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Khaled bin Sultan **Living Oceans Foundation**

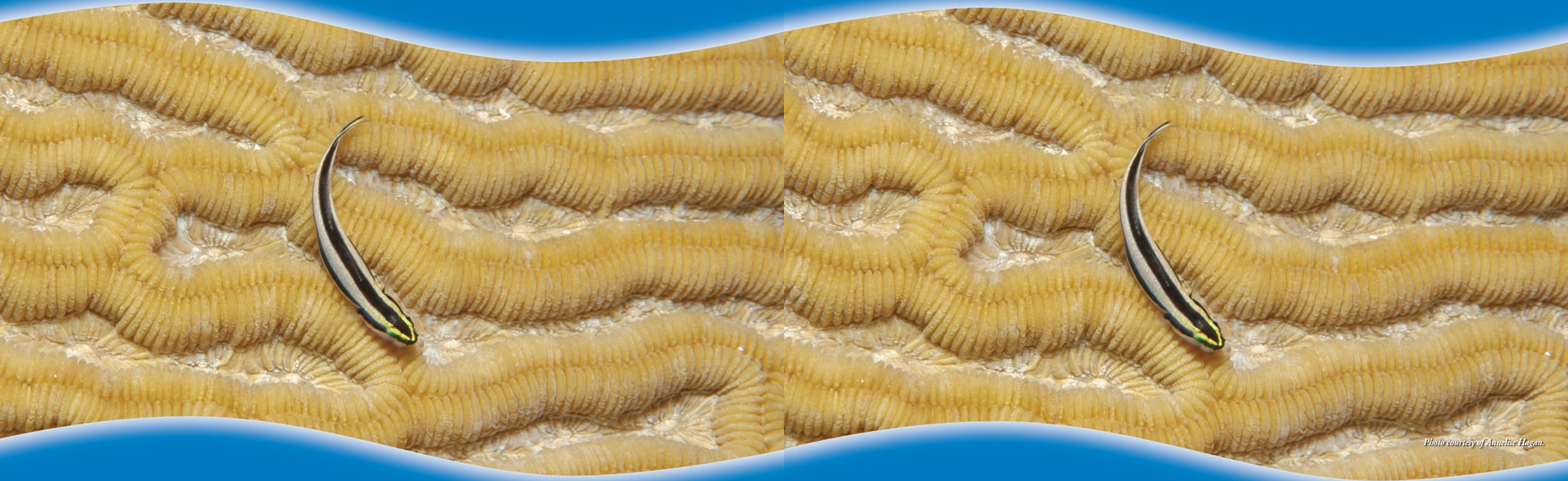


Photo courtesy of Annelise Hagan.

2007 Annual Report



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The Living Oceans Foundation is dedicated to conservation and restoration of living oceans and pledges to champion their preservation through research, education and a commitment to Science Without Borders®.

Message from the Executive Director



Phil Renaud with Escort

Photo Courtesy of Annelise Hagan

As time presses on, a pause is worthwhile to reflect on the Foundation's accomplishments of last year. I am pleased to report that the year 2007 was punctuated by several major milestones.

Education and Outreach are major components of our Foundation's mission. Prince Khaled has long aspired to create an "underwater classroom" to bring living oceans to those who are unable to experience undersea wonders firsthand. In 2007, the vision of His Royal Highness came to life in an underwater laboratory called Aquarius, inhabited by six "Aquanauts." Six exciting classes on coral reef

science were broadcast live to the world from this unique "classroom" on the bottom of the sea. This project was a prototype for a series of live underwater classrooms to be produced by the Foundation in the near future. Through Project SeaCAMEL (Classroom Aquarius Marine Education Live), an inspiration became a reality!

The Foundation's first documentary film, *Our Coral Islands*, was shot on location in the Farasan Islands of the Red Sea during 2006. The film was distributed world wide during 2007, setting the stage for global awareness of natural and human threats to coral health and the Foundation's important work to conserve these resources. Focusing on our Red Sea project, the film highlights cutting-edge research of our science team. We are proud to announce that our film was selected to be shown in the Conservation Cinema at the Barcelona World Conservation Congress in October, 2008.

Our operational projects in 2007 took place among the magnificent coral reefs of the Red Sea, Bahamas, and Seychelles Islands. We created high resolution habitat maps of vast areas of coral reefs and conducted underwater surveys of their biodiversity. Outcomes of these research projects will positively impact global coral reef conservation measures in the future. Details of each of these operations are included in this report.

Looking ahead, the Living Oceans Foundation is planning to embark on a Global Coral Reef Research Expedition to take place over the next few years. This unprecedented expedition will embody Science Without Borders® by joining scientists from around the world to advance coral conservation research.

Philip G. Renaud, Executive Director

Science Without Borders®

Science Without Borders® is the trademarked operating principle of Khaled bin Sultan Living Oceans Foundation. The Foundation employs a collaborative approach in its operations to leverage individual capabilities and resources of partners so that the impact and 'whole' of our work is greater than the sum of its parts. The synergy created through this approach is imperative for making significant impacts in the restoration of ocean health. We have just begun to build an international network of ocean conservation experts who will embody the Science Without Borders® philosophy and join forces in a collective effort to reverse declining health and improve the wellbeing of our oceans.

Note: First use of this service mark by the Living Oceans Foundation in the United States was recorded on December 3rd, 2000. The service mark "Science Without Borders®" was officially registered on September 9, 2003, with the United States Patent and Trademark Office under Reg. No. 2,760,882. The mark is also registered with the Registrar of Trade Marks in Australia as Trade Mark No. 1092401 and with the European Community as Trade Mark Reg. No. 4757084. Protection of the trademark is currently being registered in the Kingdom of Saudi Arabia. The main intention of this mark is to promote public awareness of the need to preserve, protect and restore the world's oceans and aquatic resources.

Focus Areas

I. Research, Conservation and Restoration

Expertise in coral reef ecosystem surveys

II. Marine Science Knowledge Management

Databases, models, Geographic Information Systems (GIS)

III. Accessing Remote Marine Sites

Remote sensing and operational field work

IV. Education and Outreach

Graduate level fellowships and experiential programs

Sound scientific research is a critical prerequisite of any successful conservation or restoration endeavor. Currently, the Foundation's primary research focus is on coral reefs; however, other vital ocean ecosystem issues are also addressed. The Foundation recognizes coral reefs as a keystone ecosystem for measuring the vitality of the entire ocean. Although coral reefs occupy less than one quarter of one percent of the marine environment, more than 25% of all known marine fish species thrive in these delicate habitats. Coral reefs are often referred to as rainforests of the oceans because they support such an abundance of life. This rich biodiversity of life is profoundly important and must be preserved and protected.

2007 Projects and Operations

The Khaled bin Sultan Living Oceans Foundation engages in operational projects that fulfill the following criteria:

IMPACT: Does the research have clear potential to significantly impact the fundamental mission of conservation and restoration of life in the oceans? Does the project have well defined and measurable outcomes?

UNIVERSALITY: Does the project have wide application to other ocean ecosystems around the globe? Is the project collaborative by design? Is it well aligned with our operating principle of Science Without Borders®?

CATALYTIC: Will a modest investment potentially result in a large return in terms of positive outcomes and impact? Has the basic research been completed and is the hypothesis for application well developed? Will the project result in a procedure, diagnostic test, management tool, or other tangible product?

UNIQUENESS: Is the project unique? The Living Oceans Foundation seeks projects that will fill a significant scientific knowledge gap.

EXPEDITIONS

NORTHERN RED SEA HABITAT MAPPING AND BIODIVERSITY ASSESSMENT (PHASE I): September 2007

This expedition was the first phase of a two-part Northern Red Sea Habitat Mapping and Biodiversity Assessment program. Phase II of the Northern Red Sea coral survey program will be accomplished in the spring of 2008. Previously, in May 2006, the Foundation conducted an extensive coral reef survey around the Farasan Island Archipelago in the South-Central Red Sea near the Saudi Arabia and Yemen border. Results of these three field-work projects will be synthesized into a comprehensive report that will be presented to the Kingdom of Saudi Arabia for their use in coral conservation management initiatives.

Adhering to our operating principle of Science Without Borders®, the Northern Red Sea research expedition was a collaborative venture among Khaled bin Sultan Living Oceans Foundation, National Commission for Wildlife Conservation and Development (NCWCD), National Coral Reef Institute, World Conservation Union (IUCN), and Cambridge Coastal Research Unit over the time frame September 1-11, 2007. The primary objectives were to significantly enhance and expand upon existing marine resource habitat maps and to identify areas of rich biodiversity for management considerations.



Prince Khaled with Red Sea Science Team

Remote sensing technology has become a mainstay of our coral survey operations. This project was the first in which we acquired and analyzed multispectral QuickBird satellite data from DigitalGlobe, Inc. Quickbird is a commercial, high accuracy, high resolution imagery satellite that includes a multispectral sensor (red, green, blue, near-IR). We acquired a vast amount of multispectral imagery along the northern Red Sea coastline with the intended purpose of deriving detailed coral reef habitat maps. Therefore, our field work focused primarily on collecting detailed “ground-truthing” and bathymetric data to optimize analysis of the satellite data. In addition to ground-truthing survey work, detailed coral and fish surveys were conducted to assess the present health of these reefs and ascertain their level of “resilience” in the context of recent wide-spread coral stress events such as the 1997–1998 “El Nino” sea temperature warming event. Ecological resilience can be defined as the



Lobed Brain Coral (Lobophyllia)

Photo Courtesy of Annelise Hagan

capability of a system to undergo, absorb, and respond to change and disturbance (i.e. recover), while maintaining its structure and functions. If the ecological resilience of a system is lowered, it becomes more vulnerable to future stress events. This coral resiliency concept is analogous to human health resilience principles.

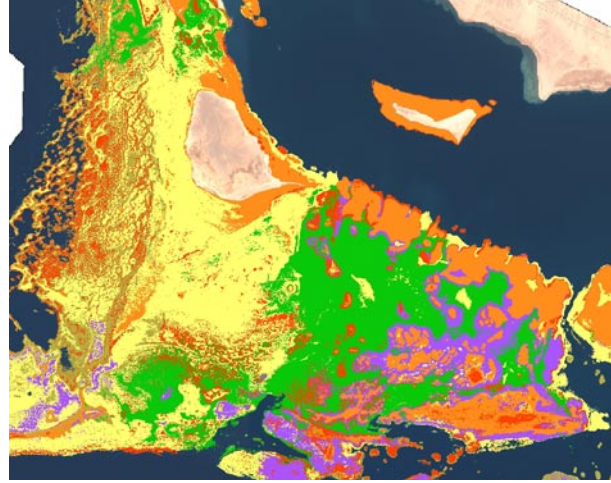
One of the Foundation’s objectives is to use resilience principles to advance knowledge and management of impacts associated with climate change, stress, and other natural and man-made (anthropogenic) stressors. Resilience principles are being widely employed in coral reef management with the goal of applying scientifically valid interventions to conserve healthy coral reef ecosystems. A key objective of the Northern Red Sea survey was to identify indicators of resilience, categorize key ecological areas of high resilience,



Typical Red Sea Limestone Island

“Our series of Red Sea coral reef research projects is progressing very well. Preliminary analyses are yielding impressive results and are revealing unprecedented knowledge of Saudi Arabia’s coral reef resources. This extraordinary knowledge of Red Sea coral reefs is being achieved both rapidly and efficiently. We look forward to completing and delivering the final results with the high hope of positively impacting future coral reef conservation initiatives. Our expectation is to provide Saudi Arabia with a better understanding of its own coral reefs than exists in any other country of the world.”

— Philip G. Renaud, Executive Director



Northern Red Sea Habitat Map Derived From Satellite Imagery

and integrate resilience principles in Marine Protected Area (MPA) design and management.

Results from this expedition will be compared to, and will build upon, the habitat mapping project “the Study on Coastal/Marine Habitat and Biological Inventories in the Northern Part of the Red Sea Coast in the Kingdom of Saudi Arabia” conducted by NCWCD-JICA circa 1998–2000.

The outputs of our Red Sea research projects will subsequently be available for incorporation into future marine ecosystem management plans of the area. High resolution habitat maps, and the information contained within them, will help guide decision makers to conservation and management strategies which should be afforded to this region.

RESEARCH AND CONSERVATION

Bahamas Biodiversity Study and Planning for New Marine Reserves



Bahamas Project Press Conference

Throughout 2007, the Living Oceans Foundation and the Marine Spatial Ecology Laboratory (University of Exeter, UK) collaborated on an endeavor to support the Bahamian government’s Marine Protected Areas (MPA) decision making process. The primary effort involved in-depth analysis of data on biodiversity, fisheries habitat, and impacts of hurricanes and climate change collected in and around the Bahama Islands. Further, we surveyed coral reefs of the Exumas Land and Sea Park and Conception Island to fill critical

knowledge and data gaps. Outcomes of the project will significantly impact the marine reserve site selection process and will result in a more sustainable network of marine reserves in The Bahamas.

Deliverable Outcomes, Implications, and Methods:

1) National-scale habitat map

We are creating the first national-scale habitat map for The Bahamas archipelago, a massive ecosystem covering thousands of kilometers. A national habitat map underpins many conservation activities including setting a Geographic Information System (GIS) base map, demarcating management zones and marine reserves, providing a general map of biodiversity, and forming a basis for a sophisticated conservation model.

2) Map of highly productive areas where coral reefs and mangroves are connected

Reefs with prolific mangrove access have a greater supply of several commercially-important fishes and increased levels of fish grazing that are thought to improve the reef’s recovery from hurricanes and bleaching events. Various maps are being created to represent areas that have rich fisheries and grazing productivity, critical mangrove habitats, and priority sites for possible mangrove reforestation.



Conception Island Lagoon

Photo courtesy of Annelise Hagan

3) Ranking of marine habitats for biodiversity conservation

Currently, managers typically set a goal to represent a minimum of 20% of each habitat in the design of marine reserves which implicitly assigns equal importance to each habitat. We intend to provide a more appropriate weighting of habitat importance, identifying the minimal set of habitats needed to represent all species. Products will include a ranking of the relative importance of each habitat for protecting species in The Bahamas and a detailed species list associated with various habitat types. Such information is useful when providing a case against a particular activity that may damage specific habitats.

4) Location of biodiversity hotspots

Two previous grants from the Living Oceans Foundation have enabled the University of Exeter to develop the world’s first method for mapping hotspots of beta diversity (an important level of biodiversity). A desirable

aspect of the method is that it combines both the field knowledge of species in each habitat with the larger-scale information on habitat distribution available from remote sensing. Maps of beta diversity will help conservation efforts by identifying some of the richest areas of The Bahamas archipelago for priority conservation. Such information will be particularly useful to local communities that are actively engaged in locating local marine reserves.

5) Risk of hurricane impacts on the reserve network

Any conservation plan must consider catastrophic events and how to spread the risk of losing several key elements of the ecosystem at once. There are two large-scale threats to coral reefs of The Bahamas—hurricanes and mass coral bleaching. Essentially, the conservation planner must try to spread reserves so that not all reserve areas within a region (e.g. major Bahamian island) degrade to a damaged state at once. One of the objectives of this research is to identify the minimal spacing among reserves to ensure that only one reserve in a region deteriorates to a depleted state following major hurricane strikes. Coral cover tends to increase in years without hurricanes and be set back when hurricane activity is great. Well designed placement of coral reserves is essential to ensure long term sustainability of these important resources.

6) Risk of coral bleaching due to global warming

Coral bleaching is a serious natural threat to coral reefs of The Bahamas. Bleaching occurs when sea temperatures become unusually warm during summer months and can cause massive coral mortality. However, some regions rarely experience very high sea temperatures because strong coastal currents rapidly disperse the warming waters. Knowing the location of such areas is



Caribbean Reef Shark Patrolling “Danger Reef”

Photo courtesy of Annelise Hagan

useful in helping to spread the risk of multiple reserves being impacted simultaneously. Therefore an output of this project will be to produce maps of Sea Surface Temperature (SST) patterns throughout The Bahamas in collaboration with NOAA's Coral Reef Watch team. Each map will display the number of bleaching episodes per decade, revealing how these patterns vary in space and how the frequency of bleaching changes over time.

Note: To our knowledge, no country has ever incorporated the effects of climate change into their planning of marine reserves and this project will set a global precedent.

Summary of Anticipated Benefits to The Bahamas

The Government of The Bahamas, in association with The Bahamas National Trust and The Nature Conservancy, has embarked on a plan to form a national network of marine reserves. A key objective

of the plan is to ensure the sustainable protection of Bahamian biodiversity for future generations. This project was designed to assist the Government of The Bahamas in their marine conservation planning and implementation process. We are optimistic that our 2007 Bahamas project will fill important scientific knowledge gaps. We look forward to our continuing engagement with The Bahamian Government in their ongoing marine reserve planning process with a goal of helping to maximize management effectiveness. Our hope is that, through the outputs of this project, The Bahamas will become the first country to incorporate climate change into its planning for a sustainable network of marine reserves. An exciting development from this project of late is indication from The Bahamian Government that they will soon be advancing a proposal to establish a marine reserve around beautiful Conception Island, in large measure due to the comprehensive survey we conducted there during April–May of 2007.

MARINE SCIENCE KNOWLEDGE MANAGEMENT

Seychelles Islands Habitat Map Production and Validation



Alphonse Island Habitat Map

Coral reefs are threatened by numerous stressors, both human and natural, and effective management of these important ecosystems is vital to ensure their future health. The islands of the Republic of Seychelles in the western Indian Ocean depend heavily on their surrounding

coral reefs for income through tourism and fisheries. The El Niño related ocean warming event of 1997–98 was particularly severe in the western Indian Ocean and Seychelles reefs suffered up to 90% mortality. Future predictions of global climate change raise the urgency of obtaining accurate baseline data on the present status of these vulnerable ecosystems, in order that appropriate management strategies can be implemented.

In January, 2005, the Living Oceans Foundation partnered with Seychelles Centre for Marine Research and Technology—Marine Parks Authority and the Cambridge Coastal Research Unit, University of Cambridge, UK, to conduct a mapping study of the Amirantes Group of islands and coral reefs. A three-week expedition to the area was launched to map the shallow marine ecosystem using a sensor called CASI (Compact Airborne Spectrographic Imager) operated from a seaplane. Remote sensing using CASI was ideal for surveying the 400 km² expanse of the Amirantes Group of Islands and Banks.



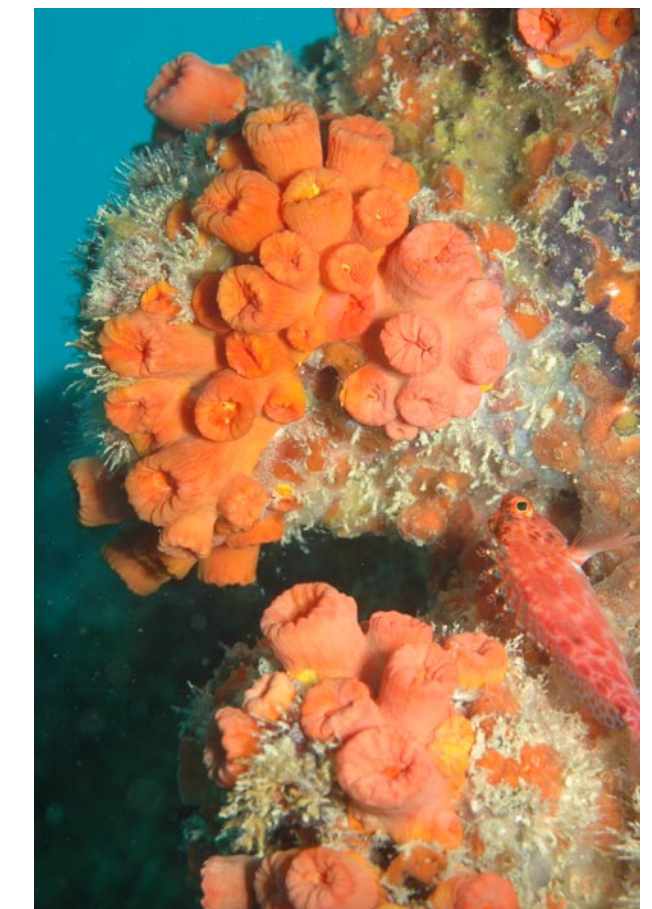
Habitat Map Validation Data Processing

In 2006, the CASI data were processed and classified by a team from the Cambridge Coastal Research Unit and the Unit for Landscape Modelling, University of Cambridge, UK, under the direction and guidance of Dr. Tom Spencer, Cambridge Coastal Research Unit and Dr. Annelise Hagan, Living Oceans Foundation. The process of producing habitat maps from CASI imagery is complex and time-consuming and occupied nearly 12 months of the team's energies. The team conducted positional corrections on the airborne imagery, mosaiced the data strips together, and further classified the data using ground-truthing data collected in the 2005 expedition. In early 2007, paper and digital copies of a set of 11 high-resolution maps of the islands and surrounding shallow-water marine habitats of the Amirantes were produced.

These high-resolution maps of the Amirantes are the first of their kind for the Seychelles, and will be a vital resource to the Seychelles Government in marine ecosystem management. A better understanding of the magnitude and health of marine resources in the Amirantes will improve the effectiveness of future management applications. For example, healthy coral reefs are a hub of biological diversity that provide habitats for hundreds of species of coral and fish while seagrass beds and mangroves provide nursery areas for juvenile fish. The habitat maps produced for the Amirantes will also serve as valuable tools for marine ecosystem monitoring in the region by providing accurate baseline datasets to which future surveys of the shallow-water marine environment can be compared.

The Seychelles habitat mapping project continued on in 2007 with a field work project on Alphonse Islands, Amirantes Group. The science team set up camp on Alphonse Island and conducted detailed validation fieldwork. Various habitats identified from the processed CASI data were visually verified by terrestrial surveys, SCUBA surveys, and reef flat surveys. After conducting some georeferencing improvements, we were pleased to discover that our habitat maps obtained an impressive overall accuracy rate of 77%. This validation fieldwork was an exciting culmination of our Seychelles project.

In 2008, the Cambridge Coastal Research Unit will create a comprehensive oceanographic atlas of the Amirantes Group that will include our habitat maps, our survey results, and accompanying data from previous surveys. This will be the hallmark product of our Seychelles project.



Orange Cup Corals (*Tubastrea coccinea*)

Photo courtesy of Annelise Hagan

Education and Outreach

One of the Most Important Missions of the Living Oceans Foundation

Although nearly three-quarters of the Earth's surface is water, a large majority of people are unaware of how important that massive part of our world is to mankind. As well, the results of our operational research and survey work must be effectively communicated to a wide range of stakeholders to have the most impact.

Living Oceans Foundation Amirante Islands Coral Reef Habitat Map Training Workshop, Mahé, Seychelles, 7th–10th October, 2007

The Living Oceans Foundation, along with the Cambridge Coastal Research Unit (University of Cambridge, UK), the Seychelles Centre for Marine Research and Technology (SCMRT), and the Seychelles Ministry of Environment conducted a three day coral reef habitat mapping workshop in October, 2007. The first day of the workshop provided an overview of our habitat mapping project data collection fieldwork, remote sensing principals, and the methodology used by Cambridge University in processing the data into coral reef habitat maps. The next two days involved intensive hands-on training for a select group of specialists in the application of remote sensing to oceanography and coastal management. Training was led by two Living Oceans Foundation fellows with considerable remote sensing experience; Sarah Hamylton, University of Cambridge, and Justin Prosper, Ministry of Environment, Seychelles. The training team received positive feedback regarding the value of the workshop and compliments on the intellectual level at which it was conducted.

The Living Oceans Foundation provided a series of Seychelles Amirantes habitat maps to this group of scientists from 12 marine environmental authorities focused on the Seychelles Islands area. Professor David Stoddart, widely considered the world's foremost authority on the Seychelles marine environment, remarked:

“The Seychelles Amirantes habitat maps are astonishing in their detail and clarity and I wish I had them with me when I visited some of these islands almost forty years ago. The Foundation is truly to be congratulated on making it possible to do this mapping. I hope to draw attention to them publicly and look forward to using these maps in the field.”

Project SeaCAMEL (Classroom Aquarius Marine Education Live)

Over the past few years, Prince Khaled has expressed his interest in creating an “underwater classroom” to bring the ocean to life for those who do not have an opportunity to personally experience undersea wonders. In 2007, the vision of His Royal Highness came to life with Project SeaCAMEL in an underwater laboratory called Aquarius, inhabited by six “Aquanauts” who brought live coral reef classroom teaching to the world. The Aquanauts included our Executive Director, Phil Renaud, our Chief Project Scientist, Annelise Hagan, and the Principal Investigator from the Virginia Institute of Marine Science, Mark Patterson. This project was a prototype for a series of live underwater classrooms we plan to conduct in future years.



Aquarius Habitat.

Live underwater classroom modules were broadcast from NOAA's Aquarius, the world's only underwater laboratory, located off the coast of Key Largo, Florida, during Project SeaCAMEL from 12–14 November, 2007. These marine science classes have since been archived and are available online at <http://seacamel.livingoceansfoundation.org>.

The classroom modules were essentially unscripted reality TV from the bottom of the sea, involving real scientists doing real experiments, in this exciting project created by the Living Oceans Foundation. Although the live classrooms were focused at the university level, they are also relevant to advanced high school students. Each module has ancillary reading and web resources, and most have associated data sets suitable for use in guided quantitative exercises.

“Our video conference this afternoon was one of the coolest educational experiences in which I've ever participated! The students were really excited about the whole event.”

—Nancy Bourgeois, Teacher, Broadneck High School, Arnold, MD

“The video transmissions were wonderful and the question and answer session was awesome for our audience.”

—David Olli, Manager of Gallery Education, Science Museum of Virginia



Inside the Aquarius Laboratory

A brief description of the six classroom modules follows:

1. Introduction to Aquarius: External and internal tour of Aquarius habitat to show Aquarius as an undersea laboratory (marine engineering and technology) including a broad overview of all other modules.

2. The Reef at Night: Focus on behavioral changes of reef organisms—feeding by corals and large predators, fish sleeping (e.g. parrotfish in mucus cocoon), and using ultraviolet fluorescent imaging to see reef organisms in a novel way.

3. Reefs Under Siege: Introduction to coral biology and threats to reefs. Use of Pulse Amplitude Modulation (PAM) fluorometry to measure photosynthetic health of corals in the natural environment (light and shade) and under various water flow conditions.

4. Sponges—the Reef’s Filters: Harmless organic dye was injected into sponges to illustrate and calculate rates of pumping; measure oxygen levels of the water passing into and out of a sponge to calculate metabolic rates.

5. Physical Oceanography: Boundary layers were measured using oxygen profiles from seabed to a few meters above seabed. The Aquarius laboratory was examined to determine whether its structure induces a local “island mass effect” thereby altering the physical environment of the reef.

6. Aquarius as an Artificial Reef: Fish populations were surveyed by video and photography to identify preferences for inhabiting upstream or downstream structure. An Autonomous Underwater Vehicle (AUV), a free swimming robot, was also employed to determine whether AUV technology can effectively measure fish populations.

Please visit <http://seacamel.livingoceansfoundation.org> to view archived webcasts.

Khaled bin Sultan Living Oceans Foundation Laboratory of Aquatic Animal Pathologies (University of Cheikh Anta DIOP Dakar, Senegal)

The Living Oceans Foundation continues to support the Laboratory of Aquatic Animal Pathologies at the University of Cheikh Anta Diop in Dakar. The laboratory was established in 2004 with financial and developmental assistance from the Foundation in order to help Senegal maintain and regulate a sustainable fisheries industry. Support from the Foundation facilitates expansion of scientific expertise at the laboratory as well as building a strong relationship between this underprivileged nation and the Foundation. In 2007, the Foundation’s Lead Scientist and Director, Dr. Mohamed Faisal, flew to Dakar to present our grant of \$50,000 to Dr. Bhen Toguebaye, the laboratory director.

Internship Program



Intern Sarah Van Cleve

During the summer of 2007, the Living Oceans Foundation hosted Sarah Van Cleve to learn about the Foundation and its operations while she assisted with the planning process for the one-of-a-kind, live underwater classroom mission known as Project SeaCAMEL.

Sarah worked with us for three weeks helping with the preparation for Project SeaCAMEL. The highlight of her internship was when she traveled to NOAA’s Aquarius headquarters in Key Largo, Florida. During that field trip, Sarah assisted in development of a basic outline for each of the six underwater classrooms, planned the details of the project’s filming and broadcasting, and dived 60 feet underwater to the Aquarius habitat in order to identify the best sites for each classroom module.

Shortly after her internship with the Living Oceans Foundation, Sarah began her undergraduate education at UCLA with intentions to study Environmental Science. We are following her studies with great interest, knowing she will succeed in whatever career she pursues.

Fellowship Program

The Living Oceans Foundation awarded Fellowships to three deserving students in 2007.

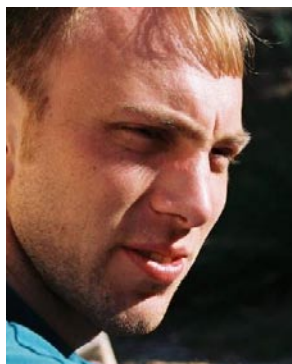
The first two candidates were awarded three-year Joint Fellowships with two of our affiliated institutions, Cambridge University and the National Coral Reef Institute. In both cases, the students' work was aligned with active Foundation research projects.



Sarah Hamylton graduated from Southampton University in 2003 with a Masters in Environmental Sciences, specializing in Marine Resource Management. Currently, Sarah is pursuing a Ph.D. at Cambridge University and is developing coastal management tools from remote sensing datasets. Sarah's achievements for the Foundation include producing a series of maps of the Amirante Islands, Seychelles using Compact Airborne Spectrographic Imager (CASI) data collected during a previous Foundation expedition. Her dissertation on Remote Sensing of Tropical Coastal Environments involves extensive Living Oceans Foundation field work in the Red Sea throughout the tenure of her fellowship.

“Some of my most pleasing experiences have taken place underwater on colourful reefs that host a wealth of beautiful and interesting creatures.”

—Sarah Hamylton



Gwilym Rowlands, our second Joint Fellow, is a Ph.D. student at the National Coral Reef Institute (NCRI), NOVA Southeastern University. The Fellowship supports Gwilym's investigations towards a greater understanding of coral reef processes over space and time, through the use and development of powerful spectral remote sensing techniques. Gwilym graduated from York University in 2006, with a Master of Research in Ecology and Environmental Management. Gwilym has worked in the field of remote sensing, biological resource mapping, and education for several organizations, notably for an Egyptian/United Nations

Development Project, and for the Fijian Ministry of Tourism and Ministry of Fisheries Projects. During his fellowship, Gwilym has been primarily involved with various Living Oceans Foundation Red Sea habitat mapping projects, particularly involving complicated processing of the Compact Airborne Spectrographic Imager (CASI) data. Gwilym will give an oral presentation on our findings at the International Coral Reef Symposium in Fort Lauderdale, 2008.

“Since I first became engaged with the underwater world through SCUBA, I have felt a great privilege, but also the burden of responsibility to ensure the long-term survival of those ecosystems.”

—Gwilym Rowlands



Alex Venn completed his Ph.D. at the University of York, United Kingdom and the Bermuda Institute of Ocean Sciences (BIOS). His current research focuses on the impact of environmental stressors on corals and their symbiotic algae. He is developing gene-based markers of coral stress to build the capacity for improved means of coral health assessment. Under the guidance of Dr. Ross Jones and Dr. Andrea Bodnar at BIOS, Alex has worked toward completion of sequencing the entire multi-xenobiotic gene (a first for corals). This will contribute to the understanding of the structure and function of the protein. Alex will orally present his Living Oceans Foundation-funded research at the International

Coral Reef Symposium (ICRS 2008), held in Fort Lauderdale, Florida. In addition, Alex has co-authored a review article on “Photosynthetic Symbioses in Animals” scheduled for publication in the Journal of Experimental Botany, February, 2008.

“Working in the Red Sea as a dive guide exposed me to the urgent need to address the immediate impact man can have on coral reef ecosystems set against the backdrop of a changing climate.”

—Alex Venn

Awards and Recognitions

Prince Khaled bin Sultan's accomplishments on behalf of the environment were honored by the organization *Boat International* at a ceremony in Venice this year. His Royal Highness was presented with the top environmental award for his ***“Outstanding contribution to oceanic science by making his yachts available for marine conservation and research and for his long-standing collaboration with leading marine institutes and universities, his creation and ongoing support to the Living Oceans Foundation, his sponsorship of students, and his research voyages to the Red Sea, the coasts of Saudi Arabia and the Seychelles.”***

The Secretary of Commerce appointed the Living Oceans Foundation Executive Director, CAPT Philip G. Renaud, USN (ret), to the Marine Protected Areas Federal Advisory Committee. Along with a diverse group of 30 ocean stakeholders, the Executive Director will join forces to serve present and future generations of Americans on issues of critical importance to the environment, particularly relating to coastal and ocean ecosystems. This is a major achievement for establishing recognition of the Living Oceans Foundation in the United States.

The Foundation's Lead Scientist, Professor Mohamed Faisal, D.V.M., Ph.D. was the recipient of an honorary doctorate from the Association of Francophone Universities, a global network of French-speaking higher education and research institutions. He also received the Ralph Smuckler Award at Michigan State University, recognizing him as an academic leader in international studies.

Publications

Atoll Research Bulletin

A grant from the Living Oceans Foundation supported the publication of a special issue of the Atoll Research Bulletin by the National Museum of Natural History, Smithsonian Institution. The publication, subtitled “Tsunamis and Coral Reefs” edited by David R. Stoddart, included eight articles addressing the impacts of the 2004 tsunami in Southeast Asia. Three of the articles were authored by Living Oceans Foundation staff members and/or colleagues. Dr. Annelise B. Hagan, Living Oceans Foundation Chief Project Scientist, addressed impacts of the tsunami in the Republic of Seychelles and Aceh Province and North Sumatra, Indonesia. Dr. Thomas Spencer, a member of our Scientific Advisory Council and senior lecturer at University of Cambridge, contributed a publication related to coral reefs and the processes and ocean-wide patterns of impact.

Motor Yacht *Golden Shadow*

The founder makes significant assets available to the Living Oceans Foundation at no expense to the Foundation. Accordingly, the Foundation can access remote marine sites to conduct scientific research via periodic employment of a 219 ft logistics support vessel. The Motor Yacht *Golden Shadow* has dedicated laboratory facilities, a diving recompression chamber, and an embarked amphibious aircraft (*Golden Eye*) that has been used extensively for aerial multi-spectral surveys of coral reef ecosystems. One of the most important capabilities of the *Golden Shadow* is its stern elevator platform. This system is used to launch and recover the *Golden Eye*, as well as its various tenders, and can handle loads up to 12 tons.



The *Golden Eye*

The *Golden Eye* is a Cessna Caravan 208 Amphibious Aircraft embarked aboard the *Golden Shadow*. The aircraft has long endurance and can carry up to a maximum of 11 passengers and two pilots. It also carries sophisticated hyperspectral sensor equipment for conducting remote sensing operations over shallow water coral reef ecosystems.



Living Oceans Foundation Directors



Chairman and President

His Royal Highness, Prince Khaled bin Sultan

Assistant Minister of Defense and Aviation and Inspector-General for Military Affairs; Full General; Educated at The Royal Military Academy, Sandhurst, UK; United States Army Air Defense Artillery School, Fort Bliss, TX, and US Army Command and General Staff College, Fort Leavenworth, Kansas. Distinguished Graduate of Air War College, Maxwell Air Force Base, AL.



Vice Chairman

General Charles A. Horner, USAF (Ret)

Former Commander In Chief North American Aerospace Defense Command and US Space Command, Commander,

9th Air Force and Commander, US Central Command Air Forces. He commanded US and allied air operations for Operation Desert Shield and Desert Storm in Saudi Arabia (1990–1991).



Executive Director

Captain Philip G. Renaud, USN (Ret)

Former Commanding Officer, Naval Oceanographic Office. Board Member of the Blue Frontier Campaign.

Member of the Marine Protected Areas Federal Advisory Committee.

Directors



Chief Financial Officer

Ian D. Fair

Chairman, Bahamas First Holdings Limited; Deputy Chairman Butterfield Bank (Bahamas) Limited;

Chairman of The Bahamas Maritime Authority.



Lead Scientist

Mohamed Faisal, D.V.M., Ph.D.

Professor of Aquatic Animal Medicine, Michigan State University; Former Executive

Director of Khaled bin Sultan Living Oceans Foundation.



Secretary

Shawn M. McLaughlin, Ph.D.

Research Microbiologist and Curator, International Registry of Coral Pathology, National Oceanic

& Atmospheric Administration (NOAA); Doctor of Philosophy in Marine Biology; Recipient of the Presidential Early Career Award for Scientists and Engineers.



Director

Professor/Dr. Abdulaziz Abuzinada

Former Secretary General of the Saudi Arabian National Commission for Wildlife Conservation and

Development (NCWCD).

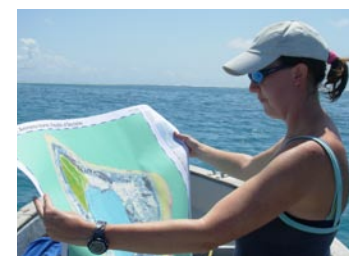
Living Oceans Foundation Staff

Executive Director

Captain Philip G. Renaud, USN (Ret)

Executive Assistant

Melinda Harrison



Chief Project Scientist

Annelise Hagan, Ph.D.

(Visiting Scholar with University of Cambridge)

B.Sc. Oceanography with Marine Biology (first class honours), University of Southampton, UK; Ph.D. University of Cambridge, UK. (Term ended December 31, 2007.)

Information Technology Specialist

Jerry Bellotti

Board photos courtesy of Jan Baldwin

Advisors



Douglas Baldwin
Staff Member, His Royal Highness
Khaled bin Sultan in Riyadh,
Saudi Arabia.



Ron Gibbs
Recently retired from Linklaters
(head of shipping and aviation
dept.) Yachtmaster and Master
Scuba Diver.



William E. Beamer
Attorney, Beamer, Lauth, Steinley
& Bond, LLP, San Diego, CA.



Dr. John Ind
London Physician and Medical
Advisor to the Foundation.

Scientific Advisory Council

The work of the Scientific Advisory Council includes project portfolio review, fellowship selections, and scientific strategic planning for the Foundation.

Sylvia A. Earle, Ph.D.

Oceanographer, marine botanist, ecologist, explorer, SCUBA diver, author and lecturer; Leader of more than 60 research expeditions.

John W. McManus, Ph.D.

Director, National Center for Caribbean Coral Reef Research (NCORE), Rosenstiel School of Marine and Atmospheric Science (University of Miami), Ecosystem Management and Modeling Expert.

Peter J. Mumby, Ph.D.

Professor of Marine Ecology, Marine Spatial Ecology Lab, University of Exeter, UK. Remote Sensing Expert.

Bernhard Riegl, Ph.D.

Associate Professor, Coral Reef Institute, Oceanographic Center, Nova Southeastern University, Dania, FL; Associate Director of the National Coral Reef Institute.

Thomas Spencer, Ph.D.

University Senior Lecturer, University of Cambridge and Director, Cambridge Coastal Research Unit, Department of Geography, University of Cambridge, UK.



Statement of Financial Position

December 31, 2007 and 2006

ASSETS	2007	2006
Cash and cash equivalents	\$ 632,736	\$ 632,736
Pledges receivable	1,900,000	1,000,000
Prepaid expenses	6,791	70,934
Investment restricted for endowment fund	206,999	201,000
Furniture and equipment, net	224,457	157,968
Deposits	6,466	6,466
Total assets	\$ 2,979,785	\$ 2,069,104
LIABILITIES AND NET ASSETS		
Accounts payable and accrued expenses	\$ 28,716	\$ 32,620
Grants payable	35,000	35,000
Total liabilities	63,716	102,620
Net Assets:		
Unrestricted	309,070	765,484
Temporarily restricted	1,805,999	1,000,000
Permanently restricted	801,000	201,000
Total net assets	2,916,069	1,966,484
Total liabilities and net assets	\$ 2,979,785	\$ 2,069,104

Statement of Activities

Year ended December 31, 2007 (With Comparative Totals for 2006)

	Unrestricted	Temporarily Restricted	Permanently Restricted	2006 Total	2007 Total
Revenue and other support:					
Contributions	\$73,500	\$1,800,000	\$600,000	\$2,473,500	\$1,505,500
Donated goods and services	103,800	-	-	103,800	271,300
Other revenue	10,183	-	-	10,183	20
Interest and dividend income	18,393	5,999	-	24,392	19,144
Net assets released from restrictions	1,000,000	(1,000,000)	-	-	-
Total revenue and support	1,205,876	805,999	600,000	2,611,875	1,795,964
Expenses:					
Program services:					
Red Sea expedition	441,631	-	-	441,631	-
Knowledge management	215,280	-	-	215,280	181,810
Research and conservation	248,500	-	-	248,500	938,739
Education and outreach	538,321	-	-	538,321	235,505
Total program services	1,443,732	-	-	1,443,732	1,356,054
Supporting services:					
Management and general	201,077	-	-	201,077	161,532
Fundraising	17,481	-	-	17,481	27,263
Total supporting services	218,558	-	-	218,558	188,795
Total supporting services	218,558	-	-	218,558	188,795
Changes in net assets	(456,414)	805,999	600,000	949,585	251,115
Net assets, beginning of year	765,484	1,000,000	201,000	1,966,484	1,715,369
Net assets, end of year	\$309,070	\$1,805,999	\$801,000	\$2,916,069	\$1,966,484

Supplemental Information

Schedule of Functional Expenses

Year ended December 31, 2007

	Program Services				Supporting Services		Total
	Red Sea Expedition	Knowledge management	Research & conservation	Education & outreach	Management & general	Fundraising	
Marine science, research, conservation and restoration	\$ 337,531	\$ 141,786	\$ 166,576	\$ 328,665	\$ -	\$ -	\$974,558
Salary and employee benefits	61,114	36,509	36,509	49,209	66,683	3,971	253,995
Fellowships and sponsorships	-	-	-	123,600	-	-	123,600
Professional services	10,409	18,368	16,504	8,922	56,214	3,271	113,688
Communication	1,519	868	868	1,302	3,646	477	8,680
Other office expenses	375	214	214	322	900	118	2,143
Printing and reproduction	519	297	297	445	1,247	163	2,968
Postage and delivery	1,076	615	615	923	2,583	338	6,150
Office supplies and stationery	735	420	420	630	1,763	231	4,199
Travel expense	3,916	2,238	2,238	3,356	9,398	1,231	22,377
Marketing	2,041	1,167	1,167	1,750	4,899	642	11,666
Depreciation expense	5,996	3,426	13,720	5,139	14,390	1,884	44,555
Occupancy	13,500	7,715	7,715	11,572	32,401	4,243	77,146
Computer equipment	1,479	845	845	1,268	3,549	465	8,451
Miscellaneous	1,421	812	812	1,218	3,404	447	8,114
	\$441,631	\$215,280	\$248,500	\$538,321	\$201,077	\$ 17,481	\$1,662,290

Audited financial statements are available upon request. Please write:
 Khaled bin Sultan Living Oceans Foundation
 8181 Professional Place, Suite 215
 Landover, Maryland 20785

