



MARINE AQUARIUM CONFERENCE OF NORTH AMERICA

MARINE AQUARIUM CONFERENCE OF NORTH AMERICA 2017 • NEW ORLEANS, LOUISIANA



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- 6 WELCOME TO MACNA 2017!**
by Dr. Kevin Erickson, MASNA President
- 9 THINGS TO DO**
Before, during, and after the conference
- 12 MACNA CONFERENCE AREA**
- 14 DAILY SCHEDULES**
- 16 EXHIBITORS**
- 19 RECEPTION & BANQUET**
- 20 SUSTAINABLE CORAL** by Vincent Chalias
- 30 REEFKEEPING ON THE EDGE OF THE FUTURE**
by Julian Sprung
- 37 SPEAKER BIOS**
- 54 ON THE TOWN**
- 60 LOCAL FISH STORES**
- 64 SPONSORS**
- 65 ADVERTISER INDEX**

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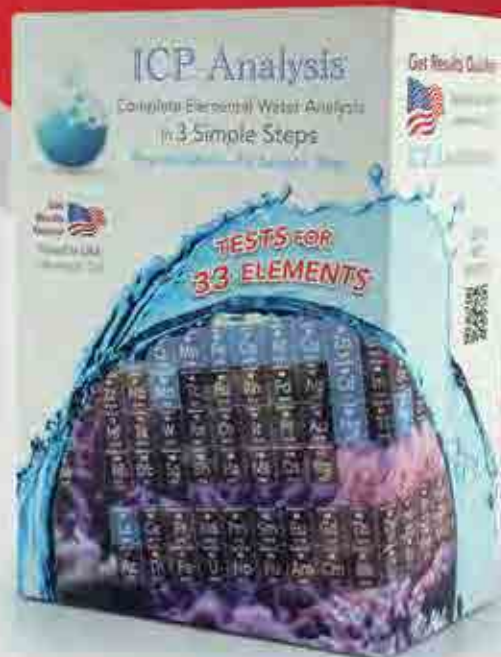
Cover: Honeycomb Brain Coral (*Diploastrea heliopora*), Great Barrier Reef. Image: Gary Bell © OceanwideImages.com

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the Mississippi
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WELCOME!

to New Orleans & MACNA 2017

On behalf of the Marine Aquarium Societies of North America (MASNA) and our many sponsors, welcome to MACNA 2017 in New Orleans, Louisiana! This is the 29th annual MACNA and we are glad you could join us here on the Gulf Coast. You are in for an amazing time! MACNA 2017 has the biggest showroom floor of any MACNA yet, with more than 170 exhibitors. We are also hosting 19 speakers, including scientists, advanced aquarists, and industry pioneers!

Many of those speakers will be incorporating a message of increased sustainability in their talks. I would like to take a moment and continue with that message. As conscientious aquarists, it is our responsibility to ask questions and insist that our hobby be as sustainable as possible. Worldwide, there are voices being raised against the keeping of any wild or even domesticated “pet” animals, and the burden is increasing on us to show that our aquariums are being stocked and kept ethically and with respect for nature.

This can be achieved by taking a few steps that take no additional time. These include asking your LFS to carry captive-bred and aquacultured livestock—especially locally grown—and whenever possible to carry ethically and sustainably collected livestock and provide evidence as to how the livestock was collected.

Livestock that has been through the supply chain with as few steps as possible and has had the best treatment will be a better investment for you. With increased market

demand for these types of livestock, collectively we can create a change in the marketplace. Additionally, as conscientious aquarists, we should all be quarantining our new livestock. By ensuring our new pets are properly quarantined and prepared to be moved to our main displays, we can provide longer, better lives for our current and new pets as well as decrease our need to find replacements. Do not be afraid to ask questions of the LFS employees about the source of their livestock, how the livestock are treated in the supply chain, and the animals’ disease history.

It dawned on me this past year that many of us could be more sustainable than ever before by keeping tanks that run on solar energy stored in batteries within our own homes, filling them with livestock that is 100 percent aquacultured within 500 miles, and using rainwater collected on our own properties and filtered. As our demand for these more sustainable practices and techniques grow, they will become more achievable and financially feasible for hobbyists and suppliers.

Look for the topic of sustainability throughout the MACNA 2017 talks and in this Official Program Guide, and feel free to share the message on social media with the hashtag #MACNA2017. Once again, welcome to MACNA 2017—and have a great time! ■



TOP: NEW ORLEANS CONVENTION & VISITORS BUREAU; INSET: COURTESY KEVIN ERICKSON, PH.D.



WELCOME TO THE
FUTURE OF AQUATIC DESIGN
STREAMLINING AQUARIUMS IN THE 2020s



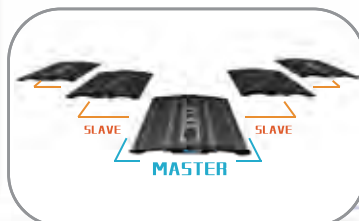
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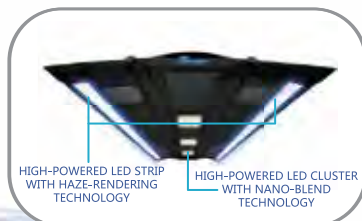
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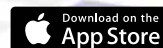
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The Gulf of Mexico exhibit at the world-class Audubon Aquarium of the Americas.

THINGS TO DO

BEFORE, DURING, AND AFTER THE CONFERENCE

AUDUBON AQUARIUM OF THE AMERICAS

Run by the Audubon Institute, this aquarium features a huge array of sea creatures, including Potbellied Seahorses, Leopoldi Stingrays, Southern Sea Otters; large frog and jellyfish exhibits; and local ecosystem exhibits of the Mississippi River and the Gulf of Mexico (the latter is a 400,000-gallon tank, shown above with a famous local sea turtle named King Mydas). Immerse yourself in re-created versions of both the Amazon Rainforest and a sunken Mayan City. 1 Canal Street, (504) 565-3033, www.audubonnatureinstitute.org/aquarium

AUDUBON BUTTERFLY GARDEN & INSECTARIUM

Featuring a huge array of butterflies, beetles, ants, bees, mantids, and much more, this is a must-see for any insect-lover. 423 Canal Street, (504) 524-2847, www.audubonnatureinstitute.org/insectarium

AUDUBON ZOO

A world-class zoo in historic Uptown New Orleans, 6500 Magazine Street, (800) 774-7394, www.audubonnatureinstitute.org/zoo

LOUISIANA CHILDREN'S MUSEUM

A wonderland of interactive escape for curious kids: a climbing wall, art studio, play grocery store and much more. 420 Julia Street, (504) 523-1357, www.lcm.org

MARDI GRAS WORLD

A huge working warehouse where floats are made for Mardi Gras parades. Take a tour to get a glimpse behind the scenes of the Fat Tuesday spectacle and pageantry. 1380 Port of New Orleans Place, (504) 361-7821, www.mardigrasworld.com

STEAMBOAT NATCHEZ

A short walk from most Conference hotels, here is a chance to "come aboard the last authentic steamboat on the mighty Mississippi River," with daily jazz cruises and local cuisine. 400 Toulouse Street, www.steamboat-natchez.com



RIVERWALK OUTLET SHOPPING

A Gulf Coast shoppers' mecca, with a huge collection of outlet stores and eateries offering big brands and southern charm, from Coach and Nordstrom Rack to Fidget Spinners and the NOLA Tropical Winery. 500 Port of New Orleans, (504) 522-1555, www.riverwalkneworleans.com



PRESERVATION HALL

A hallowed place in the history of jazz, this living museum of American music is open nightly during MACNA, with shows at 6, 8, 9, and 10 PM. Just show up and wait in line for admission, or call ahead for “Big Shot” reservations. 726 St Peter Street, www.preservationhall.com

NATIONAL WWII MUSEUM

Visit the nation’s World War II treasury, a must for military history buffs. 945 Magazine Street, (504) 528-1944, www.nationalWW2museum.org

JAX BREWERY BISTRO BAR

A sprawling watering hole in the restored, architecturally historic Jackson Beer factory in the Vieux Carré, (French Quarter.) 620 Decatur Street, www.jaxnola.com

CONTEMPORARY ARTS CENTER

A rotating mix of visual arts, concert performances, and lectures, currently featuring an exhibit billed as Ephemera Obscura. 900 Camp Street, (504) 528-3805, www.cacno.org

HARRAH’S NEW ORLEANS CASINO

If slot machines, baccarat, or poker is your thing, this Las Vegas classic has a New Orleans outpost near the French Quarter with gaming, Chef John Besh’s steakhouse, an Acme Oyster Bar, and libations galore at the Hoodoo Lounge, which has six frozen drink machines and this assurance of local authenticity: “Hoodoo Lounge has been blessed by the voodoo clergy.” 228 Poydras Street, www.caesars.com/harrahs-new-orleans

LALAURIE HOUSE

Considered to be one of the most haunted places in the French Quarter, this mansion has a grisly, storied past and is part of the Ghost Tour. 1140 Royal Street, www.ghostcitytours.com

ST. LOUIS CATHEDRAL

Opened for worship in 1727, this is the oldest cathedral in the United States and a historically rich New Orleans landmark, overlooking Jackson Square. 615 Pere Antoine Alley, www.stlouiscathedral.org

OGDEN MUSEUM OF SOUTHERN ART

Boasts the largest and most comprehensive collection of Southern art and photography in the country, located in the vibrant Warehouse District. 925 Camp Street, (504) 539-9650, www.ogdenmuseum.org

CREOLE DELICACIES & COOKIN' CAJUN

Taste and bring home local delicacies (Creamy Pralines, Café du Monde Beignet Mix, Slap Ya Mama Creole Seasoning) and regional cookbooks. 533 St. Ann Street, (504) 523-6425, www.cookincajun.com

CREOLE QUEEN MISSISSIPPI RIVER CRUISES

Twice-daily historical river cruises. 365 Canal Street, Suite 2350, (800) 445-4109, www.creolequeen.com

NEW ORLEANS MOVIE & TV TOURS

Ride in a 10-passenger van and learn fascinating history of New Orleans and its role in some 200 films and television shows. 227 Bermuda Street, (504) 520-9747, www.nolamovies.com

SPANISH PLAZA

A lovely plaza with a huge, magnificent fountain at its center, located downtown near the Mississippi and other major attractions. 1 Poydras Street, Downtown New Orleans

FULTON ALLEY

Major league bowling alley with games from indoor bocce to darts, played with Deep South comfort food and cocktails. 600 Fulton Street, (504) 208-5593, www.fultonalley.com

BUZZ NOLA BIKE TOURS

Bike rentals and a menu of group tours, including many on electric bicycles, such as the Big Easy Electric Bike Tour, that you allow to pedal at your level of fitness. 214 Magazine Street, (504) 533-9688, www.buzznola.com



GHOST CITY TOURS

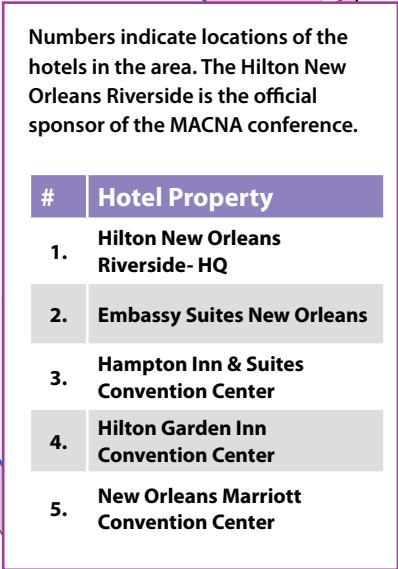
Tours of "one seriously haunted city." 643 Magazine Street. #304, (888) 859-5375, www.ghostcitytours.com

NOLA TROPICAL WINERY

Sample and take home unique fruit wines and sip exotic, refreshing specialties, such as a Blue Sangria or Pineapple Coconut Wine Smoothie. 500 Port of New Orleans, (504) 561-6010, www.nolatropicalwinery.com







3-6PM Early Conference registration
(Exhibit Hall closed)



Welcome!

BAYOU REEFKEEPING is a Louisiana based reef club dedicated to the marine and reef hobbyist in the Gulf Coast region and surrounding areas. Like you, we are a group of hobbyists that share in your enthusiasm and desire to learn how to better care for our tank inhabitants. Bayou Reefkeeping supports members interested in learning more about the hobby, whether you are a novice or expert in reefkeeping. It is your questions, advice, and participation that help define Bayou Reefkeeping and build an informational community. We are proud to present MACNA 2017 in our hometown and are thrilled to have you with us. Enjoy New Orleans!

The Directors of Bayou Reefkeeping
Thomas Adam Clayton, Greg Graham, Eric Owens

7AM-5PM Conference registration open

9:00AM **TULLIO DELL AQUILA** - *The Facts of Light*

10:00AM Exhibit Hall opens for MASNA members

10:00AM **BILL WANN** - *Everything You Wanted to Know About Aquarium Plumbing & Pumps, But Were Afraid to Ask*

11:00AM Exhibit Hall opens to attendees

11:00AM **JULIAN SPRUNG** - *Little Stories 2*

11:30AM **WORKSHOP** - See MACNA 2017 Desk

12:00PM **AUSTIN LEFEVRE** - *Bulletproof Reefkeeping*

1:00PM **TODD GARDNER** - *Tricks of the trade: Small actions and simple tools that can make a big difference in marine fish culture*

1:30PM **WORKSHOP** - Reef Nutrition — **CHAD CLAYTON**

1:30-3:00PM **MASNA POSTER SESSION** - Presenters available

2:00PM **JOE YAIULLO** - *Bonsai Reefkeeping in a 20,000-Gallon Box*

Prize drawing! Winners on screens in Hall E/Lobby

2:30PM **WORKSHOP** - EShops - *Beginner's Guide to Filtration* — **LOUIE TRANG**

3:00PM **GERALD HESLINGA** - *Giant Clams: Sustainable Aquaculture and Conservation*

4:00-6:00 PM MASNA members meeting

6:00PM Exhibit Hall closes

6:45PM Pre-parade gathering — Hall E of MCCNO

7:00-10:00PM Parade/reception at Mardi Gras World

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8AM-5PM	Conference registration opens
9:00AM	MARC LEVENSON - <i>Preparing for the Worst Before It Ever Happens</i>
9:30AM	WORKSHOP - See MACNA 2017 Desk
10:00AM	Exhibit Hall opens to attendees
10:00AM	EHSAN DASHTI
10:30AM	WORKSHOP - Abyzz America — <i>Pumps — The Heart of Aquatic Installations</i> — JEFF MACARE
11:00AM	RICHARD ROSS - <i>The Right Kind of Lazy</i>
11:30AM	WORKSHOP - Industrial Test Systems — CHRIS ZHOU
12:00PM	HUNTER HAMMOND - <i>A "Fairy" Inclusive Look at Keeping & Mixing Cirrhilabrus Wrasses</i>
1:30PM	WORKSHOP - Neptune Systems — <i>Flow & Plumbing</i> — TERENCE FUGAZZI
1:30-3:00PM	MASNA POSTER SESSION - presenters available
2:00PM	SANJAY JOSHI - <i>Tales from the Travel Crypt</i>
2:00PM	PRIZE DRAWING! Winners on screens in Hall E/Lobby
2:30PM	WORKSHOP - ATM Products — STACEY BLOOD
3:00PM	WALT SMITH - <i>Relevance of Coral Farming in the World Today (How Far We've Come)</i>
3:30PM	WORKSHOP - See MACNA 2017 Desk
4:00PM	DR. CRAIG BINGMAN - <i>Reefkeeping by the Numbers: Comparative Nutrient, Gas Exchange, and Calcification Dynamics</i>
4:30PM	WORKSHOP - See MACNA 2017 Desk
5:00PM	BOB FENNER - <i>Anemones for Aquariums: Natural History, Species, Selection & Husbandry</i>
6:00PM	Exhibit Hall closes
7-9PM	Banquet at La Nouvelle Ballroom (MCCNO)

8AM-3PM	Conference registration opens
8:00AM	MASNA president's meeting
9:00AM	MARK CALLAHAN - <i>Coral Placement for the Long Haul</i>
9:30AM	WORKSHOP - See MACNA 2017 Desk
10:00AM	Exhibit Hall opens to attendees
	NED DELOACH - <i>Dream Fish</i>
11:00AM	LAURA BIRENBAUM - <i>Keeping Cuttles and Pajama Squid: We Do It, So Can You</i>
11:30AM	WORKSHOP - Neptune Systems — <i>Alkalinity in the Aquarium</i> — TERENCE FUGAZZI & JIM WELSH
12:00PM	AUSTIN LEFEVRE - <i>Keeping Benthic Feeders with Coral</i>
1:00PM	CAITLIN LEE - <i>The Importance of Captive Breeding and the Future of Our Hobby</i>
2:00PM	SCREENING - <i>Chasing Coral</i> (movie)
3:00PM	Exhibit Hall closes

There is no better high than discovery.
— E.O. Wilson,
biologist & naturalist

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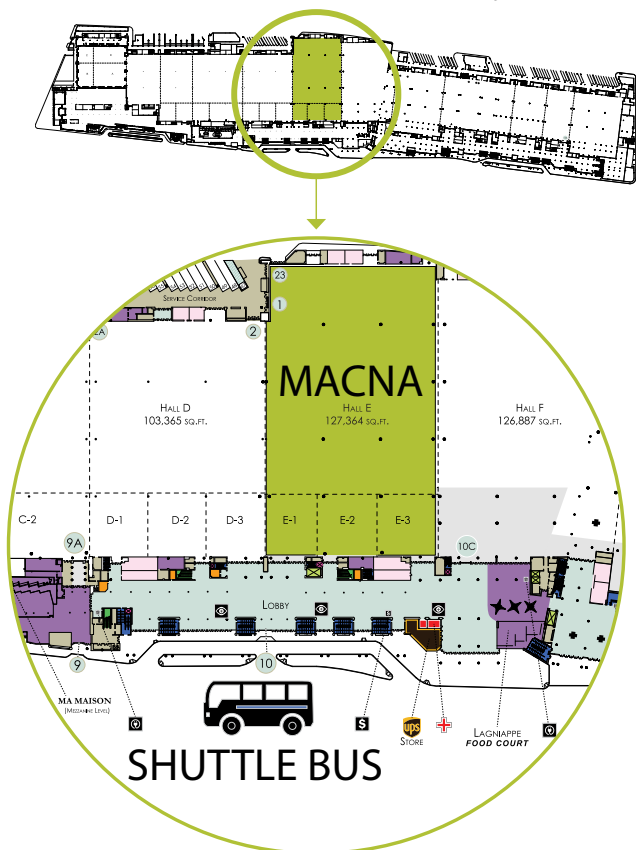
Our Aquarium Solutions® line of products offers safe and effective options to resolve common marine tank issues. Check us out!



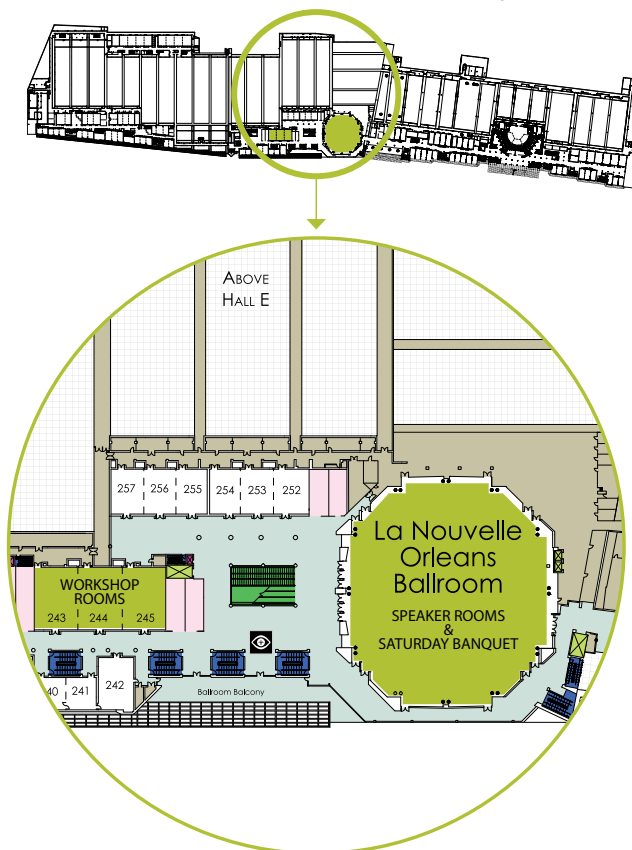
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Convention Center – 1st floor



Convention Center – 2nd floor



The Great MACNA Button Hunt

Find them, trade them, steal them from a buddy... It doesn't matter how you do it, just get **AT LEAST 25** different button pins. Pin them to your lanyard and show proof of your hunt at the registration booth and get a **FREE RAFFLE TICKET** for the exclusive Button Hunt Raffle.

TICKETS LIMITED TO THE FIRST 200 TO ENTER!

No need to be present to win. Winners will be contacted daily by phone. You must submit your name and phone number on the back of your drawing ticket. Your information will not be sold or used for any reason other than contacting a winner. One entry per attendee. Don't be lazy, no sharing buttons!



JBJ LOUNGE

Poster Session

182 Coral Connection	281 Tropic Marin USA
180 Blue Life USA	279 Ken's Tropical Fish
178 Ocean Life Aquariums	277 Two Guys Corals
176 JEBAO CO., LTD	

282 Pieces of the Ocean	381 Lifegard Aquatics
280 Golden Basket Reef	379 Tsunami Coral Reef
276 Spectrum Brands	

382 TECO US/ ATM Aquarium Products	
378 Aquatic Experience	477 Dirk's - The Real Reef-er's Store
376 AquaFX	

482 Beautiful Corals	581 Step Ahead Innovations
480 Reef-A-Palooza	579 TFT Distributors
476 World Wide Corals	

582 Rising Tide Conservation	681 Ocean Inspirations
580 Nice Rack	679 Bill Wann
576 Fritz Industries	

682 Biota Aquariums	
678 Coral Restoration Foundation	777 Got Corals
676 Brightwell Aquatics	

782 Cobalt Aquatics	
778 Planet Aquariums	776 Reef Brite

882 Smooth-On, Inc.	
880 Ushio	979 JIAYU Pumps
878 Smarter Reefs	977 Atlantis Aquariums
876 BulkReefSupply.com / BRStv	

166 Unique Corals	
164 Marco Rocks	263 Fraggin Wagon LLC
162 Riley's Reef	261 Supreme Reefs
160 Strictly Fish Miami	260 Blue Seas Aquariums

270 Zetlight Group	
266 Ming Trading	367 Sticks n' Stones
	365 Joe Knows Reefs
260 AznNutty's Saltwater Connection	

366 Top Shelf Aquatics	465 Reefers Direct
364 iJam Coral	463 Zen Reef
362 Jason Fox	461 Sea Dwelling Creatures

470 Fluval	
468 Reeflo Pumps	565 Aquarium Specialty
466 Bashsea	
460 Hikari USA	

570 inTANK	
568 Crystal Dynamic Aquarium Mfg	667 Milwaukee Instruments
566 Zoomed	665 Poseidon Construction
560 Pecan Grove Solutions	

666 Elos	
664 ME Coral	761 Champion Lighting
662 AutoAqua	

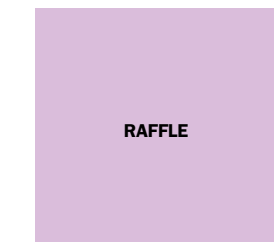
770 Eye Catching Coral	
768 V20 Aquarium Foods	865 Coast Tropicals
766 Aquatic Life	
760 Red Sea	

870 Real Reef Rock	
860 Royal Exclusiv, GH/L, Fauna Marin	

152 Feed Me Algae	251 Sustainable Aquatics
150 SeaSide Aquatics	249 Abyzz
144 Billy's Reef Connection	243 sera
142 SB Reef Lights	

252 RK2 Systems	
250 Joshpork-sandwich Zoas	349 Reef Hobbyist Magazine
244 Coralwear Clothing	343 ProDibio
242 Hydor	

348 Walt Smith International	
346 Reef Builders	445 Reef Savvy
344 Melev's Reef	443 Ecosystem Aquarium
342 Cairns Marine	



648 OmegaSea	
646 Tunze USA	745 Pacific East Aquaculture
644 Fraghouse Corals	743 Spike's Corals
642 ProAquatix	

752 Macro Aqua	
750 Dr. Tim's Aquatics	849 Alternative Reef, LLC.
744 EkoPro Solutions	843 CaribSea
742 Boyd Enterprises Jellyfish Art	

852 Acrylic and Glass Exhibits	
844 Reefs.com	949 Audubon Aquarium of Americas
	943 CORAL Magazine
842 San Francisco Bay Brand	

134 Sun Pet	
132 ICP Analysis	231 Geo's Reef
126 MARSH	225 Artfully Acrylic
124 SemiGrow	

234 New Life International	
232 Corals Depot	331 JKS Aquatics
226 Hanna Instruments	325 Aquarimate
224 Kessil	

330 Aquatic Sealife	
328 Industrial Test Systems	427 Sea & Reef

434 HM Electronics Co., Ltd.	
432 Epic Aquaria	531 Synergy Reef
428 YourReef.com	527 A Reef Creation
426 Reef Nutrition	

534 Kordon LLC	
532 Aquatic Realm Int.	627 Sicce
528 Unlimited Color Corals	
526 ESHOPPS	

630 Current USA	
628 Zoanthids.com	727 Reef Deep Aquatics

734 ORA Farms	
732 Jellyfish Shop	831 AlgaGen
726 Ruby Reef	825 CerMedia
724 Live Aquaria	

834 Pro-Clear Aquatic Systems	
832 Reef Grow	931 Reef Chicks
826 Murfreesboro Aquatics	925 Rossmont
824 Carolina Aquatics	

118 JBJ Lighting	
----------------------------	--

218 Neptune Systems	
-------------------------------	--

320 Coral Vue	
-------------------------	--

418 AquaForest/Deepwater Distribution	
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620 Central Aquatics	
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720 Piscine Energetics	719 D&D
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818 NYOS	910 CAD Lights
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112 Two Little Fishies	
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212 Giesemann	
-------------------------	--

411 Maxspect International	
--------------------------------------	--



611 Triton	
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711 Vaquatics	712 Aqua Illumination
710 Rod's Food	

812 Ecotech	
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- A Reef Creation:** 527
Abyzz: 249
Acrylic and Glass Exhibits: 852
AlgaGen: 831
Alternative Reef, LLC: 849
Aqua Illumination: 712
AquaForest/Deepwater Distribution: 418
AquaFX: 376
Aquarimate: 325
Aquarium Specialty: 565
Aquatic Experience: 378
Aquatic Life: 766
Aquatic Realm Int.: 532
Aquatic Sealife: 330
Artfully Acrylic: 225
Atlantis Aquariums: 977
Audubon Aquarium of Americas: 949
AUTOAQUA: 662
AznNutty's Saltwater Connection: 260
Bashsea: 466
Beautiful Corals: 482
Bill Wann: 679
Billy's Reef Connection: 144
Biota Aquariums: 682
Blue Life USA: 180
Blue Seas Aquariums: 260
Boyd Enterprises: 742
Brightwell Aquatics: 676
BulkReefSupply.com/BRStv: 876
Cadlights: 910
Cairns Marine: 342
CaribSea: 843
Carolina Aquatics: 824
Central Aquatics: 620
CerMedia: 825
Champion Lighting: 761
Coast Tropicals: 865
Cobalt Aquatics: 782
Coral Connection: 182
CORAL Magazine: 943
Coral Restoration Foundation: 678
Coral Vue: 320
Corals Depot: 232
Coralwear Clothing: 244
Crystal Dynamic Aquarium Mfg: 568
Current USA: 630
D&D: 719
Dirk's—The Real Reefer's Store: 477
Dr. Tim's Aquatics: 750
Ecosystem Aquarium: 443
Ecotech: 812
EkoPro Solutions: 744
Elos: 666
Epic Aquaria: 432
ESHOPPS: 526
Eye Catching Coral: 770
Fauna Marin: 860
Feed Me Algae: 152
Fluval: 470
Fraggin Wagon LLC: 263
Fraghouse Corals: 644
Fritz Industries: 576
Geo's Reef: 231
GHL: 860
Giesemann: 212
Golden Basket Reef: 280
Got Corals: 777
Hanna Instruments: 226
Hikari USA: 460
HM Electronics Co., Ltd: 434
Hydor: 242
ICP Analysis: 132
iJam Coral: 364
Industrial Test Systems: 328
inTANK: 570
Jason Fox: 362
JB Lighting: 118
JEBAO CO., LTD: 176
Jellyfish Art: 841
Jellyfish Shop: 732
JIAYU Pumps: 979
JKS Aquatics: 331
Joe Knows Reefs: 365
Joshporksandwich Zoas: 250
Ken's Tropical Fish: 279
Kessil: 224
Kordon LLC: 534
Lifegard Aquatics: 381
Live Aquaria: 724
MACNA 2018: LOBBY
Macro Aqua: 752
Marco Rocks: 164
MARSH: 126
MASNA: LOBBY
Maxspect International: 411
ME Coral: 664
Melev's Reef: 344
Milwaukee Instruments: 667
Ming Trading: 266
Murfreesboro Aquatics: 826
Neptune Systems: 218
New Life International: 234
Nice Rack: 580
NYOS: 818
Ocean Inspirations: 681
Ocean Life Aquariums: 178
OmegaSea: 648
ORA Farms: 734
Pacific East Aquaculture: 745
Pecan Grove Solutions: 560
Pieces of the Ocean: 282
Piscine Energetics: 720
Planet Aquariums: 778
Poseidon Construction: 665
Pro-Clear Aquatic Systems: 834
ProAquatix: 642
Prodibio: 343
Real Reef Rock: 870
Red Sea: 760
Reef Brite: 776
Reef Builders: 346
Reef Chicks: 931
Reef Deep Aquatics: 727
Reef Grow: 832
Reef Hobbyist Magazine: 349
Reef Nutrition: 426
Reef Savvy: 445
Reef-A-Palooza: 480
Reefers Direct: 465
Reeflo Pumps: 468
Reefs.com: 844
Riley's Reef: 162
Rising Tide Conservation: 582
RK2 Systems: 252
Rod's Food: 710
Rossmont: 925
Royal Exclusiv: 860
Ruby Reef: 726
San Francisco Bay Brand: 842
SB Reef Lights: 142
Sea & Reef: 427
Sea Dwelling Creatures: 461
SeaSide Aquatics: 150
SemiGrow: 124
sera: 243
Sicce: 627
Smarter Reefs: 878
Smooth-On, Inc.: 981
Spectrum Brands: 276
Spike's Corals: 743
Step Ahead Innovations: 581
Sticks n' Stones: 367
Strictly Fish Miami: 160
Sun Pet: 134
Supreme Reefs: 261
Sustainable Aquatics: 251
Synergy Reef: 531
TECO US/ ATM Aquarium Products: 382
TFT Distributors: 579
Top Shelf Aquatics: 366
Triton: 611
Tropic Marin USA: 281
Tsunami Coral Reef: 379
Tunze USA: 646
Two Guys Corals: 277
Two Little Fishies: 112
Unique Corals: 166
Unlimited Color Corals: 528
Ushio: 880
V20 Aquarium Foods: 768
Vaquatics: 711
Walt Smith International: 348
World Wide Corals: 476
YourReef.com: 428
Zen Reef: 463
ZETLIGHT GROUP: 270
Zoanths.com: 628
ZooMed: 566

Reception & Banquet

Friday Welcome Reception: Come to Mardi Gras World!



The MACNA 2017 Friday night reception will take place at **Blaine Kern's Mardi Gras World** ("Where every day is Mardi Gras!"), an unforgettable venue found only in New Orleans. Attendees will experience a traditional New Orleans Second Line Parade—"a quintessential New Orleans art

form—a jazz funeral without a body," followed by a night of music, food, and libations on the bayou.

To participate in the half-mile parade, gather in the lobby of Morial Center Hall E at 6:45 PM for the pre-parade festivities and a 7 PM parade to Mardi Gras World. Buses will be departing Hall E, heading to Mardi Gras World, as well. The event runs 7-10 PM with buses returning to the Hilton every 15 minutes throughout the evening. www.mardigrasworld.com.

Saturday Banquet La Nouvelle Ballroom, 7-10PM



The banquet will be held in the La Nouvelle Ballroom at the Morial Convention Center from 7-10 PM. Join us for the presentation of the MASNA Award, Aquarist

of the Year, our 2017 scholarship winners and the Fiji Raffle drawing. You'll also have a chance to learn more about MACNA 2018 in Las Vegas.

Richard Ross will be the emcee for the evening and, along with his performing partner Michael Goudeau, will present *It Looked Good on Paper: An evening of comedy, juggling, and so much more*. Before becoming a professional aquarist, Richard Ross was a professional juggler, opening for greats like Weird Al and The Smothers Brothers. Rich is proud to be teaming up once again to host and entertain with Goudeau — a friend, Guinness World Records title holder, and writer/producer of Showtime's "Penn and Teller: BS!", at the MACNA New Orleans Saturday night banquet.

With two talented comedic minds and various feats of physical prowess, what could possibly go wrong?

Poster Sessions

The MASNA Scientific Poster Session allows for advanced aquarists, undergraduates, graduate students, scientists, and citizen scientists to submit posters on their current or past marine aquarium-related research projects.

Posters have been judged by a committee consisting of marine aquarium hobbyists and scientists. Prizes will be awarded at MACNA New Orleans for posters in each of the following three categories: General Hobbyists/Citizen Scientists, Undergraduate Students, and Graduate Students.

The goal of the poster session is to allow Conference attendees to interact with the folks who are doing aquatic research, providing feedback and educating each other. Sessions are 1:30-3:00 pm Friday and Saturday at the rear of the Exhibition Hall. Presenters will be with their posters to answer questions.

P001: **Cyanide Fishing. An Overview on Its Impact in the Hobby and Ocean.**

Hickey, Brigid A

P002: **Comparative Analysis of U.S. Aquaculture Management to the FAO Certification Guidelines: An Assessment Tool.** Walsh, Michelle "Mick" L; Jones, Robert C

P003: **Specialization in Salt-water Aquarium Keeping: An Exploration of Science and Conservation Behaviors in a "Science and Leisure" Hobby.** Marchio, Elizabeth A

P004: **Captive Culture and Larval Development of the Melanurus Wrasse *Halichoeres melanurus*.** Groover, Elizabeth M; DiMaggio, Matthew A; Alo, Micah M; Digidio, Jon L

P005: **The Spawning and Rearing of *Elactinus oceanops* in a Low-Density System on a Small Budget.** Cannella, Laura; Rice, Patrick; Walsh, Michelle "Mick" L; Knorr, Travis

P006: **Breeding the Frostbite.** Hirt, Kyle

P007: **Establishing a Length-Weight Relationship for Post-Metamorphosis Juvenile *Ocellaris Clownfish*, *Amphiprion ocellaris*.** Knorr, Travis G; Walsh, Michelle "Mick" L; Rice, Patrick H

P008: **How Florida Keys Community College Changed My Life.** Soucy, Breanna N

P009: **A comparison of the effect of different frag sizes on the growth of *Montipora capricornis* using micro-fragmentation.** Lynch, Sam W; Lynch, Katherine M

P0010: **An Evaluation of The "Other" Lionfish in the Marine Ornamental Trade.** Lyons, Timothy J; Hill, Jeffrey E; Tuckett, Quenton M

SUSTAINABLE CORAL

Echinophyllia aspera “Ludicrous Chalice,” a coral discovered in the Java Sea and soon to go into limited production in a new land-based facility at the author’s Bali Aquarium farms.



Author Vincent Chalias with rack of maricultured *Acropora*.

Two decades ago, I was landing in Indonesia after a few years traveling all over Southeast Asia and the Indo-Pacific, exporting fish in Kenya and importing fish in Europe. I was in my twenties and with a fresh, new marine aquaculture diploma to my name, and I was filled with motivation. I wanted to culture everything.

Twenty years ago, everything was wild-collected. There was no such thing as a CITES permit for cultured livestock; there was not even a definition for farmed, ranched, or cultured corals. There was only one CITES code: “W” for Wild.

Indonesia and Fiji, soon followed by Vietnam and to a lesser extent the Solomon Islands, were the sole suppliers of the worldwide live coral trade regulated by the CITES Convention. (Without CITES approval, there would have been no importation of live corals allowed into North America or most of Europe.)

At that time, any coral, any color would sell; nobody was terribly fussy about their corals, they just wanted colonies that were big and well-pigmented, with polyps that would sway in the current and make a reef look impressive. It was the golden era of the wild coral industry. New technologies such as metal halides, protein skimmers, and powerful current pumps became more affordable, and the keeping of live corals was suddenly within the reach of most of us. We could even expect them to grow our aquariums—not just survive—which was quite unthinkable 10 years earlier. Wild-collected corals, some the size of cantaloupes or soccer balls, were selling by the thousands.

Then, slowly over the next dozen or so years, the market became more and more selective, with only the bright, lasting colors in demand, until only a few select species with some very specific coloration would sell. Then came the second technological revolution, with the sudden appearance of blue LED lights. All of a sudden, “gold” hues became the rage. Before that, gold was basically brown under metal halides or T5 fluorescent light; blues, greens, pinks and purples came onto the



Broodstock colonies growing rampantly in natural sunlight to provide fragments for culturing in the coastal waters of Bali, Indonesia.

stage. Yellows and red were the next colors to pop up under LED, and a whole new set of coral species became popular. This is also when the naming frenzy started, for instance with *Acropora microclados* becoming Strawberry Shortcake and a sensation among reefkeepers.

Acropora boomed in popularity, and they are still the one genus that people never seem to tire of. As a coral aquaculturist, I can see firsthand how demand for different genera and species rises and falls, but I suspect that good, colorful Acros will always be the most popular corals. Luckily for us, although they are quite temperamental, they are also the fastest-growing genus, and the easiest to culture, frag, and share with others. An *Acropora*-dominated tank will always be the fulfillment of a reef aquarium husbandry dream, and the classic representation of a perfect reef tank for most observers.

A DARK SHADOW

When the fact emerged that the importation of stony coral colonies into the United States was exceeding a million pieces annually around the year 2000, voices of concern began to be heard. Is this harvest sustainable? Is the aquarium trade becoming a threat to the health of coral reefs that were already under other pressure from shoreline development, pollution, deforestation, overfishing, and warming seas? Murmurs of quotas or even bans on the harvest of live rock and corals, both already tracked under regulations on the movement of Scleractinian species, started to be heard.

Despite the fact that aquaculture techniques had started to emerge in the 1990s, not much was going on in marine aquarium livestock farming. It was just too easy to make money with wild corals at that time.

THE STORY OF *ACROPORA ROBUSTA*

An exceptional beauty, even among the most colorful in its large genus, *Acropora robusta* is not very common anywhere in Indonesia; it likes places with tremendous flow that are not friendly to diver-collectors. We found one colony about 5 feet (1.5 m) in diameter in the year 2000, and took some frags to propagate. It grew so fast that in less than a year we had over 50 mother colonies more than a foot across. We gave away countless frags, and it is safe to say that all the *A. robusta* being farmed in Bali come from this one colony. Growing on the edge of one of our farms, the original colony is still there, maybe twice the size it was 17 years ago, while clones on our broodstock racks are 5-6 times bigger than the mother colony. We have transplanted it in so many locations, starting so many artificial reefs, that we can say now there are more than 100 daughter colonies as big as the original. If we add all the frags growing all over the world that came from this single wild colony, we can be sure that its survival is very well secured, indeed.



Thanks to the pioneering work of Dave Palmer in the Solomon Islands at the end of the nineties, the notion of fragmenting stony corals and propagating them was born. It was only in Indonesia, after a few trials in Fiji, that coral farming started to become a real industry of its own. It took some time, and there were new challenges posed by changing regulation barriers imposed on the trade in marine organisms, and struggles to define all the different propagation techniques and to find ways to regulate this newborn industry.

Today the growth of mariculture in Indonesia to supply the aquarium trade has become a important phenomenon, and its impact on local communities is tremendous, with thousands of people directly and indirectly benefiting from this new industry. Well over 50 companies are registered as commercial mariculture operation in Indonesia alone. Previously concentrated in Bali, culture facilities are now spread all over Java, all the way to Sumbawa, Flores, and Sulawesi. The number of species cultured has grown to over 74, with many listed as SP (undetermined species), so the actual figure is much higher. All SPS are now produced in ocean farms, and the list of LPS is constantly growing. If we include the hundreds of thousands of cultured soft corals that are not accounted for, we start to have a clear picture of how huge this industry has become. Coastal communities in Indonesia traditionally have had very few different sources of income: some crafts, fishing, and collecting seafood, depending on the seasons. Some local people have a few fields of seasonal crops such as coconuts,

corn, and mango, but coral culture offers them a steady, year-round source of income—for many it is now their main activity. Growing corals gives them the opportunity to make a decent living and afford school fees and it even opens access to credit to buy homes, boats, and vehicles.

DOWN UNDER

The emergence of Australia as a new collecting country sparked fresh enthusiasm in the industry with new species and new color morphs becoming available. Qualified as sustainable, the Australian coral trade still has to overcome some political and administrative hurdles before it matures enough to become really sustainable by embracing the mariculture movement. We can be sure that when this day arrives, the coral aquaculture industry will grow exponentially. The Australian industry is well supported by having the world's center of coral reef research as well as access to many academic resources. They already produce the world leaders in coral reef science, so it's obvious that a lot of exciting things could be coming in the future from Down Under.

For species of fast-growing corals, mariculture is now so successful that the wild-harvest quota for *Acropora* in Indonesia has been reduced to almost nothing; over a million pieces of cultured *Acropora* are produced each year in Indonesia, while not even 3,000 pieces from the wild were exported last year.

The coral industry is led by trends, and these trends often become more and more demanding. In a way this

is pretty good news for the reef, because reefs are mostly brown, with only a very small percentage of the colonies of interest to the aquarium trade and consumer. This means that collectors of wild corals have to go further and further to get the really rare piece that nobody has. Twenty years ago, a brown Hammer Coral (*Euphyllia ancora*) was good enough; ten years ago we had to have Green Hammers; five years ago it was Gold; now we need to find Toxic Gold Hammers—half yellow and half metallic green. And guess what? Those pieces were so rare and sought-after that the industry had to find a solution to supply the demand. This is when serious fragging started in the US.

Now when an importer acquires one very nice piece, instead of selling it to one happy customer, he or she will often frag it, and sell it in small pieces to 10 happy customers. This is creating a new industry—real propagation farms here in the US, as well as in cold-climate European countries—creating jobs, not only in the origin country of the coral itself, but all the way down the supply chain. When corals are produced domestically, you don't need a CITES permit to ship, which makes this new industry easier and more viable. While mariculture mass-produces ocean-grown corals at a very low cost, land-based propagation farms can produce high-end aquarium corals in limited "editions," and reducing the size of the corals sold makes it cost-efficient. Now hobbyists are used to buying quarter-inch frags and understand that

they need to grow these corals themselves, not just put them on display. This contributes to a whole new way of keeping aquariums: we now have coral aquariums instead of reef aquariums, where corals are not added just to provide a nice background for colorful fish—they are now the centerpiece of the tank, and getting the real respect that they deserve. The fishes may even become auxiliary cleaning devices. That's quite a game-changer.

FUTURE CHALLENGES

Both the mariculture and the domestic greenhouse propagation industries have their limits. Some single-polyp corals just don't like to be sliced into pieces. In the ocean, it's very difficult to plant frags that are only half-inch pieces. They get eaten by fish or parasites, overgrown by algae or sponges, or just succumb to bacterial infection. So there are only a very limited number of frags that we can get out of one small, unique piece. Then we have all the very slow-growing, single-polyp corals such as Elegance, Scolys, and various brain corals that can't really be mass-produced in either ocean- or land-based facilities. Other corals the mariculture industry has failed to produce so far are zoanthids and coral-limorphs; these corals live in such specific habitats, and they are very hard to farm in the ocean, unless you have the perfect location and techniques. Many zoas live under 10-foot swells—no need to explain why it's a bit difficult to work in this kind of environment. Mushrooms



Local Indonesian Bali Aquarium coral farm crew cleaning a frag rack of algae and encrusting organisms.

A premium *Acropora millepora* maricultured small colony: the race is on for ever-richer colors.



live in very, very turbid habitat, often in cracks to avoid predation, and are very difficult to secure on an artificial base, especially in the ocean, with all the currents. Coral-limorphs are very specifically adapted to certain habitats. Trying to mass-produce them in different conditions doesn't always work well. If you find a coral in a certain location, there is a reason for it. Unfortunately, land-based propagation farms may be the best solution for these. Thanks to the frag frenzy and high prices paid for tiny pieces, these closed-system farms can prove profitable nowadays.

One other thing to consider is that once-abundant blue and red mushroom corals are becoming much scarcer, as their habitat has been sadly degraded. Time for their cultured production is coming. With their rarity, the price will go up, and it will drive production incentives up, too. But, even though terrestrial farms work best for high-value items, like some very specific strains of zoanthids, they will never replace the mass production scheme of mariculture. And common, cheap zoas and mushrooms are "bread-and-butter" items for beginner and intermediate

aquarists, who are the foundation of the industry. They surely finance the equipment, chemical, aquarium food, and maintenance businesses, to name a few. So even though I have been a culturist for more than 20 years, I've always been concerned by the lack of interest shown by dry goods and equipment manufacturers for the live

animal trade that is so essential to their business success. The time when they should get more involved has come. Investment to put millions more coral frags into the ocean, or into high-tech domestic farms is sorely needed. The costs of research and development desperately needed to increase ornamental aquaculture production for the livestock trade will

have to be shared or subsidized in some manner.

If coral propagation farms on American soil can only focus on high-end corals due to the high cost of operation, then companies in countries of origin will need to operate land-based propagation farms also. They have lower operating costs, so they can produce the more common corals needed to supply the wholesale industry. But they are also the countries of origin

"We now have coral aquariums instead of reef aquariums, where corals are not added just to give a nice background for some colorful fish—they are now the centerpiece of the tank, and getting the real respect that they deserve."

Artificial reef garden planted near Bali Aquarium's farming racks.



for these high-end corals, they may eventually profit as US and European farms start trends and do the research and development needed, in time allowing island farms in the tropics to mass-produce corals to support the whole industry. It's going to be a good race forward, with fair and sustainable trade at the finish line.

There is only one problem in the whole equation. The biggest challenge in coral mariculture remains the mass-production of corals at a low cost. Many of the very popular solitary-polyp LPS corals can't really be propagated through asexual means, which means that sexual reproduction of these corals is the only way forward. Some work has started, like the efforts of Jamie Craggs to propagate *Acropora* sexually at the Horniman Museum in London, along with other public aquarium initiatives like SECORE. But at the end of the day, it's the industry itself that needs to lead the way and take its destiny into its own hands.

Reproducing coral at an experimental level can be done almost anywhere. But mass-producing slow-growing corals requires large areas of coastal facilities and huge ocean grow-out farms, so I believe that it can only be achieved in the tropical countries of origin of these valuable corals. Waiting seven years while a coral frag reaches market size in a closed system in North America or Europe is not going to result in any significant numbers of corals that are either affordable for hobbyists or profitable for culturists. Investments that have to be made are important, and risky, but essential.

So there are still many hurdles, and the push is still on to build a truly sustainable industry. These challenges will need to be addressed very soon, as the clock is ticking, and activist NGOs—some of which have already



"Toxic Gold"
Euphyllia ancora

tried to end the trade in certain corals and fishes—will soon be on our backs, the same way they are in Hawaii, trying to ban the collection of reef fishes.

Twenty years ago, I would have never thought that we would have achieved as much as we have. I never expected that the CITES system would adapt to accommodate this new industry. It's been a long trip, and not always an easy ride from the time when every single piece of coral entering our aquariums was wild-collected, to the present day, where in Indonesia, one leading coral supplier has annual cultured coral output is that is twice the size of the country's entire wild-harvested export volume.

There are always challenges ahead of us, but I'm certain that we will be again able to change the system to a 100-percent sustainable industry based only on cultured organisms. We need to keep rolling up our sleeves and get to work! We who farm the corals cannot rest on our achievements, and you who buy aquarium corals can play a vital role by supporting the trade in aquacultured, captive-bred, maricultured, and sustainably produced marine livestock. The future of our hobby and survival of our precious reefs depend on it. ■

Vincent Chalias is a marine biologist with Bali Aquarium, where he has helped develop mariculture protocols and built the trade in sustainably grown corals. <http://www.baliaquarium.net/>



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ON THE EDGE OF THE FUTURE



In 1990, I brought home from Australia a four-polyp fragment of *Duncanopsammia axifuga* that I had spotted in a local aquarium shop. This was years before the coral fragging phenomenon swept through the world of reefkeeping, and even before the legendary Stüber *Acropora* reached North America in its diaspora of tens of thousands of frags. We were just starting to learn how small pieces of live stony corals could be grown into beautiful, cloned daughter colonies in our reef aquariums.

Known today as the Duncan Coral or Giant Green Polyp Duncan, this fast-growing, colorful stony coral has become a favorite of many aquarists. I have fragged and shared my original Australian strain of this coral with hobbyists in Brazil, Germany, Norway, Switzerland, and

the United States. Oceans, Reefs & Aquariums has had it in culture since the mid-1990s, offering it as the ORA Duncan Coral. Like the Stüber *Acropora*, it can likely be found in thousands of marine aquariums worldwide, and both of these corals, started as single colonies by

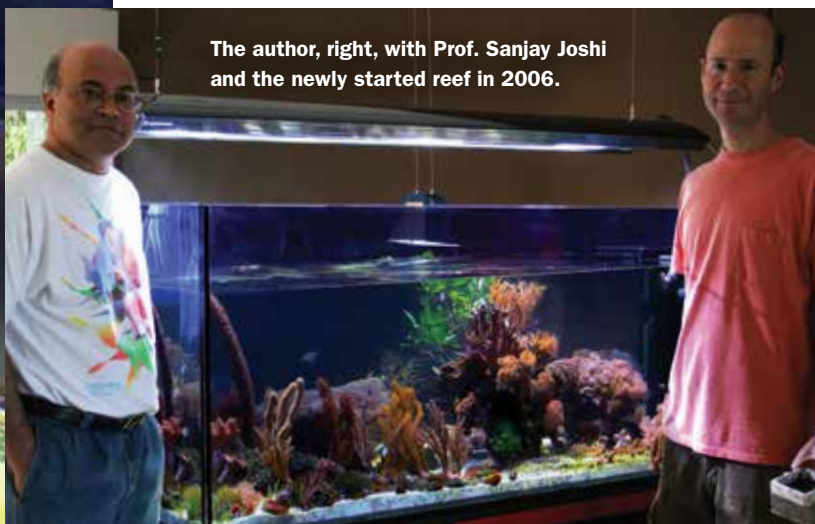
Living proof of how far the marine aquarium hobby has come in 30 years—and some thoughts on where we go next.



Top view of a 250-gallon home reef aquarium grown mostly from coral cuttings by the author.

home aquarists, must have produced many tons of growth in captivity by now.

These are exciting times for the marine aquarium hobby, but all the new discoveries and vast improvements in our ability to keep fishes and corals healthy and thriving are happening at the same time that animal rights organizations in a number of countries are trying to limit or stop the pet industry, the keeping of aquariums, and the harvest of marinelife from the wild. We are the focus of their attention more and more. I am encouraged by the development of new ornamental aquaculture and mariculture achievements, but discouraged by the mounting and seemingly never-ending push to end our hobby. As we have seen in Hawaii, a recurring theme of the anti-aquarium activists is that most of our animals die



The author, right, with Prof. Sanjay Joshi and the newly started reef in 2006.

shortly after we bring them home, and that the keeping of reef animals in tanks is somehow inhumane.

LIVING MESSAGES

Perhaps one of the best arguments we can make is to show the world the potential of our reef aquariums to flourish, becoming both beautiful and educational—tools for sharing messages of coral reef stewardship and conservation. My home 250-gallon tank shown here, for instance, has been grown almost completely from fragments and without a reliance on coral colonies harvested from the wild.

Like the corals that have migrated from my original 15-gallon reef aquarium in the early 1990s to fill aquariums all over the world, our hobby has expanded in many interesting ways well beyond the simple box concept of an aquarium.

For instance, with the application of control and monitoring devices connected via the Internet and accessible by our own smartphones and computers, we now have an unprecedented level of capability to know what is happening in our aquariums, getting well beyond what we can simply see. Tracking more and more parameters of the maintenance of aquariums is suddenly possible and becoming simpler and more accurate. This is exciting not only for the “cool factor” but also for the scientific opportunity to document the ways our aquariums respond to changes in husbandry. We can record quantitative data and connect it with qualitative results, and reproduce the conditions to verify that the response is a real cause-and-effect one.

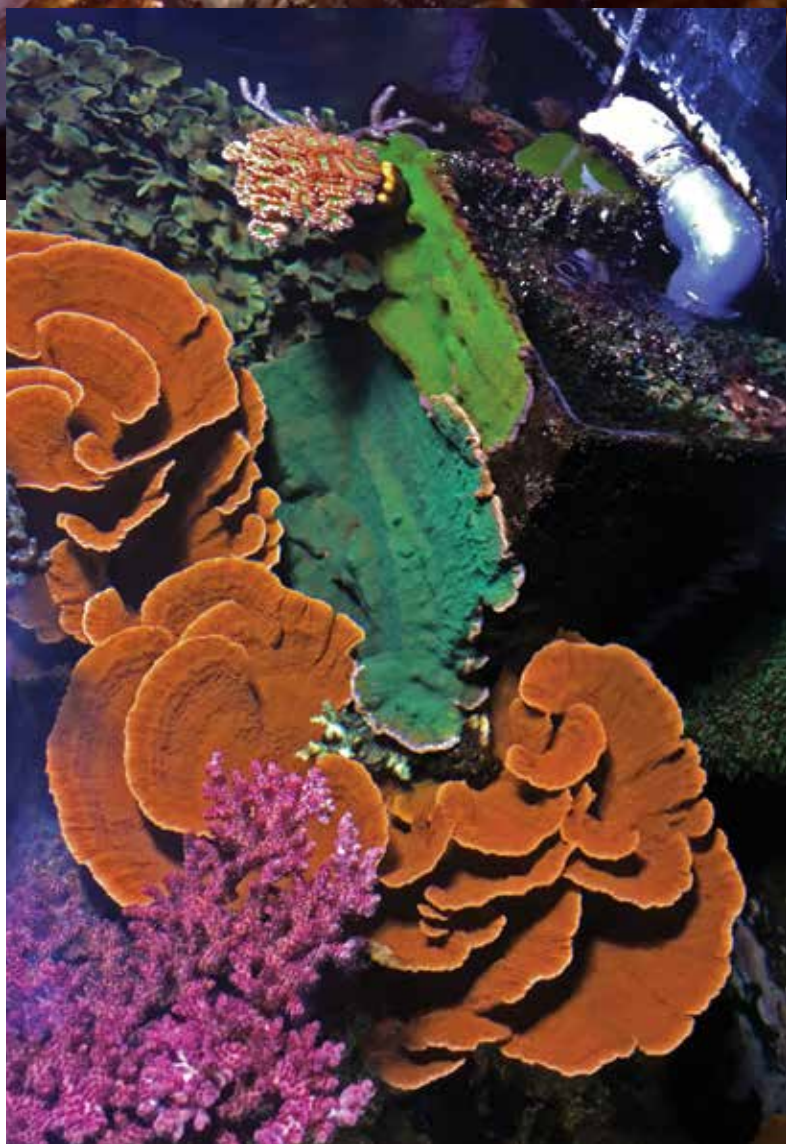
The expansion of coral mariculture pioneered by Vincent Chalias in Bali, Walt Smith in Fiji, and Dave Palmer in the Solomons—and the scale of fish culture achieved by Wen-Ping Su at Bali Aquarich—are a vital part of a new aquarium industry. Domestic aquaculture businesses and institutions are achieving successes with new species and varieties being bred for the first time, almost every month it seems. New breakthroughs



The author's 15-gallon reef, circa 1993. Note the Duncan Coral below the female *Percula* Clownfish, right, and Stüber's *Acropora* below the male clownfish, center. These are the mother colonies from which subsequent ORA cultured generations originated. Right: section of the current 250-gallon (950-L) system.

happen at home in hobby-sized setups, too. Coral breeding, not just fragmenting, is surely coming next.

Cyanide detection is another important subject that appears to be close to a breakthrough. If the technique of measuring byproducts of cyanide in the water holding fishes can be shown to be a reliable way to prove exposure to cyanide as the collecting method, the aquarium industry will finally have a way to knowingly select clean sources of fishes without sacrificing the animals, and that, in turn, would have the effect of curtailing cyanide collection. The basic methods of this cyanide detection have been worked out and proven to a large extent, but there is still some work left to implement it. Who will use it, and where? Will it be used to enforce import and exports? Will penalties be applied? As you can imagine, the subject comes with much suspicion and doubt, so part of the difficulty is in gaining confidence from the industry itself, even though the aquarium trade needs and wants to be able





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Wild reef or aquarium corals? Keeping marine life alive and thriving is a hallmark of modern reefkeeping.

“As we gather for the 29th MACNA Conference, it is important to stop and recognize how we have grown into more than just a home-based hobby over the past decades into something connected with other academic fields and endeavors. The experiences gained by home aquarium keepers fragging and growing stony corals provided the seed concepts that now help worldwide efforts to restore degraded wild reefs.”

Positioning the dive industry as an opponent of the aquarium hobby and trade is something that animal rights organizations have attempted to do in Hawaii and elsewhere. The cooperation between scientists, academic institutions, non-profit organizations, the dive industry, and the aquarium trade should be highlighted in any published work about reef restoration. The ties to tourism and the dive industry in promoting and becoming actively involved in reef restoration work should always be a part of the story.

to know whether the fishes it is buying and selling are cyanide-free.

Lastly, I am hopeful that the present trend of utilizing aquarium-developed techniques to mariculture and outplant corals for reef restoration will continue to grow and gain a wider public awareness. The recognition that this methodology is something both developed by aquarium enthusiasts and supported and sponsored by our industry is important. It is too easy to mislead the public by claiming that reef restoration was developed independently by “scientist saviors,” which positions the work in a way as something highly complex (which it is not), while at the same time poaching on the aquarium industry’s role in coming up with the techniques utilized.

As we gather for the 29th MACNA Conference, it is important to stop and recognize how we have grown into more than just a home-based hobby over the past decades into something connected with other academic fields and endeavors. The experiences gained by home aquarium keepers fragging and growing stony corals provided the seed concepts that now help worldwide efforts to restore degraded wild reefs. Aquarium hobbyists and the aquarium industry directly help fund restoration efforts too. Mariculture farms and livestock collectors in the source countries are some of the strongest defenders of the reefs. We can easily get lost in the wonders in our own aquariums, but we should be sure our positive message is reaching the public and policymakers. ■

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Craig Bingman, Ph.D.

Craig Bingman, Ph.D. is a biochemist and structural biologist at the University of Wisconsin-Madison who says he has been “a little too fascinated with water chemistry” since his first experiences with pH Up and pH Down when he was eight years old and learning that his fish were less than enthusiastic about his experiments. Later in life, he fell in with a group of dedicated coralholics, who self-identified as the New York Reef Mafia. At the suggestion of Prof. Terry Siegel, he wrote a series of articles for *Aquarium Frontiers* that are credited with helping lay the scientific foundations of the reef aquarium hobby, covering optical effects in aquariums, auto-fluorescent pigments in corals, calcification, and other subjects. His longstanding interests include predicting outcomes in aquariums through numerical simulations, and understanding the interplay between the three major physicochemical processes in reef aquariums: nutrient dynamics, gas exchange, and calcification.

TOPIC: *Reefkeeping by the Numbers: Comparative nutrient, gas exchange and calcification dynamics*



Laura Birenbaum

Laura Birenbaum is a marine biologist and the owner of ReefGen, an aquaculture company on Long Island, New York. Her company is dedicated to propagating a diverse selection of corals and invertebrates while working in collaboration with the Long Island Aquarium. Laura’s special passion at ReefGen has been breeding a variety of cuttlefish species, including the Flamboyant, Stumpy, and Common Cuttlefish. Most recently, she has been thrilled to work with the rare Pajama Squid and a new Mysis Shrimp breeding invention. She has successfully bred eight generations of the Stumpy (Dwarf) Cuttlefish, *Sepia bandensis*, and looks forward to increasing the distribution of all of these unique captive-bred invertebrates across the country. Laura enjoys aquarium experiments, tinkering with methodology and equipment to try and improve efficiency in coral shipping, cuttle keeping, and Mysis breeding. When not at her desk or the workbench, she loves fishing, boating, and beach days. www.reefgen.us

TOPIC: *Keeping Cuttles and Pajama Squid: We do it, so can you.*



Mark Callahan

Mark Callahan is the creator and star of Mr. Saltwater Tank TV, the web-based television show dedicated to taking the confusion out of setting up and maintaining a saltwater tank. Mark says there is a central theme in his life: Water. Water. Water. He currently maintains a 450-gallon tank, and, since starting his video show in 2010, Mark has created more than 375 Mr. Saltwater Tank TV episodes, resulting in more than 12,500,000 views worldwide. The show has attracted 55,000-plus YouTube subscribers and 48,500-plus fans on Facebook. He has authored and co-authored six ebooks, including *The No-Nonsense Guide to Setting Up A Saltwater Tank* and a number of articles for international magazines such as *Tropical Fish Hobbyist* and *Marine Habitat Magazine*. Mark makes his home in the Nashville, Tennessee area, and spends time with his wife and two kids. www.mrsaltwatertank.com

TOPIC: *Coral Placement for the Long Haul*



Ehsan Dashti

Ehsan Dashti is the founder and owner of Triton Applied Reef Bioscience, headquartered in Dusseldorf, Germany, founded in 2008 to use cutting-edge technology to analyze artificial and natural seawater for aquarium professionals and hobbyists. As a “reef and chemical geek out of a real Bio-Chemistry Family,” Ehsan says he was able to create methods and chose sophisticated tools (inductively coupled plasma optical emission spectroscopy and high performance liquid chromatography—ICP-OES and HPLC) to measure seawater with greater detail and precision, and to push the boundaries of reefkeeping by, for example, making trace and macro elements visible that have been previously ignored. Using enhanced water testing results lead him to creating the Triton Method, using proprietary supplements and treatments to help reefkeepers find success with optimal water parameters. TRITON: www.triton.de/en

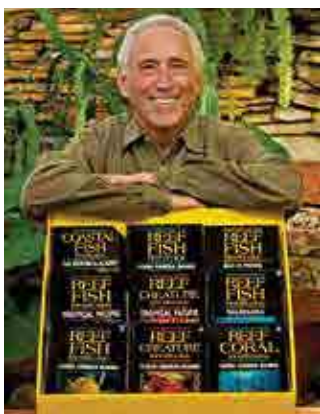
TOPIC: *Modern Practical Reefkeeping: Combining contemporary knowledge and industry insight to deliver more successful and sustainable reef aquariums*



Tullio Dell Aquila

Tullio Dell Aquila is a New Jersey-based professional lighting designer whose innovative work with high-power LEDs spans numerous commercial, automotive, and aquarium applications. During his career he has designed and manufactured lighting products for many of the top companies in the aquatics industry. From the original LED moonlights to the first full-spectrum and actinic/LED lighting systems, his pioneering work with LEDs continues today. His focus on the spectral requirements of corals and photosynthetic invertebrates has helped improve the output, spectral composition, spectral power distribution, and quality of many aquarium lighting products sold today. His continued work with specialized reflector systems, advanced thermal design, and high-efficiency microprocessor controlled electronic ballasts has played a role in helping revitalize metal halide and T5-based aquarium lighting products as well.

TOPIC: *The Facts of Light: An in-depth look at the facts and myths regarding aquarium lighting*



Ned DeLoach

Ned DeLoach is a co-author of a series of bestselling guides to marine life, used by countless aquarists and divers world wide. In 1971 he completed his first handbook, *Diving Guide to Underwater Florida*, currently in its 11th edition. Through the 1970s and 80s he was active in Florida’s cave-diving community and writing dive/travel pieces for underwater magazines. In the mid-80s he began working with Paul Humann, as co-editors of *Ocean Realm Magazine*. In 1989 the pair published their first field guide, *Reef Fish Identification, Florida, Caribbean, Bahamas*, which launched an extensive library of visual marine life field guides for tropical oceans around the world, published by New World Publications, Jacksonville, Florida. Currently Ned and his wife Anna are compiling a new edition of *Reef Fish Behavior*, first published in 2000, and writing the Encounters column *Alert Diver Magazine*. www.fishid.com

TOPIC: *Dream Fish: The rare, beautiful and bizarre*

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Robert M. Fenner

Bob Fenner is a marine biologist, writer, underwater photographer, and content provider to the aquatics hobby and author of the award-winning bestselling book, *The Conscientious Marine Aquarist*. He has lived the science, hobby, and business of aquatics in the Philippines, Japan, and the United States as a livestock collector, wholesaler, jobber, retailer, and system designer—working at all levels: manager, owner, hatchery worker, retail clerk, technician. Except for a stint teaching high school sciences for four years, he has worked all his life in the field of ornamental aquatics. His published works include many magazine articles in *Freshwater and Marine Aquariums* (FAMA), *CORAL*, *TFH*, and others. He currently does consulting, speaks frequently at aquarium events, and maintains the popular *Wet Web Media* site, based in San Diego, California. MASNA Award Winner 2005. www.wetwebmedia.com

TOPIC: *Anemones for Marine Aquariums:
Natural history, species, selection & husbandry*



Todd Gardner

Todd Gardner is a professor of marine biology at Suffolk County Community College in Riverhead, New York. His life and his career have both been shaped by his passion for marinelife and he has written numerous scientific and popular articles about his research and experiences collecting, keeping, and culturing marine organisms. Todd's professional background includes work on a *National Geographic* documentary, commercial aquaculture at C-quest Hatchery in Puerto Rico, and an 11-year term at the Long Island Aquarium, Riverhead, New York, where he spent much of his time developing techniques for rearing marine fish larvae. To date he has raised more than 50 different species, including a number of “firsts,” most recently the rare Cuban Basslet, *Gramma dejongi*. In his spare time, Todd dives, photographs marine life, runs marathons, and plays in a blues band. MASNA Award Winner 2013.

TOPIC: *Tricks of the Trade: Small actions and simple tools
that can make a big difference in marine fish culture*



Hunter Hammond

Hunter Hammond is a structures engineer in the aerospace propulsion engine industry. He is known on various forums as “Evolved, The Wrasse Guy” and admits to being “completely obsessed with wrasses.” He is an Arizona native and a marine hobbyist who currently keeps a 270-gallon peninsula reef in his living room featuring numerous rare wrasses. Hunter is a leading expert in the captive care of all reef-safe wrasses. He has been in the marine hobby since 2009 and lives in Phoenix, Arizona with his devoted partner and their Thai Ridgeback dog. Online, he spends much of his reefing time as a moderator and expert contributor on Reef2Reef.com and has authored articles for Reefs.com. Locally, he has served as the vice president since 2014 of Arizona's only MASNA reef club, Arizona Fish Reef Aquarium Group (FRAG). www.reef2reef.com

TOPIC: *A Fairy Inclusive Look at Keeping & Mixing Cirrhitilabrus Wrasses*

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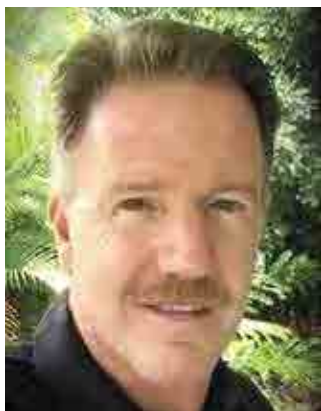
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Gerald Heslinga

Gerald Heslinga is a marine biologist and founder of Indo-Pacific Sea Farms, an aquaculture enterprise in Kailua-Kona, Hawaii. He has spent over 30 years developing the sustainable production of endangered coral reef species, heart-healthy seafoods, and marine ornamental organisms through aquaculture. Educated at Harvard and the University of Hawaii at Manoa, Gerald has worked professionally in 18 countries in the Asia-Pacific region for universities, governments, private industry, and international agencies. Gerald is considered the father of giant clam farming, having developed successful methods for the captive spawning and farming of *Tridacna* species that face increasing pressure from poachers and growing Asian populations. Aquacultured giant clams are now raised in 25 countries and displayed in aquariums around the world but challenges remain.
www.ipsf.com

TOPIC: *Giant Clams: Sustainable aquaculture and conservation*



Sanjay Joshi, Ph.D.

Sanjay Joshi in real life is a professor of Industrial and Manufacturing Engineering at Penn State University. He has been a reef addict since 1992, and currently keeps several reefs aquariums at home, including a 500-gallon SPS-dominated reef. He also co-manages the 500-gallon reef aquarium at Penn State University's HUB-Robeson Center. Dr. Joshi is actively involved in educating the hobby on various topics such as lighting, aquarium system design and general reef husbandry through his publications in reef journals and lectures. He has published articles in magazines such as *Advanced Aquarist*, *Reefs Magazine*, *CORAL*, *Marine Fish and Reef Annual*, *Aquarium Frontiers*, and *Aquarium Fish*. In addition, he has been an invited speaker at many marine aquarium society meetings in the US and Europe. He received the MASNA Aquarist of the Year Award in 2006 for his contributions to the marine aquarium hobby.

TOPIC: *Tales from the Travel Crypt: Designing robust systems that can survive the owner's vacation*



Caitlin Lee

Caitlin Lee is a communicator for the aquarium livestock trade, with a deeply rooted passion for marine life. Her first job was at a local fish store scrubbing aquariums and befriending moray eels. As a regular blogger on popular online reef-centric publications, her writings have covered a wide range of aquatic subjects. Caitlin moderated a video web series that brought together industry leaders to discuss many important topics. Her passion for the aquarium trade has led her to Quality Marine, where she creates media news stories and features that highlight an industry-leading commitment to sustainability through captive breeding and net-collected fishes. Caitlin currently operates Reef Musings, a blog devoted to covering the beauty and mystery of the ocean. Her mission, in part, is to spread the word on why captive breeding is so important, what the benefits are, what individual hobbyists can personally do to support such efforts.
www.facebook.com/reefmusings

TOPIC: *The Importance of Captive Breeding and the Future of Our Hobby*

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Austin Lefevre

Austin Lefevre is the founder of Aqua Box, a Michigan-based company that installs unique aquarium systems worldwide, and professionally quarantines and conditions marine fishes. Austin has been in the aquarium industry since 2002, previously working in local fish stores, coral farms, and heading up a fish breeding program. He believes that, as aquarists, “We have the responsibility to allow all of our animals to thrive, not just survive. Our animals are stewards to their wild counterparts that can inspire others to push for better conservation. We have the ability to keep animals alive far longer than in nature provided the right care. My mission is to spread sound, science-based information to keep animals thriving long-term.” Austin has been published in *Reefs Magazine*, *Reefs.com*, and *Reef Edition Magazine*. www.aquaboxaquariums.com

TOPIC #1: *Bulletproof Reefkeeping: System design, installation, and maintenance*

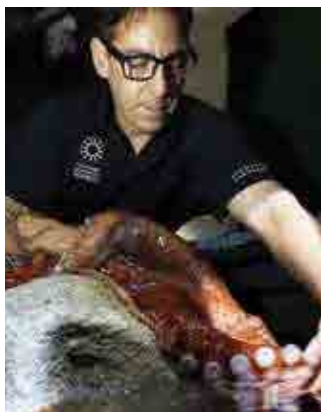
TOPIC #2: *Keeping Benthic Feeders with Coral: Angelfishes, butterflyfishes, and more*



Marc Levenson

Marc Levenson is known to many online as “Melev” and has been involved with marine aquariums since 1998, blogging his experiences with his own reef on his website melevsreef.com to help others learn husbandry skills. Most recently he’s become an online personality with tens of thousands of followers on his YouTube channel. His website articles, blogs, and Critter IDs cover topics like pest control, feeding techniques, working with acrylics, reef photography and water chemistry. His online store includes items that he himself invented as solutions to make reefkeeping easier. Marc is a nationally recognized speaker, who regularly recommends supporting local club events, shopping at local fish stores, and interacting with others via social media. His other hobby is diving, exploring natural reefs. His current tanks are a 400-gallon reef and a 60-gallon anemone cube, filled with captive bred fish and aquacultured corals. www.youtube.com/melevsreef

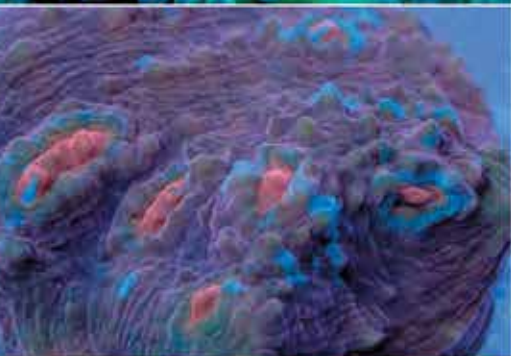
TOPIC: *Preparing for the Worst Before It Happens: Troubleshoot your system now, not after something goes wrong*



Richard Ross

Richard Ross is a senior biologist at the Steinhart Aquarium in the California Academy of Sciences, Golden Gate Park, San Francisco. He is known for his *Skeptical Reefkeeping* series, his groundbreaking work with cephalopod husbandry, his entertaining and informative talks, and for managing the Steinhart’s ambitious 212,000-gallon Philippine reef. “It’s so great,” he says. “I get to work on what interests me in a variety of ways; I write and speak about the practical philosophy of aquarium keeping and animal welfare in the hobby press, and I get to publish in academic journals. I get to practice the fascinating craft of aquarium keeping on a daily basis, as well as participate in various kinds of field work like coral sexual reproduction. Through it all, I have the ongoing challenge and honor of working with incredible species like pygmy seahorses, unique cephalopods, ghost pipefish and more.” MASNA Award Winner 2014. In addition to his presentation, Rich will be the Master of Ceremonies for the MACNA 2017 Saturday Night Banquet. www.packedhead.net

TOPIC: *The Right Kind of Lazy: Phosphate. Nitrate. Detritus—What, me worry?*



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Walt Smith

Walt Smith is one of the pioneers in the marine aquarium livestock trade, having started as a saltwater fish enthusiast in 1970 when technology was limited to an undergravel filter and air stones. When Walt first opened his Tonga collection station in 1989, he had already spent more than 17 years in the business as a wholesaler in Los Angeles, California. In 1995 Walt and his wife Deborah decided to expand their business to Fiji and have been there ever since, exporting live rock, fish and corals. In 1998 they started experimenting with natural coral farming and live rock manufacturing, making Walt Smith International the first commercial coral and rock farm in the world. Today Walt says his crews practice sustainable fragging on a commercial scale: "Not just a few trays, but 60,000 to 90,000 pieces per year. Find out what happens to all this new coral and who benefits. You may be surprised." www.adeproject.org

TOPIC: *The Relevance of Coral Farming in the World Today...
How Far We've Come*



Julian Sprung

Julian Sprung is a marine biologist and entrepreneur who grew up on an island in Biscayne Bay in Miami Beach, Florida, where he spent many hours collecting and observing all kinds of aquatic life. Today, he is president of Two Little Fishies, the company that he co-founded in 1991. Julian has been keeping marine aquariums for more than 40 years, and currently maintains seven marine systems plus a few planted freshwater displays. He is also installing a marine pond at home that will utilize natural sunlight. As a writer, Julian became known to the aquarium hobby through his monthly column *Reef Notes* in *Freshwater and Marine Aquarium (FAMA) Magazine*, and many years of traveling the lecture circuit at aquarium club meetings and exhibitions around the world. His books include *The Reef Aquarium* series that he co-authored with J. Charles Delbeek, *Corals: A Quick Reference Guide*, *Invertebrates: A Quick Reference Guide*, and *Algae: A Problem Solver Guide*. MASNA Award Winner 2004. www.twolittlefishies.com

TOPIC: *Little Stories 2 The Sequel: More short & interesting tales—floating corals, mangroves in strange places, pest redemption, and more*



Bill Wann

Bill Wann is a mechanical engineer known for his self-built, 20,000-gallon full reef aquarium system, which is the largest privately owned tank of its kind in North America. Wann designed it and all of its highly complex support systems (pipes, filters, sump pools) and literally built his house around the tank, making sure to include a very elaborate and nearly self-sufficient filtration system. His background is in the pharmaceutical equipment industry, but in his spare time, he has always managed and maintained tanks, most of them large—and getting bigger with every new build. Along the way, he says he has bought every brand of skimmer and calcium reactor he could find and has been disappointed by the quality and the lack of performance, which never seemed to match the claims. So he decided to build his own, which led to his second business, Aquarium Engineering, based in Bristol, Wisconsin, creating high-quality and custom filtration equipment and systems. www.aquariumeng.com

TOPIC: *Everything You Wanted to Know about Aquarium Plumbing and Pumps, But were Afraid to Ask.*



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Joe Yaiullo

Joe Yaiullo is a marine scientist and curator and cofounder of Long Island Aquarium in Riverhead, New York, where he has pioneered efforts in establishing educational outreach through his public 20,000-gallon reef tank, which houses corals that date back more than 26 years. Prior to his current position, he worked for eight years at the New York Aquarium in Brooklyn, New York as Senior Aquarist. Starting in 1987, Joe employed innovative techniques that are common practice in reefkeeping today and upped his game in 1993 with the establishment of a 1,400-gallon reef tank, which at the time was the largest successful reef tank in the Western Hemisphere. Joe has spoken to aquarium groups throughout Europe and across Canada and the USA, including several MACNAs dating back to 1994. MASNA Award Winner 2016. www.longislandaquarium.com

TOPIC: *Bonsai Reefkeeping in a 20,000-Gallon Box*

An underwater photograph showing a coral reef restoration project. Several horizontal lines of coral are visible, with some coral fragments attached to them. The water is clear and blue. The text "ADOPT A ROPE" is in yellow and white at the top. "RESTORE A REEF" is in yellow and white in the middle. "SUPPORT CORAL REEF CPR" and "coralreefcpr.org" are in white at the bottom. A circular logo for Coral Reef CPR is in the bottom right corner.

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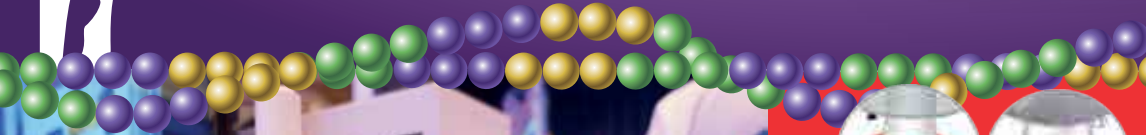
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www.gallianorestaurant.com

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[www.lucysretiredsurfers.com/](http://www.lucysretiredsurfers.com/neworleans)

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Kirk Melton's 120-gallon SPS-dominated reef, running since 2005, is an upgrade to a tank wiped out by Hurricane Katrina. Ninety percent of the tank is grown from one-inch aquacultured frags; almost all fish are 10-plus years old.

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LOCAL FISH STORES

While at MACNA, or when the conference winds down, take the opportunity to visit the local aquarium shops that serve GNO—the Greater New Orleans area. Bayou Reefkeeping members will be highly visible during the

conference and can provide further information and recommendations. Visits to see local outstanding reef systems, such as Reef Bayou member Kirk Melton's, above, may also be arranged.

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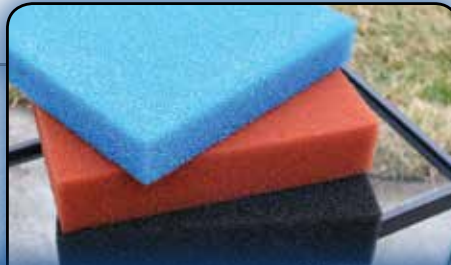
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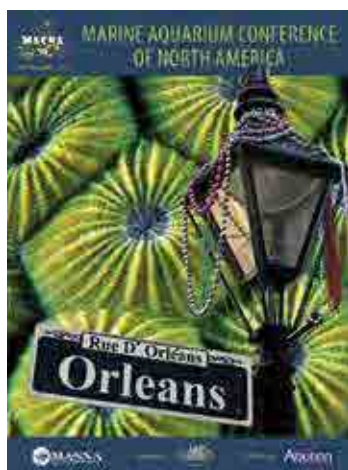
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—Dr. Sylvia Earle

A&M.....	45	I.T.S./Sensafe	59
Abyzz	58	ICP Analysis.....	5
Aquarium Arts/Pacific Aqua Farm . . .	52	JBJ	56
Aquatic Experience	51	Liveaquaria/Drs Foster and Smith . . .	33
Aquatic Life	39	MACNA 2018.....	57
Bali Aqua Farm	52	MASNA	61, 63
Bashsea.....	61	Maxspect.....	7
Boyd/Chemi-Pure	55	MBI	52
Carib Sea.....	66, 67	Neptune.....	27
CORAL Magazine App	65	Quality Marine.....	28, 29
Central Pet/Coralife	Back cover	Reef Nutrition	35
Coral Reef CPR	48	Rod's Food.....	47
Coralvue.....	49	Swiss Tropicals	62
Deepwater Global Dist/Aquaforest . . .	4	Tropical Fish Hobbyist	50
Ekopro Solutions	35	Triton US	8
GHL USA	43	Tunze.....	36
Hagen/Fluval.....	41	Two Little Fishies. . .	Inside front cover, 3
Hikari.....	14, 15	Walt Smith.....	53
Im A Reefer	65		

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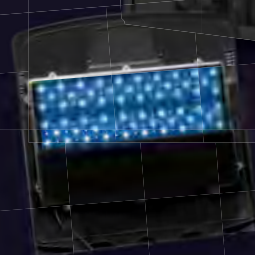
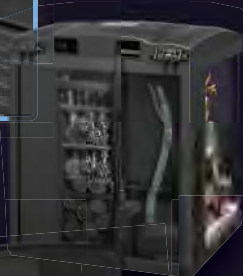
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