

## OUR MISSION

---

The mission of CRF is to develop affordable, effective strategies for protecting and restoring coral reefs and to train and empower others to implement those strategies in their coastal communities.

## OUR APPROACH TO ACCOMPLISHING OUR MISSION

---

We take a multi-faceted approach to this seemingly impossible mission. We break down the many challenges into tasks that can be accomplished on austere budgets and in challenging and even remote environments, often with just the tools at hand and the know-how we provide in our training sessions and hands-on experiences. In the past several years, we have focused on perfecting our unique methodology for growing coral in open ocean nurseries and developing training and volunteer programs to support and expand the nurseries and help CRF transplant growing corals to restore nearby reefs.

## OUR HISTORY – THE JOURNEY TAKEN ON OUR MISSION

---

Ken Nedimyer started an offshore live rock aquaculture farm in the Florida Keys in 1994. Within a few years, hundreds of coral larvae had settled on the rock and begun to grow, including three small colonies of staghorn coral. Ken realized that the staghorn coral was special and found ways to protect them from hurricanes and bleaching events while he observed their growth behavior. By 2001, those fledgling coral settlers had grown too large for aquarium use - more like the corals on the nearby reefs. In 2001, as part of a 4-H Project, Ken helped his daughter Kelly began cutting and mounting nursery-raised corals using very crude equipment and tools.

By 2003, Ken realized that the corals he was growing could be re-planted on the reef and used to restore degraded reefs, so he approached the Florida Keys National Marine Sanctuary (FKNMS) with a proposal to transplant some of them onto some nearby reefs to see what would happen. Ken was allowed to transplant a few corals to a site at Molasses Reef (the Wellwood ship grounding site) where the reef had been destroyed. By the summer of 2011, after eight years of repairing and replanting broken pieces from the original six corals, there were over 3,000 coral colonies growing at the north end of Molasses Reef. In the past four years, dozens of those colonies have spawned.

## THE SCIENCE AND LESSONS LEARNED

---

Because Ken's nursery stock started from just three larval settlers in 1996, the methods for successfully growing coral in an open water nursery were largely uncharted territory. The learning curve was steep and progress was slow at first. Ken and his family and volunteers discovered by trial and error (and then taught each other) how to mount coral fragments, when to cut and mount them, how often to clean the invasive algae, and how to manage diseases - lessons that were often frustrating and time consuming. The eight hurricanes that brushed or passed over the Keys in 2004 and 2005, coral bleaching events in 2007, and record setting cold in early 2010 provided more tough lessons and setbacks. But each event resulted in additional knowledge and refinements to the nursery design and maintenance processes, and today the nursery program has become extremely efficient, effective, and affordable.

## CRF TODAY

---

While we are still focused on the science and development of coral growth and planting techniques, CRF is putting more and more of its efforts into developing community outreach and education, volunteer training, and reef restoration programs.

The idea of involving volunteers began in 2004 with Kelly Nedimyer's 4H program that required some sort of community service project. She and her family involved some local high school and 4H students in diving and working in the coral nursery. Now hundreds of volunteer divers are getting involved in CRF nursery and reef restoration programs.

Our educational programs are aimed at Awareness, Protection, and Restoration of coral reefs.

- CRF helped develop the Coral Reef Restoration class that is offered at the Florida Keys Community College. Our goal is to encourage more colleges and universities to add coral nursery and restoration programs into the marine sciences curriculum. CRF partners with professors who want to bringing students to the CRF facilities and nurseries in the Keys for multi-day, hands on learning programs.
- We work with local, regional, and national high school teachers to provide the same kinds of experiential learning programs for their students. Local students in Key Largo are actively involved in assisting with all aspects of the coral nursery and restoration program, as well as ongoing "Reef Minders" maintenance programs.

- We work with volunteers from SCUBA clubs, dive shops, environmental groups, and other organizations looking for ways to get involved in saving our coral reefs. CRF provides workshops, training, and “get wet and work” programs in our nurseries and out on the Florida reefs.
- The CRF Volunteer Training Programs include everything from a one-day educational dive experience to long-term training programs designed to develop team leaders and project leaders. Several levels of the PADI Distinctive Specialty dive certification program have also been developed and approved, and course outlines and training materials are available to local SCUBA instructors who want to participate.
- In the Upper Keys, CRF is working to develop a community based restoration program that works with local dive shops to train visiting divers to help transplant nursery grown corals out onto selected reefs. Our hands-on training methods quickly allow certified divers to begin working on saving our reefs.
- Like volunteer foresters who plant tiny saplings that restore forests after fires, disease, and other natural disasters, we bring our coral “foresters” into the underwater world of growing, planting, and maintaining new reefs that revive the underwater habitat with new growth. After planting corals from the nurseries onto the reef, our volunteer “Reef Minders” maintain, repair, and nurture those burgeoning new reefs with regular care and attention to the emerging growth.
- As part of our diver and environmental education programs, we promote “gentle” underwater tourism and protection of reefs against natural and man-made threats. CRF fosters sustainable fishing and coastal development practices. We promote recycle/ reuse programs, alternative energy, and all forms of environmentally conscious ways to maintain a healthy “planet” environment for coral and other reef dwellers.

## OUR RESULTS

---

Education, Action, and Results are three words that summarize the focus of our time and resources at the Coral Restoration Foundation. We believe that education combined with action will produce results, so when we match that formula to volunteer programs, the results achieved are significant and far reaching.

Through speaking engagements, trade shows, and seminars, we have reached tens of thousands of people with our message of coral reef protection and restoration. While the main focus of our message is about the importance of taking steps to restore reefs through replanting key coral species, we also stress that restoration alone will not fix the problem, and that activities such as improving waste and storm water treatment, reducing physical impacts, reducing greenhouse gasses, and managing fisheries are important parts of an overall reef protection and restoration program. We're trying to stress that there is hope, but that the "clock is ticking" and action needs to be taken now while the opportunity is still here, which is the focus of our second key word: "Action."

Action is what sometimes seems to be lacking in today's rhetoric about reef protection. Often in the climate change/ocean acidification discussions, the solution to the problem, the "Action" needed, is so overwhelming that there is no clear place to start and no clear way to accomplish it, so the average person or the average activist group spends more time talking about the problem than doing something constructive about it. The threats facing coral reefs are enormous and lasting solutions require global action, but regardless of the size of the problem, the solutions require action, and those actions usually start with small, seemingly insignificant steps. At this point we are not a global company and don't have the resources to act globally on anything, but we have identified several small steps that we can take to protect and restore the coral reefs in our part of the world, and we are acting on those steps. We believe that some of these actions can be applied to other coral reefs in the Caribbean and throughout the tropics, so we are working with other environmental groups, private businesses, governments, and individuals to share what we've learned and learn from them what they have learned.

At our original coral nursery off the island of Key Largo in the Florida Keys, we have slowly but diligently worked at refining our nursery techniques over the past ten years and have recently made some significant breakthroughs in raising output and lowering production costs. Our new coral tree nursery design has revolutionized the way we grow coral and has allowed us to grow small coral fragments into reef ready colonies in less than a year with minimal care during the grow out period. The floating tree design has also proven to be more storm resistant than the more traditional disk nursery design or the line nursery design.

The Key Largo nursery is now the biggest coral nursery in the western hemisphere, and possibly the largest in the world. It is certainly the largest coral nursery dedicated to reef restoration, and is the largest that utilizes just second, third, and fourth generation corals for use in restoration. As of the fall of 2011, there are 95 different genetic strains of staghorn coral growing in the nursery, all of which originated from an average of 30

linear centimeters of primarily fragments of opportunity per genotype. The fall 2011 inventory count exceeded 17,000 corals, and the potential output of the site is over 15,000 reef competent coral colonies per year.

## FUTURE PLANS

---

CRF expects to receive permits in early 2012 to start planting 50,000 nursery grown corals throughout the Florida Keys over the next five years. Using CRF's proven methods for outplanting corals, this unprecedented scale of restoration will have far reaching implications for the Florida reef tract. The targeted sites are based upon historically high staghorn/elkhorn coral populations and include many popular reefs that are frequented by tourist divers. By involving both the commercial diver operators and the local residents, these restoration events become part of their efforts and encourage reef stewardship. As these corals begin to grow, these and other volunteer groups can help CRF and the reef by monitoring and maintaining these restored sites through the "Reef Minders" program.

Currently, CRF's Tavernier coral nursery is the main supply for nursery-raised staghorn corals to be outplanted. The scope of CRF's future work will require an additional nursery to be strategically placed further north to help cost effectively "seed" many of the popular Upper Key Largo reefs. Much like the success at sites like Molasses Reef in Key Largo (Wellwood restoration), CRF will further enhance recovery of staghorn and elkhorn corals by placing numerous genotypes together at 22 additional reef sites, effectively "jump starting" natural recruitment through future sexual reproduction by nursery-raised corals.

The need to start expanding into other coral species is also an important aspect to CRF's future. While elkhorn and staghorn coral are model species for nursery work due to their fast growth and critical reef building capacity, many other species are equally important and need to be addressed. CRF has identified several species and will be actively expanding the nursery areas to accommodate this additional coral diversity.

Since CRF's mission is not limited to the Florida Keys, so international projects are key to having a broader impact on global coral reefs. CRF is actively working in a couple of areas of Columbia and most recently Bonaire. Due to the simple and cost effective methodologies of CRF's nursery techniques, coral restoration is possible anywhere in the world where these animals exist. CRF has also partnered with several public aquaria to encourage land-based coral culture for restoration and conservation. This also provides CRF with a "seed bank" of coral genotypes that can be used if a hurricane or other significant event were to damage the offshore ocean nurseries.

112 Garden Street • Tavernier, FL 33037  
coralrestoration.org • adoptacoral.org  
programs@coralrestoration.org



CRF's plan will put Florida and Key Largo in the international spotlight. Currently, Key Largo is known as the "Diving Capital of the World" and CRF plans to additionally make it the "Coral Restoration Capital of the World", thereby showing that this can be done anywhere in the world with active community involvement.