

spring/summer 2000

# reef notes



Reef Environmental Education Foundation  
Protecting Marine Life Through Education, Service and Research

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## What's Happening Now

### Caribbean Liveboards Offering Fish Counts and Prizes!

Peter Hughes has long been associated with great diving, world-class liveboards and impeccable service. Now, Hughes is teaming up with REEF to include topnotch fishwatching. Four Peter Hughes Diving (PHD) liveboards operating in the Caribbean now offer free beginning fishwatching courses on every cruise. The Dancer fleet is supplying their divers with all of the materials needed to conduct REEF surveys during the week and PHD guests receive a special gift for joining in on the fun. Those wishing to go completely fishy can even get the new PADI Project AWARE Fish Identification Specialty certification during their week of diving.



In preparation for the Go Fish program, REEF staff conducted training seminars for the staff of the Wave Dancer in Belize, Sea Dancer in Provo, Wind Dancer in Grand Turk, and Antares Dancer in Los Roques, Venezuela. Each Dancer's crew now conducts their own customized fish course every week and encourages divers to take part in fish surveying activities. All of the data collected will be returned to REEF for inclusion in its fish survey database.

As a bonus, for every survey completed during a PHD trip, divers are entered into a quarterly prize drawing. The more surveys completed, the more chances to win! The winner of the first quarterly

prize drawing was Jeff McCaffer of Ontario, Canada, who was diving on the Wave Dancer in Belize. Way to go, Jeff! A grand finale prize drawing will be held at the end of the year for a PHD week for two.

REEF has a Field Survey in Grand Turk scheduled on the M/V Wind Dancer, August 22-29. During the weeklong cruise, most participants will average 20 dives which means 20 chances to win the grand prize! You can make a difference and have a great time doing it!

For more information or to sign up for REEF's August trip, please call REEF or e-mail reefldw@aol.com. For all other inquiries contact Peter Hughes Diving at 1- 800- 9-DANCER.



## Director's Corner



Partnerships. Growth. Data Collection and Management. Public Involvement. I think if REEF were a stock, it would be time to invest! We have a lot of great things going on and even more on the horizon. We've even had to expand REEF Notes to keep up with the growth! Here is a summary of where we are and what's coming up.

REEF's membership has grown continuously since 1993 when we conducted our first surveys. From meager beginnings of a few hundred interested divers, we have grown to a large and very active organization with over 17,000 members world-wide.

The REEF database is also growing into an extremely valuable information source. There are now over 22,000 surveys in the database and researchers and resource managers are making very good use of this information. REEF Field Operation Coordinator Leslie Whaylen has brought our data management timeline down from a six month delay to a matter of weeks between receiving your forms and having them up on our Website. Christy Semmens, REEF's Scientific Coordinator, is also working hard, not only producing high level analysis of the data, but also working with cutting edge technology in a partnership effort with NOAA. See the articles about the new relational database, Geographic Information Systems (GIS) mapping, and the Fish Distribution Atlas project in this issue of REEFNotes.

REEF's geographic range is also growing. In response to a large number of requests from both the scientific community and our membership, we have expanded the fish survey program to the Tropical Eastern Pacific (Gulf of California - Galapagos) and are working on the Hawaii expansion this year. With these expansions, come opportunities for you to travel to new locations, learn about new fish species and environments, and contribute the valuable information needed to help manage these areas.

This growth and these expansions would not be possible without strong partnerships. REEF's work with the Living Oceans Society in the Pacific Northwest, Sonoran Sea Aquarium, National Wildlife Federation, PADI Project AWARE, the Biscayne Bay Foundation and the Field Station of Northwest Florida have been the keys to achievement. With their efforts at the local level, we are all years ahead.

Another strong partnership is the relationship REEF has with our funders. Foundation support from the Henry Foundation, Curtis and Edith Munson Foundation, PADI Project AWARE, National Wildlife Federation and others allow us to continue our programs. Their efforts, in combination with the generous support of our members, have resulted in the great accomplishments you read about in each newsletter. For the third consecutive year, the Munson Foundation has generously offered to match REEF members' contributions this spring. Watch for an upcoming announcement on this opportunity.

And of course, the biggest partnership of all, is our partnership with you, the REEF members. With your active surveying, generous contributions and vocal support of marine conservation, REEF is maintaining its 'do something' attitude and remains a part of the solution.

See you there!



Laddie Akins  
Executive Director



PS. Join us at the OceanFest dive show in Lauderdale by the Sea, June 9-11! We have survey dives scheduled for the weekend and have even talked Paul Humann into doing a few fish ID talks! For more info call Lauderdale By The Sea Chamber of Commerce at (954) 776-1000 or visit [www.oceanfest.com](http://www.oceanfest.com)

# SECOND ADVISORY BOARD MEETING AND SUSTAINER'S SOCIAL A "FISHY" TIME



On April 15th while most people were thinking about taxes, REEF was thinking fish. The second annual REEF Advisory Board Meeting and Sustainers' Briefing and Social was hosted by Paul Humann and Ned and Anna DeLoach at Mango Manor, Humann's home in Davie, Florida. The Cayman Islands Department of Tourism sponsored this event for the second time!

The day's events included the staff's annual report of REEF happenings. Presentations of current programs were also made by Susan Francis, Training Director of the Living Oceans Society; Billy Causey, Superintendent of the Florida Keys National Marine Sanctuary and Bill Horn of the Florida Fish and Wildlife Conservation Commission. Tom Isgar also talked with the group about his experience with Charitable Remainder Trusts. In between presentations, numerous break sessions were scheduled to allow for open discussions and Advisory Board comments. REEF President and founder, Paul Humann invited guests to stroll through his gardens enjoying waterfalls, fountains, and a collection of palms from all over the world.

Once the afternoon wrapped up, the evening festivities kicked in and included a cocktail party, a dinner catered by Jacksonville's Happy Chefs, a raffle for door prizes, and a slide presentation of Humann's favorite scorpionfish and "muck diving" species. The evening was highlighted with the presentation of REEF's Volunteer of the Year Award to Tom Isgar. (See the separate article on page 6 in this issue.)

As the party wound down, all present felt that this had been a great evening filled with information, ideas, and added energy for REEF and marine conservation to continue into the next year and beyond.



# REEF Certificates of Merit Available

## National Marine Fisheries Service Works With REEF to Recognize Survey Effort. Hot New Recognition Certificates available!

As a way to say "Thank you!", NOAA's National Marine Fisheries Service (NMFS), Atlantis Pins, and REEF have joined together to recognize the efforts of our volunteer fish surveyors. With over 22,000 surveys now completed, the REEF database is becoming increasingly valuable to marine managers and scientists. To recognize this volunteer effort and to encourage more divers to join REEF in conducting surveys, NMFS has produced a series of certificates recognizing members as they achieve different levels of survey effort. Each spring, volunteers having conducted 25 or more fish surveys will receive a beautiful barred hamlet certificate and pewter hamlet pin. Those reaching the 50-survey level will receive a spotfin butterflyfish certificate and pin, and members with 100 or more surveys to their credit will receive a queen angelfish certificate and pin in recognition of their efforts.

The certificates made their debut at the annual REEF Sustainer's event and will be soon be mailed to REEF members. During the year, any member who has completed the required number of surveys may also request their certificate by sending an e-mail, referencing their survey level from the REEF Website at [www.reef.org](http://www.reef.org). **If you have conducted at least 25 surveys, watch for yours in the mail!**



# Bonaire Dive Festival

REEF will again participate in the annual Bonaire Dive Festival sponsored by the Coral Reef Alliance (CORAL). This year's festival will be held June 10-17th, and promises to be better than ever. The week features a series of fun and interesting environmental speakers and activities, including REEF training seminars and dives. For more information, call 1-800-BONAIRE or visit [www.scubadiving.com/divedeal/bonairefest.html](http://www.scubadiving.com/divedeal/bonairefest.html).

**We hope to see you there!**



## Monitoring Contracts

### REEF and Florida's Artificial Reef Dive Teams Join for Fishwatching

Last December, REEF was awarded a contract by the Florida Fish and Wildlife Conservation Commission (FWCC) to conduct regional training events with the state's artificial reef dive teams. These county teams are funded by the state to construct, place, and monitor artificial reefs in Florida waters. REEF was called in to help standardize the data collection process and data management by conducting training events in four different regions of Florida. On March 11, 2000, REEF's Leslie Whylen conducted the first of these training events in Punta Gorda with the Charlotte County and Lee County artificial reef dive teams. The training included intermediate and advanced fish identification along with an overview of survey methodology. Twenty divers were in attendance, including REEF advisory board member Bill Horn. A special thanks goes to Rich Novak, Charlotte County's Marine Extension Agent, for organizing the event.

Three other regional training events are being scheduled for later this year. Seminars are modified for each area's local fish assemblages. By year's end, REEF and FWCC will have a core group of artificial reef dive teams trained. They will be surveying their local artificial reefs and submitting survey forms to REEF Headquarters. The data will be processed, uploaded to REEF's Website and reported to the FWCC.

For more information, please contact Leslie Whylen at [reefLDW@aol.com](mailto:reefLDW@aol.com) or 305-451-0312.

# Marine Protected Area News

Part of REEF's over-arching mission is to encourage the protection of marine ecosystems, and we believe that marine protected areas (MPAs) are a vital management tool for this protection. To this end, we urge our members to stay informed on initiatives to create new MPAs and on funding issues for new and existing MPAs. Below are a few recent and noteworthy happenings...

- This spring, an international group of natural and social scientists submitted a Call for Presidential Action (CPA) to establish a comprehensive system of national MPAs to safeguard the nation's marine environment. During a meeting convened by the Marine Conservation Biology Institute and The Cousteau Society, actions were formulated including measures that the current and succeeding Administrations can undertake to protect the biological diversity and integrity of our nation's estuaries, coastal waters, and oceans. A benchmark goal of a minimum of 2% of US marine waters protected as no-take reserves within 5 years was suggested. The document, "Safeguarding America's Seas: Establishing a National System of Marine Protected Areas", contains recommendations for MPA site selection, design, and management, and is available at [www.mcbi.org](http://www.mcbi.org).

- Another national effort to protect marine resources in US waters has been taken on by the US Coral Reef Task Force (CRTF). This Task Force was charged by Presidential Order to formulate a plan to protect, restore, and better understand the Nation's coral reefs. This past March, the CRTF released its groundbreaking plan that calls for the protection of at least 20% of coral reefs in US waters to be protected as no-take by the year 2010. Check out the CRTF Website for more information and to read the Action Plan at [www.coralreef.gov](http://www.coralreef.gov).

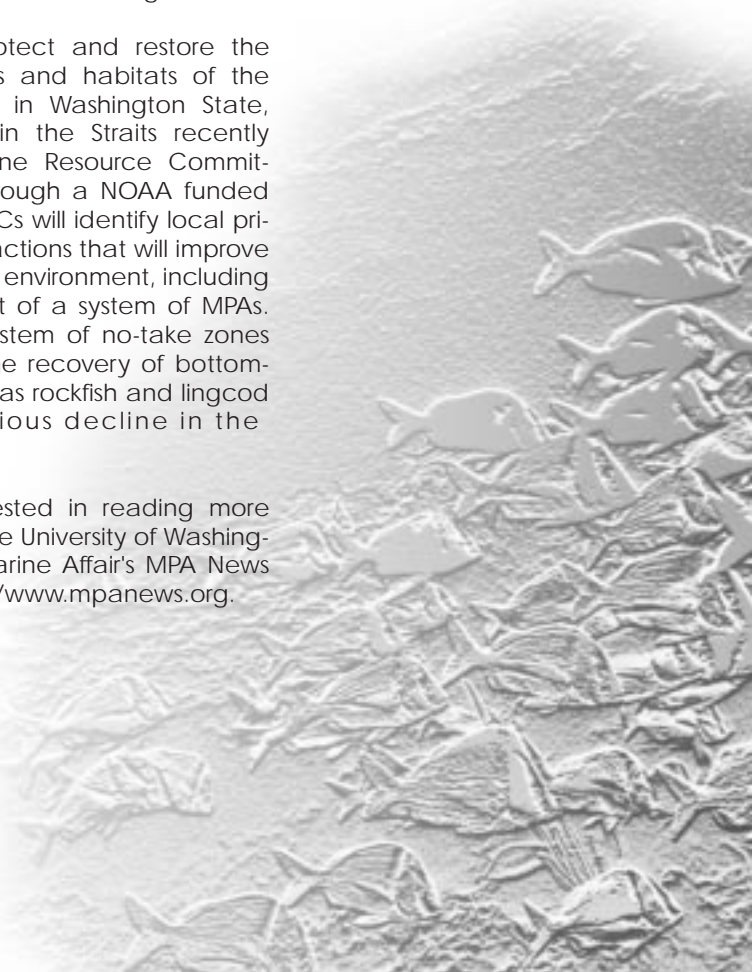
- Using a scoring system based on socioeconomic and ecological criteria, five no-take reserves were recently created in the Bahamas to provide protection from overexploitation, while giving long-term support for the fishing

and diving industries. The five selected sites are North Bimini, the Berry Islands, South Eleuthera, the Exuma Cays, and the Northern Abaco Cays. The creation of these reserves is a vital step toward managing the marine environment in developing areas using the precautionary approach. REEF has collaborated with the Bahamas National Trust (BNT) to ensure regular data collection by BNT staff that will supplement other REEF activities in the region. These data will be a valuable tool for measuring the effect of the reserves.

- The National Marine Fisheries Service recently proposed two gag grouper reserves in the northeast Gulf of Mexico. This is an effort to protect the species from further decline. Gag, and other species of grouper, are particularly susceptible to over-harvesting because of their slow growth, late maturity, and reproductive strategy of forming large spawning aggregations that are vulnerable to harvest. For more information visit <http://www.gulfcouncil.org>.

- In order to protect and restore the marine resources and habitats of the Northwest Straits in Washington State, seven counties in the Straits recently established Marine Resource Committees (MRCs). Through a NOAA funded program, the MRCs will identify local priorities and lead actions that will improve the local marine environment, including the development of a system of MPAs. An integrated system of no-take zones would support the recovery of bottom-fish species such as rockfish and lingcod that are in serious decline in the Northwest Straits.

If you are interested in reading more MPA news, visit the University of Washington School of Marine Affairs' MPA News Website at <http://www.mpanews.org>.



# Volunteer of the Year!



Although this year's decision was difficult because of the dedication and support of so many REEF members, we are pleased to announce that REEF's Volunteer of the Year is Advisory Board member Tom Isgar.

A REEF member since 1994, Tom regularly takes part in REEF Field Surveys, racking up a life list of 238 fish species and surveys totaling 94. This past December, Tom traveled to St. Marteen and conducted a fish identification seminar with several local divers, dive operators, and environmental officers. The event was lauded in the local newspaper as a success.

A Platinum Sustainer, Tom has also been a tremendous help over the years volunteering to staff the REEF booth at scuba shows such as OceanFest and DEMA. With his generous donation of a Xerox machine, printer, and fax, REEF's office efficiency has increased dramatically. Recently, Tom helped compile an email list of REEF members and scanned slides for the new Gulf of California program. This October, Tom will once again be participating in REEF's Advanced Assessment Team project in the Florida Keys and will join us on the Dominica trip in June. Thanks Tom!!

## Other Outstanding Contributors

For over a year, Audrey Smith has been volunteering two days each week in the REEF office in Key Largo. Audrey was a 5th grade teacher in Harrisburg, Pennsylvania for over 30 years before she and her husband, Ken ("Smitty"), relocated to the Keys after retirement in 1998. Audrey has been an invaluable help keeping track of inventory, shipping orders, organizing the office, membership, and much, much more.



Audrey became SCUBA certified 5 years ago and enjoys diving throughout the Caribbean as well as in her backyard, the Florida Keys. She and Smitty are joining the St. John Field Survey in October and Bonaire REEF Field Survey in November. Thanks Audrey!

## Anne Siegenthaler was REEF's 1999 fall intern.



At the end of August, Anne flew into Miami from California without a car or SCUBA gear! But within a few days, Anne had purchased both and was headed down to Key West to join REEF's Advanced Assessment Team for a week of diving in Key West, the Marquesas, and the Dry Tortugas. Nothing like jumping in headfirst! Even with Hurricane Floyd, Anne doubled her total number of dives and got a big jump-start on reef fish identification. Upon returning to dry land, Anne worked in the REEF office on membership, data forms, and shipping orders. Outside of the office, she presented fish identification seminars, assisted in the research of submerged cultural resources, advanced her fish watching skills in the Keys' waters, worked on her Rescue Diver certification, and helped with REEF's booth at OceanFest. In December, Anne left for Ecuador where she spent the Holidays. She now lives in Kaluai, Hawaii, where she is finishing her college education. For more information on REEF's Internship program and opportunities for participation and sponsorship, contact reef003@aol.com or call REEFHQ.

# We Need You!

## VOLUNTEERS NEEDED!

Are you looking for an opportunity to do some REEF surveys? Here are some groups that need help...

Los Angeles: The Santa Monica Baykeepers needs volunteers to help with their kelp forest monitoring project. For more information, contact Ladan Mohajerani at 310-305-9645, extension 3, or dolphin@smbaykeeper.org.

Seattle: Monthly surveys are conducted at the Edmonds Underwater Park and the Port Townsend Marine Science Center. Contact Kirby Johnson (Edmonds) at kirbjill@gte.net or Kurt Steinbach (Pt. Townsend) at kurtsteinbach@hotmail.com.

South Florida: The Biscayne Bay Foundation is conducting quarterly fish survey dives along with other benthic monitoring programs. Contact Karen Bareford at BBF@herald.infi.net or call (305) 447-4566

Florida: Reef Research Teams throughout Florida are conducting regular monitoring of artificial reefs. For information on the team in your area e-mail Bill Horn at the Florida Fish and Wildlife Conservation Commission at HORN@gfc.state.fl.us



# 2000 Field Survey Schedule

Each Field Survey is hosted by highly regarded local resorts and dive operators and typically runs from Sunday through Friday. As a survey volunteer you will gather data at locations especially important to marine wildlife management and conservation officials. A minimum of two survey dives will be conducted each day. Between survey dives REEF personnel will present colorful and interactive fish identification seminars. You'll learn the most successful surveying strategies, participate in informative discussions, and get plenty of exciting fish behavior tips. You will be amazed at how much more enjoyable diving will be with your expanded knowledge of marine wildlife.



## Take a dive vacation that counts !

JOIN REEF FOR A WEEK-LONG FIELD SURVEY AT A FAVORITE DIVE DESTINATION.

### **Dominica - Dive Castaways - June 24-July 01**

led by Paul Humann and Ned DeLoach - 7 nights/8days  
\$965 includes room, all breakfast and dinners, 5 days of 2 tank am diving, transfers, and taxes  
Does not include ~\$600 airfare

### **Little Cayman - Southern Cross Club - July 01-07**

FULL

### **Tobago - Blue Water Resort - July 22-29**

led by Paul Humann and Ned DeLoach - 7 nights/8days  
\$752.50 includes room, all breakfasts, 5 days of 2 tank am diving, taxes and transfers. Does not include airfare

### **Grand Turk - M/V Wind Dancer - August 12-19**

7 nights/8days \$1595-1795 includes diving, all meals, taxes and transfers. Does not include port fees (\$45) or airfare

### **Flower Gardens - M/V Spree - August 20-25**

Coral Spawning - FULL

### **St. John - Westin Resort - September 02-09**

7 nights/8days \$716 includes room based on double occupancy and 5 days of 2 tank am diving  
Does not include airfare, meals, taxes (8%) and transfers (\$50 roundtrip water taxi from St. Thomas)

### **Bonaire - Sand Dollar - November 04-11**

7 nights/8days \$849-1599 (based on occupancy) includes room, 6 days of 1 tank boat diving, unlimited shore dives, taxes  
Does not include airfare or transfers

### **Cozumel - Safari Inn/Aqua Safari Dive Shop - December 02-09**

7 nights/8days \$383-471 (varies w/ occupancy) includes 5 days of 2 tank am diving, room, taxes. Does not include airfare or transfers

An additional tax-deductible \$200 REEF fee will be added to each trip to cover the cost of the group leader, seminars, and survey materials. Please call our REEF office (305-451-0312) or email Leslie at reef.DW@aol.com for all initial inquiries. We will then direct you to the respective reservations offices for the scheduled trips.

## GREAT AMERICAN FISH COUNT

### Event focuses on Partnerships

Every July, fish surveyors, marine park managers, the news media and interested members of the general public jump in with both feet -- literally-- to the Great American Fish Count (GAFC). This year, REEF and the National Marine Sanctuary Program will present the July event at coastal sites around the country. Sponsors will include REEF Field Stations, dive shops, non-profit organizations, aquarium facilities, universities and dive clubs working in partnership with coastal communities and sanctuaries.

The GAFC idea started in the Channel Islands, California, with Gary Davis, and has spread throughout the US, as a way to focus attention on our oceans and their fish stocks. REEF has been involved with the GAFC since 1997, and is now the principal organization managing the event.

A major benefit of the GAFC event is the national media attention that is focussed on fish and volunteer fish survey activities. Even though thousands of REEF members conduct surveys year-round, this event presents an opportunity to more broadly publicize our efforts, involve new divers and help spread the word about our marine resources.

Taking advantage of the Internet, divers can log onto the GAFC Website to view and sign up for available seminars and dives in their area. REEF is looking for partners around the country to conduct seminars and schedule their survey dives. To schedule your organization as a GAFC partner, contact REEF at (305) 451-0312 or REEFHQ@aol.com.

For more information on scheduled events, visit the GAFC Website at [www.fishcount.org](http://www.fishcount.org).

# Thank you...

The following members and corporations have generously donated \$100 or more between November 1999 and March 2000. Space does not allow the listing of all gifts to REEF but each contribution made plays a crucial role in the continuance and expansion of our work. Thank you all for your support.

## BRONZE SUSTAINERS \$100.00

BARBARA ABELES  
RENAY ADKINS  
DANA AFRICA  
TODD AIKINS  
MARK AIREY  
MARY ALEXANDER  
STEVE AMOS  
KATE ARCHHEY  
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DOUG ROEX  
JULIE ROSENFELD  
LINDA SCHILLINGER  
ANNE WALTON

## GOLD SUSTAINERS (500.00 and over)

PATRICIA AYERS  
NANCY BETTS  
DAVID ORR  
PATRICIA PACHUTA  
SUNNY SKOBEL  
ANNE WALTON

## PLATINUM SUSTAINERS — \$1000.00 and over

DARCY CHARLIER  
JIM DALLE PAZZE  
KEN DEAVER  
NED DELOACH  
STEVEN DINGELDEIN  
MUNS FARESTAD  
ROBIN GLACKIN  
KATHLEEN GUNDERSON  
PAUL HUMANN  
TOM ISGAR  
MARK KAEHLER  
JOSE KIRCHNER  
JEAN KIRKPATRICK  
CAROL LORENZ  
JOE MEYER IV  
DAVID NANK M.D.  
JEFFREY NEHMS  
OLE PELOSO  
JOHN PITCAIRN  
WILLIAM SHEPPA

KENNETH SINIBALDI  
HILTON C. SMITH JR.  
EDWIN STEINER  
JOHN STRAND

If you feel any of your contributions are listed in error, please let us know.

## Wish list and special thanks for wishes granted

### Thank You!

Slide projector from Jose Kirchner, newsletter editors Deena Wells, Ed Steiner, Dennis Schneider, and Susan E. Kruck, Ken Marks for Website management, ReefNet donations of CDs, Kitty Philips, John Pitcairn and Tom Isgar's help with DEMA booth, slides and prints from Paul Humann, Brice Semmens for Website involvement, nautical charts from John Rothchild, continued contribution from Diver's Outlet for office space

**Wishes** - laptop projection system, slide scanner, nautical charts, light table, office furniture (desks, chairs, filing cabinets), digital camera.



# Books and CD ROMs

## Surveying Coral Reef Fishes - \$12

A manual for data collection, processing and interpretation of fish survey information for the tropical northwestern Atlantic - a useful tool for any volunteer, this manual assists both the amateur and professional in contributing to the study of marine life.

Code BKA

## Reef Fish Identification Book - \$39.95

Florida, Caribbean and Bahamas, 2nd edition, a fish ID book designed for divers, includes 670 photographs of 494 species.

Code BKB

## Reef Creature Identification Book - \$37.95

Florida, Caribbean and Bahamas - 478 color photographs illustrate the most common marine invertebrates sighted by divers.

Code BKC

## Reef Coral Identification Book - \$32.95

Florida, Caribbean and Bahamas - 375 color photographs will help you sort a stony coral from a gorgonian.

Also includes 100 color photos of marine algae.

Code BKD

## Snorkeling Guide to Marine Life - \$32.95

Florida, Caribbean and Bahamas - 280 color photos illustrate marine life seen in 15 ft. or less of water including corals, fish and invertebrates.

Code BKE

## \*NEW\* Reef Fish Behavior Book - \$39.95

Florida, Caribbean and Bahamas, has 475 marine life photos, many capturing spectacular fish behaviors never before documented. Chapters, including reproduction, life cycles, feeding, colors, camouflage and many more, help divers learn where and when to observe many of the most dramatic behaviors.

Code BKF

## Reef Fish Identification Galapagos - \$34.95

A comprehensive fish identification guide for the Galapagos Islands - the world's most spectacular natural aquarium. 260 beautiful color plates display the famous archipelago's fabulous fish life. This guide can also be used for Gulf of California divers.

Code BKG

## Coastal Fish Identification - \$32.95

California to Alaska - a comprehensive fish identification guide for the West Coast of North America.

Over 250 colorful photos.

Code BKH

## \*NEW\* "In-a-Pocket" Guides - \$10

These new waterproof guides are a companion to Reef Fish Identification and fit right into your BC pocket!

Contains over 100 color photos.

"Fish-In-a-Pocket" (Code FIP) and

"Creature-In-a-Pocket" (Code CIP) available.

## Reef Fish Identification CD-ROM - \$39.95

The ultimate fish ID learning tool with more than 1,600 images, interactive fish ID learning games, scientific pronunciation, virtual dives, fish finder, log book and more.

Code CDF



# REEF Gear

Get ready to count fish on your dive vacation!

## REEF Starter Kit - \$25

The basic kit for all fish-watchers. Contains REEF Underwater slate, waterproof fish ID card, underwater Fish-in-a-Pocket booklet, BC Tag, 1 waterproof log sheet and 2 REEF Scanforms  
Code SKC

Available also for Pacific area (without Fish-in-a-Pocket) - \$15  
Code SKP

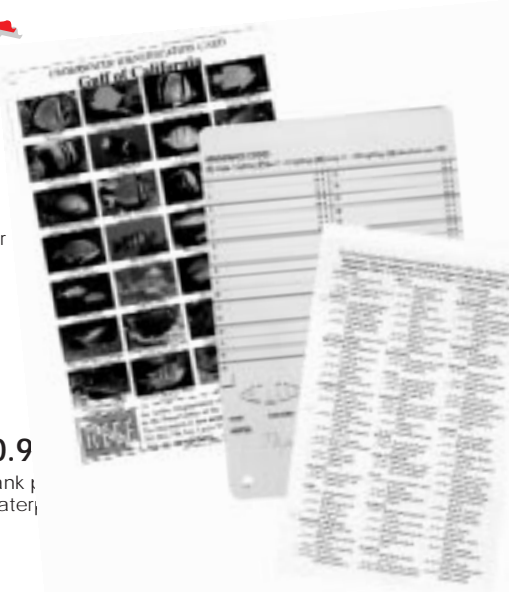
Tropical Eastern Pacific (without Fish-in-a-Pocket) - \$15  
Code SKP

## Survey Slate and Fish ID Card - \$10.9

Yellow fish ID slate has 60 spaces to list fish sightings and blank space to sketch "mystery fish". Includes attachable pencil and waterproof ID card with 30 photos of commonly sighted fish.  
Code SL

## Underwater Paper - \$0.60

One sheet of double-sided waterproof paper - good for 2 surveys.  
Code UWP



# OTHER REEF GEAR

## REEF T Shirts - \$15

100% cotton T-shirt displaying the REEF logo on the back, underscored by "We Speak Fish". Sizes: M, L, XL  
Code CLT

## \*NEW\* REEF Golf Shirts - \$35

100% heavyweight cotton pique short sleeved dark teal blue with REEF logo embroidered on front. Sizes: M, L, XL  
Code CLG

## \*NEW\* REEF Caps - \$15

Six panel, 100% cotton deluxe pigment-dyed cap with embroidered REEF logo on front and "We Speak Fish" in semicircle over back opening. Available in 3 color combinations: Forest crown with Sand visor, Khaki crown with Forest visor, Khaki crown with Navy visor. Please specify color choice when ordering. One size fits all.  
Code CLC

## REEF Embossed License Plate - \$10

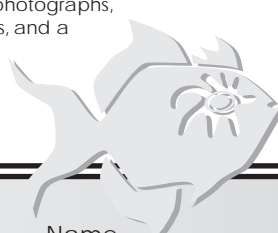
Custom license plate displaying colorful REEF logo.  
Code LP

## Reef Creature/Coral Identification CD-ROM - \$39.95

Learn to identify more than 500 reef creatures and corals as well as pronounce their names! Interactive learning games and more than 2,300 spectacular images add to the fun of this long-awaited CD-ROM.  
Code CDC

## ReefNet Fishes of the Caribbean and Adjacent Waters - \$50.00

More than 200 video clips, 1400 photographs, descriptions of nearly 500 species, and a customizable slide show.  
Code CDF2



### Order Information

Code	Description	Quantity	Price
___	_____	___	___
___	_____	___	___
___	_____	___	___

Subtotal \_\_\_\_\_

Florida Residents add 7.5% Sales Tax: \_\_\_\_\_

Add \$4.50 Shipping & Handling (plus \$1 each additional item) \_\_\_\_\_

Total \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Email \_\_\_\_\_

Phone \_\_\_\_\_

Mail to: REEF, P.O. Box 246, Key Largo, FL 33037  
or e-mail: reefLDW@aol.com

# FIELD STATIONS

## USA Field Stations

### Florida

Islamorada - Lady Cyana Divers	800-221-8717
Key Largo - Diver's Outlet	305-451-8034
Key Largo - Amy Slate's	
Amoray Dive Resort	305-451-3595
Marathon - Florida Keys National Marine Sanctuary	305-743-2437
Pensacola - REEF Field Station of Northwest Florida	850-456-9793

### Texas

Lancaster - Island Time	972-227-6678
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### Washington

San Juan - Emerald Seas	360-378-2772
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### Canada, Alberta

Lethbridge - Anderson Aquatics	403-328-5040
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### Canada, British Colombia

Victoria - Living Oceans Society	250-920-0733
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## Overseas Field Stations

### Bahamas

Nassau - Custom Aquatics	242-362-1492
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### Bonaire

Kralendyk - Green Submarine	5997172929
Kralendyk - Sand Dollar	800-288-4773

### British Virgin Islands

Tortola - Baskin in the Sun	284-494-2858
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### Honduras

Utila - Utila Lodge Resort	504-425-3143
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### US Virgin Islands

St Croix - St Croix Ultimate Blue Water Adventures	340-773-5994
St Thomas - Aqua Action Dive Center	340-775-6285

### Puerto Rico

Culebra - Reeflink Divers	787-742-0581
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# Reef Rankings

**REEF Volunteers  
top the 21,000  
survey mark !**

SURVEYS RETURNED:	Florida/Caribbean	Pacific
SITES SURVEYED :	19,677	657
# SPECIES SEEN :	1,527	138
	500	160

*The following members have completed at least 30 surveys to make the REEF Rankings:*

### Over 300 Surveys

LADDIE AKINS	602
JOE THOMAS	440
DEENA FEELEY	439
LINDA SCHILLINGER	439
JOHN PITCAIRN	300
EMILY SCHMITT-LAVIN	300

### OVER 200 SURVEYS

JEAN KIRKPATRICK	297
CHRISTY PATTENGILL	261
CATHY COUGHLIN	243
LESLIE WHAYLEN	238
CLIVE PETROVIC	234
EDWIN STEINER	207

### OVER 100 SURVEYS

MONTY DOYLE	198
ANN KNOLLENBERG	190
SHERYL SHEA	189
ELAINE MORDEN	185
BRICE SEMMENS	165
KEN MARKS	158
KEN DEAVER	153
JULIE OVERING	149
BRUCE PURDY	132
RACHID FERETTI	131
JERRY LIGON	127
CAROL LORENZ	123
DAVID PRESTON	122
BARBARA MODAFARI	113
PATRICIA AYERS	111
DOUG ROREX	109
PAMELA BEZUIDEHOUT	107
CINDY SNELL	105
DARLENE GEHRINGER	104

### OVER 50 SURVEYS

CAROL REICHERT	98
WILL RUGGLES	97
BETSY SAUNDERS	97
DOUGLASS RANKIN	96
TOM ISGAR	95
RANDY KEIL	91

BOB BISHOP	86
JOYCE SCHULKE	86
SHELLEY TYRE	85
JIM MODAFARI	84
JIM MORABITO	84
KIRSTEN BASSION	80
PAMELA CEFARATTI	80
DENISE MIZELL	80
JAMES BROOKE	77
JEAN GASEN	76
GREG BUNCH	73
KATHLEEN SCOTT	73
TONY SEBASTIAN	70
DAVE DOWNS	64
DON BUCK	63
ROBYN OSBORN	63
MONICA VEGA	62
CONNIE BISHOP	60
CHRIS KOEPFER	60
DITTE PREKER	60
EDGAR TOMEI	60
ROBERT ANTONELLI	59
MARJORIE NELSON	59
CHARLES (BOB) HERSEY	58
RICHARD HITT	58
GAIL TOMEI	58
DOUGLAS HARDER	57
PETER LEAHY	57
KAREN GARCIA	56
BRENDA HITT	56
ANTHONY KAJFEZ	56
CONNIE DOLAN	55
CURRIER RANDALL	54
DAVID MULVEY	53
CLINT WHITAKER	53
NOREEN DOWNS	52
HILARY HARDER	52
PAUL HUMANN	52
CHUCK JIRKA	52
JANET EARNSHAW	51
JONATHON TROMM	51
CHERI ARNOLD	50

### OVER 30 SURVEYS

ROBERT WINTERS	49
JONATHAN EDWARDS	48
GLEN THIEL	48

DONELLA WILSON	47
TODD AIKINS	46
MARGARET COWIN	46
DR. STEPHEN GITTINGS	46
JOSEPH FROELICH	44
CRISTI KORBECK	44
KITTY PHILIPS	44
WALTER BRINEY	43
ANNA DELOACH	43
PETER RENNEMANN	43
ERIC RIESCH	42
SARAH TAMBLYN	41
SARA THOMAS	41
JANE ROREX	40
TRACY SIANI	39
JOHN WILLIAMS	39
SHAWN EDWARDS	38
MIKE CHAMBERS	37
DONNA GERRARD	37
CORINNE HALBERG	37
KIRBY JOHNSON	37
JOHN KELLY	37
DENNY LUTZ	37
MICHAEL PHELAN	37
WADE BEVIER	36
ROBERT DRAPER	36
ED GERRARD	36
RICK HALPERN	36
MUNS FARESTAD	34
JEANA HODGES	34
LYNN HUBERT	34
MARK KAEHLER	34
JESSICA ARMACOST	32
ROBERT BURNETT	32
EDDIE GERRARD	32
MELISSA KEYES	32
KATHIE COMERFORD	31
EMMA HICKERSON	31
JOSE KIRCHNER	31
ROBERT SCHAUER	31
DENNIS SCHNEIDER	31
MARK SPRINGER	31
JOHN STUART	31
JOSEPH THOMAS	31
ARNOLD WALKER	31
STEVE GANON	30
KATIA PRONZATI	30

# What's Happening in Research?

**Bonaire Marine Park (BMP)**- REEF members have been very busy in Bonaire, and to date we have over 2,000 surveys from the island. These data represent a valuable source of information for the BMP management. In November 1999 at the annual Gulf and Caribbean Fisheries Institute meeting, REEF's Scientific Coordinator Christy Semmens presented a paper summarizing the data entitled, "The Reef Fish Assemblages of Bonaire Marine Park: An Analysis of REEF Fish Survey Data". A total of 362 species have been reported from 77 sites around Bonaire and the neighboring Klein Bonaire. This makes the BMP one of the most species rich areas in REEF's database. The paper also showed that the composition of species (presence and abundance) on Klein Bonaire and Bonaire are distinct. In addition to providing data for site characterization, the thousands of surveys in REEF's database will provide a baseline against which future change can be assessed. This paper will be published in the Institute's conference proceedings, and provides the most comprehensive species list published to date for the BMP.

**Florida Keys National Marine Sanctuary (FKNMS)**- As part of the ongoing monitoring of no-take zones in the FKNMS, REEF's Advanced Assessment Team (AAT) conducts annual surveys at 31 sites in the sanctuary and the Dry Tortugas. 1999 was the third year of REEF's contract with the sanctuary. Christy Semmens presented the survey results at the annual FKNMS Zone Monitoring Performance meeting in Marathon in February 2000. During the 1999 field season, the AAT conducted 218 REEF surveys and documented 231 species. Similarity and cluster analyses were used to look for shifts over time in the communities of fishes among the sites, as an indication of an effect from harvest restrictions. Analyses were also done at the species level, looking for changes in estimated abundance and frequency of three snapper species, hogfish, and black grouper before and after the zone implementation. The general patterns show increases for the five species at most sites, protected and open, since the zones went into effect on July 1, 1997.

Future plans include continued AAT FKNMS survey trips, with increased effort in the proposed Dry Tortugas Ecological Reserve. In addition, REEF's collaboration with NOAA's Biogeography Program (see related story) will allow the incorporation of spatial data and benthic habitat information in the FKNMS zone monitoring analysis. For more information on the FKNMS zone monitoring and to view the complete report submitted by REEF, visit [http://www.fknms.nos.noaa.gov/research\\_monitoring/welcome.html](http://www.fknms.nos.noaa.gov/research_monitoring/welcome.html).

**Atlantic and Gulf Rapid Reef Assessment (AGRRA)**- During 1999, REEF participated in three AGRRA projects. The AGRRA initiative is an effort to determine the regional condition of coral reefs, using a standard survey protocol for fish, coral, and algae. REEF collaborated in this work with the Marine Education and Environmental Research Institute in the Cayman Islands, the University of the Virgin Islands in St. Croix, and the National Marine Sanctuary Program at the Flower Garden Banks. REEF staff and AAT members Brice Semmens (Cayman Isl.), Clint Whitaker (St. Croix), and Ken Deaver (FGB), conducted the fish component of the protocol at the AGRRA sites. A minimum of one REEF survey per site and 10-12 belt transects per site were conducted. Results from these projects have been summarized and submitted to various protection agencies and institutions (Cayman Islands Department of Environment, the University of the Virgin Islands, and NOAA's National Marine Sanctuary Program).



The most comprehensive report was produced for the Cayman Islands, and a paper entitled "The Status of Reef Fishes in the Cayman Islands (B.W.I.)" and was submitted for journal publication by Christy and Brice Semmens. The paper uses the REEF database (over 1,200 surveys from the Cayman Islands) and AGRRA data to provide an updated species list for the Islands; a comparison between islands (Grand Cayman and Little Cayman) and sites (33 sites), and an analysis of the relationships between herbivorous fishes and algal cover.

Thanks to the REEF database, 44 species were added to the list of fishes known to occur on the islands. A site's location (windward or leeward) appeared to be an important factor in community composition. Additionally, many species, including groupers, had significantly higher abundance on Little Cayman, which is probably an indication of the difference in human impact between the two islands.

**For a copy of the Cayman Island paper, contact REEF HQ. For more information on the AGRRA project, visit <http://coral.aoml.noaa.gov/agra/index.html>**

# NOAA's Biogeography Program Looking at REEF Data in New Ways



REEF and NOAA Divers Working Together

Through collaboration with the Center for Coastal Monitoring and Assessment's Biogeography Program at NOAA and NOAA's Marine Sanctuaries Program, REEF data are being used in exciting and new analyses that include benthic habitat maps, Geographic Information Systems (GIS), and spatial analysis.

In 1999, Biogeography Program staff began to use REEF data from the Florida Keys to examine the relationships between fishes and habitats in the Florida Keys National Marine Sanctuary (FKNMS). During the next two years, the project aims to define, map, and model the spatial and temporal distribution and abundance of reef fishes among benthic habitats of the FKNMS using REEF data. The map-based analyses will assist in the efforts to assess the effects of designated no-take zones. The results of this project will be published in a series of reports by the Biogeography Program in the NOAA Conservation Series Technical Reports and scientific literature. In addition, a paper will be presented this October at the International Coral Reef Symposium in Bali.

The continued support of the Biogeography Program and the hard work of Chris Jeffrey have made this project possible. We will keep you updated on this exciting project in future editions of REEFNotes, and will be posting some of the maps to our Website this summer.

## Reef Fish Species Distribution Atlas Coming Soon!

The REEF database has grown to contain the most comprehensive set of information on reef fish distribution and abundance in the tropical western Atlantic (a region encompassing the Caribbean, Bahamas, Florida, and the Gulf of Mexico). In fact, it has become comprehensive enough that REEF, in collaboration with the Biogeography group at NOAA, will begin work this year on developing a Fish Species Distribution Atlas for the tropical western Atlantic. This atlas will map the presence and estimated abundance of all fish species documented during REEF surveys. The spatial resolution of our database (i.e. the exact location of each survey is known and can be placed on a map), along with the wide geographic coverage and large amount of field time put in by our members, enable the creation of this atlas. The atlas, in turn, can help answer the basic question of where species are found and can be used to determine distribution changes over time.

The use of volunteer-generated data to create atlases is not a new concept -- the Breeding Bird Survey started in 1966 and has involved thousands of birders. Breeding Bird Atlases are published by each state and have documented the breeding status of all species found. Atlas projects have been very successful in documenting the breeding birds of poorly known areas and in discovering unknown breeding populations of otherwise well-known species.

The creation of the Reef Fish Distribution Atlas will be a major accomplishment, and a significant contribution to the understanding and conservation of western Atlantic reef fishes. Ultimately, REEF hopes to have enough data from our other geographic areas to produce similar atlases so keep those surveys coming!

## Help Needed!

Your help is needed as REEF starts work on the Reef Fish Distribution Atlas.

- GPS (Global Positioning System) locations of survey sites (latitude and longitude): REEF has data from over 1,700 sites in the western Atlantic, but only latitude and longitude coordinates for approximately 1,000 of them. Without coordinates, REEF can not map survey data. Two things you can do- 1) whenever possible, please include the lat/long on your survey form; and 2) look at the list of sites we do not have location information for at [www.reef.org/GPSsites.htm](http://www.reef.org/GPSsites.htm) and help us make this list smaller. Send any lat/long information to Leslie Whaylen at [reefLDW@aol.com](mailto:reefLDW@aol.com).
- Collect data from under-surveyed areas: These include Cuba, Puerto Rico, the windward islands in the lesser Antilles, Jamaica, mainland Mexico, Crooked and Eleuthera Islands in the Bahamas, Anguilla, and Bermuda, to name a few.

We hope to fill these gaps over the next several years by planning field surveys and special projects to these locations.

**Are you interested in participating in a special project to Bermuda in the fall of 2000? If so, please contact Christy Semmens at [pattengill@mailexcite.com](mailto:pattengill@mailexcite.com).**

# New REEF Starter Kits!



REEF presents The Fish Identification Specialty Starter Kit. This kit comes in a re-sealable plastic bag and is available for Pacific, Florida/Caribbean, and the Tropical Eastern Pacific (Gulf of California to Galapagos). All kits contain a yellow fish identification slate with 60 spaces to list fish sightings, blank profiles to sketch "mystery fish", and attachable pencil; waterproof fish ID card; waterproof survey paper good for 2 dives; 2 REEF scanforms; REEF decal; BC tag and fish survey instructions. The Florida/Caribbean kit also contains Fish-in-a-Pocket underwater reference that has 132 color photos of commonly sighted fish in the Caribbean. Prices are \$25.00 for Florida/Caribbean kit, and \$15.00 for Pacific or Tropical Eastern Pacific kits. Everything a fish surveyor could ask for!

## Advanced Assessment Team Information

"I love it when a plan comes together." Wait, that's the A-Team. So what exactly is the Advanced Assessment Team (AAT)?

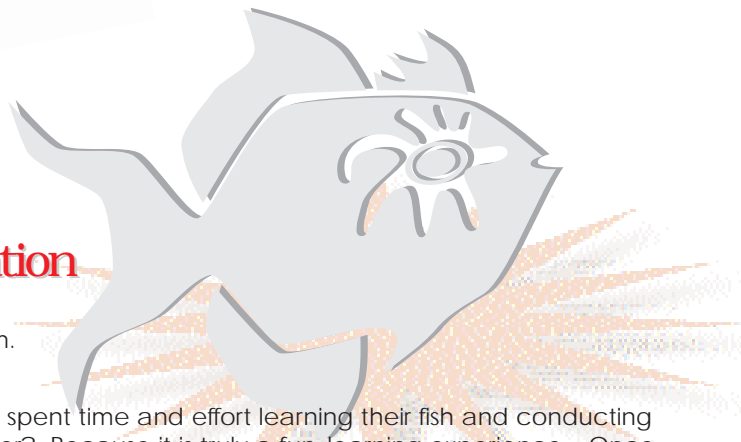
The AAT is made up of REEF's expert fish watchers, those who have spent time and effort learning their fish and conducting many surveys. Why take the time to become an expert fish watcher? Because it is truly a fun, learning experience. Once all the big fish have been identified, it is always rewarding to start "treasure hunting" for the small, cryptic species. Finding rarely identified species and being able to scribble in write-ins on the back of the scanform is sweetly satisfying.

As a member of REEF's AAT, you will receive invitations to join special projects such as the annual Florida Keys National Marine Sanctuary monitoring. Year 2000 will be the fourth year that REEF has conducted an AAT project in the Florida Keys. Because of a FKNMS contract, REEF has been able to subsidize a portion of the diving package in order to keep AAT members' costs down. REEF is also excited about the prospect of sending an AAT team to Culebra, Puerto Rico later this year. Additionally, AAT members participated in Atlantic and Gulf Rapid Reef Assessment projects last year, and we expect future opportunities to only increase.

How do you become one of REEF's expert fish watchers? In the beginning, all fish watching neophytes are classified as Level 1. Once you pass the 25 Most Common Fish Quiz with 80% and conduct 2 surveys, you are at Level 2. Level 3 is achieved by passing a 100 Common Fish Quiz with 80% and conducting 25 surveys. Level 4 is acquired by passing the Advanced 100-Fish Quiz with a 90% and conducting 35 surveys. Level 5 is acquired by passing the Advanced 100-Fish Quiz with a 95% and conducting 50 surveys. Both levels 4 and 5 are expert levels and are extended an invitation to join REEF's AAT.

Where can you take these quizzes? REEF staff can administer the quizzes on a REEF Field Survey or at the REEF office in Key Largo. We'd love to have you on a Field Survey or for a visit in the Keys. Or ask your local REEF Field Station about the quizzes.

**Come join in on the fun and excitement! You're never too old or too young to learn one more fish!**



## Tropical Eastern Pacific ... REEF Has Arrived!

REEF, with support from the Sonoran Sea Aquarium, Mexico's Instituto Nacional de la Pesca, the National Wildlife Federation, and the PADI Project AWARE Foundation, launched its latest Fish Survey Project at the Desert Dolphin Dive Show this March in Tucson, Arizona. With this addition, REEF's geographic coverage for surveys now includes waters from the Gulf of California to the Galapagos Islands. As part of the expansion, a third scanform was developed, along with new underwater paper, a color identification card, and the "Introduction to Fishwatching in the Gulf of California training curriculum. As part of REEF's collaboration with Pesca, all survey materials are available in Spanish and English.

On April 19, REEF received the first completed survey forms from REEF member, Jeff Holmes. Jeff conducted five surveys in the Gulf of California over the first weekend in April. He even had write-ins on the back of the form! Way to go, Jeff!

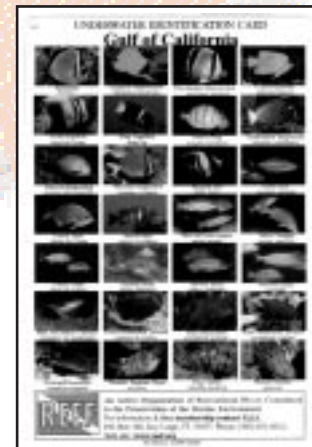
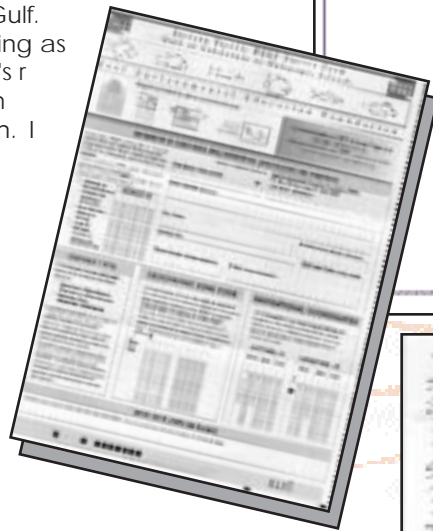
While the initial focus is on the Gulf of California, additional material for the Galapagos Islands will be developed in the coming year. During the program development, REEF Executive Director Laddie Akins, along with staff from NOAA's National Marine Sanctuary Program and the Sonoran Sea Aquarium

conducted an exploratory mission to the northeast Gulf. Laddie described the diving as a mix between California's rocky coast and the warm tropical areas of the south. Interesting encounters included scalloped hammerheads, king angelfish, a panamic fanged blenny, hieroglyphic hawkfish, bluechin parrotfish, skipjack tuna, and lots of sea lions!

In the coming year, REEF plans to coordinate training and survey dives through dive shops and clubs. Also, watch for a Sea of Cortez field survey in 2001!

A Big Fish thanks goes to our funding supporters, Dr. Don Thomson of the University of Arizona for his local expertise, and especially to Francis Gilbert of the Sonoran Sea Aquarium whose dedication to this expansion made it a reality.

If you are interested in obtaining survey materials or the fish identification curriculum, please contact REEF HQ at 305-451-0312 or reefhq@aol.com.



## Hawaii Here We Come!

On the heels of the Eastern Pacific expansion, REEF is heading west to the Hawaiian Islands. Development of the survey materials and a fish identification training curriculum is beginning soon. With the help of local partners, REEF is building the species list for the scanform and collecting images for the curriculum and colored identification card. During the Sustainable Seas Expedition last January, preliminary data collection began with 160 high school students participating in the SSE Student Summit aboard the Atlantis Submarines. The students conducted surveys and recorded information on abundances of the most common species found. This information is being used to help design the scanform, underwater checklist and course design for the upcoming Hawaiian Islands Program.

A big thanks goes to the SSE and the Hawaiian Islands Humpback Whale National Marine Sanctuary for their support, along with Robin Newbold and Donna Brown of the Coral Reef Network and Liz Foote of S.E.A.-Link for their invaluable assistance in the program's development. If you are in Hawaii and are interested in helping, please contact REEF.

# Invasive and Exotic Species Sighted

Invasive and exotic species are a threat to both terrestrial and aquatic plants and animals. South Florida is no stranger to plant and animal exotics. Through landscaping, species such as Brazilian Pepper (Florida Holly) and Australian Pine are thriving. Through releases to canals and other waterways, two fresh water fish species, Oscars and Tilapia, are also flourishing. In the marine environment, exotic species are not only introduced into an area through accidental aquaculture or unwanted aquarium releases, but also through ballast water from vessels and perhaps even larval dispersal. If the species survives in its newly foreign environment, it can become an invasive species.

Invasive species can potentially drive out the native species by competing with native animals and plants for food and habitat, reducing the native population by predation, altering the habitat, and transmitting diseases or parasites.

Since the early 1990s, divers visiting Molasses Reef in Key Largo, Florida have noted a strange sighting - a pair of Indo-Pacific batfish. Teira batfish, *Platax teira*, are discoid in shape with 2 black bands on the front half of the body and reach an average length of 45 cm. This exotic species resembles Atlantic spadefish and indeed is most often sighted with a school of Atlantic spadefish at Molasses Reef. It is not known when or how they arrived at the popular dive site, but the fish have survived and are thriving.

In December 1999, REEF member

and PADI Instructor, John Stuart, diving on Molasses Reef with his slate and camera in-hand, shot a few photographs of the Pacific batfish. The unusual aspect --THREE Pacific batfish instead of the usual two. REEF contacted the Florida Keys National Marine Sanctuary (FKNMS) and National Oceanic Atmospheric Administration (NOAA) and formulated a plan to remove the exotic species because of its



Batfish on Molasses by John Stuart

apparent increase in abundance. If allowed to continue, the Pacific batfish could turn from an exotic species and eventually compete with local fish species for food and habitat. The Batfish Removal Program (BRP) consists of collecting the three fish and shipping them to the New England Aquarium in Boston Massachusetts. The Aquarium will house and showcase the fish with

information on exotic and invasive species.

Other exotic species have also been reported in the waters off east Florida.



Sailfin Tang by Denise Mizell

Several sightings of Pacific yellow tang have been reported in the Ft. Lauderdale area. Laddie Akins sighted a milletseed surgeon on Breaker's Reef in West Palm Beach. Other sightings listed by the USGS Website of Nonindigenous Aquatic Species ([nas.er.usgs.gov](http://nas.er.usgs.gov)) are Arabian angelfish, panther grouper, and yellowface angelfish at Boca Raton and red lionfish at several sites in southeast Florida. Two years ago on a Key West wreck, REEF member, Dave Savage, sighted two clownfish in an anemone. REEF's Denise Mizell, spotted a sailfin tang off of

Commercial Pier in Ft. Lauderdale.

If you see an exotic species and are absolutely certain of its identification, please use the space on the backside of the survey scanform to write in the species name and scientific name if you know it. In addition, any photos would be appreciated. Be sure to include your full contact information and survey location on the front side of the form. REEF will add any new species to its database and keep track of exotic sightings. One identification tip to keep in mind - juvenile blue tang are bright yellow and might be confused with the Pacific yellow tang. The juvenile blue tang changes from its bright yellow color to a blue color as it matures, but always retains a yellow-colored scalpel, whereas the Pacific yellow tang has a white scalpel.





# Invertebrates in the Pacific Northwest

## A New Component of the Living REEF Project

Surveying in Oregon, Washington and British Columbia has been increasing over the last year thanks to active groups such as the Washington Scuba Alliance and REEF's partnership with the Living Oceans Society (LOS), a Canadian non-profit organization. The result of this partnership, the Living REEF Project, aims to provide increased training and survey opportunities for local divers. Additionally, LOS has developed an invertebrate monitoring program, patterned after the fish monitoring protocol.



Chris Ostron, Sarah Dudas, Dana Haggarty,  
Laddie Akins, Susan Francis, Bernie Kyle

### WHY INVETEBRATES?

Invertebrates such as colorful anemones, sea stars, and sponges dominate the landscape seen by divers in the Pacific Northwest. Some of the invertebrates found in this region, like the gumboot chiton and giant pacific octopus, are the largest species of their taxonomic group in the world. British Columbia also has the highest diversity of sea stars anywhere in the world! With this in mind, it's no surprise that Pacific Northwest divers are often more captivated by invertebrates. And while monitoring Pacific Northwest fish populations is very important to the area, invertebrate data will also be useful. Invertebrates help characterize communities, habitats, and the oceanographic characteristics of an area, and, due to the relatively sedentary nature of most invertebrates, are good indicators of an area's environmental health.

### HOW?

A list of forty-five indicator species has been included in a training curriculum. Using the roving diver method, species that can be counted such as crabs, mollusks, and anemones will be recorded using the Single, Few, Many, Abundant categories. Those that are clumped or colonial, like sponges, tunicates, and tubeworms, will be recorded as present or absent. Following a summer testing program, the West Coast scanforms will be modified to include invertebrate species, and will be available for divers to conduct an invertebrate survey, a fish survey, or both during each dive. Attendance at a training seminar is recommended for divers wishing to participate in invertebrate monitoring. Seminars with LOS Training Director Susan Francis are scheduled to start this June and July. To sign up or for more information, please contact Susan at [LRP@livingoceans.org](mailto:LRP@livingoceans.org). You can obtain the revised scanforms from REEF HQ or from LOS.





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