



Anthology

The First Five Years



Khaled Bin Sultan

Living Oceans
Foundation

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®.

Focus Areas

I. Living Oceans Research, Conservation and Restoration

Expertise in coral reef ecosystems

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 youth programs

The idea of Khaled bin Sultan Living Oceans Foundation, registered in California in September 2000, took shape during a research expedition to French Polynesia in 1998. His Royal Highness Prince Khaled bin Sultan of the Kingdom of Saudi Arabia had invited world-renowned oceanographers to accompany him on the Motor Yacht *Golden Shadow* to conduct cutting-edge coral health research on the impact of the most severe El Niño event of record. This early expedition helped forge an operational construct for the activities of the Foundation over the past five years: state-of-the-art data collection techniques, collaboration among international teams of scientists, partnership in service to ocean conservation, and public outreach.

Science Without Borders®

The Foundation exemplifies the power of its guiding principle, *Science Without Borders*.® Located in Landover, Maryland, the Foundation operates within reach of the capital of the United States, a country with the capability and resources to set the example for stewardship of our oceans. The Foundation's work—research focused on preserving life in the world's great commons, the oceans—is carried out by scientists from every corner of the globe.

Project selection

In selecting projects, the Foundation uses a consistent set of criteria, including:

- Is the project critical and unique?
- Does the project have clear potential to yield significant impact?
- Does the project have wide application?
- Will the project produce a procedure, diagnostic test, management tool, or other tangible application?

To review the Foundation's success in applying these criteria, we will begin by looking back briefly over its operational track record. We will then focus on the themes that drive the Foundation and illustrate its role as a global player in marine conservation.

The Beginning

Sea of Cortez expedition

In 2001, the first full year of operations, the Foundation supported research expeditions in the Sea of Cortez, the United States Virgin Islands, and the Mediterranean Sea.

Led by Professor William Fenical of Scripps Institution of Oceanography, University of California at San Diego, the February Sea of Cortez expedition collected and processed fungi, soft coral, and sediment samples from as deep as 400 feet using a unique sediment collector. Their goal was to develop methods for collecting and processing marine organisms tailored to specific species and specific environmental conditions. At the same time, the research team was exploring the Sea of Cortez to discover marine organisms that may hold the key for treating human diseases—recognizing that the ocean is the new frontier for medicinal sources.

“What we have done so far is just the beginning. There is much more that must be accomplished to guarantee the integrity of our oceans. That is why I look forward to a partnership with people throughout the world, working to benefit the oceans—and our future.”

Founder, His Royal Highness
Prince Khaled bin Sultan

Dr. Rosalba Encarnacion Dimayuga and Dr. Amilcar Levi Cupal, along with a team of Mexican scientists, collaborated with Dr. Fenical on the 500-mile cruise between Loreto, to the north, and Cabo San Lucas, to the south. They also followed their own research agendas, studying the health of coral reefs in the bay, performing reef fish surveys, and following the distribution of red tides—a frequent health concern in the Sea of Cortez.

U.S. Virgin Islands expedition

Dr. Fenical and Dr. Peter Mumby shared the Principal Investigator role for the Foundation’s April, 2001 expedition to the U.S. Virgin Islands, during which scientists from the U.S., Canada, and the U.K. visited 400 sites and investigated the diversity of marine life in seagrass beds, shallow patch reefs, algal plains, and coral reefs. This, the Foundation’s first “Remote Sensing” mission, paved the road for subsequent Compact Airborne Spectrographic Imager (CASI) deployment, which has developed into a focal area for the Foundation’s work. Detailed species-level surveys, augmented by digital underwater videography were conducted at more than 50 sites. This expedition provided another opportunity for Dr. Fenical and other scientists at SCRIPPS Institution to collect marine organisms that exhibit antibiotic, antiviral, or anticancer properties.

Even from these early days, the Foundation focused on gathering data to support management action on behalf of marine resource conservation. After establishing baseline data for targeted coral reef systems in the area and locating previously uncharted coral reefs in St. John, the U.S. Virgin Islands expedition team pinpointed potential Marine Protected Areas (MPAs) that could be designated for conserving regional marine biodiversity.

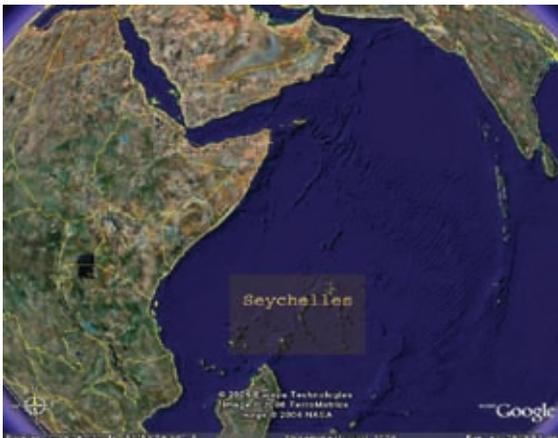
Mediterranean expedition

Later the same summer, scientists from the U.S., Canada, Monaco, U.K., Netherlands, and Italy assembled aboard *Golden Shadow* for a mapping expedition in the Mediterranean. Led by Professor Jean Jaubert of Monaco's European Oceanographic Center (EOC), the team set out to map the northwest Mediterranean's coastal habitats, with particular emphasis on the distribution of two native seagrass species, as well as an invasive green alga.

Fast Forward...

Seychelles Islands expedition

In January 2005, the Foundation embarked on a partnership with the Cambridge Coastal Research Unit, University of Cambridge, U.K., the Seychelles Centre for Marine Research and Technology, and Trident Trust to assess and map a wide expanse of shallow marine environments in the southern Seychelles Islands. The 1997-98 El Niño-Southern Oscillation ocean warming event had a dramatic impact on the health of Indian Ocean coral reefs; in fact, the Seychelles Islands lost between 60-90% of live coral cover in that brief period. With predictions that the El Niño climate pattern may intensify, establishment of a comprehensive ecosystem knowledge baseline, by which to measure long term environmental changes, was seen as crucial. Once again, the scientists used *Golden Shadow* as their home base throughout the field work phase of this project.



Map of the Seychelles.

“The Seychelles Government considers the project to be vital for the management of the coastal and marine environment and ecosystems of the outer islands of Seychelles...We are confident that the research will be ground-breaking in numerous areas, including the science, education and management.”

Rolph Payet, Chairman
Seychelles Centre for Marine Research and Technology, Marine Parks Authority

The team surveyed more than 800 square kilometers of shallow marine environments using the high-resolution hyperspectral imager, CASI, mounted on the *Golden Eye*, a Cessna Caravan float-plane. Following the expedition, the Foundation funded Annelise Hagan, Ph.D., a postdoctoral research associate at the University of Cambridge, to analyze the data.

GPS ground-truthing and ground control points were computerized for each island surveyed. Corals and macroalgae observed during the expedition were identified, photographs were catalogued, and plant and bird life observations were recorded. Shallow water transects provided overviews of the state of the reef at different times around the islands.

An educational component was integrated into the project via a customized Content Management System (CMS) which facilitated live broadcasts to the Living Oceans Foundation website throughout the expedition. Targeted for specific schools in the U.S., U.K. and Republic of Seychelles, this outreach initiative set the standard for future expeditions. The educational initiative provided an opportunity for high school students to access key research personnel, take a virtual tour of the research vessel, and join in daily question and answer periods with the scientists.

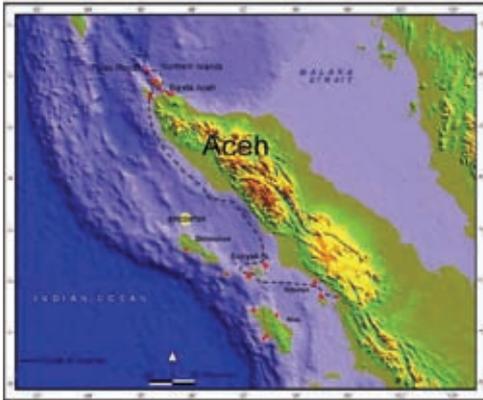
Note: This expedition is archived on the Internet at <http://seychelles.livingoceansfoundation.org>

“I have really appreciated this experience because the students are getting not only real live science, but the whole scientific method on how to study marine ecosystems. Before this expedition, they had absolutely no idea how to study a coral reef. Now they feel like experts.”

Bellarmino Preparatory High School, Tacoma, Washington.

Aceh Province, Indonesia expedition

In October, 2005, the Foundation joined with Reef Check and The World Conservation Union (IUCN), to assess the damage to coral reefs on the west coast of Aceh Province, Sumatra, Indonesia, associated with the December 26, 2004, earthquake and tsunami.



Map of the Sumatra expedition's route.

The expedition covered over 600 kilometers from Sibolga to Pulau Rondo, the northwestern tip of the Indonesian archipelago. The earthquake, as the scientists discovered, caused more physical damage to coral reefs than did the powerful waves of the tsunami. Entire islands were tilted from the earthquake, with one end rising as much as two meters and the other descending a similar distance. As a result, tens of

hectares of living coral reef were raised above the high tide level and killed, while other reefs plummeted into deeper water, altering their ecological zonation.

Although the tsunami and earthquake were the catalyst for the survey, researchers saw significant evidence that human activities were the persistent culprit in the long-term degradation of reefs in the Aceh area. For example, the low abundance and small mean size of the ten primary food fish families in Aceh suggest that local stocks are severely over fished. Following this survey, a comprehensive report was published by the Global Coral Reef Monitoring Network (GCRMN) which substantiated these findings and raised global awareness to the need for tsunami early warning systems and better management of coastal zone and fisheries management.

Developing State-of-the-Art Tools and Methods

The Foundation is a champion of applied marine science and knowledge management. It supports projects that can prove a clear linkage between knowledge gained and practical applications of that knowledge to the issues of conserving and managing local marine resources. Even more importantly, the Foundation looks for opportunities to help develop state-of-the-art tools and methods of oceanographic research that have applications in *any* region of the world.

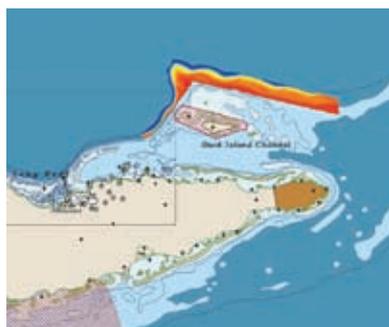
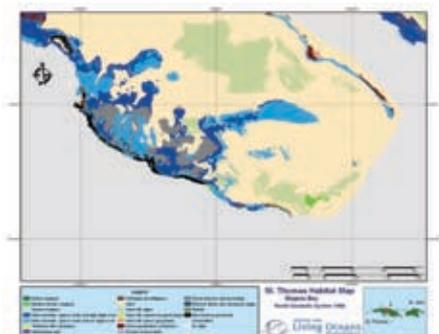
High-tech CASI sensor

One example of their application of a state-of-the-art tool is deployment of the Compact Airborne Spectrographic Imager (CASI) from the *Golden Eye* Seaplane. The Foundation embraces the power and economy of remote sensing techniques and has deployed the high-tech CASI sensor during expeditions in geographically diverse areas such as the Southern Seychelles Islands off the eastern coast of Africa, the U.S. Virgin Islands, the Mediterranean, French Polynesia, and the Red Sea. CASI has many advantages over the use of aerial photography and satellite imagery for production of detailed underwater habitat maps. Surveying marine ecosystems with the CASI sensor provides great leverage in terms of survey speed, resolution and accuracy. As Dr. Peter Mumby and other members of the French Polynesia research team explained, *“It took us one hour to acquire images over 92,500 m² of reef, which represents 3,700 plots of 25 m² each, compared with three days to survey ten such plots underwater.”*

New methods of habitat mapping

Foundation expeditions typically involve many different scientists collaborating in gathering a wide variety of data. As a result, the Foundation has been able to pioneer new methods of habitat mapping that incorporate, but are not limited to, CASI data.

For example, scientists on the 2001 U.S.V.I. expedition used a variety of analytical tools to record multiple measurements simultaneously. The result: maps of unprecedented accuracy. Their methods established new techniques of imagery collection and processing, and the maps themselves have proved to be a valuable tool to coastal managers designing conservation strategies for marine resources at risk of human impact.



Expedition survey maps.

Decision support systems

With a steady eye on the application of research, the Foundation is also spearheading development of a decision support system as a means of accessing the habitat maps based on the U.S. Virgin Islands digital habitat maps.

Once this new tool is launched, resource managers will be able to quickly retrieve complex data sets and use the tool's visual presentation to highlight existing or potential problems and formulate strategies. In addition, the project team is integrating the rich array of available marine data from other sources, thereby placing an astounding range and breadth of information at the fingertips of scientists, resource managers, and policy makers.

Ongoing Commitments in Logistical Support and Funding

The Living Oceans Foundation contributes invaluable logistical support to marine research by providing access to a highly capable research ship and embarked seaplane. Scientists' plans are often limited by lack of access to adequate research platforms. The Foundation's emphasis on remote sensing technologies is a direct outgrowth of the accessibility of a ship and aircraft.

Support for individual scientists

In addition, the Foundation has provided long-term financial support to both individual scientists and to laboratories. As a case in point, the Foundation has supported Dr. Peter Mumby of the University of Exeter, U.K., since 2001 as he has generated habitat maps from the raw CASI data for the U.S.V.I. and developed novel methods for using remote sensing to assess reef health. These maps have been refined over the past few years and are now accessible by scientists and the public alike via the World Wide Web.

The net effect of disturbances such as disease, poor watershed management, and over fishing is a loss of live coral cover resulting in the collapse of fish habitat. Habitat maps are used to assess the magnitude and location of changes to coral reef habitats. The first-ever high-resolution habitat maps of St. John and St. Thomas represent not only a tipping point in local management of marine resources but a prophecy of future management methods in other geographic areas, if sufficient resources can be dedicated to their development.

Foundation support for scientific principal investigators has produced results that impact fields of inquiry other than marine conservation. For example, Dr. Fenical and colleagues have used the opportunity represented by Foundation support to study the antimicrobial defenses of marine organisms. Their goal? The identification of novel molecules and mechanisms of defense to microbial challenge that could result in development of effective drugs to treat human diseases.

Support for research laboratories

Additionally, the Foundation has provided support since 2004 for two laboratories:

- Coral Ecotoxicology Laboratory in Bermuda, established in partnership with the Bermuda Biological Station for Research (BBSR). This lab employs unique methods of studying the effects of various toxins and altered environmental conditions on coral health, which drives policy and management decisions on eliminating or mitigating those toxins.



Ecotox coral specimens.

- Senegal Fisheries Research Laboratory for Aquatic Animal Health at the University of Cheikh Anta DIOP of Dakar, Senegal, established for the specific purpose of supporting Senegal's commercial fishing industry. In addition to identifying microbial infections, the lab developed aquaculture capability to develop sustainable fish stocks. Two graduate students were funded by the Foundation under the Living Oceans Foundation Fellowship Program.

Like expeditions and funded projects, the laboratories represent fertile test beds for new methods and tools with wide applications in marine conservation. With support from the Foundation, for example, BBSR developed a Teflon-lined dosing system to examine the toxicity of pollutants or altered environmental conditions on the health of corals. The study uses biomarkers adapted from medical diagnostics to detect stress on the corals. The biomarkers act as early warning signs by marking characteristic responses when exposed to different stressors, such as pollutants.

Catalyzing Partnerships and Synthesis of Ideas

Protecting the great commons of the oceans requires international partnerships—the synthesis of ideas, the joining of resources to a common purpose, the application of solutions from one country to the challenges of another country.

International partnerships

The Foundation supports such partnerships by:

- Selecting various research groups to participate in expeditions aboard *Golden Shadow*
- Supporting scientists from different countries and encouraging collaboration among them
- Sponsoring expeditions and projects in every part of the globe

Conferences and workshops

In addition, the Foundation sponsors or co-sponsors conferences and workshops to encourage collaboration across borders. Examples of these events include:

- Bilateral Conference Between Russia and the U.S. on Marine and Aquatic Animal Health, held in the United States, September, 2003
- Inaugural National Blue Vision Conference, held in Washington, D.C., July, 2004
- Workshop of the U.S. National Committee of the Census of Marine Life, held in Hawaii, August, 2004
- OCEANS 2005 Marine Technology Society Conference, held in Washington, D.C., in September, 2005

Sparkling Passion in Marine Issues

In the five years since its founding, the Foundation has exhibited both a short and a long-term perspective. Results are needed almost immediately to protect and manage marine habitats at risk; science must morph into practical applications almost in real time. Longer term, the torch must be passed to the next generation of citizens and of scientists.

Inspiring the public

The Living Oceans Foundation, through its website, its online learning programs, and its published materials, is reaching out to inspire the public—to help people look through the sparkling looking glass of the ocean's surface to see the diverse and amazing ecosystems beneath on which Earth's overall health is so dependent.

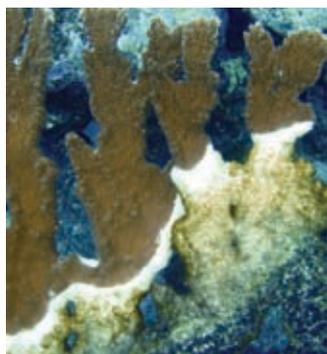
Graduate fellowships

The Foundation also realizes the importance of drawing in the best young minds to study marine conservation issues and the application of marine resources to human needs. As a result, the Foundation sponsors graduate fellowships for masters, doctoral, and postdoctoral students and researchers interested in conserving and rehabilitating marine resources. Fellows may receive up to three continuous years of financial support based on annual competitive reapplication.

In 2005, the Foundation provided grants to four students: two from Senegal, one from the University of Hawaii, and one from the Republic of the Seychelles studying at the University of Edinburgh.

The Challenge Ahead

It is important to look at a snapshot of human history in order to put the challenge of ocean conservation in perspective. Anthropologists believe that the human species dates back at least three million years. Our ancestors' precarious hunter/gatherer lifestyle kept world population in check. Unblemished oceans and terrestrial wilderness dominated our planet over the first three million years of human existence. Human population has exploded over the last hundred years with our numbers rapidly doubling over and over again. We entered the 20th century with 1.6 billion people and left the century with 6.1 billion. Population growth predictions are staggering.



Diseased coral.

The vast terrestrial wilderness areas vanished quickly in step with the population explosion because of man's insatiable demand on earth's resources. We are trying hard now to hold the line on further environmental degradation on land. Until recently, most people and governments thought that the ocean was so vast that we could do nothing to harm it. The ocean was a dump site for the byproducts of the industrial age. Unfortunately, that ignorance has caused rapid deterioration of the world's oceans. Although we all love clean beaches, we foul them with our careless discharge of waste into the sea. We love seafood, yet we recklessly over-fish wild fish stocks. Over 50% of the world's population lives in coastal communities which puts massive strain on fragile coastal ecosystems.

We are awakening to an enlightened age of ocean appreciation. We are just beginning to understand how important ocean health is to human health and to the wellbeing of our entire planet. The challenge ahead is to muster the political will and harness international resources to stop and reverse the momentum of ocean degradation. When there were only 10 million people on this earth, the choices and behaviors of each individual mattered little to ocean health. With over 6 billion people now crowding the earth, each of our individual actions and choices has a profound impact on ocean health: good or bad. We all can make a difference. We at the Living Oceans Foundation invite you to join us in taking proactive measures toward protecting and restoring the wondrous health and life that abounds in our ocean waters.



Coral wonderland.

Appendix 1

Living Oceans Foundation Fellows:

Tracy J. Mincer, Ph.D., from the Scripps Institution of Oceanography, University of California. Published *Applied and Environmental Microbiology*, *Journal of Bacteriology*, and *Plasmid*, 2004.

Mary Engels, Master of Science in Geology and Geophysics, University of Hawaii. Thesis entitled *Meso-scale variability and Geological Development of Molokai Fringing Reef, Hawaiian Islands, U.S.*

Aminata Sene, Ph.D. received her Bachelors and Masters of Sciences degrees from University Cheikh Anta DIOP of Dakar. The fellowship supported her project entitled, *Study of Helminth parasites of marine fishes from Senegal*.

Arfang Diamanka, graduate student at the University Cheikh Anta DIOP, completed his Masters of Science degree in Animal Biology in 2005 and is now pursuing a Ph.D. His project was entitled *Study of protozoan parasites of cultured fishes from Senegal*.

Frederique Kandel of the University of Hawaii received a grant which enabled her to conduct Field Work at Puako on the island of Hawaii for her thesis, *Chemical and Ecological bases of Ultraviolet Radiation Coping Mechanisms in Coral Reef Fish and Identification and Trophic Pathways of UVR Blocking Compounds*.

Justin Prosper, a team member of the 2005 Seychelles Expedition and a citizen of the Republic of the Seychelles. Justin's grant was directed towards tuition and fees at the University of Edinburgh MSc & Diploma Programme in Geographical Information Science (GIS).

Appendix 2

Living Oceans Foundation Supported Conferences/Workshops:

International Workshop of the National Center for Caribbean Coral Reef

Research (October 3-5, 2001, Miami, FL). 65 experts from 11 countries identified critical priorities for guiding the research needed for improving Caribbean coral reef management over the next decade.

United States and Russia Bilateral Aquatic and Marine Animal Health Conference

(September 21-28, 2003, Shepherdstown, WV). Resulted in a publication titled: *Health and Diseases of Aquatic Organisms: Bilateral Perspectives*.

National Blue Vision Conference

(July 11-13, 2004, Washington, D.C.). The Living Oceans co-sponsored this event which focused on developing and expanding our scientific understanding of the sea and also promoted an active and educated political constituency to protect the oceans' natural resources.

Workshop of the U.S. National Committee of the Census of Marine Life

(August 16-18, 2004, Oahu, Hawaii) Resulted in a publication titled: *Biodiversity Research Priorities for Coral Reef Ecosystems*.

Mid-Atlantic Regional Blue Vision Conference

(April 8, 2005, National Aquarium in Baltimore, MD). Representatives from 50 marine grassroots groups identified common interest topics and priorities, including aquaculture, mercury pollution, fish health, non-point source pollution, oil and gas exploration and drilling impacts, wastewater and sewage infrastructure.

OCEANS 2005 Marine Technology Society Conference

(September 19-23, 2005, Washington, D.C.). The Living Oceans Foundation was a Silver Co-Sponsor of this conference. The theme of "One Ocean" exemplified our mission of *Science Without Borders*.®

Regional Workshop on Coral Disease: E. Africa

(April 3-7, 2006, Dar es Salaam, Zanzibar). The Living Oceans was a co-sponsor of this workshop which brought together regional scientists in an effort to build capacity for monitoring coral disease in the Western Indian Ocean.

Appendix 3

Living Oceans Foundation Publications

Health and Diseases of Aquatic Organisms: Bilateral Perspectives, edited by Rocco C. Cipriano, Igor S. Shchelkunov, and Mohamed Faisal, ISBN: 0-9765653-0-7, Living Oceans Foundation Publication Number: 2005-1, Michigan State University, 2005.

Peer Reviewed Publications (Foundation Supported)

- Jensen PR, Gontang E, Mafnas C, Mincer TJ, Fenical W (2005) Culturable marine actinomycete diversity from tropical Pacific Ocean sediments. *Environmental Microbiology*
- Kubanek J, Jensen PR, Keifer PA, Sullards MC, Collins DO, Fenical W (2003) Seaweed resistance to microbial attack: A targeted chemical defense against marine fungi. *PNAS* vol. 100 no. 12, 6916-6921
- Mincer TJ, Jensen PR, Kauffman CA, Fenical W (2002) Widespread and persistent populations of a major new marine actinomycete taxon in ocean sediments. *Applied and Environmental Microbiology* 68: 5005-5011
- Mincer TJ, Spyere A, Jensen PR, Fenical W (2004) Phylogenetic analyses and diterpenoid production by marine bacteria of the genus *Saprospira*. *Current Microbiology* 49: 300-307
- Mumby PJ, Chisholm JRM, Edwards AJ, Clark CD, Roark EB, Andrefouet S, Jaubert J (2001) Unprecedented bleaching-induced mortality in *Porites* spp. at Rangiroa Atoll, French Polynesia. *Marine Biology* 139: 183-189
- Mumby PJ, Chisholm JRM, Clark CD, Hedley JD, Jaubert J (2001) A bird's-eye view of the health of coral reefs. *Nature* 413: 36
- Mumby PJ, Chisholm JRM, Edwards AJ, Andrefouet S, Jaubert J (2001) Cloudy weather may have saved Society Island reef corals during the 1998 ENSO event. *Marine Ecology Progress Series* 222: 209-216
- Mumby PJ, Hedley JD, Chisholm JRM, Clark CD, Ripley H, Jaubert J (2004) The cover of living and dead corals from airborne remote sensing. *Coral Reefs* 23: 171-183

Appendix 4



Living Oceans Foundation Directors, Staff, and Advisors

Board of Directors

His Royal Highness Prince Khaled bin Sultan (Chairman and President)

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. Co-authored with Patrick Seale, the riveting account of the Gulf War, *Desert Warrior*.

General Charles A. Horner, USAF (Ret) (Vice Chairman)

Former Commander In Chief North American Aerospace Defense Command, and the United States Space Command, and Commander of Air Force Space Command. Co-authored with Tom Clancy, the best selling non-fiction book, *Every Man A Tiger*.

Mohamed Faisal, D.V.M., Ph.D. (Lead Scientist)

Professor of Aquatic Animal Medicine, Michigan State University; Former Executive Director of Khaled bin Sultan Living Oceans Foundation.

Ian D. Fair, (Chief Financial Officer)

Chairman, Bahamas International Securities Exchange; Chairman, Bahamas First Holdings Limited; Deputy Chairman and Director of Butterfield Bank (Bahamas) Limited.

Shawn M. McLaughlin, Ph.D. (Secretary)

Research Microbiologist and Curator, International Registry of Coral Pathology, National Oceanic & Atmospheric Administration (NOAA); Doctor of Philosophy in Marine Biology.

His Excellency Sheikh Abdulmohsin Al-Sheikh

President and Chairman of Zeem Corporation, Saudi Arabia. Educated at the University of San Francisco, CA. Active participant in Special Management Programs, Harvard Business School.

Professor/Dr. Abdulaziz Abuzinada

Former Secretary General of the Saudi Arabian National Commission for Wildlife Conservation and Development (NCWCD).

Greg Norman

Professional Golfer, Director of the Environmental Institute for Golf (EIFG), Great White Shark Enterprises.

Captain Philip G. Renaud, USN (Ret)

Executive Director, Khaled bin Sultan Living Oceans Foundation.

Staff

Captain Philip G. Renaud, USN (Ret) is the Executive Director of the Living Oceans Foundation. His career in oceanography began at the Naval Academy where he earned a Bachelor of Science degree in Oceanography in 1979. Captain Renaud's naval career took him to all corners of the earth. During his distinguished 25-year career in the navy, he served as an oceanographer for the USS Theodore Roosevelt aircraft carrier, was the lead oceanographer for the commander, Second Fleet, and culminated his naval career as the Commanding Officer of the Naval Oceanographic Office. Captain Renaud has earned Masters Degrees in Oceanography, Meteorology, Strategic Studies, and Business Administration. He became the Executive Director of Living Oceans Foundation in May, 2004.

Melinda Harrison

Executive Assistant

Annelise Hagan, Ph.D.

Chief Project Scientist (Cambridge University Visiting Scholar)

Jerry Bellotti

Information Technology Specialist

General Advisors

Douglas Baldwin

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

William E. Beamer

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Solicitor, London, England; American Bar Association; Royal Geographical Society.

Scientific Advisory Council

The work of the Scientific Advisory Council includes project portfolio review, adjudication of grant proposals and strategic planning for the Foundation.

Drew Harvell, Ph.D.

Professor, Department of Ecology and Evolutionary Biology at Cornell University, Coral Disease Specialist.

Ruth Kelty, Ph.D.

Ecologist for NOAA's National Centers for Coastal Ocean Science; Co-author of NOAA's Coral Ecosystem Research Plan and the National Action Strategy.

John 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.

Royal Society Research Fellow; Marine Spatial Ecology Lab, University of Exeter, U.K. Remote Sensing Expert.

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