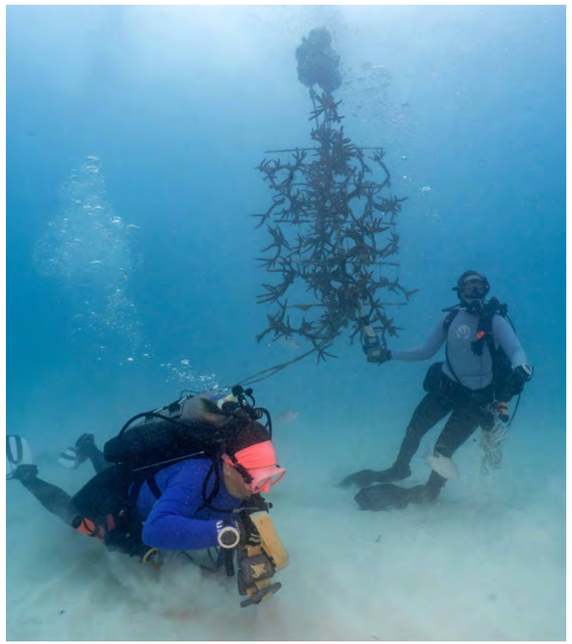
The Spiral Trees enhance our efficiency in non-Acroporid coral production:

• 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 additional day of diving per outplanting event.



(fig. 3) SPIRAL TREE TOP VIEW



2024 NURSERY INFRASTRUCTURE EXPANSION

We are expanding our production capacity for non-Acroporids, introducing new technologies, and making our infrastructure more resilient and sustainable.

SPIRAL TREE INTEGRATION

During the 2023 bleaching event, non-Acroporid corals fared better on our restoration sites than their branching cousins. While branching coral restoration is still critical, we will be increasing our production and outplanting of non-branching coral species moving forward.

In 2024, we focused on expanding our capacity to raise non-Acroporid corals for outplanting by replacing our Boulder Trees with new Spiral Trees. Boulder Trees can hold up to 24 broodstock corals and 270 plugs. The new Spiral Trees hold up to 12 broodstock corals and 380 plugs, which increases our potential for non-Acroporid production by 40% for each genotype. As of the end of 2024, we had installed 52 new Spiral Trees in our production nurseries at Tavernier, Carysfort, and Key West.

FLOAT REPLACEMENT

In 2024, we began replacing Styrofoam floats with EVA (Ethylene Vinyl Acetate) floats across our Coral Trees™, aiming for full implementation by 2025. EVA floats are more cost-effective and durable, resisting water absorption, flaking, and deformation. They also reduce biofouling and the settlement of coralivorous animals like fireworms, ultimately lowering coral mortality. So far, 37 trees have been upgraded, and their performance will be carefully monitored in 2025.

SHADING STRUCTURES

In 2023, CRF™ interns designed a shading mechanism that could be integrated with the Coral Tree™. In 2024, we tested the new design, installing 55 shading structures across three CRF™ nurseries. Although temperature measurements showed no significant difference under the shades, light intensity was reduced by 58%, offering hope for mitigating UV-related bleaching stress. The shades were removed for hurricane season but will be reinstalled before summer 2025.

DEEP-WATER NURSERY DEVELOPMENT

In 2024, in collaboration with Reef Renewal USA, CRF™ continued to develop the deep-water nursery near the CRF™ Tavernier Nursery. Originally established by Reef Renewal USA in 2023 in response to the Fourth Global Bleaching Event, this site now comprises 20 new duckbills installed by CRF™. Designed as a refuge for corals needing evacuation during disturbances, it can now be quickly equipped with Coral Trees™ if necessary.

HOLDING NURSERY EXPANSION

The Elbow Nursery has operated for several years with only a small number of Coral Trees™ and occasional use. Strategically located near Elbow Reef, Horseshoe Reef, and North Dry Rocks Reef, it is in a prime location to serve as both a temporary holding facility for corals prior to outplanting, as well as for supporting coral evacuations during disturbance events. In 2024, we expanded this nursery by installing 50 duckbills and two moorings, ready for any future challenges.

This expansion of our infrastructure reflects the CRF™ commitment to learning from nature. In 2024, we proactively implemented hard-won lessons from the Fourth Global Bleaching Event, extending our reach in reef restoration. By innovating across multiple fronts—from Spiral Trees to deep-water nurseries—CRF™ is adapting its methods to shifting conditions, maintaining our dedication to restoring and safeguarding these biodiverse ecosystems on which life in our oceans depends.

CORAL OUTPLANTING

When they are "reef-ready", corals in our nurseries are harvested from the Coral Trees™ and moved to a carefully selected spot. We track which genotypes are rehomed on each site. Corals are attached to the substrate using non-toxic, two-part marine apoxy.

APPLIED NUCLEATION: BOOSTING SUCCESS

In 2024, we refined our restoration strategy by integrating a proven forest restoration concept—applied nucleation—into coral outplanting. This approach involves forming high-density, high-diversity clusters of different coral species and genotypes, mirroring the natural assemblages seen in coral communities that survived past bleaching events. By grouping corals closely together, we promote ecological interactions that can enhance coral survival, growth, and overall reef recovery.

TARGETING KNOWN SURVIVOR ZONES

We focused on reef areas where previous bleaching survivors had already been documented. Strengthening these existing "survivor" zones with new outplants maximizes the chance of successful colonization and helps bolster live coral cover.

REFINING SPECIES COMBINATIONS

For non-Acroporid corals, we explored different species groupings to identify which combinations yield the highest survival and growth rates. By observing their interactions, we aim to optimize reef health and resilience.

THE "PIZZA METHOD"

To provide newly rehomed bouldering corals with the best chance of thriving in the wild, we now use epoxy bases shaped like large pizzas. This technique reduces predation, increases survivorship, and accelerates colony fusion.

Despite a focus on rebuilding coral populations in our nurseries, CRF™ also returned

9,958

corals to the reefs of the Florida Keys in 2024

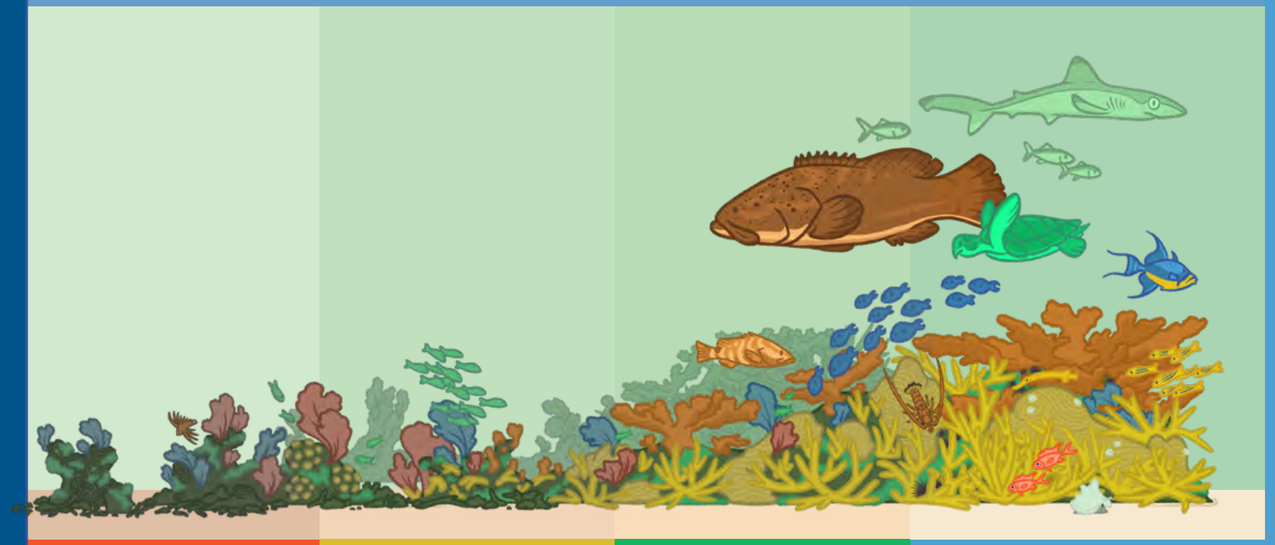
AN UNWAVERING COMMITMENT

In 2024, in the wake of the Fourth Global Bleaching Event, we needed to focus on propagating our surviving corals to rebuild the nursery stock we lost to the heat.

But our commitment to active restoration remained unwavering, and between May 3rd and June 27th, and in one big push on October 15th, CRF™ rehomed a total of 9,958 corals on the reefs of the Florida Keys. This brings our total number of corals returned to the wild to 253,833.

As our nursery stock recovers, our capacity expands, and with our refined outplanting strategies, we will soon be returning corals to the wild at ever greater numbers—ultimately replacing what was lost, and building back better to ensure these reefs are even more resilient, capable of adapting to the complex challenges of the modern world.

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.

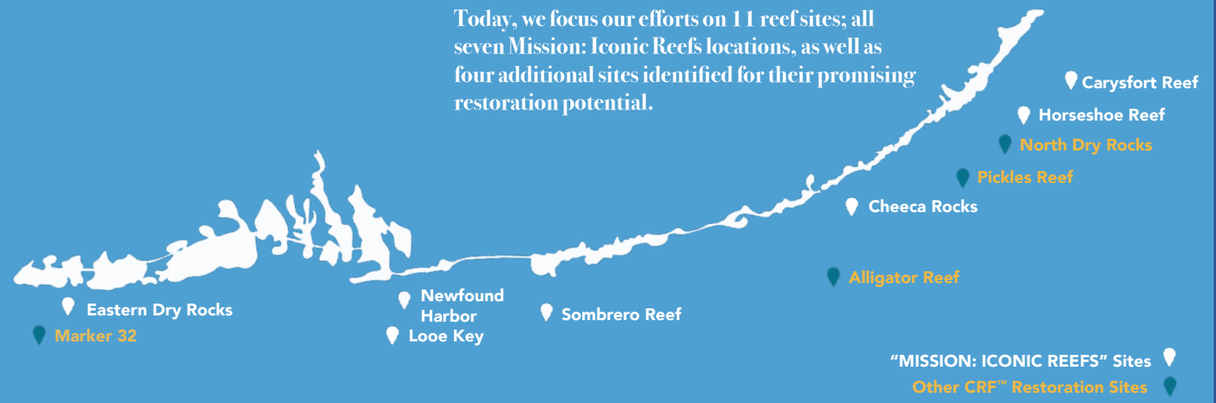
RESTORED ECOSYSTEM

- 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.

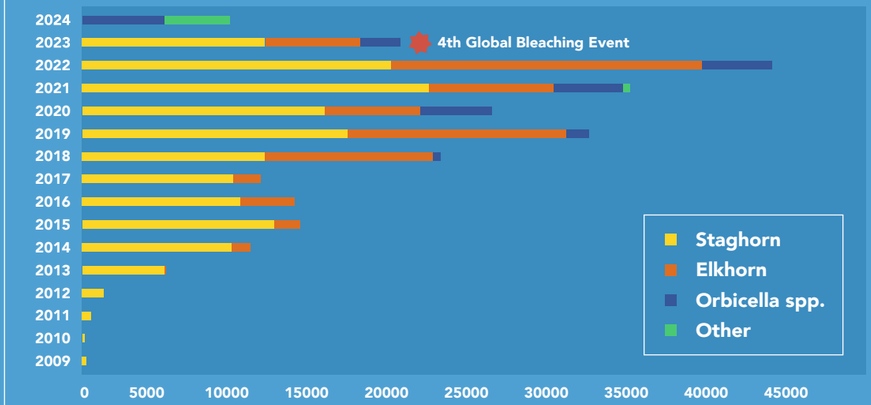
CRF™ FLORIDA KEYS RESTORATION SITES

Throughout the history of the organization, Coral Restoration Foundation™ has worked on more than 30 reef sites, guided by robust data to pinpoint those with the highest survival rates.

Today, we focus our efforts on 11 reef sites; all seven Mission: Iconic Reefs locations, as well as four additional sites identified for their promising restoration potential.



CRF™ OUTPLANT NUMBERS BY YEAR



TRACKING IMPACT

We monitor the progress of our restoration work using photomosaics. These are huge, composite images of our reef sites that are 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 photomosaics encompass up to 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 manuals on our website.

In 2024, we generated 77 restoration site monitoring mosaics, for 11 reef sites, covering 55,749m²

2024 PHOTOMOSAIC BREAKDOWN:

- For Acroporid coral monitoring, we took **42 one-year post-outplanting** photomosaics, covering **33,018 m²** of reefscape, with an average mosaic size of **785 m²**.
- We took **13 baseline** photomosaics for future outplanting, covering **8,192 m²**.
- We generated **22 three-month post-outplanting** photomosaics for non-Acroporids, covering **14,539 m²** of reefscape.

KEY FINDINGS:

The **9,958** corals we outplanted in 2024 immediately restored **2.9 m²** of live coral tissue cover across all reefs. Three months later, live coral cover was estimated to be **12.3 m².** This is an increase of **324.1%** over three months. This means the area of live coral more than quadrupled during this period, going from the area of a four-seater dining table to that of a king-size bed.

Right: The heartbeat of life in the Florida Keys, this wild elkhorn colony survived the Fourth Global Bleaching Event, and its genetic material has now been biobanked in our genetic ark.

SURVIVAL & RECOVERY IN 2024: A YEAR OF RENEWED HOPE

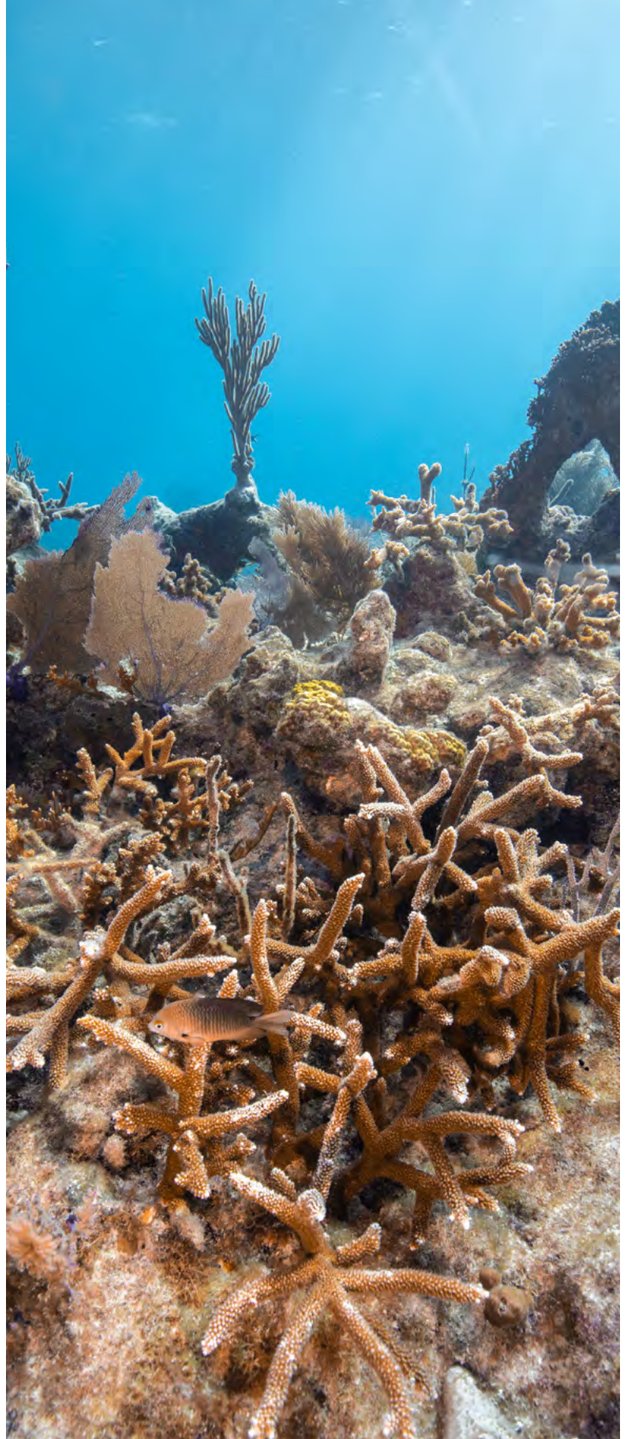
2024 was a year of renewed resolve, as we uncovered remarkable evidence of coral resilience, adapted our restoration methods accordingly, and made extraordinary progress in rebuilding our coral stock.

Throughout 2024, Coral Restoration Foundation™ continued to grapple with the aftermath of the Fourth Global Bleaching Event. The stark reality is that most reefs in the Florida Keys suffered close to 100% mortality of Acroporid (staghorn and elkhorn) populations, with an overall survival rate of just 2.3% on most restoration sites. But we also uncovered some encouraging signs of hope.

During routine monitoring, we identified thriving CRF™ outplants at multiple sites, including Pickles Reef, Carysfort Reef, and North Dry Rocks. At North Dry Rocks, some Acroporid colonies we found had been outplanted over five years ago, demonstrating the encouraging long-term potential for these corals at some sites.

But it was Carysfort Reef that yielded the most promising results. This reef has received more corals than any other in the Keys, more than 66,000 outplants over the last 10 years, thanks to ongoing support from Ocean Reef Club. At Carysfort, CRF™ outplanted Acroporids exhibited a 6.3% survival rate, nearly three times higher than the regional average.

Equally striking was the performance of great star corals *(Montastrea cavernosa)* at Carysfort, which had a remarkable 92% survival rate post-bleaching. These findings not only reveal the importance of abundance in restoration work, they also show the relative resilience of non-Acroporid or bouldering species.



Examples of some of our outplanted colonies that survived at Carysfort Reef. Clockwise from far left: Orbicella annularis, Montastrea cavernosa, Acropora cervicornis, Acropora palmata

These insights are now guiding the evolution of our outplanting strategy. Rather than genotype, it was location that that proved to be the biggest indicator of coral resilience. So, in 2024 we shifted our restoration method to focus on the most promising areas, places in which we found pockets of survivors. We are now working on repopulating these spots with high density patches of diverse species and genotypes.

Even after the 2023 disaster there are still more outplants of reef building coral on Carysfort today than there were in 2016. That year, the National Marine Sanctuary conducted an assessment of the Acroporids at Carysfort Reef and found only 18 living elkhorn colonies and only two colonies of staghorn. Today, we know there are at least two elkhorn corals and 361 staghorn colonies on this reef-the result of years of restoration work at this site.

In 2024, our focus was on rebuilding the coral stock we lost to the heat in our nurseries, rather than on extensive outplanting. At the Tavernier Coral Tree™ nursery, we started 2024 with 14,950 corals and closed the year with 17,355-a 16% net increase. We also worked on expanding stock in the Carysfort Nursery, turning the 4,064 corals we opened the year with into 6,597 corals-a 62% increase. Key West also saw massive increases in nursery stock, growing from just 1,437 corals in January 2024 to a massive 293% increase of 5,651corals by the end of the year.

While the impacts of the Fourth Global Bleaching Event cannot be understated, at CRF™ we are already implementing the lessons we learned, and rebuilding even greater resilience into the heart of our programs.

CORAL SPAWNING

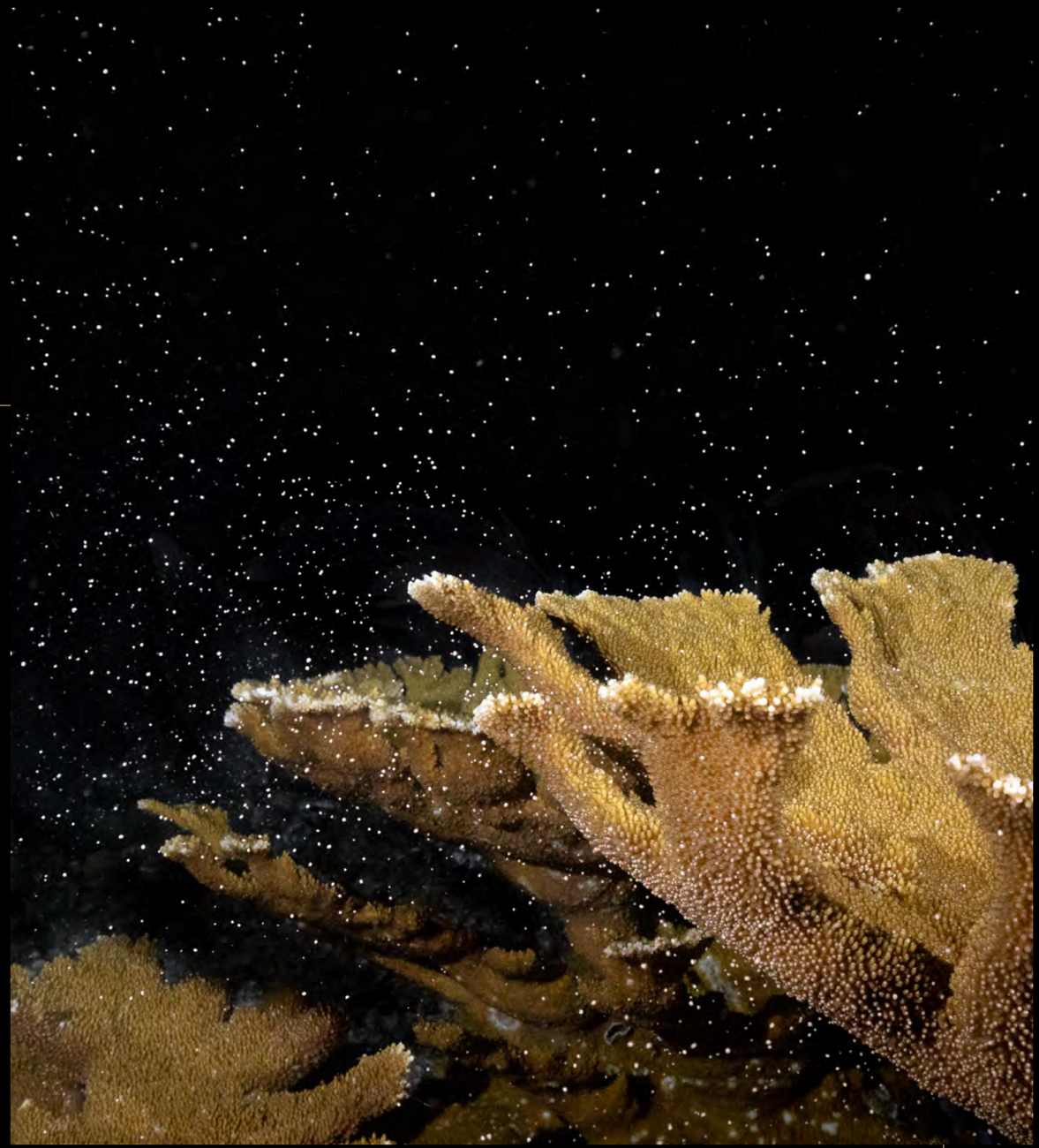
Every year across Florida and the Caribbean, around the late-summer full moon, Acroporid corals simultaneously release gametes—bundles of eggs and sperm—into the water. This is a process of sexual reproduction called "spawning" and it is vital for ensuring the genetic diversity of wild coral populations.

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. This data is vital for future research and underscores the importance of natural reef recovery and genetic diversity in ecosystem restoration efforts.

2023
In 2023, CRF™ ran two spawning observation trips at the Tavernier Coral Tree™ Nursery. Despite elevated temperatures, divers observed spawning by eight staghorn genotypes, including a sexual recruit from our 2018 assisted geneflow collaboration. At North Dry Rocks, University of Miami and NOAA researchers documented seven bleached CRF™ elkhorn and five staghorn genotypes spawning. Evacuated staghorn colonies also spawned at Keys Marine Lab. Although gamete bundles were smaller and lower in fat due to stress, partners preserved substantial genetic material that may be important for boosting diversity in coral populations in the future.

SPAWNING 2024

In 2024, corals were still recoving from the stress of the Fourth Global Bleaching Event. But our partners still managed to cryopreserve gametes from one genotype that had never been banked before.

In 2024, CRF™ targeted genotypes that had not been observed spawning before. In late August we set up a spawning alley to monitor and collect gametes from 31 staghorn and five elkhorn genotypes. Of these, five of the staghorn genotypes had been sexually propagated through collaborations with Florida Aquarium, and seven were genotypes obtained from Mote and FWC in earlier coral swaps. These corals are prime examples of the importance of inter-organizational partnerships in efforts to bolster genetic diversity.

Ultimately, only four staghorn genotypes spawned, all on August 22nd, producing limited gamete bundles. One genotype did produce enough gametes for SEZARC to cryopreserve.

According to researchers, the corals' endocrine systems were likely still recuperating from the intense 2023 bleaching event, during which many were seen "stress spawning." In light of these kinds of challenges, these collaborations around coral sexual reproduction are more important than ever.

2024 RESTORATION COLLABORATIONS

Coral reef restoration flourishes when partners come together to share knowledge, technology, and resources. Our collaborations ensure that we are maximizing our impact and constantly evolving, in line with emerging best practices.

LAND-BASED CONTINGENCY PROPAGATION

Keys Marine Lab (KML)

Between October 2024 and January 2025, Keys Marine Lab collaborated with Coral Restoration Foundation™ to propagate 7,316 corals from eight non-Acroporid species. Conducting this work in a land-based setting proved invaluable, as it avoided scheduling and safety concerns that often arise from unpredictable ocean conditions—particularly during storm season in the Florida Keys. By removing weather-related delays, we were able to fast-track our annual coral propagation goals.

Looking ahead, this partnership with KML means that we can continue propagating corals even during bad weather, and we can hold corals overnight during transfer between our nurseries or from nurseries to more remote reef sites.

DATA BUOY & SENSOR TECHNOLOGIES

iSensys

iSensys is collaborating with Coral Restoration Foundation™ to develop low-cost, customizable buoys and subsurface sensor modules that can deliver real-time data on conditions around nursery sites and restoration areas. By allowing researchers to select specific parameters of interest—such as temperature, salinity, or nutrient levels—these modular devices aim to provide robust, in-situ monitoring capabilities. The ultimate goal is to enhance our predictive capacity for environmental events that can negatively affect corals, such as sudden temperature spikes or harmful algal blooms.

A key part of this partnership is the integration of iSensys hardware with a SAM (Scientific Asset Manager) database. CRF™ will be able to view data from the sensors, set threshold alerts when parameters move outside safe ranges, and develop timely response strategies.

Importantly, SAM also interacts with other local data programs, including waste removal, mangrove monitoring, and wastewater tracking efforts. By correlating sensor readings from the nurseries with these broader environmental data sets, we may uncover new links between reef health and surrounding land-based or water-based activities. This holistic perspective could lead to more targeted conservation actions, ensuring we respond swiftly and effectively to threats facing Florida's coral reefs.

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 2024, CRF™ outplanted at all seven iconic reef sites. Between May and June of 2024, we focused on restoring non-Acroporid corals to the reefs.

Among the many species outplanted, this marks the first time that mustard hill coral (*Porites astreoides*), elliptical star coral (*Dichocoenia stokesii*), symmetrical brain coral (*Pseudodiploria strigosa*), blushing star coral (*Stephanocoenia intersepta*), and massive starlet coral (*Siderastrea siderea*) have been introduced to the reefs by CRF™. A total of 7,567 nursery-grown corals were outplanted by CRF™ across the seven M:IR reefs in 2024.

2024 US-BASED RESTORATION PROGRAM PARTNERS

THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
Provides permits that make CRF™ work possible.

NATIONAL MARINE SANCTUARY FOUNDATION
Provide funding and coordination for M:IR, and in 2024 coordinated the Solutions Challenge to coral shading.

NOAA FLORIDA KEYS NATIONAL MARINE SANCTUARY
Provides permits to make CRF™ work possible.

KEYS MARINE LAB
Provides holding facilities and coral propagation on-site.

MISSION: ICONIC REEFS
A NOAA-led initiative for large-scale reef restoration in the Florida Keys.

MOTE MARINE LABORATORY
Holds CRF™ genotypes in an ex-situ (land-based) facility.

NATIONAL FISH AND WILDLIFE FOUNDATION
Provides support to increase coral nursery capacity for *Mission: Iconic Reefs*.

NOVA SOUTHEASTERN UNIVERSITY
Supports the management of the second CRF™ offshore gene bank and serves as an evacuation nursery for future disturbances.

REEF RENEWAL USA
Supports the Tavernier Deep Water Nursery location and provides space for evacuated corals during future disturbances.

THE REEF INSTITUTE
Holds CRF™ genotypes in an ex-situ facility.

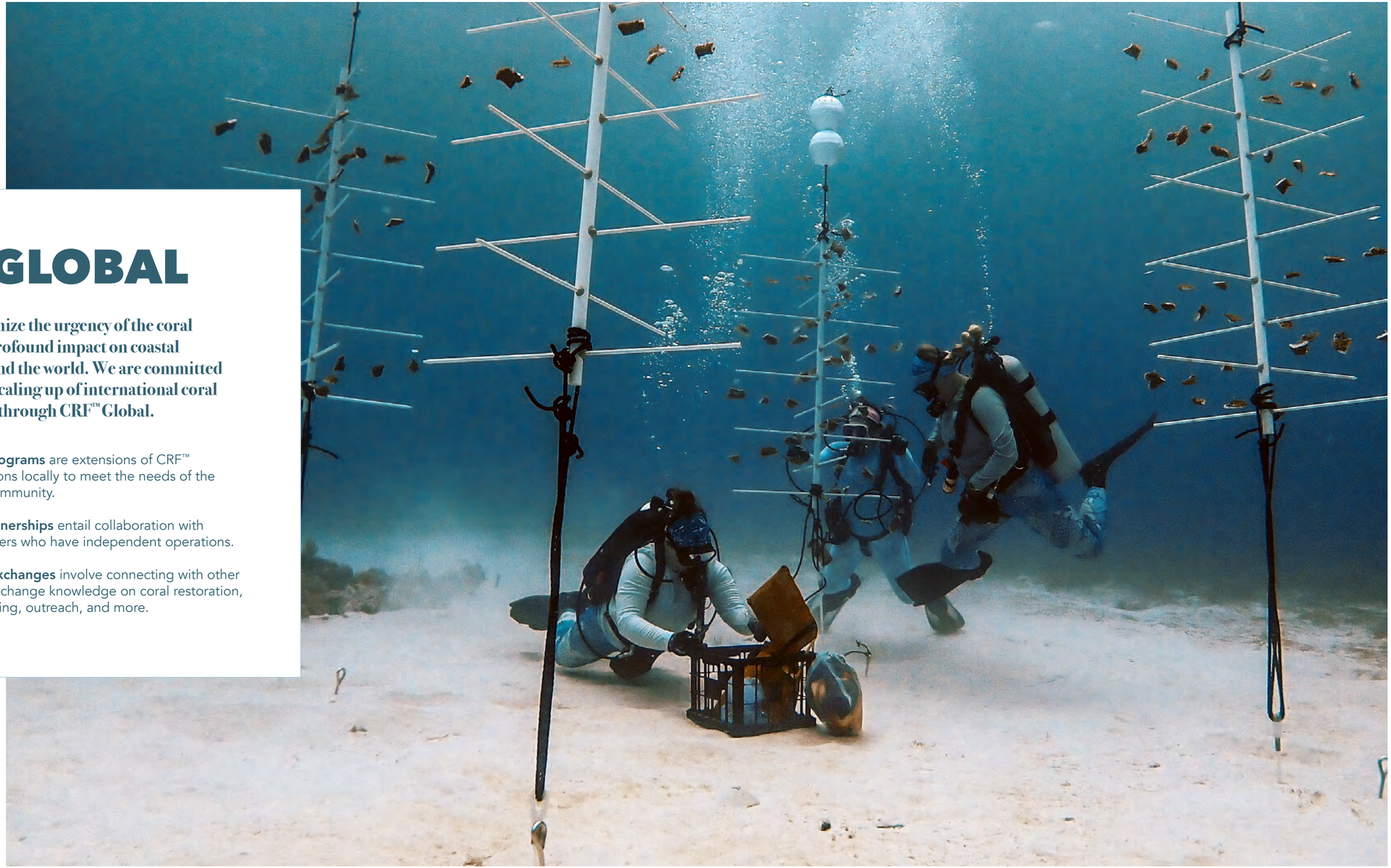
TOURIST DEVELOPMENT COUNCIL
Provides support for ongoing CRF™ restoration efforts from Carysfort Reef to Eastern Dry Rocks.

UNITED WAY OF COLLIER AND THE KEYS
Provides funding for restoration work on the Carysfort Reef Complex.

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 restoration, monitoring, planning, 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.

Through our Global initiatives, we also seek to learn from other practitioners, to continue to evolve our methods in line with emerging best practices.

Although practitioners worldwide have a shared objective, we are impacted by unique circumstances. There is no universal solution to the coral crisis; restoration techniques 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, tailoring 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 share knowledge with international practioners. 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™ SATELLITE

ST. CROIX, USVI

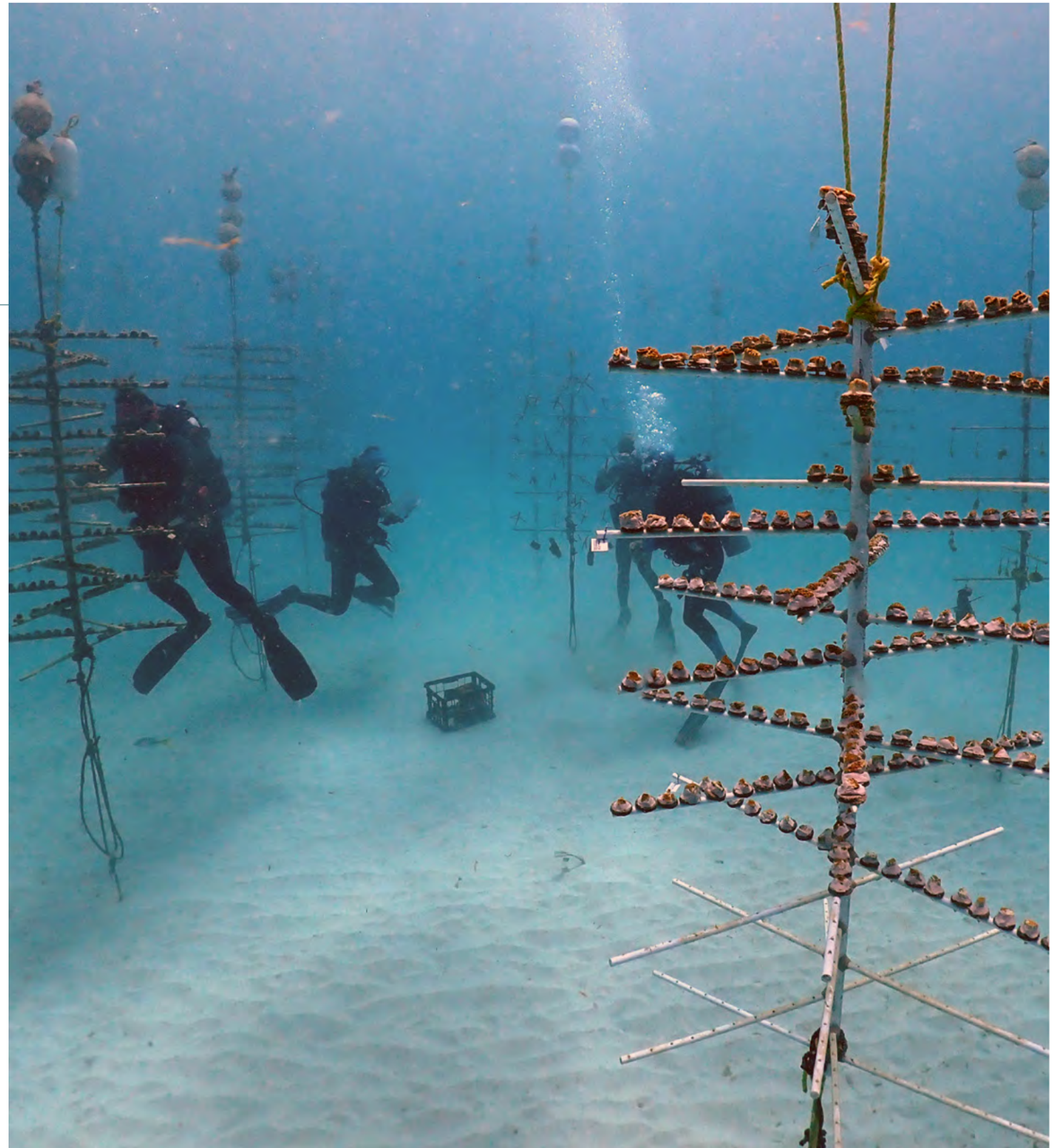
In St. Croix, we are working closely with the local government and residents to support the long-term health of Long Reef—one of six priority sites in the Virgin Islands Coral Reef Restoration Plan.

In 2024, our CRF™ Satellite Program in St. Croix hit a major milestone-completing the first phase of our nursery build out. We installed 22 Coral Trees™ and five dedicated nursery tables designed to accommodate various non-branching species.

With this infrastructure now in place, we are currently caring for approximately 3,500 corals across eight different species. The Coral Trees™ are home to around 800 young elkhorn colonies and 2,400 non-Acropora coral plugs, alongside approximately 300 broodstock colonies of bouldering corals that will be critical for spawning and propagation. The composition of our nursery population—multiple species and multiple genets within each species—is critical as we work to restore these reefs' resilience.

This year, we also completed extensive baseline photomosaic surveys covering nearly 20,000 m² of Long Reef, giving us detailed information on where we can effectively rehome these corals in the near future. These large-scale images not only help us identify existing reef structures and potential outplanting zones, but they also allow us to track changes in coral coverage and community composition with remarkable accuracy over time. They serve as an essential foundation for science-based decision making as we plan to restore this reef site.

This work is in full swing under the management of an experienced, full-time CRF™ staff member who is now working with 20 locally hired divers, all trained in CRF™ restoration techniques. By combining hands-on community participation with proven strategies, we are paving the way for a vibrant, self-sustaining coral ecosystem at Long Reef—one that will serve as a living testament to the power of targeted restoration and shared commitment.



CRF™ GLOBAL PARTNERSHIP

ST. THOMAS, USVI

Coral Restoration Foundation™ is working with Coral World Ocean and Reef Initiative Inc. (CWORI) to support the expansion of their restoration efforts at Coki Beach—one of six critical sites in the U.S. Virgin Islands Coral Restoration Plan.

In 2024, bolstered by a vital funding commitment from NOAA's Coral Reef Conservation Fund, CWORI hired two full-time employees, significantly increasing its capacity to propagate, outplant, and monitor various coral species on-site. And their progress to date has been substantial, with the project already about 30% complete.

CRF™ staff have now traveled to St. Thomas on three occasions, providing hands-on support and specialized training in pillar coral spawning techniques. In turn, three CWORI team members visited the Florida Keys, in 2024, where they gained immersive, field-based experience in large-scale reef restoration methodologies. CWORI has also been leveraging their current nursery infrastructure and plans to install 20 more Coral Trees™ and nursery tables by 2025.

In 2024, the CWORI team completed important broodstock collections for elkhorn, staghorn, bouldering star coral, great star coral, and symmetrical brain coral, and are laying the groundwork for outplanting 2,000 corals next year.

Throughout this process, CRF™ remains in regular contact with the CWORI team, ensuring that all restoration efforts at Coki Beach align with local community priorities and are set up to deliver meaningful, lasting benefits for St. Thomas's marine ecosystems.

CRF™ GLOBAL PARTNERSHIP

PUERTO RICO

Coral Restoration Foundation™ has partnered with Sea Ventures Marine Response Unit (SVMRU), to expand local expertise in large-area photomosaics and scale up coral restoration efforts.

Funded through a CRF™-administered NOAA subaward, our partnership with SVMRU focuses on supporting their work on pillar coral propagation, elkhorn outplanting, and genetic sequencing—building on SVMRU's longstanding commitment to reef restoration in Puerto Rico.

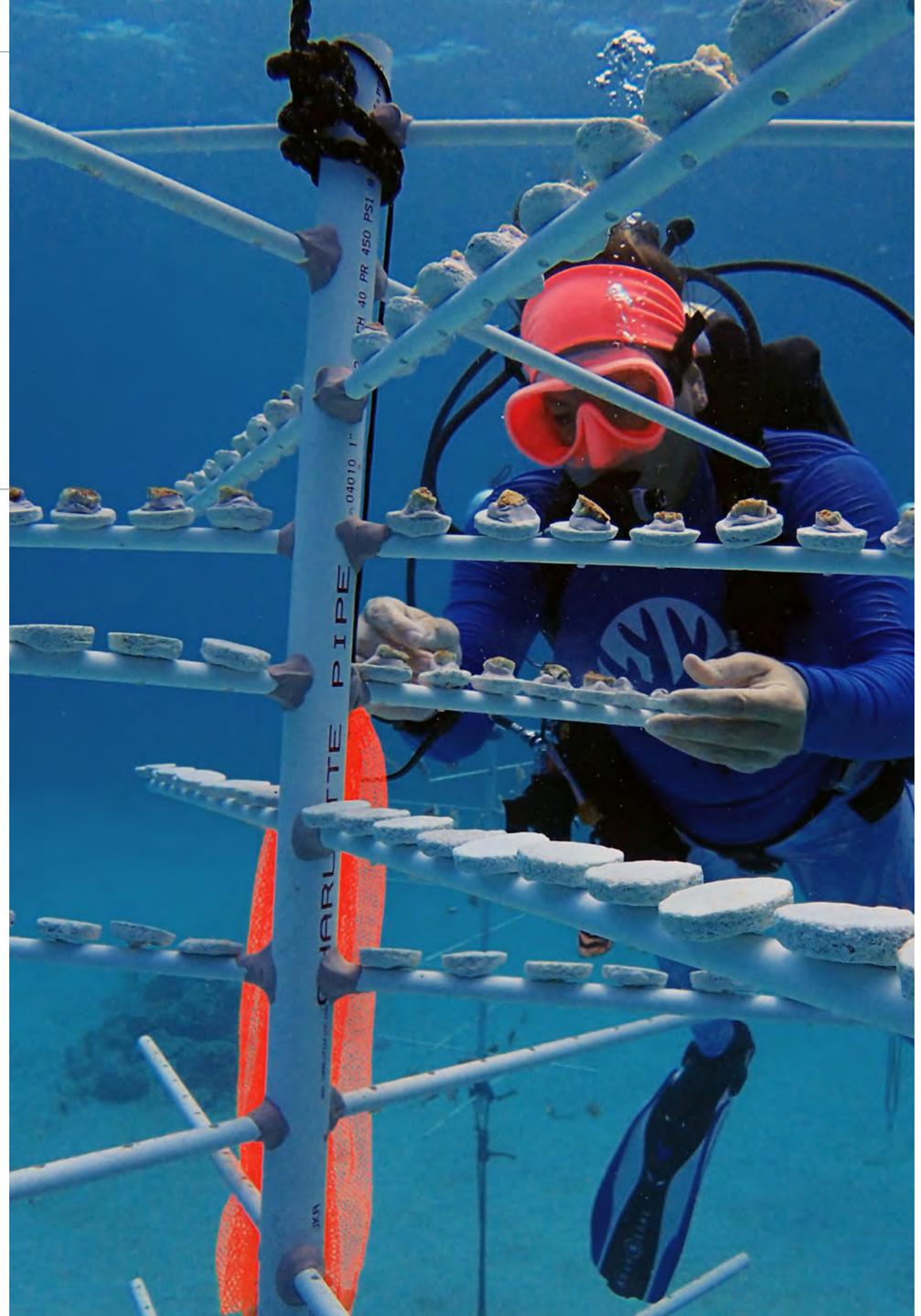
Already 35% complete, this Global Parnership program has already enabled CRF™ to provide in-person trainings that have boosted SVMRU's capacity for generating large-scale photomosaics of their restoration sites. They have now captured photomosaics of around 1,300 m² at their restoration sites.

In 2024, SVMRU installed 14 Coral Trees™, which are currently home to more than 330 pillar coral colonies. They also successfully outplanted over 1,280 elkhorn corals via their innovative "secondary cuttings" technique. The SVMRU team has mitigated genotype loss by relocating elkhorn genets between multiple reefs during extreme bleaching events.

SVMRU is on track to produce 1,000 pillar coral fragments and outplant 9,000 elkhorn corals in 2025—an ambitious scope that underscores the partnership's potential to significantly advance coral restoration in Puerto Rico.

2024 LEARNING EXCHANGES

In 2024, we led 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.



FLORIDA KEYS

Coral World Ocean and Reef Initiative (CWORI)

LARGE-SCALE RESTORATION PLANNING, IMPLEMENTATION, AND MONITORING

In May 2024, CRF™ hosted three staff members from CWORI (St. Thomas) for an in-person exchange focused on non-Acroporid restoration techniques, nursery infrastructure, photomosaic monitoring, and large-scale program management. The immersive, three-day training provided practical, real-world experience in CRF's Florida Keys nurseries, helping participants refine strategies to address coral conservation needs in St. Thomas. By sharing best practices and lessons learned, CRF™ offered CWORI a comprehensive framework to scale up their local restoration efforts.

AMERICAN SAMOA

Coral Reef Advisory Group (CRAG)

RESTORATION CAPACITY DEVELOPMENT

With funding from the National Fish and Wildlife Foundation, CRF™ partnered with the American Samoa Coral Reef Advisory Group (AS CRAG) to strengthen restoration capabilities across the territory. Site visits in both American Samoa (March) and the Florida Keys (June) focused on building hands-on skills in nursery operations and theoretical knowledge essential for restoring local coral ecosystems. Drawing on a newly drafted restoration plan outlining key knowledge gaps, CRF™ delivered targeted training, setting the stage for effective, long-term coral reef management in American Samoa.

HAWAI'I

NOAA's Restoration Center (Lead and Funder) for Multiple Partners

RUBBLE STABILIZATION AND RESTORATION INTERVENTIONS

In June 2024, NOAA's Restoration Center and CRF™ led a workshop in Hawai'i focused on stabilizing rubble as a critical coral restoration method. Multiple partners attended including State of Hawai'i Division of Aquatic Resources, Kuleana Coral Restoration, NOAA Pacific Islands Fisheries Science Center, NAVFAC Pacific, Arizona State University, The Nature Conservancy, Sea Ventures Marine Response Unit, and Reef Tech International. Hosted at two sites— the Vogetrader ship grounding on O'ahu and Kealakekua Bay on Hawai'i Island—participants from several organizations tested four stabilization techniques, including cement rock piles designed to secure reef debris. By evaluating methods under diverse environmental conditions, the workshop provided insights for eventual large-scale implementation. This event represented part of a broader Pacific Islands training series, building local expertise to enhance coral ecosystem recovery throughout the region.

ST. THOMAS, USVI

NOAA's Coral Reef Conservation Program (CRCP), National Marine Sanctuary Foundation (NMSF), University of the Virgin Islands (UVI), Coral World Ocean and Reef Initiative (CWORI)

PILLAR CORAL SPAWNING LEARNING EXCHANGE

In August 2024, researchers and practitioners from the USVI and Puerto Rico convened in St. Thomas to study pillar coral spawning. Pillar coral, recently uplisted as endangered, holds key importance for regional reef biodiversity. Despite a mild spawn, participants successfully observed spawning at UVI and CWORI laboratories, collecting valuable data for future restoration initiatives. This exchange reinforced collaboration among stakeholders in both territories, strengthening shared commitments to protect and rehabilitate pillar coral populations in the Caribbean.

CONFERENCES & MEETINGS 2024

JANUARY 2024
M:IR Implementation Workshop
FLORIDA KEYS, USA

CRF™ joined a re-grouping of key Mission: Iconic Reefs stakeholders to review progress, outline future objectives, and identify key research or management actions needed for large-scale restoration. Discussions included updates on fieldwork, strategic planning, and collaborative steps to enhance restoration efforts under the M:IR initiative.

MARCH 2024
Symposium on Climate-Informed Ecosystem Restoration in MPAs
CALIFORNIA, USA

This symposium brought together resource managers, Indigenous leaders, scientists, and restoration practitioners to address rapidly changing marine environments. CRF™ highlighted coral-focused restoration techniques, contributing lessons learned to inform strategies aimed at building resistance and resilience in both kelp and coral ecosystems.

MARCH 2024
CLOSING THE CORAL CIRCLE Recruitment Workshop
WASHINGTON DC, USA

Co-hosted by Revive & Restore and CRF™, this workshop delved into issues around Caribbean coral spawning and specifically the lack of consistent sexual recruitment in the region. Participants identified existing knowledge gaps and discussed bottlenecks—such as reduced gamete viability and limited settlement success—to guide future research.

JUNE 2024
Capitol Hill Oceans Week (CHOW)
WASHINGTON DC, USA

Organized by the National Marine Sanctuary Foundation, CHOW convened scientists, policymakers, and industry leaders to tackle pressing marine issues. CRF™ participated in discussions on coral reef health, offering insights into restoration strategies and highlighting the need for targeted policy support.

JUNE 2024
Hydrus Drone Workshop/Demo
SAN DIEGO, USA

We attended this exclusive workshop hosted by Advanced Navigation, showcasing the "Hydrus" underwater drone for autonomous reef monitoring. Participants explored how this cutting-edge technology could enhance coral surveys, reduce human-diver requirements, and improve restoration data collection.

JUNE 2024
Sanctuary Advisory Council Meeting
FLORIDA KEYS, USA

CRF™ addressed a diverse group of Monroe County stakeholders on current coral restoration progress, bleaching concerns, and preparations for the upcoming summer. This council meets regularly to advise National Marine Sanctuary managers, ensuring local voices help shape conservation strategies.

SEPTEMBER 2024
Digital Tools Workshop
FLORIDA KEYS, USA

CRF™ joined fellow practitioners, management agencies, and SeaFoundry to explore software solutions that streamline permit reporting and improve data sharing. By integrating tools with the Coral Sample Registry, the workshop set the stage for more accessible, comprehensive reef monitoring information.

OCTOBER 2024
7th International Marine Conservation Congress (IMCC7)
CAPE TOWN, SOUTH AFRICA

During this global gathering of conservation leaders, CRF™ presented its advancements in data systems—including the Coral Sample Registry, CeruleanAI, and a new learning ecosystem—and showcased how these technologies can be scaled up to benefit reef restoration worldwide.

OCTOBER 2024
Ocean Cay Marine Program Workshop
OCEAN CAY MARINE RESERVE, BAHAMAS

Hosted by MSC Foundation, this strategy and planning workshop focused on transitioning Ocean Cay's coral restoration efforts from a pilot to a large-scale operation. CRF™ provided expertise on restoration interventions and contributed to refining the program's long-term implementation roadmap.

OCTOBER 2024
Sanctuary Solutions Workshop
FLORIDA KEYS, USA

Organized by the National Marine Sanctuary Foundation, this design-thinking challenge centered on engineering solutions to address thermal stress in coral reefs. CRF™ offered insights on practical restoration applications, helping participants evaluate how innovative marine technology could combat bleaching events.

NOVEMBER 2024
CIVIC Workshop
ST. CROIX, USVI

Led by the Sandin Lab from UC San Diego, this workshop focused on large-area imagery (LAI) for community-driven marine restoration and education. CRF™ shared its extensive experience with LAI and CeruleanAI, guiding participants toward more robust monitoring and adaptive reef management strategies.

NOVEMBER 2024
ReeFlorida Symposium
MIAMI, USA

Hosted by the Phillip and Patricia Frost Museum of Science, this gathering united Florida-based coral restoration practitioners, researchers, and educators. CRF™ highlighted new restoration tools, recent conservation initiatives, and effective engagement strategies to safeguard and promote Florida's Coral Reef.

In 2017, CRF™, in collaboration with NOAA, co-founded the Coral Restoration Consortium (CRC), a global community of coral restoration practitioners, scientists, managers, and educators dedicated to enabling coral reef ecosystems to survive the 21st century and beyond. CRF™ staff help with CRC operations on a daily basis.

In 2024, the Coral Restoration Consortium (CRC) continued to evolve and expand its reach, solidifying its role as a unifying force for coral restoration practitioners worldwide. Under the leadership of Executive Director Dr. Tali Vardi, the CRC advanced its guiding goals—Listen, Elevate, and Share—by engaging its network through new research, collaborative events, and dynamic working groups.

A key indicator of the CRC's growing importance to the restoration community was the record participation in its annual global survey. With a 70% response rate, the CRC received 224 complete submissions from 70 countries and 206 unique organizations. This feedback has been instrumental in shaping the CRC's priorities, ensuring they reflect the most pressing needs of the coral restoration community. Aligned with these survey findings, a newly elected Advisory Board of 14 members from nine different countries was formed—further strengthening the CRC's international perspective.

Throughout the year, CRC members actively supported workshops and gatherings aimed at uniting regional restoration initiatives, such as the Western Indian Ocean Reef Restoration Network meeting in Zanzibar. On the global stage, CRC leadership contributed to three important publications highlighting the role of coral reef restoration in a changing world, and Dr. Vardi represented the consortium at high-profile events like New York City Climate Week and Columbia's "Future of Our Oceans: The Wave of Change." At this forum, panelists stressed the urgency of ocean conservation and underscored the inextricable ties between marine health and human well-being.

In an effort to better serve its membership, the CRC launched two new working groups—the BioRepository Working Group, chaired by Dr. Johnathan Daly and Dr. Jack Koch, and the Pacific Islands Working Group, chaired by Dr. Laurie Raymundo and Shannon Ruseborn, which already boasts more than 100 members. These groups join the existing CRC networks in offering targeted support, opportunities for collaboration, and resources for practitioners in regions facing unique restoration challenges.

This year also marked the fourth iteration of Reef Futures, which attracted 820 participants from around the world. Thanks to generous sponsorships, over 100 scholarships were awarded to attendees from less developed countries and underserved communities—reinforcing the CRC's commitment to inclusion.

Throughout 2024 the CRC also worked to bring the community together remotely, with multiple webinars, the introduction of new material on its Storytelling Hub, and concerted efforts to reach more people through social media, gaining an additional 4,000 Instagram followers and 400 new Facebook followers.

Looking ahead, the Coral Restoration Consortium remains dedicated to uniting and elevating the global community of reef restoration practitioners—ensuring that knowledge, resources, and best practices flow freely across borders, and that coral reefs worldwide benefit from the collective expertise of this vibrant network.

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









REEF FUTURES 2024

Reef Futures is the only global symposium dedicated exclusively to coral reef restoration. It provides a unique platform for practitioners, scientists, and advocates to share knowledge and advance the field. CRF™ staff continue to be heavily involved in the planning and execution of this world-renowned event.

Despite the catastrophic impacts of the Fourth Global Bleaching Event and the challenges of the past two years, Reef Futures 2024, held at Iberostar Paraíso Hotel & Resort, Riviera Maya, Mexico, was marked by an electric atmosphere of optimism and action. The symposium brought together over 820 participants from 64 countries, to share knowledge, celebrate successes, and confront challenges head-on.

"At Reef Futures, people weren't just exchanging ideas; they were refining them together, laying the groundwork for the future of coral restoration as a truly global and cooperative effort. This event is where the field comes to grow," said Dr. Tali Vardi, CRC Executive Director.

The symposium featured nearly 440 oral presentations, more than 100 scientific posters and over 25 films in the inaugural "Reefs to Reels" film showcase. Attendees explored a wide array of topics, including the transformative potential of artificial intelligence, large-scale restoration strategies, gene banking, coral spawning collaborations, cryopreservation, and assisted evolution. Key themes emphasized scaling restoration efforts to combat climate change, private sector investment in nature-based solutions, and the critical role of storytelling in building public support and driving policy change.

Two rousing plenary sessions combined scientific insights with emotional resonance. A standout talk by Rose Huizenga, founder of Coral Catch, highlighted how amplifying the leadership of women in coral restoration in Indonesia is driving meaningful change. Her presentation showcased how passion, ingenuity, and equitable partnerships can catalyze significant movements even with limited funding.

Rose's story reinforced a recurring message from the symposium: the vital importance of centering the voices, leadership, and lived experiences of strategically undervalued groups, including women and Indigenous communities. Dr. R. Scott Winters, CEO of Coral Restoration Foundation™ and CRC Board of Directors Chair, remarked, "It is clear that the contributions of historically marginalized stakeholders are fundamental to the success of coral restoration. By integrating their expertise and knowledge systems, we ensure that restoration efforts reflect diverse cultural contexts and priorities, redefining conservation as an inclusive endeavour rooted in mutual respect and justice."

Through the scholarship program, which facilitated attendance of 100 participants from across the globe, Reef Futures ensured that the voices of those most impacted by coral reef decline were at the heart of the conversation.

Dr. Phanor Montoya-Maya, Restoration Program Manager at Coral Restoration Foundation™ summed up the event's impact: "Reef Futures restored more than my motivation—it restored my belief that what we're doing is having an impact. Despite the challenges, this symposium reminded me that our work is vital. Together, we're not just restoring reefs; we're restoring hope."

Reef Futures 2024 was organized by the Coral Restoration Consortium, hosted locally by Iberostar Group, and sponsored by NEOM, King Abdullah University of Science and Technology, National Oceanic and Atmospheric Administration, Coral Restoration Foundation™, Reef Restoration and Adaptation Program, MARS, The Nature Conservancy, The Florida Aquarium, Felsten Fishman Family Foundation, Coral Vita, Revive & Restore, UCSC Center for Coastal Climate Resilience, MAPFRE, Builders Initiative, GIZ, Mote Scientific Foundation, International Coral Reef Society, and Plant a Million Corals Foundation.

SCIENCE

Our science program focuses on collaboration, research and 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.

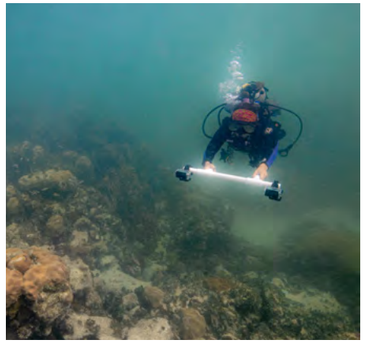
OUR RESEARCH PRIORITIES

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 three peer-reviewed journals in 2024.

Ocean Sustainability
April 2, 2024
Restoration as a meaningful aid to ecological recovery of coral reefs
Suggett, D.J., Guest, J., Camp, E.F., Edwards, A., Goergen, L., Hein, M., Humanes, A., Levy, J.S., Montoya-Maya, P.H., Smith, D.J. and Vardi, T.

Integrative and Comparative Biology
October 22, 2024
Demographic history and resilience potential of the threatened Caribbean coral, Acropora cervicornis
Ruggeri, M., Baums, I., Blanco-Pimentel, M., Bosch, P., Carne, L., Danser, N., Montoya-Maya, P., Morikawa, M., Muller, E., Baker, A. and Cunning, R.

Nature Climate Change
November 29, 2024
The critical role of coral reef restoration in a changing world
Peixoto, R.S., Voolstra, C.R., Baums, I.B., Camp, E.F., Guest, J., Harrison, P.L., Montoya-Maya, P.H., Pollock, F.J., Smith, D.J., Wangpraseurt, D. and Banaszak, A.T.

2024 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. Andrea Grottoli
OHIO STATE UNIVERSITY

Grottoli is testing the Underwater Zooplankton Enhancement Light Array (UZELA) on 60 CRF™ Coral Trees™, with half serving as "blank" controls. By increasing local zooplankton around corals, UZELA aims to boost coral health and growth before and during heat-stress events—potentially shortening nursery grow out times and reducing losses during bleaching.

Jim Brittsan
SUSTAINABLE OCEANS AND REEFS

Brittsan is installing "Bioball Streamers" (see picture to the right) in CRF™ nurseries to maximize larval settlement of the long-spined sea urchin, *Diadema antillarum*. This work helps track settlement patterns in the Upper Keys and could enhance natural grazing processes, benefitting overall reef health.

COMMUNITY STRUCTURE

Dr. Stephanie Green
UNIVERSITY OF ALBERTA

Green's team deployed hydrophones in the CRF™ Tavernier Nursery and on outplanted reefs, recording reef sounds to gauge ecological recovery. This partnership also tests species-specific outplant strategies—placing different corals together to assess functional diversity and interactions. The goal is to identify optimal species combinations that bolster restoration outcomes and long-term reef resilience.

CORAL MONITORING

Derek Manzello
NOAA

Manzello is collaborating with CRF™ to analyze the survivorship of nursery-grown corals following the 2023 bleaching events. Combined with NOAA's broader monitoring data, these findings will help identify drivers of resilience and inform best practices in restoration.

GENETIC PERFORMANCE

Dr. Michael Gerdes
CAPITAL CORALS, INC.

Gerdes is creating a streamlined genotyping protocol for Acroporid corals using field-based DNA extraction. Confirming species identity and pinpointing genet-level differences will refine restoration strategies and track long-term coral performance.

Dr. Mikhail Matz
UNIVERSITY OF TEXAS AT AUSTIN

Matz's team is studying gene expression in 12 fragments (two genotypes) of *Acropora cervicornis* provided by CRF™. By examining how different genotypes respond to environmental stressors, the project seeks to guide more resilient outplanting approaches.

RESEARCH & DEVELOPMENT

Coral reef loss and coral restoration are global issues. At CRF™, we have the privilege of the resources needed to push the field forward. We also have a responsibility to bring others along with us as we do so. Our focus on R&D in the CRF™ Science Program is helping us accomplish both.

At CRF™ we are constantly striving to increase efficiencies in all aspects of our work-through research, development, and the deployment of technology-based solutions. The Science Program is also working to prepare these solutions for adoption by groups outside of CRF™ and beyond the USA.

These solutions comprise a growing 'CRF™ Toolkit'.

The first of these tools are the Coral Sample Registry and CeruleanAI. These tools are helping us democratize the growing coral restoration space, providing access to best practices and technologies regardless of location or means.

CRF™ TOOLKIT

CeruleanAI

As coral reef restoration continues to scale globally, CRF™ is at the cutting edge of innovation, offering an accessible, AI-driven platform that streamlines large-scale reef monitoring and propels the field toward new horizons.

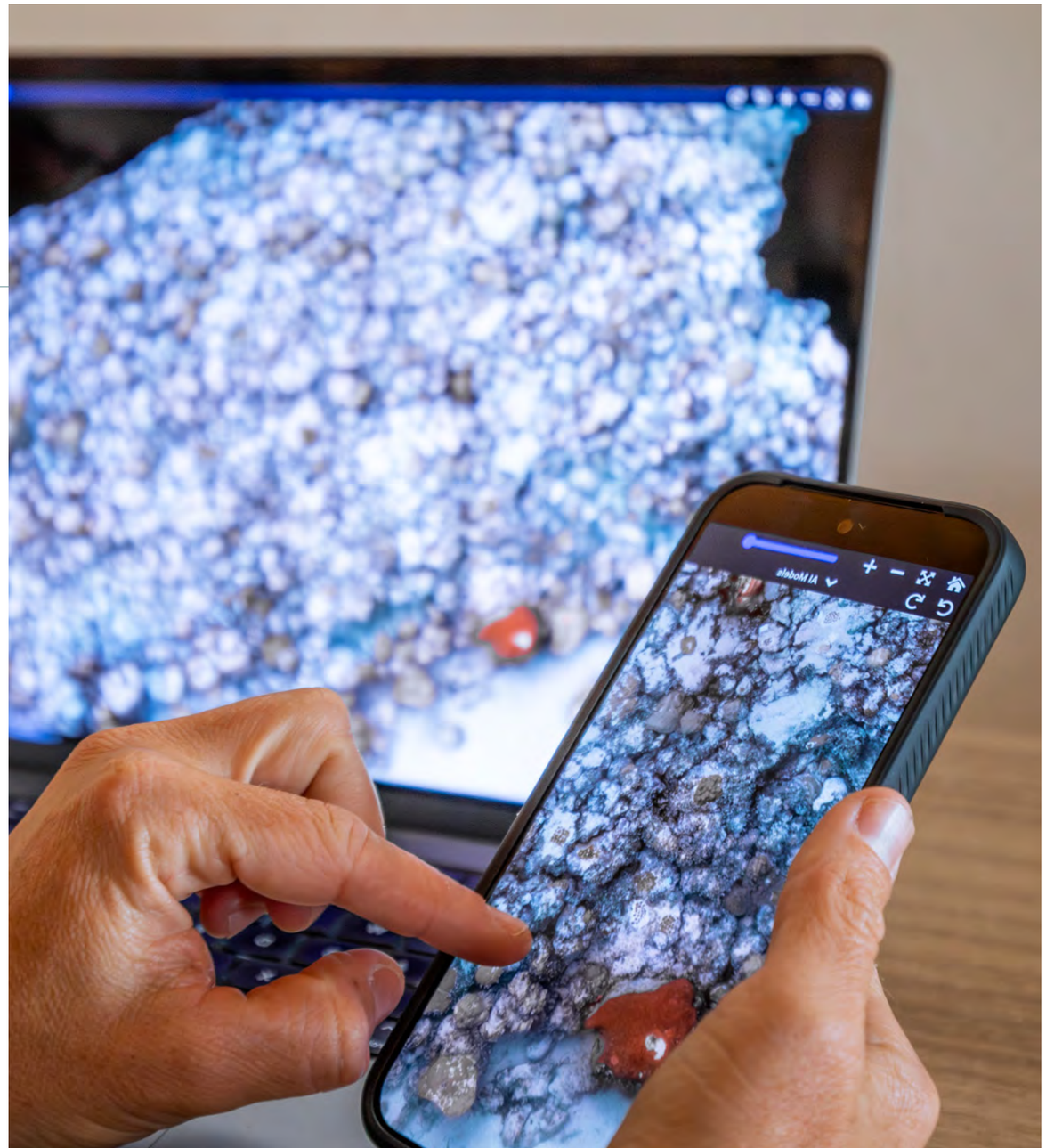
Photomosaics are a critical tool for large-scale reef monitoring, allowing practitioners to assess changes in coral cover on significant areas of reef over time. But while it is relatively simple to take the pictures needed to build a photomosaic, the stitching and analysis is incredibly expensive and time consuming, requiring massive computing power and hours of manual work to trace and assess the mosaic.

Developed by CRF™, CeruleanAI is an advanced software platform designed 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.

In 2024, we officially released the first version of CeruleanAI to the public, and multiple organizations are now using the service. We are making access as cost effective as possible, allowing anyone, anywhere to use the platform, no matter their budget.

Internally, we are still working to improve the second component of Cerulean, which includes the AI models capable of automatically analyzing the number, size, and location of corals in the imagery. So far, we have developed the models for *Acropora cervicornis, Acropora palmata, and Orbicella spp.* These models, as well as the system for generating and refining completely new AI models, will be released in 2025.

Our work continues to broaden, democratizing the tools necessary for meaningful reef conservation worldwide. By leveraging cutting-edge automation to reduce costs and complexity, CeruleanAI enables restoration teams of all sizes to generate and analyze data with ease. With next-generation features—such as 3-D modeling and integrated GPS tracking—on the horizon, we remain committed to empowering practitioners everywhere to advance coral recovery and safeguard our oceans for future generations.



CRF™ TOOLKIT

The Coral Sample Registry

The Coral Sample Registry (CSR) is emerging as a powerful unifying force for practitioners worldwide, accelerating collaboration, streamlining large-scale reporting, and advancing the collective mission to safeguard our reefs.

The Coral Sample Registry (CSR) is an open access, online database that assigns coral samples "Accession Numbers" that function like unique bar codes for individual coral specimens in use around the world. When these bar codes are embedded in an organization's internal data system—such as a gene sequencing lab's coral genetics database—they create a standardized reference point that can unify data across different projects and institutions. The CSR has become an invaluable tool for cataloging and monitoring coral samples globally. It currently contains data on more than 5,000 unique samples from more than 70 species.

In 2024, the Florida coral restoration community recognized the CSR as a key resource for integrating multiple data sets in large-scale restoration reporting. In September, CRF™, SeaFoundry, and other stakeholders met to design a system capable of automatically generating state and federal reports on coral restoration efforts in Florida. The CSR will serve as the "Rosetta Stone" of coral genotypes for this effort, ensuring that the same coral genotype is identified consistently, regardless of naming conventions or individual organizational use.

Developed in collaboration with 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, the CSR is a testament to the power of cross-agency partnership. It also demonstrates the ways in which CRF™ remains at the forefront of efforts to unite the field, fostering greater collaboration and promoting the open exchange of knowledge and data in coral restoration and conservation practice.

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 people 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
9,238
students in
2023, with
15
virtual sessions, and
150
in-person
events, workshops, and
presentations

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.

2024 CRF™ EDUCATION PROGRAM HIGHLIGHTS

JANUARY
We partner with Zoo Miami Winter Camp and hold a slime workshop for 72 campers. We also take part in the Island Boat Show with an outplant station and teach hundreds of people about reef restoration.

FEBRUARY
We launch an After School Club at the Summerville Advantage Academy elementary school. Our booth at Manatee Fest engages over 500 people, and we present the Gamete and Greet workshop to Nocturnal Wild Viscaya attendees.

MARCH
The Colorado Coralition from Polaris Expeditionary Learning School in Fort Collins, Colorado, travel to Key Largo with 20 participants to explore the technology behind coral restoration efforts by conducting photomosaic work.

APRIL
We join Rock the Ocean's Conservation Village at Tortuga Music Festival in the Coral Reef tent, and spoke to over 1,100 festival goers over 3 days. Two CRF™ Education staff become DiveHeart Adaptive Dive Buddies to expand our understanding of how to make our programming more accessible.

MAY
Our summer program with the Boy Scouts of America at SeaBase continues. From May to August we work with 200 boy scouts, cleaning 100+ Coral Trees™ in the Tavernier Nursery. We also welcome our first exclusively land-based interns, increasing accessibility to marine science for individuals who do not dive.

JUNE
We launch Coralpalooza™ week with a takeover at Zoo Miami, engaging 311 attendees. Highlights include the dynamic Captain Coral show and interactive games.

JULY
We host summer camps for 60 teenagers, teaching students about coral reef ecology, the decline of our world's reefs, and how students can become ocean stewards in their own lives.

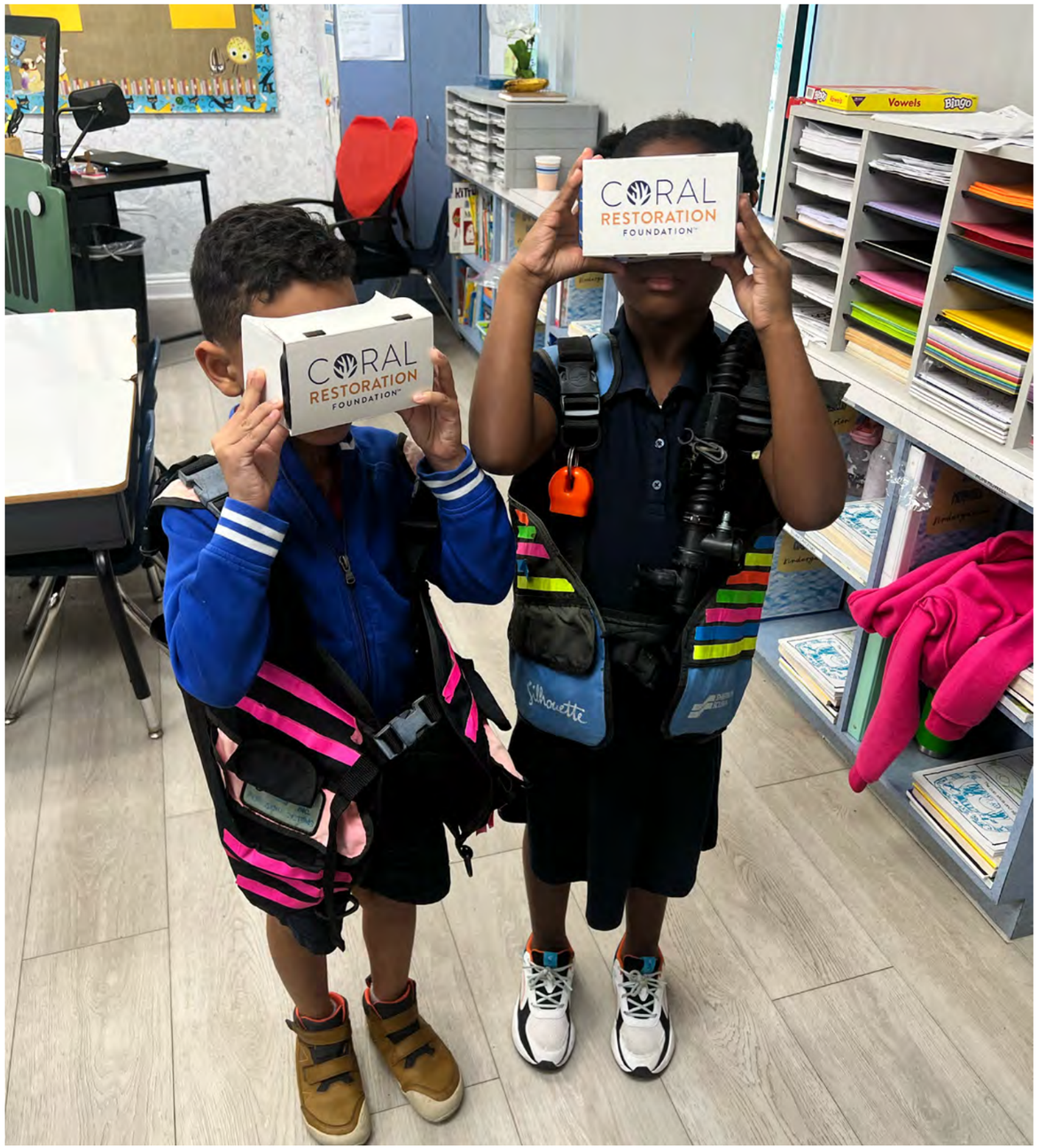
AUGUST
We host our second Night Spawning Celebration at Vizcaya, a captivating event spotlighting coral spawning. Guests enjoyed an enchanting evening at Vizcaya Museum and Gardens, featuring interactive exhibits, expert talks, and a fast-pace relay race. The event raised awareness and support for coral restoration efforts.

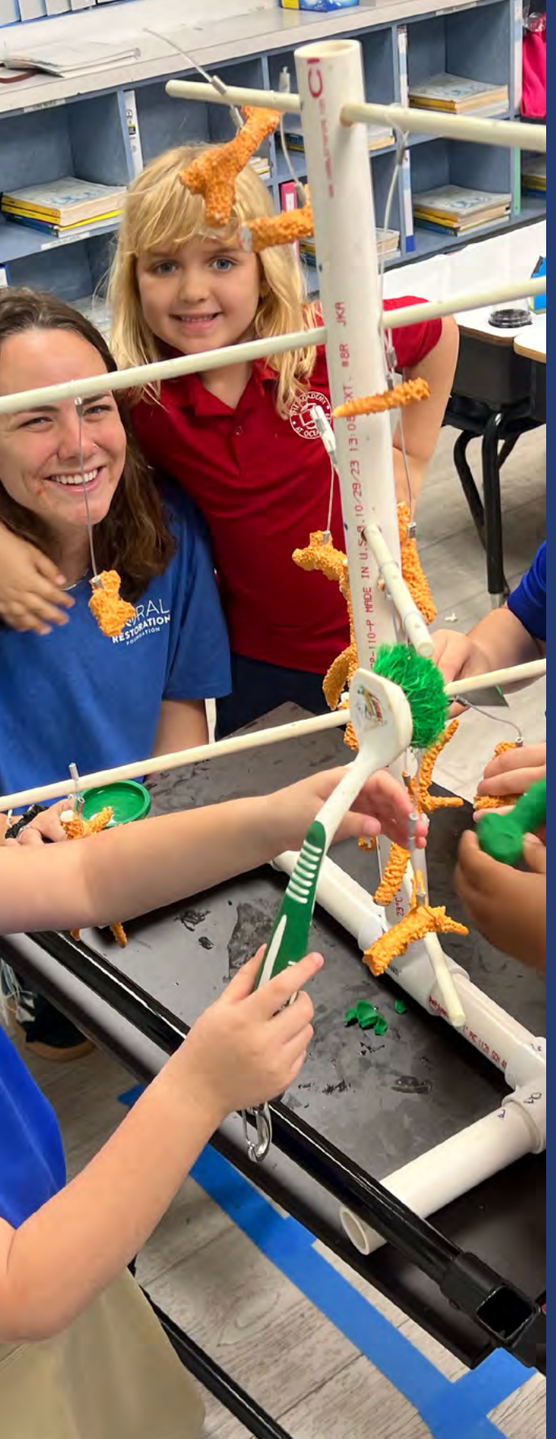
SEPTEMBER
We kick off the Girl Scouts "Girls in STEM Virtual Series" in September. A record numbers of attendees registered and joined for the virtual event that highlights women in STEM. We also hold workshops with all Girl Scout levels throughout the year, and continue to faciliate the multi-step "Be a Reef Hero" badge programs.

OCTOBER
We participate in four Halloween Trunk or Treat events, reaching 1,272 attendees. CRF™ staff also join the three-day Sanctuary Solutions Series as stewardship and practitioner representatives. The series was the first of its kind, bringing together stewardship, practitioners, and Blue Economy stakeholders like RRAP to consider proposals from engineering students on future thermal stress events.

NOVEMBER
We present at DEMA 2024 on how coral restoration supports local economies.

DECEMBER
Our Education team present at Reef Futures 2024. Read more on page 53.





CORAL REEFS & YOU

In 2024, our mission expanded to reach every 5th, 8th, and 12th graders in Monroe County. This new education series is developing wide-spread ocean stewardship in Florida's youth through STEAM workshops and immersive field trips.

The "Coral Reefs and You" program, funded by an EPA grant, was designed to inspire the next generation of ocean stewards in Florida. Connecting all Monroe County 5th, 8th, and 12th grade students to coral conservation through interactive lessons, take-home crafts, and snorkel trips, the program combines four workshop sessions for each class with a real-world experience in the form of an immersive field trip to see the work in action.

By the end of 2024, we were halfway through the the school year-long initiative. Despite facing significant weather disruptions, by December, our team had successfully implemented the curriculum in 15 schools, reaching more than 1,400 students. In total, we delivered over 250 hours of instruction.

Lessons tailored to each grade level introduce students to coral anatomy, restoration methods, and the socioeconomic importance of reef ecosystems. Through flexible scheduling and close collaboration with administrators and boat charter services, we ensured that no student missed out on the field trip component.

Pre- and post-program surveys suggest students gained a stronger grasp of how their own communities rely on healthy reefs—and, importantly, how they can help protect them. Notably, 70% of children in the Keys attend Title I schools, and baseline environmental literacy among participants was already higher than it was seven years ago. Even so, findings showed a significant increase in students' understanding of ocean stewardship and the socioeconomic benefits of coral reefs and their restoration. The next phase of evaluations will help us refine our curriculum.

Through hurricanes and tropical storms, in the face of incredible logistical challenges, the Coral Reefs and You program has proven resilient. Above all, it has shown that a hands-on approach to marine education can empower young minds to protect the underwater treasures that sustain both local communities and global biodiversity. The program will continue through 2025.

OUTREACH MATTERS

From local communities to global audiences, outreach is central to our expanding mission. Through dynamic activations, we rally diverse supporters around the urgent need for coral reef restoration and conservation.

In 2024, we reached 16,600 members of the general public with 220 activations

In 2024, highlights of our outreach activities included our booth at Manatee Fest and the hundreds of people we reached at the Island Boat Show, connecting with visitors through an outplant station. We also returned to Vizcaya Museum and Gardens for Nocturnal Wild Vizcaya, hosting a 'Gamete and Greet' workshop, and joined Rock the Ocean's Conservation Village at the Tortuga Music Festival, engaging festival goers in the mission to restore our reefs. During our Night Spawning Celebration at Vizcaya, attendees learned about coral reproduction and citizen science through interactive exhibits, relay races, demonstrations, and expert talks. In October, we took part in four Halloween Trunk or Treat events, reaching more than a thousand attendees. We also had a booth and presented at DEMA 2024, highlighting how coral restoration initiatives support local economies.

Strategic outreach remains a core element of our work at CRF™, inspiring the public to become better stewards of these important ecosystems.

CORALPALOOZA™

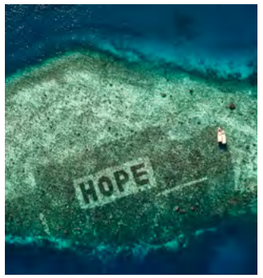
The global movement that is Coralpalooza™ continues to grow! In 2024, we reached even more people and places with the world's biggest celebration for coral reefs.

Coralpalooza™ is the annual CRF™ World Oceans Day celebration. Originally launched in 2015 as a local reef restoration event in the Florida Keys, it has now evolved into a global movement.

In 2024, Coralpalooza™ saw more than 3,500 corals returned to reefs around the world, thanks to the dedication of partner organizations from multiple countries. Over several days of action, nearly 1,000 participants contributed more than 1,500 hours both above and below the water, maintaining nurseries and restoring habitats vital to marine biodiversity. Recognized by the UN Decade on Ecosystem Restoration, and listed as a UN Ocean Decade event, we are shining a light on the urgent need for collaborative efforts to restore our planet's coral reefs.

In the Florida Keys, CRF™ mobilized hundreds of passionate scuba divers who worked in our coral nurseries, helping provide the most optimal conditions for our growing corals. On-shore celebrations in Islamorada and Key West engaged families with fun, hands-on activities and environmental stewardship events like beach cleanups. We revived Sips 'n' Science, drawing crowds to our Exploration Center in Key Largo for an evening of wine and captivating presentations. And, for the first time in Coralpalooza™ history, we ran events over three full days.

Coralpalooza™ continues to be a testament to the power of collaboration, reminding us that partnerships are critical if we are to be successful in restoring our reefs.



HIGHLIGHTS FROM THE 2024 INTERNATIONAL CORALPALOOZA™ COMMUNITY:

- **CRF™ IN FLORIDA:** Over 650 people contributed more than 1,260 hours to coral restoration and outreach, cleaning over 210 Coral Trees™ in CRF™ nurseries in the Florida Keys National Marine Sanctuary.
- **CRF™ IN ST. CROIX:** Hosted 18 participants for morning and afternoon dives, cleaning around 20 nursery structures and propagating 302 new boulder plugs.
- **CORAL NURTURE PROGRAM IN AUSTRALIA:** Deployed 10 boats with 70 participants contributing 80 hours, returning 2,864 corals across 10 reef sites, cleaning corals from 32 nurseries, conducting 18 ecological surveys, and producing photomosaic images of 41 plots.
- **RESCUE A REEF IN FLORIDA:** Returned over 80 staghorn corals at Paradise Reef, cleaned all staghorn trees in Paradise Nursery, and ran educational sessions.
- **NATURE SEYCHELLES IN THE SEYCHELLES:** Selected heat-tolerant coral species via the Coral Bleaching Automated Stress System (CBASS) and assessed the thermal tolerance of four reef-building corals.
- **BLUE CORNER MARINE RESEARCH IN INDONESIA:** 20 team members spent 10 hours outplanting hundreds of corals, installing new structures and nursery ropes, conducting a comprehensive Reef Check survey, and training local marine tourism stakeholders.
- **CORALCATCH IN INDONESIA:** Outplanted 76 corals, maintained over 30 structures, held an educational workshop for 25 elementary students, taught local women to swim, and removed 14.5 kg of beach trash.
- **SEASCAPE CARIBBEAN IN JAMAICA:** Maintained and repaired coral nurseries, monitored 1,100 coral nubbins, and propagated 30 new corals.
- **MISOOL FOUNDATION IN INDONESIA:** Outplanted 50 corals, maintained 42 artificial structures, monitored 873 coral outplants, and educated senior high school students on nursery declines.
- **REEFSCAPERS IN THE MALDIVES:** Outplanted 100 corals on frames, conducted in-water structure maintenance, monitored coral bleaching, managed predator outbreaks, and invested 15 hours in restoration.
- **MARHE IN THE MALDIVES:** Partnered with local resorts to engage 216 participants in bleaching monitoring, workshops, marine biology presentations, clean-ups, documentaries, VR sessions, and snorkeling surveys—organizing 25 activities for reef awareness and data collection.

2024 PRIVATE DIVE PROGRAM HIGHLIGHTS

FEBRUARY
We expanded our Public Dive Program by partnering with additional operators, including Conch Republic Divers, Pirates Cove Watersports in the Upper Keys, and Southpoint Divers in the Lower Keys.

MARCH
The Colorado Coralition from Polaris Expeditionary Learning School in Fort Collins, Colorado, traveled to Key Largo with 20 participants to explore the technology behind coral restoration efforts by conducting photomosaic work.

APRIL
Goshen High School, the alma mater of one of our CRF™ staff members, joined us for a dive program.

JUNE
Through a virtual presentation with Seminole Scuba, we expanded our remote programming opportunities for dive clubs, and can now welcome more dive shops and clubs to join us in the future.

JULY
Students continue their education over the summer with Water Warrior Alliance's Camp Coral, joining us for multiple days of learning and fun.

AUGUST
Barrier Free Diver's Camp Open S.E.A.S brings participants to CRF™ as part of a specialized recreational dive program designed for children with disabilities, providing them with the opportunity to learn about the importance of coral reefs while assisting with nursery maintenance.

SEPTEMBER
The Coral Reefs and You program, funded by the Environmental Protection Agency, launches the snorkeling programs that allow every 5th, 8th, and 12th grader in Monroe County to visit our CRF™ nurseries and reef outplant sites.

OCTOBER
Ransom Everglades High School in Miami, one of our valued repeat groups, continues to engage with us throughout the year, helping us expand our in-water restoration tasks to enhance our efforts.

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.

In 2024,we welcomed

950+

recreational divers and snorkelers to

145+ dive & snorkel programs

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.

2024 marked the launch of a new land-based internship. In a continuous effort to make marine science more accessible, we have expanded our robust internship program to include early career marine scientists that are not dive certified.

With six land-based interns in its first year, this new program has already proven to be a unique opportunity for eager conservationists to gain valuable real-life skills in coral restoration without the extensive and oftentimes expensive qualifications of other programs.

In addition to the skills and experience gained in the land-based program, these interns can live and work in an area brimming with dive and water-based opportunities, offering significant access to SCUBA diving that can otherwise be a limiting factor to working in marine science.

We welcomed 40 individuals to our internship program in 2024

Interns were responsible for returning more than 3,150 corals to Florida's reefs, which is 30% of all corals rehomed in Florida in 2024

VOLUNTEERS

Throughout the year, our dedicated volunteers work alongside the CRF™ team, on land and beneath the waves, helping further the mission to restore our coral reefs. In 2024, volunteers donated more than 1,400 hours of service to Florida's reefs.

In 2024, we worked with 90 active volunteers, providing 10 pool training sessions and 9 boat training sessions

EDUCATION & OUTREACH:

INSPIRING OCEAN STEWARDS

At CRF™, we are now systematically collecting and analyzing data across our outreach programs to better understand their real-world impact. The results are in, and they confirm what we've long believed: **our Dive Programs, General Presentations, and outreach events don't just educate—they transform.** Participants leave more informed, more motivated, and more committed to protecting our ocean planet.

KNOWLEDGE GAINED = ACTION TAKEN

After engaging with CRF™, **83% of participants** reported taking regular ocean-friendly actions—up from **67% before** the program.

*That's a **+16% increase in stewardship,** showing that our programs are inspiring real-world change.* Participants rated how often they take specific sustainable actions on a scale from 1 to 5, with **5 meaning "always".**

Across all actions measured, participants increased their average engagement from **3.8 to 4.5 out of 5—a +0.7 point jump.** This means participants moved from "sometimes" to "very often" adopting sustainable habits—a clear, measurable impact.

+0.7
Point Increase in Stewardship Scores

These high scores reflect lasting behavioural shifts and a growing commitment to ocean advocacy

SATISFACTION & LOYALTY – NET PROMOTER SCORES

What is a Net Promoter Score (NPS)?

NPS is an industry-standard measure of how likely someone is to recommend a program or organization. Scores range from -100 to +100, and **anything above 70 is considered world-class.**

It's based on responses to one question:

"How likely are you to recommend this to a friend?"

- **CRF™ Dive Programs NPS: 88**
- **CRF™ General Presentations NPS: 81**

These scores put our outreach among the most beloved and effective programs in the nonprofit space.

Translation? People love what we do—and they want others to know about it!

We are inspiring millions of people around the world to create positive change, using our work as an example.

In 2024, the CRF™ mission was shared by national and international media including **BBC, PBS, The Washington Post, Politico, National Geographic Kids, Bloomberg, NBC, The New York Times, Vox, CNN, The Guardian, Huffington Post, NPR, USA Today, & ABC News.**

ENGAGING THE WORLD

In 2024, we reached almost **640,000 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.

- **176,100+**
- **45,800+**
- **32,600+**
- **6,400+**
- **3,100+**
- **21,900+**

MEASURING THE SOCIOECONOMIC BENEFITS OF CORAL RESTORATION

HOW CRF™ DRIVES LOCAL ECONOMIC GROWTH

WHAT IS SOCIOECONOMICS?

Socioeconomics explores how social factors (culture, education, and demographics) interact with economic factors (income, employment, and wealth).

WHEN SOMEONE INVESTS $1.00 IN CRF™ IT DOESN'T JUST PAY FOR OUR WORK.

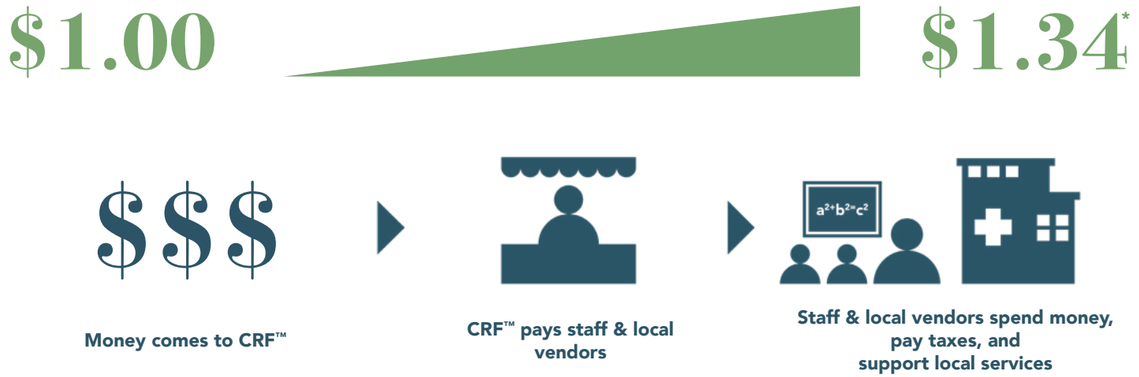
That dollar also flows into the local economy.

Economists call this the "economic multiplier".

And for CRF™, every dollar invested results in $1.34* in total local economic activity.

LOCAL FOCUS MATTERS

- CRF™ keeps investments and jobs local, maximizing direct benefits.
- Other organizations may funnel more resources back to headquarters elsewhere.
- Local communities see the greatest returns when the majority of administration and restoration activities are implemented on-site.
- When organizations like CRF™ pay workers, provide educational stipends to interns, and hire contract divers—rather than relying too heavily on unpaid volunteers—more money ends up in the local economy.



HOW DO WE KNOW?

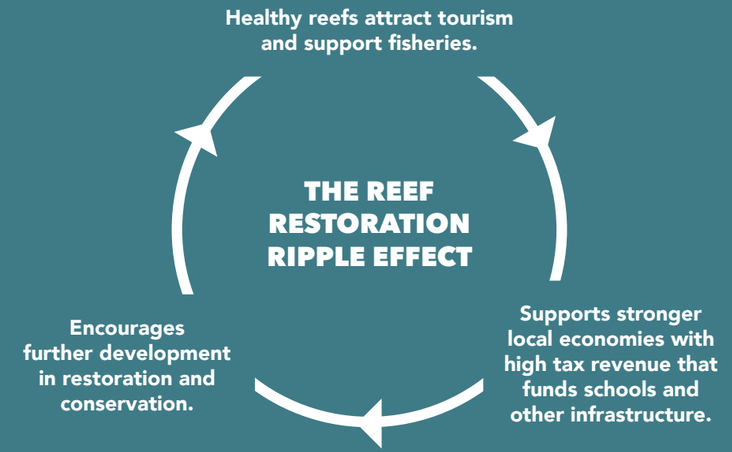
Software called IMPLAN models how money flows through regions from different industries. It calculates these "economic multipliers" using national data from sources like the Census and IRS.

IMPLAN tracks: Direct spending (operational costs like boat fuel, staff salaries, rent, supplies, etc.); Indirect effects (the impact of vendors and suppliers paying their own staff, buying equipment, etc.); and the Induced effects of all these employees spending their paychecks in the community.

By adding up all of these layers of spending, IMPLAN shows how much total economic activity is generated from a single dollar invested—giving you an economic multiplier.

WHY DOES THIS MATTER?

Our work doesn't just create long-term environmental benefits—it also delivers immediate economic benefits. The data proves that conservation work, and ecosystem restoration, isn't just about an investment in the future—it's also making a positive impact today.



*Based on IMPLAN data and adjusted to 2025 dollars.

In 2025, our average economic multiplier shifted from 1.41 in 2022 dollars to 1.34 in 2025 dollars. This is mainly due to inflation, which has averaged around 4% per year.

As the cost of goods and services has increased over time, each dollar has slightly less purchasing power. So, while CRF™ activities are still creating meaningful local economic impact, the total measured effect appears lower when calculated in today's dollars. The difference reflects economic conditions, not a change in the value of the work being done, and can be seen across economic multipliers for all industries.

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 2025 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, DAFgiving360, 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, 2024 and December 31, 2024.

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.

- Kurt Allebach
- Cheryl and Ameya Agaskar
- Andrew R. and Janet F. Miller Foundation
- Anonymous (133)
- Aperture Pet & Life
- AquaBlu Mosaics Inc.
- Aquarium at the Boardwalk
- Aquarium of Niagara
- Arlington Community Foundation
- Ethan Thomas Atkinson
- Atlantic Logistics
- Corwin and Virginia Atwood
- Kelly Baker and Whitney Ellerman
- Baker's Cay Resort, Key Largo
- Andrea Barbon
- Christian Bartholomew
- Bastion Management
- The Batchelor Foundation
- Dr. Sally E. Bauer
- Beachside Community Acupuncture PLLC
- Benevity
- Beyond Business, Inc
- BNY Mellon Charitable Gift Fund
- James J. and Mary L. Boilini
- Amy Bourne
- Douglas and Anne Marie Bratton in memory of Helen Charney
- Nicole and William Bridges
- Drs. C. Michael and Stephanie Brown
- Neal and Colleen Brown
- The Buchanan Family Foundation
- Buoy Up Styles
- Jessica and Oteil Burbridge
- Shane Burke
- Michelle and Mark Burnley
- Kim Carpenter
- Paul and Pamela Caswell
- Cause Photography
- Michele Chan
- The Charles Hazlehurst Moura Family Foundation
- Clarendon Partners
- Kathleen Close
- Jill Cohen, MD and Justina Cotter
- Community Foundation for Monterey County
- Community Foundation of the Florida Keys
- Phillip & Robyn Cooper
- Joel and Pam Copeland
- Mark Coppos and Patricia Lancaster
- Coral Ethical Wine - an Entrecanales Domecq E Hijos brand
- Karen Crouse in memory of Steve Harms
- The Curtis and Edith Munson Foundation
- DAFgiving360
- Daniels Family Foundation
- Stephen M. Daoust & Michelle G. Birnbaum
- Davidson Family Foundation
- Nick Davies
- Davis and Beverly Marksbury Foundation at Blue Grass Community Foundation
- Davis Island Garden Club
- Bob & Michelle Diener
- Disney Conservation Fund
- Lesley-Jane Dixon
- Anne L. Doubilet
- Mr. and Mrs. James Drinkwater
- Tina Steelman Duckels
- EarthShare
- The Edge Family Charitable Fund of Thrivent Charitable Impact & Investing
- The Edgemont Foundation
- The Edward and Gale McBride Foundation Inc.
- Electric City Aquarium & Reptile Den LLC
- Endaoment
- Essex Avenue Foundation
- FGP Foundation
- Fidelity Charitable
- Lori Fiedler
- The Fikes Family
- Firth-Link Family Foundation
- Fluval, a division of Rolf C. Hagen Inc.
- Franklin Philanthropic Foundation
- The Fullgraf Foundation
- The Gale Foundation
- John and Karen Gardner
- George and Marlisa Garrett
- Lily and Thistle in memory of Ryan Gerlach
- Forrest and Marjolein Gauthier
- Ryan Gerlach
- Ghemawat Charitable Fund; Mr. Sanjay Ghemawat
- Kristin and Cory Gilchrist
- Give Lively Foundation
- The Giving Block
- Goldman Sachs Philanthropy Fund
- John and Denise Gordon
- Virginia and Richard Gorelick
- Stephanie Graeler
- Great Lakes Tea & Spice
- Steve Greenwell
- Fritz Grimm
- Benjamin Gross, in memory of Josh Gross
- David and Patti Gross
- John Grubb
- Pamela Hancock
- Julie Harrison and Dr. Stephen Watts
- Laura and Fred Hartner
- Jon and Colleen Hazelbaker in memory of Jason Seely
- Helen and Ritter Shumway Foundation
- Henshel Foundation
- The Henson Family
- Hilton Global Foundation
- Caryn Hoadley
- Peggy Hoburg in memory of her husband, Jim
- The Holbrook R. and Sarah M. Davis Foundation
- Kathryn Howd and Edward Rucks
- International Face Painting School
- David and Jacqueline Irwin
- James J. and Joan A. Gardner Family Foundation
- Joel and Kathy Janco
- Tandy Jones in honor of Everett O'Flaherty and Hilary Stalnaker
- Michael and Linda Katz
- Ronald J. Kemperle
- Robert and Jane Kervin
- Key Largo Fisheries
- Keys Searchers, Chapter 1414 of the Questers
- Klein Family
- Kristen Klein
- Kirk & Andrea Klopfenstein
- Andy and Cathy Knudsen
- In memory of Jim Kolasa
- Jack & Allison Kostiuk
- Kyle Lauderdale
- Lehn & Vogt Insurance and Financial Group
- Keith and Tammy Leonard
- Scott and Julia Lewis
- Suzanne Lewis
- Light & Nature Fund
- Lightmoney.com, Dianna Burkholder
- Lindblad Quanbeck Family Fund at the Cleveland Foundation
- Charles Lynch Jr.
- Paul D. MacDougal
- Dandelion Mané
- Davis and Stacie Marksbury
- Karen McKinley
- James C. Meade Family Fund
- The Meeker Rom Family Foundation
- Jose Melendez
- Mary and Barry Menne
- Mesh Digital LLC
- Ray and Becky Middleton
- Mind Blown™ by The Plant Based Seafood Co.
- Moffett Family Foundation
- Monroe County Tourist Development Council
- Morgan Stanley GIFT
- Douglas Morrison
- The Mortenson Family
- Michael and Christine Mullins
- National Christian Foundation Orlando
- National Christian Foundation South Florida
- National Marine Sanctuary Foundation
- National Park Trust and USDA Forest Service
- National Philanthropic Trust
- Alexander Navin Charitable Fund
- The Negley Flinn Charitable Foundation
- Andrea Aleff Nelson
- Neso
- Jonathan and Terri Neufeld
- New Hampshire Charitable Foundation's Barrette Family Fund
- Newport Aquarium Retail Staff
- Nexions
- NOAA's Office for Habitat Conservation
- Northstar Sustainability Fund
- Kevin M. Nuccitelli
- Jim Nunn
- Ocean Reef Club
- Ocean Reef Community Foundation
- Ocean Reef Conservation Association
- OceanTech
- Robert and Malinda Och
- Once Upon a Time…
- David and Leslie Ornstein
- Michael and Patricia Pape
- Paul M. Angell Family Foundation
- William and Lynne Pauly
- PayPal Giving Fund

- Peek Family Charitable Foundation
- Marc and Diana Pelath
- Petco Animal Supplies
- Elise and Lucy Phares
- David and Pamela Phillips
- Mark and April Pierce
- Greg and Sheila Pietig
- Michael Pochyba in memory of Uncle Nick
- Emily & Greg Poole, III
- ProShot & Tidal Sports
- Punta Gorda Garden Club, Inc.
- David Puyanic
- Max Puyanic
- Rainbow Fund at the Rochester Area Community Foundation
- Raymond James Charitable
- Reef Telecom
- Resolve Marine
- Michael Reynolds
- The Reynolds Family
- Thomas Rich and Suzanne VanNostrand in memory of Helen Charney
- The Richard Laurence Parish Foundation
- Rochester Area Community Foundation
- Rock The Ocean Foundation
- Rotary Club of Downtown Gainesville
- Ariana Ryan
- Crista Ryan
- Saie
- Sand Cloud
- Sea Bags, LLC
- Seder Family Foundation
- Carol and Ronald Sekura
- Seminole Scuba
- Torrey and Anthony Shawe, Shawe Family Foundation
- Janet L. Shemanske
- The Shumway Fund of the Ocean Reef Community Foundation
- Sascha and Anka Simon
- Skiff Dogs
- Dr. Susanne Skyrm
- Dave and Karen Smith
- South Miami Garden Club
- Adam and Molly Spector
- David Splitt
- Kristen Starr
- Stephen Frink Photographic, Inc.
- Stratton Foundation
- Susan Kay Matthew Foundation
- T. Rowe Price Charitable
- Tampa Bay Brewing Company
- Chris Tresslar
- Triad Foundation
- Grace Nell Tyner
- U.S. Environmental Protection Agency
- United Way of Collier and the Keys, Inc.
- Rob Unruh
- Jo Ann Van Degriff
- David and Sally Vangeison
- Vanguard Charitable
- Ron VanOeveren
- Curt Varner Family
- Veza Sur Brewing Co.
- Suzy and Sadek Wahba
- Harley Wahl
- Karen and Don Waite
- Philip and Betsey Walker
- The Rev. Jeanne L. Warner
- B. Scott Washburn
- Waterbox Aquariums
- Roberta Watson
- Marcus and Anne Wedner
- Wellness Cove
- Miriam and Roger Widmann
- Jana & Dave Wiggins
- David Wing
- Woodbury Foundation
- Suzanne Wootten
- Jonathan Wren and Robin Albertson-Wren
- Robert and Carmen Wright
- Kevin and Lindsay Wylie-Werner
- YourCause
- Carl and Mary Zalaznik

IN-KIND & SERVICE DONATIONS

We are grateful to those who have donated goods and/or services to support our mission between January 1, 2024 and December 31, 2024.

- Conch Republic Dive Center
- Dive Rite
- The Dive Shop
- Flying Fisherman
- Garmin International
- Horizon Divers
- Huish Outdoors, Inc.
- Innovative Scuba Concepts
- Key Largo Dive Center
- Keys Marine Laboratory
- Liquid IV
- Margins USA
- Mind Blown™ by The Plant Based Seafood Co.
- MyCHELLE Dermaceuticals
- National Safe Boating Council
- Pilot House Marina & Restaurant
- Pinfish Entertainment
- Pirates Cove Watersports
- Quiescence Diving Services Inc.
- Rainbow Reef Dive Center
- RescueX
- RNGD
- Saie
- Sand Cloud
- Sea Bags, LLC
- SeaBase
- Silent World Dive Center
- South East Trailer Sales
- 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 2024 are broken down as follows:

SOURCES OF INCOME

Total Income: $8,852,243

- Government **$3,453,498**
- Foundations **$2,720,520**
- Corporations **$589,487**
- Individuals **$1,288,942**
- Other **$799,796**

EXPENSES

Total Expenses: $6,778,107

- Program Expenses **$5,519,381**
- General & Admin **$825,659**
- Fundraising **$433,067**

PERCENTAGE EXPENSES BY PROGRAM

Restoration **39%**

Science **16%**

Education **17%**

Global **28%**

39,760+m²
Of reef restored in Florida from 2012 to July 2023

9,950+
Corals returned to Florida's Coral Reef in 2024

253,800+
Corals returned to the reefs of the Florida Keys since 2007

9
Reef sites received corals in 2024

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

650+
Coral genotypes safeguarded for the future

20
Coral species living in our nurseries

4
CRF™ Production Nurseries in the Florida Keys

870+
Coral Trees™ in the Florida Keys

950+
People took part in our Dive Programs in 2024

9,230+
Students reached by our Education Program in 2024

40
Interns joined us in 2024

90
Active volunteers in 2024

16,600+
Members of the public reached with 220 activations

9
International knowledge exchanges in 2024

650,000+
Monthly social media reach as of January 2025

55,749+m²
Of reef documented by photomosaic in 2024

3
Publications co-authored by CRF™ in 2024

11
Restoration sites documented by photomosaic in 2024

77
Photomosaics of our restoration sites generated in 2024

CORAL RESTORATION FOUNDATION™ 2024 IN NUMBERS

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, Deutsche Welle (DW), Politico, USA Today, NPR, Huffington Post, & Bloomberg.

www.**coralrestoration**.org

DONATE TODAY!

No amount is too small to make a difference. Our monthly donors provide CRF™ with reliable, unrestricted funding that helps us forecast the future for Earth's coral reefs.