



10

Years of Coral Restoration

An all-around approach to achieve reef recovery

2022 Annual Report



Reef Renewal
Bonaire

Our Team



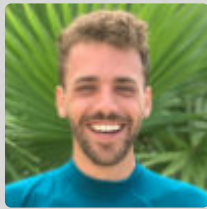
Francesca Virdis
Chief Operating Officer



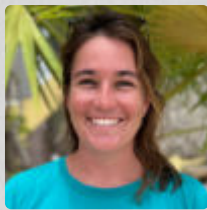
Sanne Tuijten
Operations Coordinator



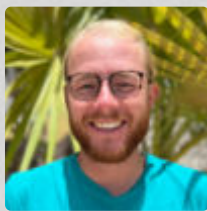
Caitie Reza
Communication & Development Officer



Ernst Noyons
Outreach & Training Program Officer



Nina Le Trocquer
Reef Restoration Technician



Marnik Lehwald
Reef Restoration Technician



Alex van der Last
SECORE/Reef Renewal Technician

Board of Directors

David J. Fishman President
Augusto A. Montbrun Secretary
Paulus P. Coolen Treasurer
Bridget Hickey Director
Christine M. Wall Director

Ken Nedimyer Technical Advisor

Reef Renewal Foundation Bonaire’s mission is to help protect, replenish, and restore the biodiverse coral reefs of Bonaire. We focus on implementing innovative, science-based programs that expand and strengthen populations of keystone coral reef species. We do this so that the reefs of Bonaire can gain the necessary scale, genetic diversity, and resilience to thrive today and in the uncertain, ever-changing conditions of the future.

Our Mission

To help protect, replenish, and restore the biodiverse coral reefs of Bonaire



Welcome! from our COO

2022 marked a significant milestone in our journey as we celebrated a **decade** of our organization's establishment and coral restoration in Bonaire. As I reflect upon the past, I'm struck by a sense of nostalgia, reminiscing about a time when our coral reefs thrived and the role of coral restoration was still a matter of spirited debate. Yet, today's reality is sobering, with our reefs facing **unprecedented threats** – fast spreading diseases and extensive coral bleaching events in the Caribbean. These challenges serve as a resounding wake-up call, confirming the need for active restoration and forcing us to confront the immediate obstacles lying ahead.

Amidst these challenges, I take pride in the formidable team we've built, equipped with the flexibility to employ **diverse restoration techniques** tailored to each hurdle we face. The groundwork laid over the years has culminated in the robust organization we proudly stand as today.

The past year was one of accomplishments, marked by both successes and a resolute commitment to **safeguard** and increase the **resilience** of coral reef ecosystems. We implemented innovative techniques for **propagating coral larvae** and outplanting corals with diverse morphologies. We collaborated with several research institutions to study groundbreaking topics, such as the role of epigenetic modifications in helping corals cope with stressors. The successful outplanting of **over 50,000 Acropora** corals back to the reef marked a momentous achievement for RRFB. While such tangible progress is heartening, our focus remains fixed on **amplifying our impact** in the year ahead.

Our team continues to actively **engage communities** both locally and globally, organizing educational workshops, awareness campaigns, and capacity-building programs to empower others to create lasting change.

Above all, the underlying truth is clear: our achievements were only possible through the **unwavering support** of our dedicated donors, partners, and volunteers. Their steadfast commitment and investments in our cause form the foundation upon which we continue to build our vision for a healthier, more resilient coral reef. ●

Sincerely,
Francesca Virdis
Chief Operating Officer



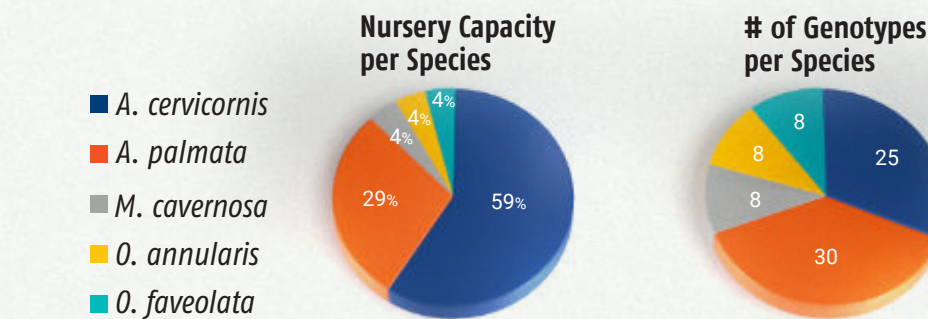


Every year we propagate thousands of corals in our nurseries through fragmentation. Our nurseries span 13 sites around Bonaire and Klein Bonaire. As each coral species is different, we adapt our nursery designs for their specific morphology, creating optimal conditions for growth.



We closely monitor our nurseries, assessing coral production, survival, health, and readiness for outplanting. These insights help us identify areas for improvement and drive operational efficiency in our coral restoration endeavors.

Total Nursery Capacity



What's NEW?

South Klein Nursery: At the start of 2022, thanks to a generous donation made in memory of Dr. Majorie Hoy, this nursery received a substantial upgrade. Namely, we installed 13 new nursery trees, expanding this nursery's coral capacity by 6%, and replaced an additional 14 trees, which were instrumental in producing thousands of corals for over 8 years.



*This project receives funding from The Caribbean OCTs Resilience, Sustainable Energy and Marine Biodiversity Programme (RESEMBID), financed by the European Union.



Lac Bay Nursery: Lac Pa Semper*, a project led by STINAPA, aims to restore and preserve marine habitats in Lac Bay. As part of this initiative, in January 2022, we installed 10 coral nursery trees within the bay, hosting *Acropora palmata* corals. The nursery will be used over the next few years to produce and outplant corals to the backreef area, where they once thrived in abundance.



Corals in our Nursery



Elkhorn coral
Acropora palmata



Great star coral
Montastraea cavernosa



Lobed star coral
Orbicella annularis



Mountainous star coral
Orbicella faveolata



Staghorn coral
Acropora cervicornis

Outplanting Corals

Photomosaic of Carl's Hill, one of RRFB's oldest restoration sites

We outplant corals at 22 restoration sites across Bonaire and Klein Bonaire, using different techniques based on the conditions. These sites are carefully selected based on specific pre-requisites, such as historical presence, coral cover, and current stressors. After outplanting, we survey underwater at 3- and 6-month intervals to gather valuable data on coral health and survival. Additionally, on a yearly basis, we monitor the long-term progress of these sites, using photogrammetry to track coral cover and growth over time.

Total Restoration Sites
22

Our Ecological Footprint

~2 soccer fields



13,008 m²

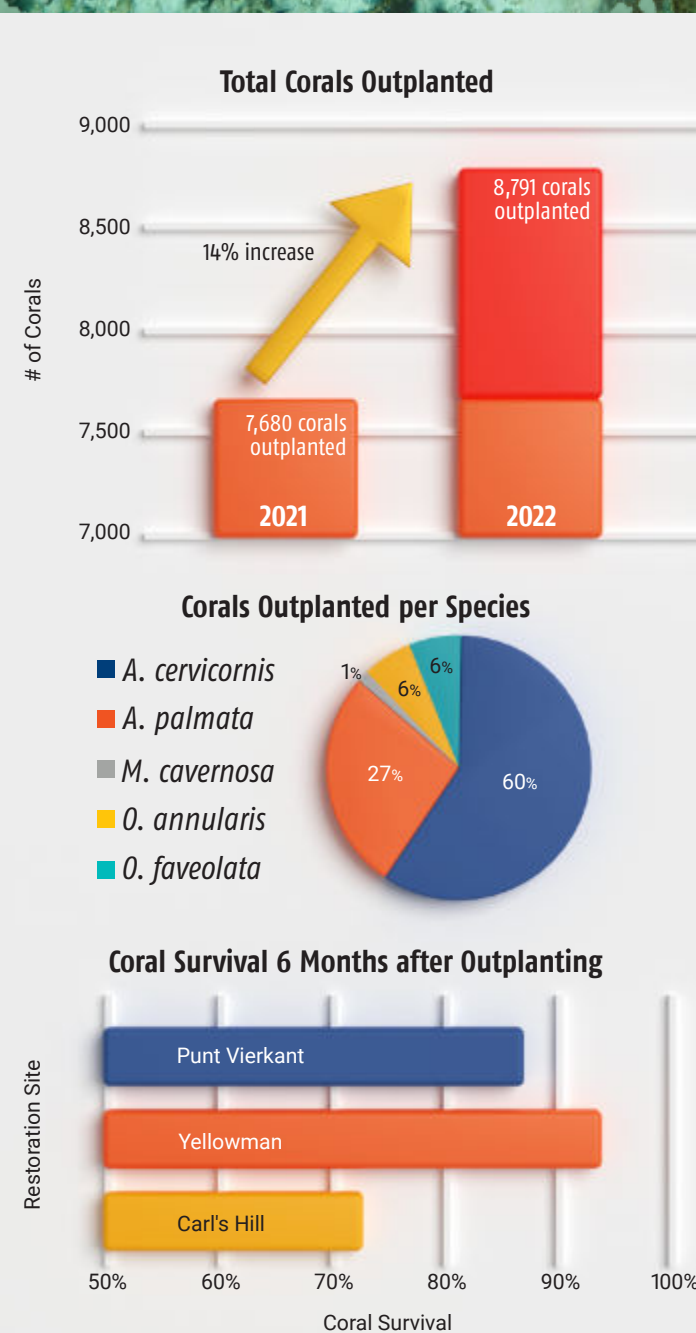
Total reef area on which corals were outplanted.

Our Coral Turnover



48%

of all the corals in our nurseries are outplanted each year.



What's NEW?

Late December marked an important first step for the implementation of our strategy focused on bolstering the populations of coral species that have been significantly impacted by disease.

For the first time, we successfully outplanted nursery-reared boulder corals of three different species to the reefs. Under the guidance of Ken Nedimyer, Reef Renewal USA, we carefully outplanted over 1,200 boulder coral colonies using a cement-based technique.





During coral spawning, we assist coral reproduction by collecting gametes and propagating hundreds of thousands of coral larvae that are settled and out-planted on the reef. This technique aims to increase the genetic diversity and therefore resilience of existing coral populations.

Laying the Foundations for Growth by...

1 Building Capacity

In 2022, we established a solid foundation to scale up our larval propagation program, to make a greater impact in the coming years. We focused on building capacity by expanding the technical expertise of our team and providing training to resident volunteers.



| Coral Species | Embryos Produced |
|----------------------------|------------------|
| <i>D. labyrinthiformis</i> | 2,840,000 |
| <i>A. cervicornis</i> | 265,200 |
| <i>C. natans</i> | 3,086,600 |

▲ Outplanting substrates with newly settled coral larvae under fluorescent light

2 Rearing Larvae in-situ

To better understand how local conditions affect coral larvae development and rearing, we assessed different locations for the CRIB (floating coral larvae nursery). We deployed the CRIB at 4 sites and successfully carried out the in-situ larval rearing process of 3 coral species. These trials are part of a larger effort to help optimize larval rearing techniques, and we will continue our research in collaboration with SECORE International into 2023.



Floating nursery deployed in Bonaire, in partnership with SECORE International

3 Strengthening Partnerships

Thanks to our successful collaboration with SECORE International, a staff member has been hired by SECORE to support larval propagation activities in Bonaire, working under the direction of RRFB. This partnership combines the expertise and resources of both organizations, boosting Bonaire's larval propagation effort.



This project received funding by IUCN through the BEST 2.0+ Program funded by the European Commission, to further support the 18-month project "Larval propagation: an innovative technique to scale-up Bonaire's reef restoration program" in partnership with SECORE International.

Driving Change Together



Involving the Diving Community

Dive shop partners play a crucial role in our outreach program, serving as integral ambassadors for our mission. By training our volunteers through the PADI Reef Renewal Diver distinctive specialty course, they serve as our primary point of contact with the public and foster more connections to our organization throughout the community.

1,753 PADI Reef Renewal Diver Distinctive Specialties
(+20% from 2021)

New Dive Shop Members



New Reef Renewal Instructors



Active Reef Renewal Instructors



Our Coral Workforce

Our work would not be possible without the invaluable contributions of our dedicated staff, volunteers and interns, who collectively form the driving force behind our mission. Their passion and commitment both above and below the water enable us to tackle coral restoration from all angles, from nursery maintenance and outplanting efforts to events and educational programs.

RRFB Interns play an active role in many aspects of our work, gaining **hands-on experience** in projects like larval propagation and more.

International Volunteer Day was a chance to welcome new volunteers and thank those who have supported us for years.



3,100+

Fieldwork hours underwater



38

Resident Volunteers



80+

Active Volunteers



8 Interns Hosted

43 Interns Hosted to date

11 Nationalities Represented

What's NEW?

2022 marked a transformative period for our organization. Hiring a new Reef Restoration Technician has enabled us to ramp up our fieldwork efforts and successfully scale up our initiatives. In parallel, the addition of a dedicated Communications and Development Officer has empowered us to elevate our outreach and funding endeavors. Recognizing the need for an expanded workspace, we secured a new office that has become a unified environment for our entire team, fostering collaboration and cohesion. ●



Education & Outreach



On-Island Educational Initiatives

A cornerstone of our work is engaging youth and residents through school programs and educational initiatives.

We equip young people on the island with the tools and understanding they need to safeguard Bonaire's reefs and raise awareness around coral restoration through interactive learning, including snorkel tours and hands-on coral restoration training. We aim to inspire a new wave of environmentally conscious leaders and foster a collective commitment to preserving the richness of Bonaire's marine ecosystems for generations to come.

STINAPA Marine Park Rangers

9 Jr. Rangers **2** Rangers



Outreach Events

In 2022, we hosted and participated in a number of events and presentations, reaching diverse audiences both locally and internationally. Our presentations have covered a wide spectrum, ranging from general overviews of our work to in-depth talks about our monitoring practices to research audiences. ●



450+
People Reached



Francesca presented at Reef Futures 2022 - a conference in Key Largo (USA), bringing together coral restoration practitioners and researchers from across the globe.



RRFB joined many other nature organizations for Biodiversity Day, a community-wide event at Lac Bay aimed at sharing knowledge about nature, wildlife and biodiversity.

Facilitating Research & Development

We partner with world-class scientists and science-backed organizations to accelerate our work, refine our restoration techniques, and properly communicate our progress.

Research Projects

1 Epigenetic responses to environmental stressors in *Acropora* corals, and applications to coral reef conservation.

Serena Hackerott and Dr. Jose Eirin-Lopez

Florida International University
Environmental Epigenetics Lab

This two-part study investigates the role of acquired epigenetic modifications in helping *A. cervicornis* and *A. palmata* cope with stressors associated with global change.



2 Performance and expansion of wild and restored *A. cervicornis* patches

Allie Blanchette and Dr. Andrew Rassweiler

Florida State University
Rassweiler Lab

This project combines large-scale mapping, in-water scuba surveys, and genetic analysis to understand factors affecting the growth, stress, and mortality of *A. cervicornis* populations in Bonaire.



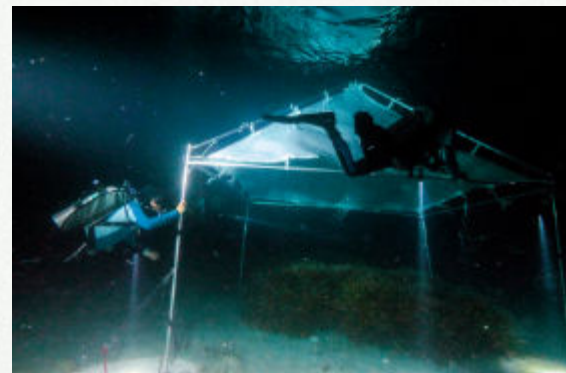
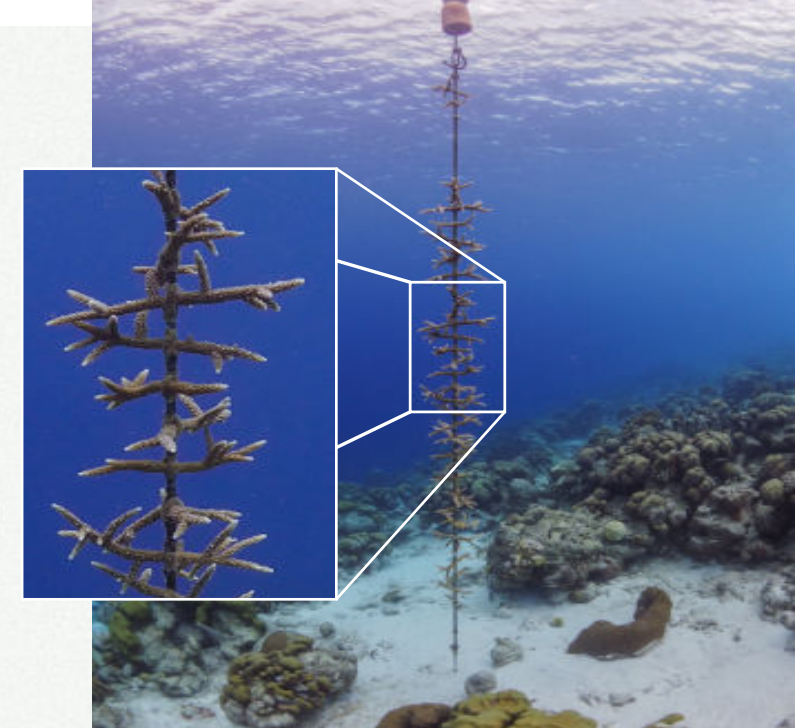
Publications

Spatial Ecology of the Association between Demosponges and *Nemateleporum lighti* at Bonaire, Dutch Caribbean. Gobbato, J.; Magrini, A.; García-Hernández, J.E.; Viridis, F.; Galli, P.; Seveso, D.; Montano, S. - *Diversity* 2022, 14, 607.

What's NEW?

We tested a simplified, **vertical rope nursery** design for 2 species of branching coral: *A. palmata* and *A. cervicornis*.

This innovative approach has the potential to significantly limit the time we spend maintaining nurseries, allowing us to potentially reach more remote areas.



The Multi Colony Collector (MCC)

We joined Secore International to test the Multi Colony Collector (MCC), an innovative device with the potential to streamline the collection of coral spawn and scale up overall restoration efforts.

Empowering Caribbean Restoration



We hosted community leaders from Mustique and St. Vincent for multi-day training workshops, with the goal of sharing knowledge and tools to kickstart restoration efforts elsewhere in the Caribbean.



RRFB joined coral biologists, restoration practitioners, and marine park managers from the BES islands for a workshop on long-spined sea urchin (*Diadema antillarum*) recovery, hosted by Dutch Caribbean Nature Alliance and University of Applied Sciences Van Hall Larenstein (VHL).

Looking Forward

Our Goals for 2023

1 Propagating Coral Fragments

- Install 1 new nursery.
- Increase coral nursery capacity by at least 5%.
- Install at least 20 new trees to expand and refurbish our current nurseries.



2 Outplanting Corals

- Outplant 7,000 *Acropora* corals and 1,000+ boulder coral fragments to the reef.
- Target 1 additional restoration site for *A. palmata*.
- Increase outplanted *A. palmata* to over 25% of total outplanted corals.
- Extend long-term monitoring to 60% of restoration sites.



3 Propagating Coral Larvae

- Monitor spawning of 4 coral species.
- Perform collection, fertilization, and rearing of 3 coral species.
- Deploy the larva rearing pool (CRIB) three times.
- Outplant 2,500+ Seeding Units back to the reef.



4 Education & Outreach

- Support 1,000+ volunteer dives.
- Partner with 1 new dive shop.
- Involve at least 15 local youth through the educational program.
- Engage with at least 300 participants through virtual and in-person events.



5 Research

- Collaborate with 1 additional research group.
- Conduct genetic analysis on the coral genotype stock.





Our work both above and below the water is fueled by the support of individuals, families, organizations, and corporations who believe in our mission. From monetary contributions to field tools and materials, their collective generosity sustains our ongoing restoration efforts.

While it's impossible to list every single person who's helped Reef Renewal Foundation Bonaire in 2022, we'd like to sincerely thank our donors, sponsors, partners, and collaborators for their commitment to our cause.

Sponsors



Partners & Collaborators



Reef Builders (\$1000+)

- Beyond the Corals
- Brian McGrath
- Craig Beaton & Toad Abinante
- David Shane
- Daniel Bender
- Dolph Heck
- Drs. Marjorie A. Hoy and James B. Hoy
- Eldridge Family Fund
- Felsten Fishman Family Foundation
- Ferdinand Rust
- In Honor of Chip
- James Ryan
- John MacKay
- Joseph Mueller
- Julie Hearth
- Kids Sea Camp
- Larry and Bonnie Lefbom
- Leslie Brian
- Lester Knutsen
- Mike and Anner Davis
- Nadine Allen
- Ocean Wishes
- Peter Korn
- Rhia Weinhaus
- Rob Unruh
- Sara and David Trockman
- Thayer/McGivern Family
- The John Akin and Mary Stevens Charitable Fund
- The Kandrach Family
- The Merkle Family
- UC Berkeley Divers & Friends
- William Talbott

If you believe we've left you or your organization out of this list, our sincerest apologies for the oversight. Please let us know at info@reefrenewalbonaire.org so we can correct this right away.

Coral Outplanters (\$500 - 999)

- Alain de Brouwer
- Alexander Sirotkin
- Allan and Leslie Lowe
- Amber Kappel
- Amber Rower
- Andreas Schünemann
- Andries de Boer
- Brave Water Foundation
- Carla Laidlaw
- Castor EDC
- Coral Casino
- Derek Dubossi and Liz Ronan
- Dive Experience Bonaire
- Dive Kawartha
- Donna Hudgeon
- Ellie Fishman
- ExpandTheRoom
- Fernando and Rita Andrade Campos
- Google
- Idonya Pinckney
- Indian Valley Scuba
- In honor of the Children of St Timothy's-Aston
- Jacquelyn Gill
- Janine Nicholson
- Jason & Laurie Wessler
- John Seiler
- Judy Calhoun and Family
- Kevin Gagliano
- Kristina Cook-Doughty
- Larry and Nichole Lehmann
- Lieke and Martijn Breijer
- Life Sagamedia
- Major League Baseball
- Marian Gaston
- Michi and Ursi Keller
- Nicholas and Susan Tang and Family
- Nicolà Gabriel
- Nikki and Scottie Hudsmith
- OceanGeeks
- Ralph de Wit
- Rebecca Turner
- Ron and Jean Theis
- Susan Grieco & Chris Karrenberg
- The Dubachs
- The Hotsma Family
- The Laughing Seahorse
- The Novis Family
- Tim and Heather Smit
- Tim, John, and Martha Lange
- Tourism Corporation Bonaire
- Tricia Coe Shadowfax farm
- Will & Kelly Shaffer
- Will & Meggie's Wedding Crew

Nursery Tree Fillers (\$100 - 499)

- Andy Duerkop
- Bobby Howard
- Brigitte Rohrbach
- Carolyn Zinko
- Christine Heckel-Oliver
- Constance Stirling-Engman
- Daniel Wesner
- Daniel Zeitz and Oath Inc
- David Glick
- Edward Moss
- Elias Thayer
- Elizabeth Altman
- Eve Bohlin
- Frank Ernst
- Frederick Morgan
- Heather McCauley
- Heidi Moon
- Henry Bemporad
- Jane Cleland
- Janet Looker
- Jason Wallace and Microsoft
- Jeffrey Levinton
- Jen Orkfritz
- Jim John Marks
- Joanne Adamkewicz
- John Easterwood
- Judith Schneider
- Karen Banta
- Kelley Henry
- Leslie and Mark Fundakowski
- Lucille Leavitt
- Lydia and Sam Stoler
- Marie-Claire ten Veldhuis
- Martin and Jennifer Reeder
- Mary Reza
- Megan Davies
- Melissa Humbarger
- Mike and Kathi Feibus
- Mirjam Hoekman
- Moderna Therapeutics
- Nicholas Johnson
- Paul Mercurio and Adobe Inc
- Rob Van Leen
- Ruth Winters
- Sandy McLaughlin
- Shelley Baglino
- Simon Blower
- Stanley Wales
- Tim and Linda Taylor
- William Weber

Fragment Makers (\$50 - 99)

- Biodiversity Day
- Breeze Griffiths
- Cathlynn Alcorn
- Cindy Cartwright
- Claire Cointepas
- Daisy Veenhof
- David Lesley
- Deb and Steve LaForge
- Deborah Everett
- Denise Frier
- Dennis Gann
- Erik-Jan Hagenaar
- Erwan Favennec
- Greg Honore
- Gretchen Larsen
- Harvey Young
- James Garland
- Jeff Klatke
- Judith Lewis
- Julie Moylan
- Kathrin Maassen
- Katie Owen
- Kelvin Owen
- Larry Williams
- Laurie Rockwell
- Lorie Kelley
- Louise Fenner
- Mary Gradishar
- Melinda Montgomery
- Mette Hyldgaard
- Michael Berry
- Michael Willshare
- Miguel Sanchez Bastida
- Patrick & Della Edrington
- Paul Shrimplin
- Phoenix Leon Wild
- Robert Simon
- Ruth and Michael Williams
- Sarah Brunson
- Shelly Huston
- Tamas Vincze
- Tom Carey and Take Two Software
- Victoria Schneider
- Villa Olivia Poolside
- Vincent Taams

Financials

| | 2021 | 2022 |
|--|------------|------------|
| | US\$ | US\$ |
| MCB Bank Account Dec. 31 | 356,160.00 | 248,119.00 |
| Total Fiscal Year Revenue | | |
| Donations, Grants, Tags, Courses, Sponsorships <i>(All RRFB funds in Bonaire and US accounts)</i> | 199,627.00 | 268,295.00 |
| Direct Expenses | | |
| Staff wages, salaries, fees | 73,408.00 | 110,299.00 |
| Staff Social benefits, tax, health insurance | 9,568.00 | 14,614.00 |
| Staff training, equipment, other | 1,324.00 | 7,934.00 |
| Marketing, Fundraising, Travel, IT costs | 5,660.00 | 18,750.00 |
| Office rent and utilities | 16,214.00 | 25,304.00 |
| Accounting, outside overhead, support, other | 18,297.00 | 18,454.00 |
| Bank Charges | 317.00 | 353.00 |
| Inventory | - | 3,434.00 |
| Depreciation | 8,599.00 | 10,126.00 |
| TOTAL Fiscal Year Expenses | 133,387.00 | 193,400.00 |

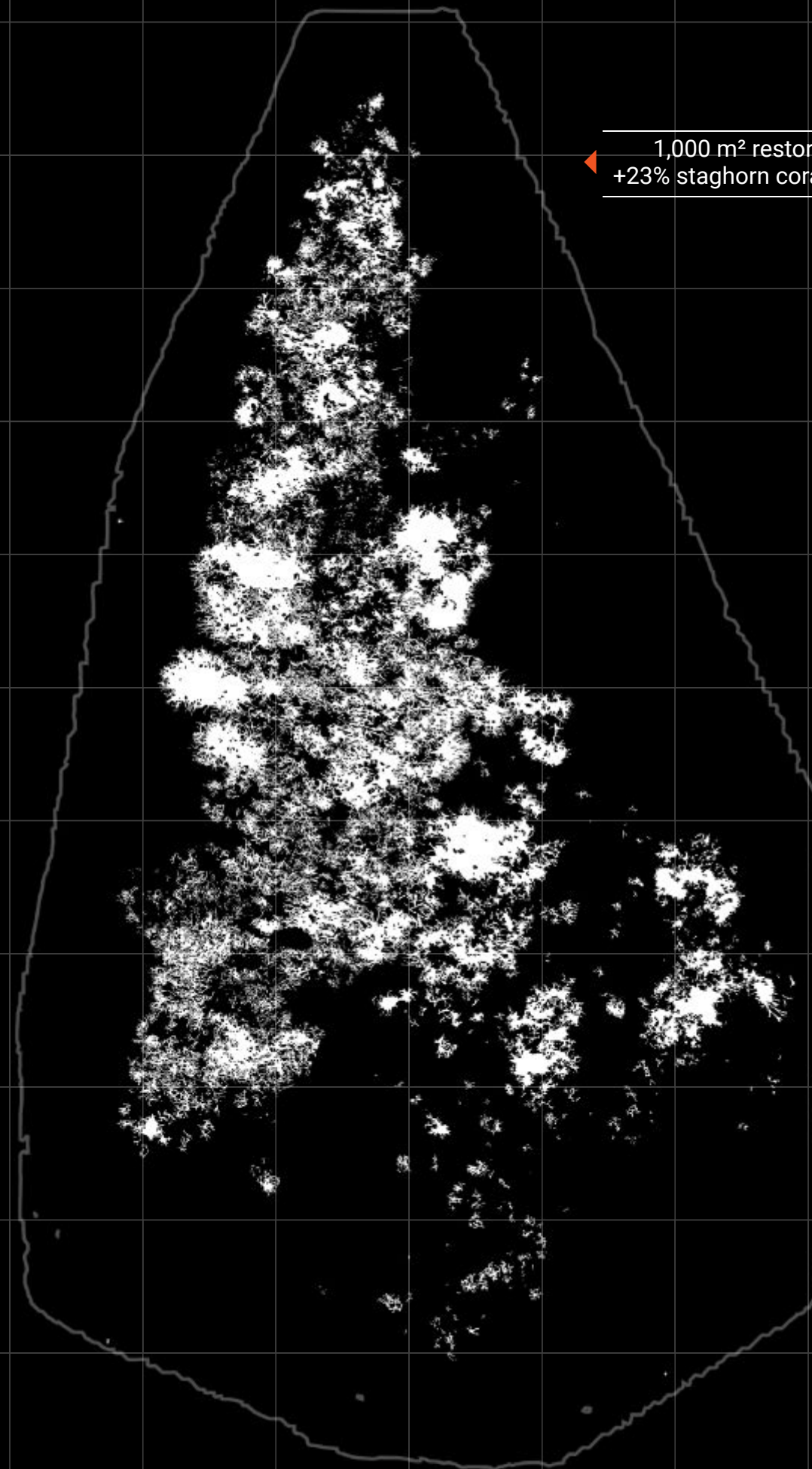
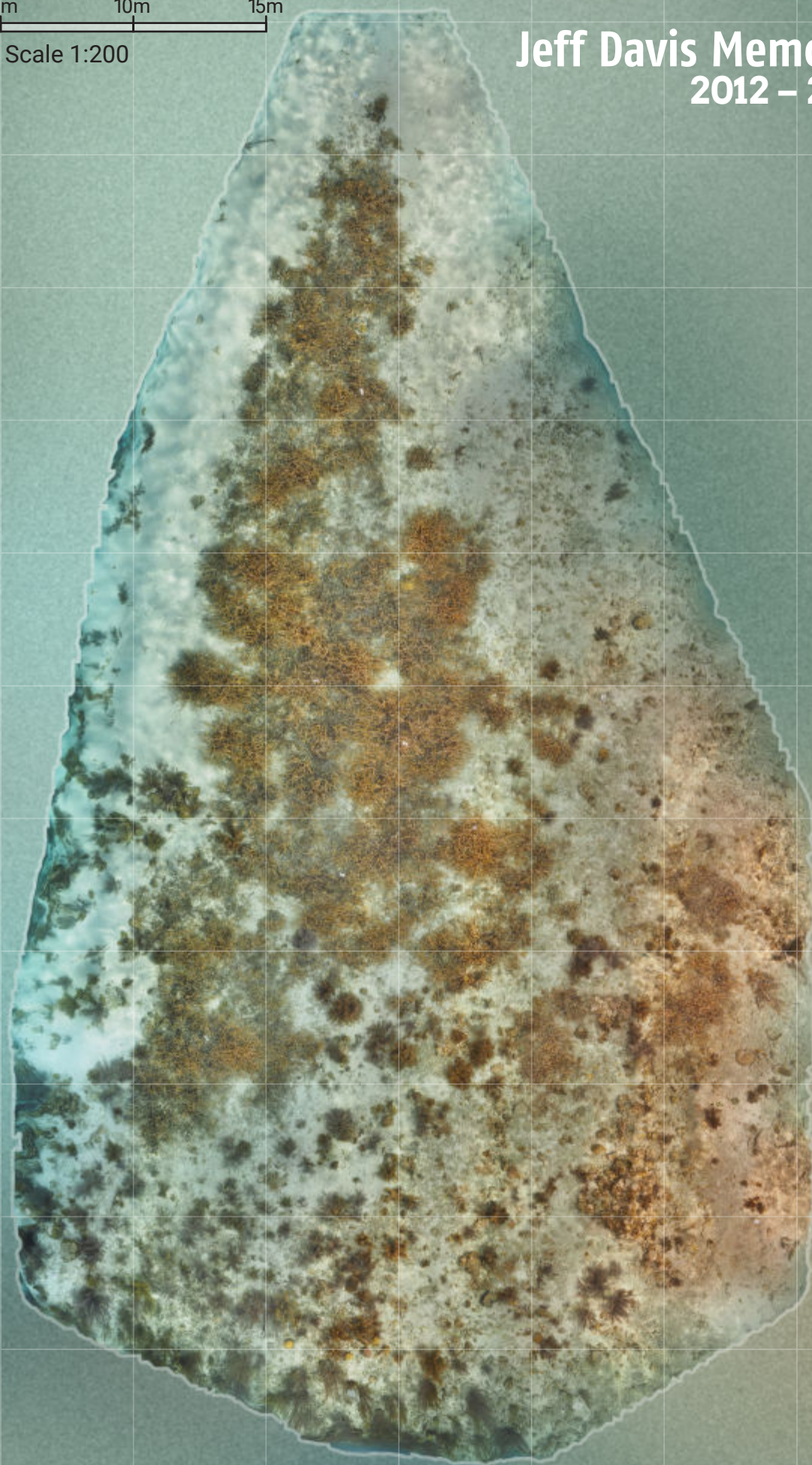


Special Thanks & Credits

We extend a heartfelt thank you to our ever-growing family of volunteers both in the water and out, including long-time volunteer Susie Wall for hand-painting hundreds of driftwood signs for our donors over the years. RRFB is very grateful for the long-time role of Buddy Dive Resort in supporting our daily fieldwork operations and kindly sharing their space with us. Thank you to Lorenzo Mittiga, Paul Selvaggio, David J. Fishman, Reef Patrol, and Dan Bender for graciously allowing us to display their photographs in this report. ●

0m 5m 10m 15m
Scale 1:200

Jeff Davis Memorial 2012 – 2022



Target Species
7

Nurseries
13

Corals in our Nurseries
18,000+

Dive Shop Partners
11

Coral Settlers on the Reef
20,000+

Ecological Footprint
13,008 m²

Corals Outplanted
50,000+

Restoration Sites
22

Genotypes Stocked
79

Educational Events
221

Reef Renewal Divers Certified
1,753

