

### LETTER FROM OUR PRESIDENT

Looking back on more than a quarter-century of ocean conservation, REEF's impact is remarkable.

From using citizen science as a means to explore our oceans, to combating invasive species like lionfish, and working to protect endangered species like Nassau Grouper, we are proud to be a community of more than 60,000 ocean stewards dedicated to marine conservation.

Today, more than 15,000 divers and snorkelers have contributed to the world's largest marine life database, which includes more than 200,000 surveys. It has never been more important to ensure that we protect our oceans by promoting citizen science and environmental education, and

REEF is working to build a strong legacy of ocean conservation.

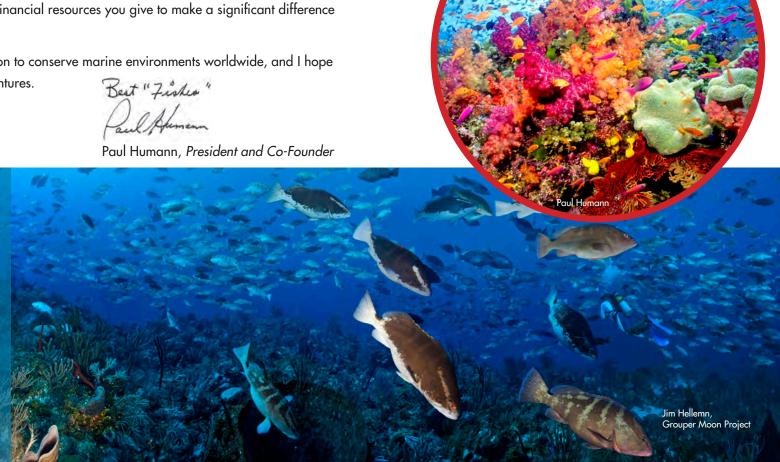
As we look to the future, we plan to continue building a community of ocean stewards by expanding our facility in Key Largo, Florida, to ensure that we can educate even more people about our the importance of our marine environment.

Whether you have been with REEF since it was founded in 1990, or joined somewhere along the way, we are grateful for the time, skills, and financial resources you give to make a significant difference in ocean conservation.

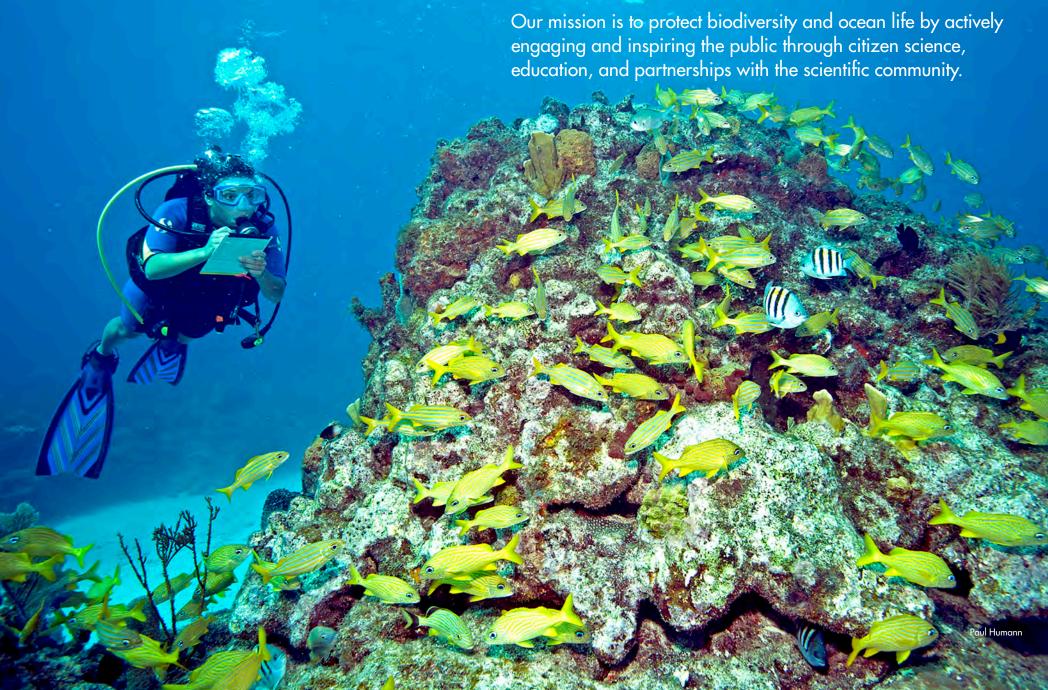
Thank you for being a part of our mission to conserve marine environments worldwide, and I hope you will continue to join us on our adventures.

#### **BOARD OF TRUSTEES**

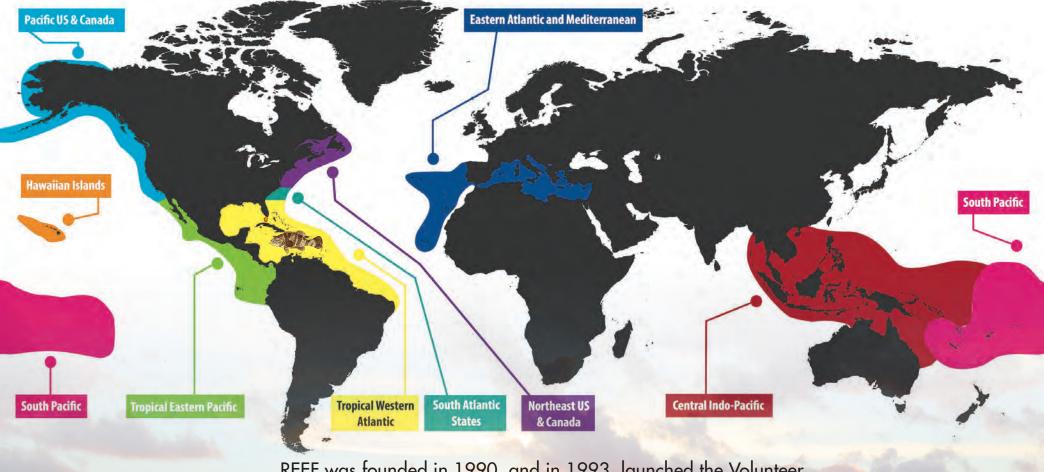
Paul H. Humann, President and Co-Founder Ned DeLoach, Co-Founder James P. Dalle Pazze, Esq. Alexander Alexiou Janet Camp **Andy Dehart** Anna DeLoach Harris Friedberg, Ph.D. Peter Hughes Mary "Mel" McCombie, Ph.D. Robert Ramin Marty Snyderman



## REEF CONSERVES MARINE ENVIRONMENTS WORLDWIDE.



### WHERE REEF WORKS



REEF was founded in 1990, and in 1993, launched the Volunteer Fish Survey Project. This citizen science-based marine life monitoring program has become the world's largest such effort. Today, REEF has expanded its core programs to include monitoring and research of endangered and invasive species, education and outreach programs, and volunteer dive trips worldwide.

EXPLORE. DISCOVER. MAKE A DIFFERENCE.

### 2016 IN REVIEW

Hosted our annual **REEF Fest in Key Largo**, attended by **more than 400 ocean enthusiasts**, divers, and conservationists

Provided research to support legislation in the Cayman Islands that **permanently protects endangered Nassau Grouper** populations from overfishing

Attended **five dive shows** throughout the US, including Our World Underwater (Rosemont, IL), Beneath the Sea (Secaucus, NJ), Boston Sea Rovers (Boston, MA), Long Beach Scuba Show (Long Beach, CA), and DEMA Show (Las Vegas, NV).

Hosted **34 ocean education programs** at REEF Headquarters for groups ranging from school children, to universities, to adult travel groups

Received funding from Monroe County Tourist Development Council for **improvements**, additions, and renovations to REEF Headquarters

Published the **second edition of The Lionfish Cookbook**, featuring more than 60 appetizer and entrée recipes designed to encourage the removal and consumption of invasive lionfish

REEF Director of Special Projects, Lad Akins, was honored as a 2016 recipient of **DEMA's Reaching Out Award**, designed to recognize individuals who have made a significant contribution to the dive industry

Released a Lionfish Sightings App for divers throughout the Atlantic and Caribbean to report invasive lionfish and access location information for lionfish removals

Presented scientific findings at the International Coral Reef Symposium in Hawaii, including an analysis of REEF survey data collected by volunteers in Bonaire Marine Park over the last 20 years

Developed markets for invasive lionfish through partnerships with chefs and restaurants, including lionfish tasting dinners and a lionfish culinary competition

Coordinated the first Field Survey Trips to the Central Indo-Pacific region, resulting in more than 1,500 REEF surveys from the Philippines, Palau, and Yap

Continued to host our popular monthly Fish & Friends event, a marine science seminar and social, featuring presentations on diving, marine biology, and underwater photography



### PROTECTING BIODIVERSITY THROUGH CITIZEN SCIENCE



STANDOUT SURVEYORS This year, we welcomed three dedicated surveyors into the prestigious Golden Hamlet Club, a group of volunteers who have made outstanding contributions to citizen science by conducting at least 1,000 REEF surveys. Congratulations to Patti Chandler, Kim White, and Tracey Griffin for reaching this milestone!

### **VOLUNTEER FISH SURVEY PROJECT 2016 STATS**

- 11,394 surveys were conducted worldwide by 1,005 volunteer citizen scientists.
- To date, 217,876 surveys have been conducted at 13,277 survey sites. \*As of Aug. 13, 2017

# In 2016, **four papers** were published in scientific journals that included REEF data:

- Bernard, AM, KA Feldheim, R Nemeth, E Kadison, J Blondeau, BX Semmens, MS Shivji.
   2016. The ups and downs of coral reef fishes: the genetic characteristics of a formerly severely overfished but currently recovering Nassau grouper fish spawning aggregation.
   Coral Reefs. 35:273–284
- Johnston, M.W and J. L. Akins. 2016. The non-native royal damsel (Neopomacentrus cyanomos) in the southern Gulf of Mexico: An invasion risk? Marine Biology. 163: 12
- Montecino-Latorre, D, ME Eisenlord, M Turner, R Yoshioka, CD Harvell, CV Pattengill-Semmens, JD Nichols, and JK Gaydos. 2016. Devastating Transboundary Impacts of Sea Star Wasting Disease on Subtidal Asteroids. PLoS ONE. 11(10): e0163190.
- Schultz, JA, RN Cloutier, IM Côté. 2016. Evidence for a trophic cascade on rocky reefs following sea star mass mortality in British Columbia. PeerJ. 4:e1980

### REEF DATA IN ACTION: Documenting Sea Star Wasting Disease

In recent years, the U.S. Pacific Northwest and western Canada experienced a mass mortality of sea stars, important predators and keystone invertebrates in many temperate marine habitats. The sunflower star (*Pycnopodia helianthoides*), a previously abundant predator, disappeared from many sites over the course of several weeks in 2013. REEF volunteer surveyors collected data about this startling population decline. Scientists used REEF's database to document the sea star decline regionally, along with a dramatic increase in green sea urchins (*Strongylocentrotus droebachiensis*) as well as declines in kelp canopy coverage. This type of ecological change is known as a tropic cascade, meaning that a change in one species impacts many others. The long-term and widespread nature of REEF's Volunteer Fish Survey Project has proven invaluable in documenting the impacts of sea star wasting disease.

### **RAPID RESPONSE:**

### Non-native marine fish captured in Florida

In October 2016, a REEF member spotted a popular aquarium fish, the Onespot Rabbitfish (Siganus unimaculatus), while SCUBA diving near Dania Beach, Florida, and reported this sighting to REEF. REEF and the U.S. Geological Survey (USGS) worked together to successfully capture the fish within 24 hours. This was the first record of the Onespot

Rabbitfish outside of its native western Pacific Ocean, but the 36th nonnative marine fish species documented as part of REEF's Exotic Species Sightings Program. It is unknown how the fish could impact its nonnative range, but it is still a cause for concern. "Non-native fish compete with and prey on native marine life and can spread diseases," said

Pam Schofield, USGS Fish Biologist. In addition to the rabbitfish, REEF has coordinated the removal of four other non-native marine fish species from Florida waters. The Onespot Rabbitfish is now on display at the Patricia and Philip Frost Museum of Science in Miami, to educate the public about the importance of early detection and rapid response.

### 2016 FISHINARS BY THE NUMBERS

REEF continued to offer our popular Fishinar program in 2016.

- 27 sessions
- More than 850 attendees
- 172 webinars in current archives
- Topics ranging from Gulf of Mexico fishes to Manta Rays, to practical applications using REEF's online database

Fishinars are free, online webinars about marine life identification and related ocean topics. By viewing Fishinars, REEF members can explore and discover the marine environment

from the comfort of their own home – all that's needed is an Internet connection!



Every July REEF mobilizes and trains volunteers to document fish diversity and population trends. Dozens of GAFC events were held across all REEF regions in 2016, including free identification seminars and organized survey dives. www.fishcount.org





### PROTECTING BIODIVERSITY THROUGH CITIZEN SCIENCE



"Being a volunteer has given me the opportunity to see firsthand and learn many fantastic facts about the sea and the creatures living there. REEF has brought me to places I never imagined I would go, and shown me sights I thought were unbelievable." – Doug Harder



REEF volunteers who conduct a minimum number of surveys and pass an identification exam for a given survey region achieve **Expert** status in that region and are invited to join REEF's **Advanced Assessment Team (AAT)**, consisting of more than **400 members worldwide**. Members of the AAT assist REEF with special survey projects. Two important long-term monitoring projects take place annually in Washington State, to assess fish and invertebrate populations.

### OLYMPIC COAST NATIONAL MARINE SANCTUARY

- Started in 2003
- In 2016, the team documented 100 species of fish and invertebrates, including juveniles of 10 different rockfish species. This could be a positive sign for these threatened fish species.

### SAN JUAN ISLANDS (in partnership with SeaDoc Society)

- Started in 2013
- Annual results from this project have been important in tracking the spread of sea star wasting disease and better understanding the impact of rockfish conservation zones.

#### **REEF FIELD SURVEY TRIPS:**

This year we offered our most diverse set of Field Survey destinations, welcoming hundreds of volunteer citizen scientists on both fish and invertebrate identification trips, as well as three invasive lionfish research trips. Highlights of the 2016 schedule include two of our first ever organized trips to the Central-Indo Pacific (CIP) region, including a two week land and sea exploration of Dumaguete and Tubbataha Reef in the Philippines, and a trip to Micronesia where surveyors collected data in both Yap and Palau. In 2016, 222 participants conducted more than 2,220 surveys and removed more than 1,280 invasive lionfish, proving that REEF Trips truly are "Dive Vacations That Count."

### 2016 REEF TRIPS BY THE NUMBERS

Barbados, Dive Barbados Blue and Coconut Court Beach Hotel - 132 surveys

Belize, Blackbird Caye Resort - 245 surveys

Bermuda, Dive Bermuda and Grotto Bay Beach Resort – 105 surveys

British Columbia, Rendezvous Dive Adventures – 67 surveys

Cozumel, Chili Charters and Safari Inn/Casa Mexicana – 298 surveys

Cozoniei, Chini Charlers and Salari Inin/ Casa Mexicana – 270 surveys

Curacao, Go West Diving and Kura Hulanda Lodge - 514 lionfish removed

Dominica, Dive Dominica and Castle Comfort Lodge – 131 surveys, 566 lionfish removed

Florida Keys, Islamorada Dive Center and Postcard Inn at Holiday Isle - 73 surveys

Micronesia, Manta Ray Bay Resort and Palau Aggressor II - 465 surveys

Philippines, Atlantis Dumaguete Resort and Azores Liveaboard – 457 surveys

Saba, Sea Saba Dive Center and Juliana's Hotel – 95 surveys

Utila, Laguna Beach Resort – 37 surveys, 204 lionfish removed

Virgin Gorda, Dive BVI and Guavaberry Spring Bay – 120 surveys

### INSPIRING ACTIONS FOR CONSERVATION





### PROTECTING A CARIBBEAN ICON:

### Cayman Islands Enacts Sweeping Science-based Reforms to Nassau Grouper Fishery Regulations

During winter full moons, Nassau Grouper reproduce in large spawning aggregations. The species has suffered severe population declines due to fishing on spawning sites and is now endangered. Through the Grouper Moon Project, REEF works with the Cayman Islands Department of the Environment and academic scientists to monitor aggregation sites, conduct cutting-edge research on genetics and ecology, and provide important conservation information to policymakers and educators. Thanks to these ongoing research efforts, in 2016 the Cayman Islands government enacted a comprehensive set of regulations to recover Nassau Grouper locally, and promote conservation efforts throughout the region.

### The regulations include:

- All take, possession, or sale of Nassau Grouper is prohibited during spawning season (December-April)
- 2• When take is permitted (May-November), no more than 5 Nassau Grouper per fishing vessel per day can be kept and harvested fish must be 16 24 inches
- 3. Nassau Grouper may not be taken on spear gun

REEF has conducted research on the Nassau Grouper spawning aggregation in Little Cayman for the past 15 years. Ongoing research and education programming is conducted in partnership with scientists from Scripps Institution of Oceanography at UC San Diego and Oregon State University. The Grouper Moon Project is the Caribbean's oldest continuous grouper spawning aggregation research program, and represents one of the most advanced, multi-faceted tropical fisheries research programs in the world.

SUPPORT FOR THE GROUPER MOON PROJECT PROVIDED BY:

Brac Reef Resort
Cayman Airways
Cayman Islands Department
of the Environment
Peter Hillenbrand
FLOW Cayman Islands
Little Cayman Beach Resort
and Reef Divers
Southern Cross Club



### INSPIRING ACTIONS FOR CONSERVATION







REEF is an international leader in addressing the lionfish invasion throughout the Atlantic, Caribbean, and Gulf of Mexico. In 2016, regional and local efforts included research, control, market development, outreach, and management.

### **REEF LIONFISH DERBIES**

- Removing 2,426 invasive lionfish through REEF Lionfish Derbies in the Florida Keys, Sarasota, Ft. Lauderdale, and Palm Beach County
- 8 sanctioned derbies held in five different countries

REEF hosted Lionfish Collection and Handling Workshops to educate the public of safe removal techniques, as well as Lionfish Jewelry Workshops designed to further encourage commercial market development.

In 2016, **two papers** were published in scientific journals that included findings from REEF's Invasive Lionfish Program:

- Luis Malpica-Cruza, L, LCT Chavesa, IM Côté. 2016.
   Managing marine invasive species through public participation: Lionfish derbies as a case study. Marine Policy. 74 (December 2016): 158–164
- Hixon, MA, SJ Green, MA Albins, JL Akins, and JA Morris Jr. 2016. Lionfish: a major marine invasion. Marine Ecology Progress Series. Vol. 558: 161–165

In 2016, REEF published the second edition of *The Lionfish Cookbook*, co-authored by Tricia Ferguson and Lad Akins, with photography by David Stone. The book features more than 60 appetizer and entrée recipes to encourage the removal and consumption of invasive lionfish. Adding to the original 45 recipes in the first edition, the second edition also includes 16 new recipes from guest chefs serving lionfish throughout the Caribbean.





### BUILDING A COMMUNITY OF OCEAN STEWARDS



REEF is proud to honor Janet Eyre as our 2016 VOLUNTEER OF THE YEAR.

Janet is an expert in tropical Pacific fish taxonomy. She has helped REEF staff create new survey and training materials and assisted with error checking and quality control of tropical Pacific surveys. Next, she will be working

closely with our staff to develop the next region for the Volunteer Fish Survey Project, the Indian Ocean and Red Sea.

### **About Janet Eyre**

- Joined REEF in 2002
- 1,612 REEF surveys and counting!
- Expert surveyor in four REEF regions—Tropical Western Atlantic, Hawaiian Islands, South Pacific, and Central Indo-Pacific
- Participated in 18 REEF Field Survey Trips to date, plus several Advanced Assessment Team projects
- Discovered a species of goby in Fiji in 2015—it has since been named Eviota eyreae, Eyre's Dwarfgoby.

Fun Fact: Janet sighted 260 species in 73 minutes at the dive site "Edy's Black Forest" near Waigeo in Indonesia, which is REEF's record for most species recorded on a single dive.

Thank you Janet! We are so grateful for your enthusiasm and dedication to REEF and our mission.

BECOMING A REEF MEMBER IS FREE AND EASY AT WWW.REEF.ORG/JOIN

"I feel privileged to be a REEF member and to have the opportunity to dive with so many amazing people who truly care about our seas." – Deb Hebblewhite

### **BUILDING A COMMUNITY OF OCEAN STEWARDS**

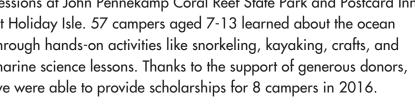






### OCEAN EXPLORERS SUMMER CAMP

In the summer of 2016, REEF held four week-long camp sessions at John Pennekamp Coral Reef State Park and Postcard Inn at Holiday Isle. 57 campers aged 7-13 learned about the ocean through hands-on activities like snorkeling, kayaking, crafts, and marine science lessons. Thanks to the support of generous donors, we were able to provide scholarships for 8 campers in 2016.



### FISH FIELD METHODOLOGY COURSE

Nine college students and recent graduates aspiring to have a career in marine biology and field research attended this week-long summer course in the Florida Keys to learn about commonly used tools and techniques for visual assessments of reef fishes. Through daily classroom and field experiences, the course exposed these young professionals to fish identification, various survey methods, data management, and career options in marinerelated industries.

### MARINE CONSERVATION INTERNSHIP

Interns play a crucial role at REEF by assisting with important research, education and outreach programs, and daily office tasks. Twelve motivated young adults as well as one education specialist intern participated in REEF's internship program in 2016.

"My time as an intern at REEF has helped shaped me into a more well-rounded and passionate candidate for environmental education. I could not be more grateful to have learned from such phenomenal leaders in marine conservation."

- Kathy Ilcken, Fall 2016 Marine Conservation Intern



### LOOKING AHEAD



### IN 2017, WE WILL:

**Transform** REEF Headquarters in Key Largo, Florida, into an educational campus that engages more than 60,000 visitors annually. To support our growing programs, additions will include a new Interpretive Center building and a Native Plants Trail with signage about flora and fauna of the Florida Keys, as well as adding educational exhibits and renovations within the existing Headquarters facility

**Collaborate** with scientific partners to expand the Volunteer Fish Survey Project to the Eastern Indian Ocean, while continuing to facilitate data collection in our existing nine survey regions

**Protect** vulnerable species and habitats by partnering with diverse constituents while conducting innovative research and implementing conservation-based education programs

**Expand** opportunities for conservation-minded individuals and organizations to partner with us on ocean initiatives, including active involvement with our Invasive Lionfish Program

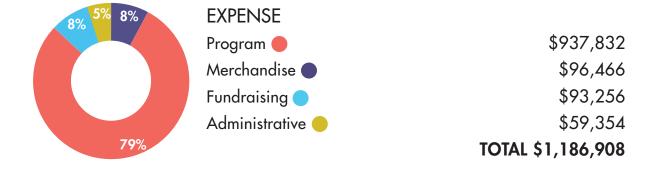
**Increase** our online presence with an updated website, featuring more visuals and engaging content

**Initiate** work on scaling our data management system to meet the increased participation in the Volunteer Fish Survey Project and demand for its data

### **FINANCIALS**

REEF's ability to conserve marine environments worldwide is dependent on strong financial operations. We strive to keep overhead expenses low while allocating funds directly to meaningful programs and research.















### **OUR SUPPORTERS**

We could not accomplish our conservation goals without the generous support of individuals, foundations, and corporations. While limited space does not allow us to list every donation, each contribution makes a difference in the health of our oceans. Thank you to the following supporters who have made gifts of \$1,000 or more in 2016.

#### BENEFACTORS: \$2,500+

Frederick S. Bucholz Janet and Doug Camp Jim Dalle Pazze Ned and Anna DeLoach Peter Fox and Sheryl Shea Roger and Patricia Grimes Jim and Judy Kewley Murray and Jeanie Kilgour Chris MacGregor John McGurl and Michelle Gluck Rob Mougey Jeffrey Nehms Doualas Oare John and Bonnie Strand

#### SUSTAINERS: \$1,000-\$2,499

Alexander Alexiou Barbara Anderson Martha Austin and and Capt Alan Wilson Philip Balbi Sally Bauer Marta and Paul Bonatz Laurie and Don Brooks Amy and Nathan Brown Timothy Callow Barbara Chu Mindy Cooper-Smith Charles Curry Steve and Mary Dingeldein Kathy and Mark Doane Donn Ellerbrock Neil Ericsson and Karen Florini Carlos and Allison Estape Marty Giesecke

Steve and Marty Gittings Joe Glaser Barbara Goldstein Fred and Janet Heyne Terry and Pam Hillegas Norbert and April Hoeller Dean Howard Paul Humann Emily Ip Kathleen Kingston and Scott Kisling Linda and Lester Knutsen Kreg Martin Gordon and Meridyth McIntosh Franklin and Cassandra Neal Chris Ostrom Susanne Otero-Mallon Neal and Cathy Rakov Robert Ramin Alice and Will Ribbens Patricia Richardson Michelle Rogers William F. Spitznagel Alex Tausanovitch and Cyndee Pelt Ann Tretter Helen Truax and Ian Ross Joyce and Matt Tunnard

### FOUNDATIONS, AGENCIES, & PARTNERS

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Lenfest Ocean Program The Meyer Foundation Monroe County Tourist

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Curtis and Edith Munson Foundation The National Fish and Wildlife Foundation New World Publications

NOAA Center for Coastal Fisheries and Habitat Research

NOAA Coral Reef

Conservation Program

Ocean Reef Conservation Association

Sharkey's Pub and Galley Restaurant

Carl and Caroline Swanson

#### IN KIND SUPPORT

Thank you to all the photographers who donated pictures in 2016!

Rock Beauty by Daryl Duda

Amy Slate's Amoray Dive Resort Atlantis Philippines Dive Dominica Eco Divers Resort Lembeh Florida Keys Brewing Company Florida Keys Electric Cooperative Fred Haase Horizon Divers John Pennekamp Coral Reef State Park **Key Dives** Dr. Stephanie Green Loggerhead Marinelife Center NOAA National Marine Sanctuaries Ocean Divers Dan Orr Quiescence Diving Services Quino El Guardian Liveaboard Rainbow Reef Dive Center Rory McCracken Scubapro Sea Saba Dive Center & Juliana's Hotel The Snider Family U.S. Geological Survey Whole Foods ZooKeeper LLC

Piccolo Ristorante The Pelton Charitable Foundation Rock the Ocean Foundation, Inc. Shulwell Family Charitable Fund The Bernard & Anne Spitzer Charitable Trust

Foundation, Inc. Triad Foundation

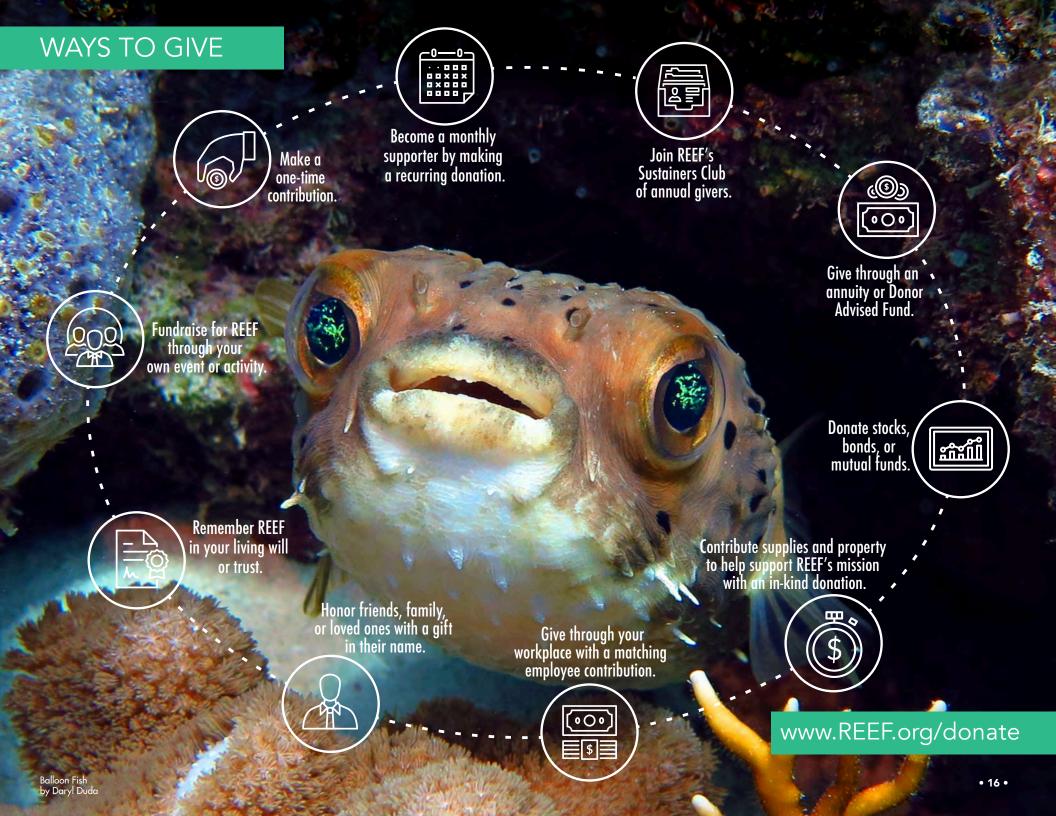
Photos by Janna Nichols. Species from L to R: Blue Chromis, Giant Kelpfish, Fairy Basslet, Sargassum Triggerfish











### THE REEF TEAM

### DIRECTORS

Lad Akins, Director of Special Projects
Martha Klitzkie, Director of Operations
Christy Pattengill-Semmens, Ph.D., Director of Science

### PROGRAM STAFF

Bonnie Barnes, Development Program Manager
Amy Lee, Trips Program and Communications Manager
Jessica Morris, Store Manager
Janna Nichols, Citizen Science Program Manager
Ellie Place, Conservation Coordinator of the Volunteer
Fish Survey Project
Ellie Splain, Education Program Manager

### REEF HEADQUARTERS VOLUNTEER STAFF

Jane Bixby, Office Assistant
Nancy Perez, Key Largo Volunteer and Events Coordinator

### **ADVISORY PANEL**

Billy Causey, *National Marine Sanctuaries* Ken Deaver, Ph.D.

Kalli de Meyer, Dutch Caribbean Nature Alliance Stephen Frink, Stephen Frink Photographic Steven Gittings, Ph.D., National Marine Sanctuaries Wolcott Henry, Curtis & Edith Munson Foundation William Horn, Fish Haven Services

Tom Isgar, Ph.D., Wild Images Photography

Ken Marks, Bits and Pisces Consulting Chris Ostrom

Emily Schmitt-Lavin, Ph.D., Nova University

Edwin Steiner, Ph.D.

Kathleen Sullivan Sealey, Ph.D., University of Miami

Anne Walton, NOAA

Deena Wells-Reppen, Florida Association of Counties
James Bohnsack, Ph.D. NOAA, Science Liaison to the Board

