

REEF NOTES



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Protecting Marine Life Through Education, Service and Research

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Grouper Moon Project

*By Douglass Rankin
and Will Ruggles*

Grouper lead interesting lives, especially when it comes to sex. Normally solitary and territorial, during the winter full moons they travel, sometimes great distances, and "group" together to spawn. About fifty spawning aggregation sites have been recorded throughout the Caribbean. Historically, once discovered, grouper aggregation sites have become synonymous with fisherman aggregation sites. Due to the timing and site fidelity of the spawning aggregations, and the ease with which these relative loners can be caught while congregating by the hundreds and thousands to spawn, one-third to one-half of the known Caribbean aggregation sites are now inactive. The Cayman Islands used to be home to five spawning sites. Today, four of these sites are dormant or depleted.



Grouper Moon Project team. Front row: Huw Evans, Cathy Coughlin, Douglass Rankin, Leslie Whaylen, Croy McCoy. Back row: Mark Boardman, Denise Mizell, Will Ruggles, Phil Bush, Jon Clamp, and Henri Fourie.

This winter, REEF coordinated a groundbreaking expedition to the Cayman Islands - the Grouper Moon Project. The Project's objectives were to observe the Nassau grouper (*Epinephelus striatus*) aggregation off the western tip of Little Cayman, and to develop a protocol for monitoring their numbers and activity at the site. For eleven days, a team of divers that included REEF's Field Operations Coordinator, Leslie Whaylen, five REEF volunteers, and staff members from the Cayman Islands Department of Environment and Southern Cross Club visited the aggregation site and nearby reefs.

During the first days of the Project, the divers located the aggregation site and their adventure began. Several hundred Nassau grouper were seen swimming over an underwater plateau about half the size of a football field at a depth of 80-100 ft. Hundreds more milled along the wall edge adjoining the plateau. All



Little Cayman's spawning Nassau groupers.

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Director's Corner

REEF in Brief - What's New

This winter, REEF led a coordinated effort to document Nassau grouper spawning aggregations around Little Cayman. The Grouper Moon Project provided footage of spawning grouper and collected baseline data on grouper populations from nearby reefs.

REEF moved into its new home in September 2001. The REEF Marine Conservation Center, located at MM 98 in Key Largo, will serve as a location for REEF HQ and as a place where visitors can learn more about REEF's activities, the Florida Keys environment and marine conservation.

The second in a series of fish and benthic monitoring workshops was held in St. Thomas in October. Over 40 local residents and six REEF AAT members participated and conducted surveys.

REEF expert fish watchers and Paul Humann surveyed the eastern coast of Venezuela in November. Exciting finds of 200 species of fish included three new species not pictured before in either the Reef Fish Identification book or the ReefNet CD-Rom.

The GAFC is turning 10 this year, and with the birthday comes a name change to reflect the annual event's success and expansion – the Great Annual Fish Count.

The REEF database continues to be a source of information for researchers. Recent requests for data include Pacific Northwest invertebrate data on sea pens and pink hydrocoral, and Florida/US Caribbean snapper and grouper data.

REEF staff participated in a recent science mission at the underwater habitat in Key Largo known as the Aquarius. Goals of the project included evaluating the effect of diver presence and SCUBA bubbles on fish census data.

"A changed world." We have heard the words often since September. For much of what we do, and for our outlook on life, those events have awakened a new sense of priorities in us. As horrendous as recent events have seemed, from our new vantage point there may be positive outcome.



Renewed value of family and community, revised priorities, and rededication to our goals have been affected since September. Has the environment been pushed to the back burner? Those of us working to protect the environment have all wondered how public opinion and support would change. The jury remains out and the decision is in your hands.

The situation of the marine environment, however, remains precarious. Heavy fishing pressure, the effects of local and global pollution, and the lack of both data and public awareness of the issues, continue to plague our underwater world. REEF's mission in addressing these issues has not changed. And through your efforts, we are making grand steps along the road.

The annual Great American Fish Count is expanding in leaps and bounds. It has now become an international event, renamed the Great Annual Fish Count to reflect its new scope. This year marks the 10th anniversary of the count started by Dr. Gary Davis in California. REEF's new Marine Conservation Center is helping to create a strong presence in the Florida Keys, educating visitors and others on marine environmental issues. REEF's partnerships with the Florida Fish and Wildlife Conservation Commission (artificial reefs), the National Park Service (Dry Tortugas) the Florida Keys National Marine Sanctuary (FL Keys), and NOAA's Coastal Zone Management Program (Caribbean) have all helped provide valuable training and data on fish populations in those areas. REEF's upcoming special projects in education, documentation of exotic species, grouper and snapper spawning aggregations and ship grounding assessments continue to lead the way in providing information, awareness and data on marine systems. And you, as REEF members and volunteers, are leading the way. The REEF database now contains over 40,000 surveys and the REEF membership roles have topped the 20,000 mark. Your support and your focus are critical in continuing the protection of marine environments around the world.

In a new era, as we reflect upon what is important, as priorities shift and focuses change above the water, don't forget that the marine environment remains under siege. Join us in maintaining marine environmental issues as a high priority and helping to protect resources that benefit every one of us.

Best Fishes,

A handwritten signature in black ink, appearing to read "L. Akins".

Lad Akins
Executive Director



HAPPENINGS & UPDATES

Fish and Benthic Monitoring Workshop



St. Thomas Workshop REEF staff and AAT: Bob Bishop, Brice Semmens, Mark Kaehler, Doug Harder, Jessie Armacost, Christy Semmens, Barb Modafari, and Deena Wells.

charge. A total of 48 participants took part in the program, including dive industry professionals, educators, college/graduate students, and proactive sport divers. Ten children aged 12-16 from the Bovoni Weed and Seed youth prevention program were among the participants. The workshop featured classroom and field training in taxonomic identification of local fishes, corals, algae, and key invertebrates and in the survey methodologies of REEF's Fish Survey Project and The Ocean Conservancy's Reef Ecosystem Monitoring Program (RECON). As part of the program, six members of REEF's Advanced Assessment Team were enlisted to assist in the training and collect survey data. The AAT conducted 188 surveys and



REEF workshop leader Brice Semmens and REEF AAT members Deena Wells, Doug Harder and Jessie Armacost enjoying themselves before a day on the water with the workshop participants.

and we are look forward to continuing this program. To find out more about the project, view the final report posted at www.reef.org/data/Vlreport.pdf. A special thanks to Bill Letts, the St. Thomas Diving Club, and the Bolongo Bay Resort for hosting the workshop, to Ed Kruse of the CZM, and to the AAT members who participated.

Last October, in collaboration with The Ocean Conservancy and funding support from NOAA's Coastal Zone Management (CZM) Program, the second in a series of monitoring workshops was held on St. Thomas, USVI. The week-long program was targeted at local stakeholders and was offered free of



Workshop participants getting ready for a survey dive.

documented 224 fish species during the week. These data represent a valuable addition to the REEF database, more than tripling the survey effort for St. Thomas. The workshops provide REEF an exciting opportunity to involve local divers to contribute meaningful information on the reef ecosystems that are in their own backyards

Survey Expedition to Venezuela Yields

Exciting Finds

Despite having the longest continuous coastline in the Caribbean, very few REEF surveys have been conducted along the eastern coast of Venezuela. Last November, a group of expert REEF surveyors led by Paul Humann teamed up with the HORISUB Dive Shop to begin filling in some of the survey and photographic "blank spaces" around Venezuela's Mochima National Park. The park is located between Barcelona and Cumana and encompasses 32 islands and a portion of the adjacent mountain range. The group visited 14 sites and identified 200 species of fish. Several of the species included those found in the Brazilian Fish Appendix in the 3rd Edition of Reef Fish Identification. Some of the most interesting sightings included Southern Stargazer, Diamond Pipefish, Sapo Cano, Spiny Sailfin Blenny, Saddle Bass, Redbanner Blenny, Twinspot Bass and the Resh Pikeblenny, all species newly included in the 3rd Edition.

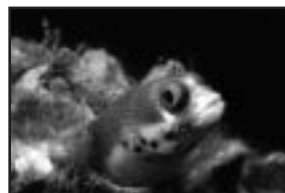


Paul Humann 'speaking fish' to CIPLC Elementary School students in Venezuela.

Three new species, not pictured in either Reef Fish Identification or the ReefNet CD-ROM, were documented and identified by Paul. The Key Worm Eel, *Ahlia egmontis*, is a small eel, about as big around as your little finger, a foot or so long, tan to pale yellow, and distinguished from similar species by a dorsal fin that starts about half way back on the body above the anus. Rarely observed (but relatively common at one dive site), they live and forage in small holes and openings in the substrate of rubble areas adjacent to reefs. Distribution ranges from North Carolina to Brazil, including the Bahamas, Gulf of Mexico and all the Caribbean. The second was the Spotjaw Blenny, *Acanthemblemaria rivasi*, a shallow water, barnacle shell dweller easily distinguished by numerous bluespots on the head and large brown spots on the rear jaw. Previous to these sightings, this species was know only from the waters of Panama and Costa Rica. The third was a Southern Guitarfish, *Rhinobatos percellens*, which can be distinguished from the Atlantic Guitarfish by less numerous but larger white spots on the back. Its known range is the Southern Caribbean to Argentina.



Key Worm Eel



Spotjaw Blenny



Southern Guitarfish

Sound interesting? Then join Paul Humann on a Field Survey to the park, August 31-September 7. For more information, see the Field Survey Schedule on page 10.



HAPPENINGS & UPDATES

REEF Marine Conservation Center

REEF members heeded the call! After more than a year of searching for the right property and working out purchase arrangements, REEF has purchased and moved into its new Marine Conservation Center! Funded largely by a generous grant from the J. Edward Mahoney Foundation, a loan from REEF Sustainers, and significant contributions by REEF members, REEF founder Paul Humann signed on the dotted line on September 14th. The new space and provisions to accept visitors now allows REEF to expand programs and services to help protect the marine environment.

Following a month of preparations (including a complete rewiring of the building for phone, computer networking and DSL service by REEF Volunteers Lauren Penner and Clint and Carol Whitaker), REEF officially moved into the Marine Conservation Center in October and began operations. Built in 1936, just after the Labor Day hurricane, the historic building, contains over 2000 square feet of workspace. Located in the median of US Hwy 1 in Key Largo, the Center is divided into three separate offices, a retail area, an information center and an upstairs loft that is used as workspace and storage. An area of the property next to the building contains hardwoods and palms and will be landscaped with native vegetation, signage and picnic tables for use by visitors.

Inside the office, one area will provide visitor information, displaying the projects that REEF conducts around the regions, as well as local and regional information on the current research of other organizations. Volunteer opportunities and a local community calendar will also be displayed. Plans for REEF's old office space include the establishment of another visitor information center. The Florida Department of Environmental Protection will provide a large coral reef community display for permanent loan at the center. A computer station will be set up at the center with the REEF website and



Jon Moss, Shannon Lyday, Leslie Whaylen, Leda Cunningham, Audrey Smith, and Laddie Akins in front of the REEF Marine Conservation Center.

data accessible. Additionally, REEF work and volunteer opportunities will be displayed. The information center will be staffed through the REEF intern program and local volunteers. REEF will be looking for funding and office equipment to outfit and staff the new information areas. Those interested in contributing should contact Lad Akins or Leda Cunningham at (305) 852-0030.

Thank you, again, for all of the generous contributions for the new center. If any of you are in the Keys, please be sure to stop by. The address of the new Marine Conservation Center is 98300 Overseas Hwy, Key Largo, FL 33037. The old office (to be information center) is located at 105950 Overseas Hwy.

(\$250.00 + contributors)

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Grouper Moon Project

from page one

of the fish were large (50-85 cm) and most displayed the white belly (with faded bars on top), dark, and bicolor reproductive color phases. Over the next six evenings, the team documented changes in the numbers, positioning and color phases of the fish as courting behaviors such as following and nudging intensified. Abdomens seemed to distend daily. On the seventh evening, the group witnessed an act of nature they will never forget – the spawning of hundreds of Nassau grouper. That night, approximately ninety percent of the fish were in a bicolor phase, and the fish had formed a huge, densely packed cone. Five or six fish in the bicolor phase would begin by chasing a larger dark phase fish horizontally through the large mass of groupers. The movement would pick up pace, shift diagonally, and suddenly as many as forty fish would shoot upward above the swirling cone, twist around each other, release gametes in translucent clouds, and then drift downward like falling stars to rejoin the milling mass. Other fish were there too, coming to feed on the clouds of gametes and to join in the spawning mêlée! Packs of horse eye jacks, hundreds of bar jacks flashing yellow tails and dusky body bars just before spawning, thousands of mackerel scad, and courting black jacks with white tail tips and black speckled rear halves. An aggregation of tiger

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REEF NOTES

Aquarius

During the first two weeks in September, Laddie Akins and Alex Score participated in a research project with the National Marine Sanctuary Program and the National Undersea Research Center to evaluate how different dive technologies affect fish counts. Fish surveys were conducted using the Prism closed circuit rebreather unit and regular open circuit scuba. The focus of the research was to determine whether the bubbles produced by open circuit scuba (the standard equipment used by most recreational divers and science divers) frighten or attract certain fish or change their natural behavior.



Cathy Sakas, James Linholm, Billy Causey, Jay Styron, Mike Smith and Lad Akins saturated inside the Aquarius habitat.

Lad's part of the mission involved saturating in the habitat for eight days in order to collect extensive data on the fish assemblages of Conch Reef. Lad spent 11,000 minutes of bottom time in Aquarius, the only research habitat in the world. Aquarius is located in 60 feet of water on Conch Reef in the Florida Keys. Alex used rebreather technology from day boats to gather the same information. Alex reported that one of the advantages of diving with rebreathers was the ability to hear the grunting sounds of the bluestriped grunts, the midnight parrots grinding pieces of coral rock, and your buddy talking and singing during the dive. It was like being in a different underwater world and enjoying the natural sounds of the reef. It was so enjoyable that spending 2 hours in one 60 foot dive (one of the other advantages using a rebreather unit is increased bottom time with a constant partial pressure oxygen) was definitely not enough time!!

During the 8 day mission, two different methods were used by both the saturation and the rebreather divers to collect data. The Stationery Visual method was used to gather exact numbers and sizes of fish species in a defined cylindrical area around the diver, while the REEF Roving Diver Technique gathered presence/absence and relative abundance information during exploratory area swims. Both methods provided valuable information on the composition of fish on the reef.

Some of the most interesting species observed during the mission included two sightings of an extremely rare red cornetfish, numerous sightings of yellowbelly hamlets and a threeline

basslet found under a ledge at 90 feet. Unusual schooling behavior of hundreds of gray angelfish and hogfish were also observed immediately following the passage of a tropical storm halfway through the mission. Initial results of the data suggest that there were few differences between rebreather and saturation dive data. This may seem surprising until one realizes that Conch Reef has been under protected status since 1997 and the fish did not seem wary of diver presence. Heavily harvested areas could show significant differences.

Other members of the rebreather dive team included Otto Ruten, Jack Javitch and John Halas. Saturation divers included Billy Causey, Cathy Sakas and James Lindholm. For more information on the Aquarius, including summaries of the Sanctuary mission, visit www.uncvill.edu/nurc/aquarius/. For a look at the REEF data collected during the mission visit the REEF website and view projects. As new technologies become available for the visual gathering of fish data, REEF will be working with the Sanctuary System to help test and validate these technologies.

Grouper Moon Project

from page four

grouper in their tricolor mating phase also joined in the flurry, buzzing around like bees on the ocean floor. Every minute or two, spawning bursts would form and as quickly disappear.

Throughout the Project, a disconcerting reality was the ongoing harvest of fish. The team's initial estimates of the aggregation were between 3,000 and 4,000 Nassau grouper. During the two-week project, the government estimated that over 2,000 fish were harvested, and most were still gravid, indicating that they had not yet completed spawning. During the previous year, more than 2,000 grouper were taken from this same aggregation.

But actions have been taken - the Cayman Islands Legislative Assembly passed laws to prohibit harvest on all designated Cayman Island grouper aggregations every other year, and to

limit the catch to 12 fish per boat per day during open years. As a direct result of the data from the Grouper Moon Project and the knowledge that the fish often re-aggregate during the February full moon, the Assembly pushed forward the ruling's effective date for the 12 fish limit to February 2002 (rather than December 2002), thus offering some protection to a second aggregation that may occur at the Little Cayman west end location in late February.

REEF is planning to return to Little Cayman for the February 2002 full moon, and again in the winter of 2003 to continue documenting this important event. Results from the Grouper Moon Project will be used to better understand grouper population density and viability of grouper aggregations. REEF hopes that the information and the awareness that grows from this Project will provide resource agencies and policy administrators the tools to ensure healthy grouper populations into the future.

During the Grouper Moon Project, REEF worked in cooperation with the Cayman Islands Department of Environment, the Southern Cross Club, Sam McCoy's Diving Lodge, and the Coral Reef Alliance. There was also generous support from Peter Hillenbrand, Island Air, the Little Cayman Beach Resort, and Paradise Villas. For more information about the Project, please contact Leslie Whaylen at leslie@reef.org or call the REEF office at 305-852-0030.

Visit the Grouper Moon Project page on REEF's Website - www.reef.org/data/groupermoon.html to view video clips, images, and results of the Project.



REEF NOTES

The Evolution of Fishwatching

Fishwatching This is the term we use to describe our hobby, what we do each time we put our face in the water. It seems like such a normal word to us, but when you tell others about it, you often get a weird look. You might then say, "You know, like birdwatching, but underwater", and that seems to partially explain it. Of course, divers have always looked at fish, but we at REEF would like to think that as the organization comes up on its 10th year of coordinating volunteer fish monitoring, the 'science' of fishwatching has evolved and improved. REEF members, through the activity of fishwatching, have become better naturalists, keenly aware of what is common, what is rare, and what does not belong (as is the case with exotic species).

Over the past year, updated versions of two Caribbean fish identification guides have been released that are a testament to this evolution – the ReefNet CD-ROM Version 2 and Humann and DeLoach's Reef Fish Identification, 3rd edition. Between these two resources, we now have our hands on information for over 600 species of fish and access to over 2,800 images. Despite this wealth of knowledge, REEF members continue to find "mystery" fish that are not in either of these or other common reference guides. Fortunately, the authors/creators of both of these new references work with REEF staff on a continuing basis to help solve mysteries, as well as update us on the determination of species ranges and identification characteristics. Through our newsletter and website, we will share these updates.

Common Name Changes

In all of REEF's materials, we use a standardized set of common names. For the Caribbean/ Atlantic region, we follow Reef Fish Identification, which follows the AFS Common Names list. Below are a list of name changes in the 3rd Edition.

Goliath Grouper (*Epinephelus itajara*) - was Jewfish

Cave Basslett, Peppermint Basslett, and Wrasse Basslett (*Liopropoma* spp.) - All were previously "Bass" but now join the other member of the genus, the Candy Basslett, in using the name "Basslett," which means small bass.

Yellowtail Parrotfish (*Sparisoma rubripinne*) - was Redfin Parrotfish

Darkhead Blenny (*Emblemariopsis* spp.) - Was originally listed as one species, the blackhead blenny (*Coralliozetus bahamensis*). However ichthyologists at the Smithsonian have concluded that there are at least six species that are visually indistinguishable in the field. The six species are now lumped in the REEF database under the common name Darkhead Blenny.

Geographic Range Not Fully Established

The concept of REEF was first imagined because there is so little known about fish distributions. Over the past 9 years, REEF members have filled in gaps for many species. However, as additional species are realized, more gaps arise. In the 3rd edition of Reef Fish Identification, there are several species that list the geographic range as unknown and refer readers to REEF if these species are sighted. These species include the Yellowfin Chromis (a species currently

known from Bermuda and Brazil), the Snow Bass (photographed in Belize and south Florida), the Yellow Garden Eel (known from a few locations in Florida), and several others. As additional REEF surveys are conducted throughout the region, we look forward to developing distribution coverages for these species.

Supplemental Information

The momentum of fishwatching is rapidly increasing, and so are discoveries of "new" species (not new in the scientific sense, but new to the fishwatching world) and the development of additional visual identification characteristics. The static nature of products such as books and CD-ROMs prohibit them from staying current. Therefore, REEF will periodically provide updates on mystery species identifications, color phases, additional identification characteristics, and modified ranges in a special section of the Member Forum on our website (www.reef.org/member/forum).

For example, with the help of Kris and Les Wilk, creators of the ReefNet CD-ROM, we recently figured out a mystery blenny that our members have been seeing for years in Bonaire. The Orangespotted Blenny (*Hypleurochilus springeri*) looks somewhat like a Tesselated Blenny. However, the pattern of markings on the head can be used to distinguish the two species (see the webiste for color photos). The Tesselated Blenny has spots on the snout that are round and well defined and the polygonal red/orange spots behind the eye and upper head are well defined by black edging. The Orangespotted Blenny's orange markings are more random in form, less well defined and lack any black edging. The snout shape and cirri pattern are



Orangespotted Blenny



Tesselated Blenny



Darkheaded Blenny



Yellowfin Chromis



MEMBER ARTICLE

Ma and Pa Dive Site #1: Point White Pier, Washington

by REEF Member John F. Williams

If you're an airplane pilot, chances are you've read The Cannibal Queen, Stephen Coontz' account of taking his son for a tour of the country in a restored biplane. Their motive wasn't to land in the largest airports in the country, nor to fly as high as possible or to search for the flashiest Hard Rock Café. Instead, the author chronicled, among other mundane things, "ma and pa" landing strips in the 48 contiguous states, discovering the freedom and hominess of these endangered bits of Americana.

Around the Puget Sound, there is a wide variety of dive sites. There are the big draw sites that feature rock walls, sunken boats, wolf-eels, octopus, and even the occasional six-gill shark. Then there are the ma & pa dive sites. Divers frequent these latter sites because they are close, convenient, familiar, and believe it or not, they can be endlessly fascinating.

But are they good places to conduct REEF surveys?

West of Seattle, across six miles of protected waters, lies Bainbridge Island, a rural community easily accessible by ferry from Seattle or by bridge from the Kitsap Peninsula. Along the west



One of the many fishes that can be found at Pt. White Pier, the penpoint gunnel is often seen hiding in with the algae.

side of the island is a mile-wide channel, and into the channel sticks the Point White pier. Constrictions at each end of the channel prevent the huge tidal swings from roaring too rapidly down the channel in the vicinity of the pier. Currents can still be strong. I have crawled hand over hand across the bottom when my choice of dive times wasn't auspicious. Fortunately, the entry point is next to the pier, so even if there is an appreciable current, there is plenty to see without having to swim much of anywhere.

If you dive the Point White Pier on a warm, summer day, watch overhead for falling children. The sunshine seems to suck them off the end of the pier into the water.

This is an excerpt of John's Favorite Fish Spot Article. To read the entire thing, visit the REEF Member Forum at www.reef.org/member/forum and click on the Favorite Fish Spot button.

GAFC Is Turning 10!!!

This year marks the 10th year anniversary for the Great American Fish Count (GAFC). This is a milestone for the GAFC and a great occasion to celebrate its success and expansion over the last decade. Due to the exponential growth the GAFC had last year, with over 900 people participating and over 1900 surveys conducted during the month of July, the National Marine Sanctuary Program and REEF have decided that this would be a good opportunity to change the official name to the **Great Annual Fish Count** (GAFC). Through the GAFC, REEF will encourage volunteers to take fish surveys in the Caribbean, Mexico, Central America, South America and Canada. Fish have no nationality and pay no attention to political or geographical boundaries. Many migrate between countries and spawn in areas far from their usual habitat. The GAFC will become an International event that will focus on the education of the recreational diving and snorkeling community and will raise international awareness regarding the conditions of the world's fisheries, coral reefs, and the marine environment. Of course, we will continue to support and encourage increased focus on our National Marine Sanctuaries.



Laddie Akins and REEF member Chatten Hayes conducting a REEF survey at Molikini, Hawaii.

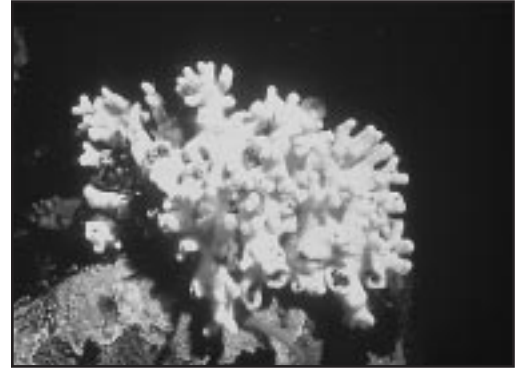
To commemorate the origin of the GAFC, a special 10th year anniversary celebration and kick-off event will take place with the Channel Islands National Marine Sanctuary. The founder of the GAFC, Dr. Gary Davis, will speak about the beginnings, accomplishments, and future of the Great Annual Fish Count. This promises to be a fun and exciting year for the GAFC. Stay tuned to the GAFC website at www.fishcount.org for listings of events, seminars, and survey dives!

Fishwatching in our National Marine Sanctuaries

Do you have a great photo depicting the fish life or REEF surveying in one of our National Marine Sanctuaries? In celebration of the Great Annual Fish Count's 10 year anniversary, REEF is holding a digital photo contest. One image from each sanctuary where the REEF program is in place will be selected to be part of a digital display at the anniversary celebration to be held in Santa Barbara, CA, in June 2002. The number of entries per person is not limited, but entries will not be returned. Submit entries by May 1, either electronically to contest@reef.org or via mail to REEF HQ. Be sure to include which sanctuary is featured. Please see www.fishcount.org/contest for full contest rules.

SCIENCE UPDATE

- REEF's Scientific Coordinator, Christy Pattengill-Semmens, presented "Using Volunteers as a Tool" at the MPA Power Tools Conference last October in British Columbia. She discussed the path REEF has taken in developing our volunteer monitoring program, lessons learned along the way, and advice for others.
- Even though the Living REEF Project's Pacific Northwest Invertebrate program is just getting started, the data are already being put to use.
 - The Marine Conservation Biology Institute recently used survey data on pink hydrocoral (*Stylaster* spp.) in a study on cold water corals.
 - University of Washington researchers will be using REEF data to assist mapping historical and current sea pen beds in Washington State.
- The National Marine Fisheries Service's Southeast Center is currently using REEF data in stock assessments of yellowtail snapper and other harvested species in Florida and the Caribbean.



The pink hydrocoral is one of the species included in the Pacific Northwest Invertebrate program and is an indicator of high current areas. Photo by Rick Harbo.



A diver descends through an amazing kelp forest in the Channel Islands. Photo by Kip Evans, courtesy of the CINMS.

Join REEF on Field Surveys to two of California's most treasured MPAs!

Monterey Bay NMS, April 10-14.

This weekend getaway is perfect for the entire family and will feature six boat dives, plenty of time to explore historic Cannery Row and a tour of the Monterey Bay Aquarium.

Channel Islands NMS, Sept. 17-21.

We will share this livaboard dive trip aboard the M/V Conception with Sanctuary staff and naturalists.

For more information, see the Field Survey Schedule on page 10.

CORRECTION:

In the PNW Invertebrate Monitoring Article that was in the last issue of REEFNotes, the surveyor pictured with the lingcod was Ton Schaefer, not Jan Honda. Sorry, Tom!



MPA News

REEF believes that Marine Protected Areas (MPAs) are an important tool for the protection of marine ecosystems, and we urge our members to stay informed of MPA initiatives and funding issues. In each issue of REEFNotes, the MPA News feature brings you recent and noteworthy happenings.

California Marine Life Protection Act

As is the case with all coastal areas, the famous beaches and shoreline cliffs of California are under tremendous pressure from multiple threats. Many of the marine creatures that call California home have declined dramatically as a result of these threats. While there are currently over 100 marine protected areas in California, most of these were created on a case-by-case basis and there are many legislative inconsistencies in the current network. The vast majority of these MPAs provide very little protection to marine life and only 0.2% of state waters is fully protected from all harvest. In an effort to improve the protection of the state's coastal and ocean areas, the California Marine Life Protection Act (MLPA) was signed into law in 1999. As a result of the MLPA's passage, the state is currently developing a master plan that will guide state agencies in siting and managing the state's MPA network. As part of this plan, all existing and new MLPAs will be one of three types -

- State Marine Reserve - Access and use (such as walking, swimming, boating and diving) may be restricted and no commercial or recreational take will be allowed.
- State Marine Park - Access is allowed but may be restricted and no commercial take will be allowed. Recreational take for specific species will be allowed but may be restricted.
- State Marine Conservation Area - Access is allowed. Certain commercial and recreational take will be allowed.

In 2001, multiple public hearings were held. A draft plan is currently being developed by the California Fish and Game Commission and a final plan is due to be implemented sometime in 2003. To find out more, to view maps of the current proposed network, and to submit comments, visit www.dfg.ca.gov/mrd/mlpa/.

REEF NOTES

New Staff Additions

Alex Score, REEF's new Education Outreach Coordinator, joined REEF's team late July 2001, replacing Julie Dutcher who decided to move closer to her family in Tennessee. Alex relocated to Key Largo from Savannah, Georgia, where she worked for NOAA's Gray's Reef National Marine Sanctuary. Her duties at Gray's Reef included reef fish monitoring, reef invertebrate characterization studies, managing a loggerhead sea turtle satellite tagging project, leading educational and distance learning programs, creating outreach displays, and producing habitat characterizations using GIS. Alex has a B.S. degree in Marine Biology from Florida Institute of Technology and a M.S. degree in Biology from Georgia Southern University. Alex is not new to REEF's projects and mission. While living in California and working as a research associate studying aquarium biological mechanisms, she volunteered with the Channel Islands National Marine Sanctuary during various fish surveys and the Great American Fish Count (GAFC) in 1993. She was also fortunate to participate in the Sustainable Seas Expedition, along with Laddie Akins, piloting the manned submersible DeepWorker 2000, while taking invertebrate surveys at Gray's Reef and conducting fish counts on the West Coast of Florida. Her duties at REEF include coordinating the GAFC, developing education materials and school programs, managing REEF's Field Station program, working with new partners, and leading the monitoring of several artificial reefs in the Florida Keys.



Alex Score after a rebreather dive in Key Largo.

Leda Cunningham is REEF's new Office Manager or OM, an appropriate epithet considering her interest in yoga and in generally bringing harmony to REEF HQ. She began as an intern in Fall 2000 and was hired full time in August, 2001 to keep the books; oversee membership, orders, and inventory; and to coordinate the Marine Conservation Internship program. Leda earned a BA in biology from Macalester College, St. Paul, Minnesota and hopes to one day pursue a Masters degree in international non-profit management. In early 2001, Leda received a grant from PADI Project AWARE Foundation to help start a marine education program at Chumbe Island Coral Park, Zanzibar, Tanzania. Highlights of Leda's career with REEF include helping the staff grow into our new space at 98300 Overseas Highway, improving the Internship program, and helping Christy lead the Field Survey to Curacao in November 2001. She has also developed a latent interest (and talent?) in accounting, a shock to many, her mother most of all. The most enjoyable part of this job, she says, is being part of the HQ team. When she is not processing Fall 2001 solicitations, Leda likes to cook exotic vegetarian meals, jog down Overseas Highway, and read, read, read.



Leda Cunningham on the Curacao 2001 Field Survey.

REEF Interns

Shannon Lyday arrived at the end of August from Colorado. She recently graduated in Environmental Science from the University of Colorado and was seeking work experience and immersion in fish counting. She quickly became involved during the FKNMS/NURC Aquarius mission and was able to dive to the habitat. At the office Shannon processed memberships, orders, incoming data, and helped with the move to the new office. She also designed and produced a brochure on exotic species that will be available soon. Shannon tripled her total number of dives in the Keys and during the Bermuda Field Survey. During her 4 month internship, Shannon volunteered in several different areas, including teaching fish ID seminars for Coral Shores High School, and working a few times at the Dolphin Research Center and with the Dolphin Ecology Project. Before leaving REEF, Shannon passed the advanced fish quiz and is now a Level 4. Shannon is looking for a position on the west coast to pursue a career in marine conservation.



Shannon between dives in Key Largo.



Jon Moss at REEF HQ.

Late one night in the computer rooms at Heriot-Watt University in Edinburgh, Jon Moss stumbled upon REEF's website while completing his thesis on overfishing in Indonesia. Intrigued by the simple, yet effective idea of using recreational divers to collect survey data, Jon applied to be an Intern and arrived at the REEF offices in September. REEF was in the midst of moving offices and Jon jumped right in, helping with the move and setting up the new computer systems. He got the chance to attend the Dry Tortugas Field Survey and enjoyed some superb diving there, and got to see first hand what REEF was all about. He volunteered for the Dolphin Ecology Project with Laura Engelby and witnessed the mud circle fishing technique the dolphins use, which is thought unique to the area. Jon has recently graduated with a MSc in Marine Resource Development and Protection and is returning to England where he plans to pursue a career in marine conservation.

Fish Seminars

If you will be teaching a fish identification seminar in your area, we can post your information on REEF's website. Please provide date, location, time, and contact information to alex@reef.org.



FIELD SURVEYS

Visit the online Field Survey Log to read past trip reports:
www.reef.org/member/forum/lslog.htm

REEF 2002 Trip Schedule

REEF Field Surveys are your opportunity to take a vacation that counts! These week-long diving adventures are not only fun, but educational and environmentally important. Informative, interactive discussions and presentations will be led by knowledgeable fish experts and include identification, habitat and behavior information on local species. Spend a week with REEF and get excited about diving! An additional \$200 REEF fee will be added to each trip to cover the cost of the trip leader(s), seminars, and survey materials needed throughout the week. The REEF fee is tax-deductible. (*Fee is lower on short trips).

For 2002 trips, please contact REEF's travel agent affiliate, Dive Reservations, Inc at 888-363-3345 (tollfree) or email reef@diveres.com. Prices do not include airfare. All prices are per person based on double occupancy unless otherwise noted.

Conduct REEF Fish Surveys in Celebration of Earth Day

REEF would like to invite all of our members to participate in this year's "Dive In To Earth Day" event and conduct fish surveys. Tens of thousands of scuba divers, snorkelers and ocean lovers from around the world will be celebrating Earth Day underwater by Diving In, April 15-22, 2002. Make a dive that counts! Register you events on the Dive In website at divein.coralreefalliance.org/.



April 15-22

Dive In is an international event that encourages people to participate in marine-related activities during the week of Earth Day (held each year on April 22). For the past two years, The Coral Reef Alliance (CORAL) has organized Dive In To Earth Day, with the help of other environmental organizations, divers, scientists, aquariums, and students from around the world.

WWW.REEF.ORG - What's New?

- REEF's database, which is accessible online, has topped the 40,000 mark! Through the data interface page, you can generate summary reports on species distribution, sightings list for a given area, and your own data. www.reef.org/data.
- Online Store. We have added several identification books, including Stokes' Caribbean fish book and guides for Hawaii, the Northeast, and Pacific Northwest invertebrates. www.reef.org/cgi-bin/shop.cgi.
- Fishes of the National Marine Sanctuaries. This new section features each of the Sanctuaries that REEF members are currently surveying. A gallery of interesting species that call each site home, the top ten fishes, links to data summaries, and general information about each location is given. www.reef.org/sanctuaries.



Flower Gardens Banks NMS Field Survey – August 8-12, 2001.



Bermuda Field Survey participants and Bermuda locals – Sept. 22-29, 2001.

Monterey Bay National Marine Sanctuary • April 10-14

Limit 15 participants

Package: 4 nights/5 days - \$580 includes lodging just minutes from Cannery Row at the Monterey Plaza Hotel, diving (three 2-tank AM boat dives and optional shore dive) with the Monterey Bay Dive Center, and 2 breakfasts. We will also be touring the Monterey Bay Aquarium. *\$100 REEF fee.

Long Island, Southern Bahamas • Stella Maris • April 28 - May 5

Limit 13 divers

Package: 8 Days/7 Nights - \$1527, includes all meals, lodging, 2 to 4 dives per day, r/t airfare from Nassau to Long Island, and r/t airport transfers.

Chinchorro Bank & Yucatan, Mexico • Maya Ha Resort • May 18-25

Limit 15 participants

Package: 8 days/7 nights - \$1095 includes lodging, food, and diving and r/t transportation from Cancun.

Guanaja, Bay Islands Honduras • Pasada Del Sol Resort • June 22 - 29

Limit 15 participants

Package: 8 days/7 nights - \$1,184, includes all meals, lodging and 6 days of 3 boat dives per day, one night dive, unlimited shore diving, and airport transfers from San Pedro.

Little Cayman • Southern Cross Club • July 13 - 20

Limit 11 participants

Package: 8 days/7 nights - \$1,860, includes lodging in beachfront cabanas, food, 3 boat dives per day, and airport transfers.

Flower Garden Banks NMS Research Trip • M/V Spree • July 28 - Aug. 2

Limit 13 divers

Package: 6 days/5 nights - \$600, includes all meals, diving and lodging on liveaboard; trip will be shared with Sanctuary researchers.

Midway Island, NW Hawaiian Islands • August 10-17

Limit 11 divers - FULL

Key Largo Coral Spawning Project • August 27-September 2

Limit 19 participants

Package: 6 nights/7days - \$685, includes lodging at Amy Slate's Amroy Dive Resort, 5 days of 2 tank dives, 3 one tank night dives to witness the coral spawning, and continental breakfasts.

Venezuela • (led by Paul Humann) • August 31 - September 7 OR August 31 - September 10 with extension

Limit 18 divers

Details will be posted to the website soon.

British Columbia • God's Pocket Resort • Fish & Invertebrates • Sep. 8 -14

Limit 14 divers

Package: 7 days/6 nights - \$821.50, includes lodging, food and diving (2 boat dives per day, unlimited shore diving), and r/t transportation from Port Hardy. This project will also include invertebrate identification seminars and surveying.

Channel Islands Nat'l Marine Sanctuary • M/V Conception • Sept 17-21

Limit 14 divers

Package: 4 days/3nights - \$430, includes all meals, lodging, food, and diving on liveaboard dive boat. *\$100 REEF fee.

Gulf of California/Sea of Cortez • Don Jose (led by Ned DeLoach) • Oct. 6 - 13

Limit 10 divers

Package: 8 days/7 nights - \$1550, includes lodging, food, and diving, aboard liveaboard dive boat.

Grenada • True Blue Resort and Eco-Dive • November 16-23

Limit 15 divers

Package: 8 days/7 nights - \$715, includes lodging and 5 days of 2 tank diving.

Puerto Rico REEF Discovery Tour (led by Paul Humann) • Nov. 2- 9

Limit 18 participants

Package: 8 days/7 nights - \$885, includes accommodations at Copa Marina Resort and 5 days of 2 tank diving. This week is for divers and snorkelers who are interested in learning more about marine life and seeing more in the water. Several short slide presentations will be scheduled during the week to teach and discuss reef fish and creature identification and behavior.

FIELD STATIONS

Visit the REEF website for direct links and more information on REEF's Field Stations.

Field Stations are instrumental as centers for dissemination of REEF information and materials. Field Stations regularly promote and teach Fish Identification Courses, organize dives built around fish watching and taking surveys, promote REEF membership, and serve as distribution centers for REEF materials and survey forms.

REEF Field Station of Cozumel Aqua Safari

By Sheryl Shea

As one of the world's top diving destinations, Cozumel was in dire need of a REEF Field Station, and Aqua Safari filled the bill by signing on in January 2001. Since then, local divers, visiting divers, and Aqua Safari staff have all joined in to enhance the Cozumel survey database by completing over 250 surveys. In July, our first annual GAFC was held with a team of 18 divers from the US and Mexico and with the participation of Cozumel Reefs National Park staff. As a GAFC Challenge grand prize donor, thanks to Bill Horn's generosity and support, Aqua Safari hosted the lucky winner, Tina Fisher, for a week of diving and fish surveying in December. In September, all of the dive masters were trained in the REEF method, and besides having great fun doing their first surveys, they now have a practical way of putting their knowledge of the underwater world to use. They are always on the lookout for new and unusual species, such as the spotted spoon-nose eel recently sighted by Asuncion Mex Puc. We offer REEF fish ID courses, books, survey materials and of course, help with questions on fish seen during a dive.

Individuals or groups wishing to include the REEF program as part of their dive trip can be easily accommodated for both diving and lodging.

Fishwatching courses from one to four days are available in our REEF classroom, and the Safari Inn, conveniently located right above the dive shop, is an economical choice, comfortably accommodating up to 5 divers per room. We are located on the web at www.aquasafari.com and in Cozumel on the downtown waterfront between 5th and 7th Sts.

Stop in while in Cozumel to "speak fish"!



Divemaster training class – Sept 2002. Back row from left: Orlando May Marentes, Sergio Munoz, Ivan Carvajal, Elpidio May Ramos, Mariano Mex Puc, Porfirio Maldonado, Ricardo Gutierrez. Front row from left: Georgina Tuxpan, Jose Canche, Sheryl Shea.



GAFC winner Tina Fisher (left) in Cozumel with Sheryl Shea at Aqua Safari.

USA and Canada Field Stations

California	
Oceanside – Under Water Schools of America	760-722-7826
Riverside - Scuba Schools of America	909-689-2422
Connecticut	
New England Ski & Scuba LLC	860-872-0013
Florida	
Bonita Springs – Eagle Ray Dive Center	941-992-2237
Islamorada – Lady Cyana Divers	800-221-8717
Juno Beach - Marine Life Center	561-627-8280
Key Largo- Diver's Direct Outlet	305-451-8034
Key Largo – Amy Slate's Amoray Dive Resort	305-451-3595
Key Largo – Horizon Divers	305-453-3535
Marathon – FL Keys Nat'l Marine Sanctuary	305-743-2437
Riviera Beach – Jim Abernethy Adventures	561-691-5808
Hawaii	
Honolulu - Island Divers Hawaii	808 947 6583
Honolulu - Midway Phoenix Corporation	808-599-5400
Kailua.Kona – Eco Adventures	808-329-7116
Louisiana	
New Orleans –	504-276-4887
REEF Field Station of Northern Gulf of Mexico	
Michigan	
Ann Arbor – Huron Scuba Adventures	734-994-3483
Minnesota	
Rochester - MDC Sports	507-288-8802
New Jersey	
Belle Mead - The Scuba Connection	908-359-1250
New York	
Rome - Delta Divers	315-337-2300
Texas	
Lancaster – Island Time	972-227-6678
Washington	
San Juan and Orcas – Island Dive and Sports	360-376-7615
Vancouver - Thunder Reef Divers	360-573-8507
Vancouver - Ocean Odyssey Scuba Center, Inc.	360-883-2621
Canada, Alberta	
Lethbridge – Anderson Aquatics	403-328-5040
Canada, British Columbia	
Victoria – Living Oceans Society	250-920-0733
Overseas Field Stations	
Aruba	
Paradera - Windie's WaterSport	297-87-2281
Bahamas	
Cat Island – Dive Cat Island	800-688-4752
Nassau – Custom Aquatics	242-362-1492
Belize	
Belize City - Seasports Belize	501-2-35505
Bermuda	
Flats - Bermuda Aquarium, Museum & Zoo	441-293-2727
Bonaire	
Kralendijk- Buddy Dive Resort	599-717-5080
Kralendijk – Plaza Resort Bonaire	599-717-2500
Kralendijk – Green Submarine	599-717-2929
Kralendijk – Sand Dollar	800-288-4773
British Virgin Islands	
Tortola – Baskin in the Sun	284-494-2858
Cayman Islands	
Grand Cayman – Wall to Wall Diving	345-942-6608
Little Cayman - Southern Cross Club	345-948-1099
Cuba	
Salty Dog Adventures	636-677-7504
Curacao	
Curacao Sea Aquarium	0599-9-461-6666
Honduras	
Utila – Utila Lodge Resort	504-425-3143
Mexico	
Chinchorro – Maya Ha Resort	512-891-9812 (US)
Cozumel - Aqua Safari	011-52-987-872-0661
La Paz - Baja Quest	011-52-612-123-5320
Puerto Aventuras – Dive Aventuras	011-52-987-35129
Yucatan Peninsula - Akumal Dive Adventures	505-992-3333
Puerto Rico	
Culebra – Reeflink Divers	787-742-0581
Rincon - Oceans Unlimited	787-823-7436
Turks and Caicos	
M/V Wind Dancer (Peter Hughes Diving)	800-9DANCER
M/V Sea Dancer (Peter Hughes Diving)	800-9DANCER
Providenciales - Big Blue Unlimited	649-946-5034
US Virgin Islands	
St Croix – St Croix Ultimate Blue Water Adventures	340-773-5994
St Thomas – Aqua Action Dive Center	340-775-6285
St Thomas – St. Thomas Diving Club	340-776-2381
Venezuela	
Puerto La Cruz - Horisub	58-81-814878
Los Roques – M/V Antares (Peter Hughes)	800-9DANCER
West Indies	
St. Vincent – Dive St. Vincent	784-457-4928



SURVEY NUMBERS



Little Cayman Field Survey participants and Southern Cross Club staff – July 14-21, 2001.



TWA (Tropical Western Atlantic)

Over 100

Laddie Akins (777)
Linda Schillinger (646)
Leslie Whaylen (546)
Deena Wells (505)
Joe Thomas (471)
Christy Semmens (441)
Cathy Coughlin (400)
Jean Kirkpatrick (385)
Sheryl Shea (365)
Judie Clee (329)
Emily Schmitt Lavin (302)
John Pitcairn (302)
Monty Doyle (287)
Peter Leahy (283)
Edwin Steiner (280)
Ken Deaver (273)
Brice Semmens (262)
Elaine Morden (260)
Jessica Armacost (247)
Clive Petrovic (234)
Ken Marks (224)
Patricia Ayers (217)
Joyce Schulke (211)
Linda Baker (209)
Doug Rorex (201)
Bruce Purdy (200)
Ann Knollenberg (198)
Tom Isgar (198)
Darlene Gehringer (194)
David Preston (194)
Carol Lorenz (193)
Will Ruggles (188)
Douglass Rankin (187)
Jerry Ligon (178)
Kris Wilk (173)
Clint Whitaker (157)
Douglas Harder (156)
Bob Bishop (151)
Julie Overing (149)
Barbara Modafari (144)
James Brooke (136)
Randy Keil (135)
Betsy Saunders (132)
Margaret Cowin (127)
Kathie Comerford (126)
Scott Fowler (119)
Hilary Harder (119)
Mark Kaehler (118)
Patricia Chandler (117)
Dave Grenda (117)
Carol Whitaker (114)
Kitty Philips (109)
Pamela Bezuidehout (107)
Chris Koepfer (107)
Cindy Snell (105)
Jim Morabito (104)
Any Wilk (104)
Tracy Siani (101)
Don Buck (100)

Over 50

Currier Randall (98)
Carol Reichert (98)
Denise Mizell (97)
Greg Bunch (96)
Cheri Arnold (92)
Connie Bishop (90)
Brenda Hitt (89)
Kathleen Scott (88)
Dr. Stephen Gittings (88)
Lorraine Sommer (88)
Neil Ericsson (88)
Paul Humann (87)
Andy Dehart (87)
Shelley Tyre (85)
Jim Modafari (84)
Rhian Lewis (83)
Gail Tomei (82)
Tony Sebastian (81)
Kirsten Bassion (80)

Pamela Cefaratti (80)
Tracy Hamilton (80)
Karen Garcia (80)
Lauren Penner (79)
Karen Florini (79)
Kern Spencer (79)
Jean Gasen (77)
Robyn Osborn (77)
Robert Doyle (76)
Cassandra Weith (75)
Rick Halpern (74)
Wes Nicholson (73)
Ralph Dickerson (71)
Susan Thompson (69)
Ann Outlaw (69)
Richard Hitt (68)
Corinne Halberg (66)
Connie Dolan (66)
Audrey Smith (65)
Dave Downs (64)
Jane Rorex (63)
Dennis Schneider (63)
Monica Vega (63)
Pug Pugliese (62)
Janet Earnshaw (62)
Jacquie Tinker (61)
Tim Gurney (60)
Ditte Preker (60)
Edgar Tomei (60)
Robert Antonelli (59)
Marjorie Nelson (59)
Wayne Manning (58)
Charles (bob) Hersey (58)
James Vaughn (57)
Michele Vaughn (57)
Anthony Kajfez (56)
Denny Howley (56)
Kathy Aguilar (56)
Anna Deloach (55)
Walter Briney M.D. (55)
Julie Dutcher (55)
Gijs Van Hoorn (54)
Clive R. Wood (53)
Woody Brooks (53)
Brenda Berliner (53)
Matt Hoelscher (53)
David Mulvey (53)
Kevin Henke (52)
Chuck Jirka (52)
Lillian Kenney (52)
Noreen Downs (52)
Melody Hamilton (52)
Michael Phelan (52)
Glen Thiel (51)
Jonathon Tromm (51)
Gibran Tuxpan (51)
Gustavo Vazquez (50)
Bobbii Cartwright (50)

Over 25

Robert Winters (49)
Jonathan Edwards (48)
Sara Thomas (47)
Donella Wilson (47)
Sandra Percell (47)
Todd Aikins (46)
Chris Ostrom (46)
Joseph Froelich (44)
Leda Cunningham (44)
Sanford Robbins M.d. (44)
Cristi Korbeck (44)
Jo Ann Nucifora (43)
Peter Rennemann (43)
Eric Riesch (42)
Jose Kirchner (42)
Steve Ganon (41)
Emma Hickerson (41)
Tony Ramirez (41)
Chris Jeffrey (40)
Robert Grist (39)
Mike Chambers (39)
Robert Burnett (39)
Shawn Edwards (38)
William Horn (38)

Joe Meyer IV (38)
Donna Gerrard (37)
Susan Siegel (37)
John Kelly (37)
Denny Lutz (37)
Alex Score (37)
Gail Klepper (37)
Linda Meyer (37)
Mark Springer (36)
Ed Gerrard (36)
Wade Bevier (36)
Rob Mccall (36)
Robert Draper (36)
Janet Phipps (36)
Barbara Kirchner (36)
Annie Glasspool (35)
Kathleen Gunderson (35)
Carolyn Kennedy (35)
Andrea Valerioti (35)
Randy Holley (35)
Mark Messersmith (35)
Gaylynn Dickerson (34)
Jennifer Stuart (34)
Kandie Vactor (34)
Muns Farestad (34)
Lin Creel (34)
Lynn Hubert (34)
Kevin Buch (34)
Jeana Hodges (34)
David Colvard (33)
Lisa Canty (33)
Brett Sussman (33)
Craig Scott (33)
Joseph Thomas (32)
Steve Boutelle (32)
David Siegel (32)
Melissa Keyes (32)
Pat Lommel (32)
Norris Boone (32)
Eddie Gerrard (32)
John Stuart (32)
Jill A. Mashburn (32)
Lynn Carey (32)
Susan Cable (32)
Rosalinda Garcia (32)
Robert Schauer (31)
Karel Cantelar Ramos (31)
Arnold Walker (31)
Mark Bailey (30)
Beth Bruton (30)
Jesse Meyer (30)
Katia Pronzati (30)
Ken Smith (29)
Ronald Moss (29)
Van Duncan (29)
James Lommel (29)
Phyllis Robinson (29)
Edward Sullivan (29)
Gary Lenning (29)
Michaela Dethlefsen (29)
John Lane (29)
Jennifer Adams (29)
Cathy Springer (28)
Stephen J Vinitzky (28)
Bryan Nichols (28)
Bob Bonanno (28)
Cheva Heck (28)
Sascha Steiner (28)
Patricia Pachuta (28)
Sarah Henke (27)
Christy Sims (27)
Roxanne Chavanne (27)
John Summey (27)

Cassandra Warn (27)
Kathy Bonanno (27)
Judy Keller (27)
Keith Phillips (27)
Seymour Halberg (27)
Les Wilk (27)
Rebekah Moore (26)
Claudia Campos (26)
Belal Hansrod (26)
Pete Wyman (26)
Edith Summey (26)
Blair Bertaccini (26)
Alyssa Klepper (26)
Matthew S. Kendall (26)
Jeffrey Nehms (26)
Mark Mcalpin (26)
Lana Smithson (26)
Shannon Lyday (26)
Kathleen Wean (25)
Dillon Harder (25)
Jessica Lorek (25)
Sharon Stockholm (25)
Roger Stockholm (25)
Kristi Klomp (25)
Roger Wiandt (25)

PAC (Pacific)

Over 100
Rachid Feretti (166)

Over 50

John Williams (94)
Kirby Johnson (73)
Wes Nicholson (45)
Matthew Dowell (36)
John Wolfe (34)
Bruce Higgins (33)
Kurt Steinbach (32)
Christy Semmens (30)
Sarah Tamblyn (29)
Janna Nichols (29)
Alan Dower (29)
Bryan Nichols (27)

TEP (Tropical Eastern Pacific)

Over 50

Richard Baker (93)
Kandie Vactor (65)

Over 25

Beth Bruton (37)

HAW (Hawaii)

Over 25

James Vaughn (44)
Michele Vaughn (44)
Fred Litt (33)
Liz Foote (30)



THANK YOU

BRONZE SUSTAINERS (\$100 or more)

NANCY ABEL
BARBARA ABELES
DANA AFRICA
MONICA AMBROSI
STEVE AMOS
ROGER ANDERSON
ROBERT ANTONELLI
BRUCE ASMUSSEN
KEN BAILEY
ROBERT BALZANO
DAVID BARR
MARJIE BARROWS
BARBARA BAUCOM
MICHEL BAUMEISTER
CHRIS BEAMER
DOUG BECKER
IRA BELL
RUSS BERGER
DENNIS BERNIER
PAUL BILODEAU
BOB BISHOP
DAVID BISHOP
RICHARD BLANKFEIN
PAUL BLECHA
KENT BLUMBERG
MARK BOARDMAN
MARK BOEHM
ALLEN BOORSTEIN
NEAL BORNSTEIN
JO ANNE BOJMA
CHRISTIN BOYD
EDWIN BOYNTON
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The sea raven can be seen by surveyors in the Northeast US and Canada. Its body color is variable (red, yellow, or brown) and it uses its large mouth to swallow its prey (usually smaller fish).
Photo by Andrew Martinez.

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