WINGS
WORLDQUEST

In 2005, Wings WorldQuest launched the Wings Expedition Flag Program to bring visibility and support to women leading expeditions of discovery. The Flag promotes the organization's dedication to advancing exploration in science and art for educational purposes. The 2005 Flag Report, documenting six expeditions, was distributed to hundreds of young people across the country. We are delighted to bring you the 2006 Flag Report on 11 expeditions. A dozen more are currently in the field.

The expeditions in the 2006 Flag Report cover the depths of the ocean, the grasslands of India, the Gobi desert, caves in Honduras and the Bahamas, jungles of Central America and the glaciers of the American Northwest. The explorers shed new light on mysteries of ancient humans as well as mysteries about Mars. They discovered new species, worked to save imperiled species, and extended their reach across cultural divides. What unites them is their passion for learning, their commitment to sharing their discoveries and their dedication to the preservation of the fragile zones they are exploring.

- **Kate Harris** bicycled 4000 km as she traced Marco Polo's travels along the ancient Silk Road.
- **Genie Clark** recorded discoveries about coral reef fish in the Solomon Islands.
- **Sue Hendrickson** searched for dinosaur fossils in Wyoming and explored caves in Honduras to find new species of geckos.
- **Stephanie Schwabe** dived into forbidding caves in the Bahamas to examine the role that microbes play in the earth's chemistry.
- **Gitanjali Banerjee** investigated the endangered greater one-horned rhino in Jaldapara Wildlife Sanctuary, India.
- **Edith Widder**, using her remarkable infrared camera invention Eye in the Sea, found new species on the ocean floor.
- **Dalia Amor Conde** reviewed the impact of deforestation on the jaguar in Mexico.
- **Maureen Clemmons**' expedition to the Mojave Desert lifted tons of stone with kites to test her theory that ancient Egyptians built pyramids with the help of wind power.
- **Erin Pettit's** Girls on Ice program took nine teenagers to Mt. Baker to teach them about glaciology. She also did ice coring on Mt. Waddington to analyze climate history.

This report has been the work of a number of individuals, including editors Susan Bednarczyk, Sally Anderson and Leila Hadley Luce. Kate Strickland keeps track of the flag expeditions. We look forward to reporting next year on the flag expeditions that are in the field presently making discoveries from New Guinea to South India to Africa.

– Milbry Polk, Director

WESTERN CHINA EXPEDITION

Cycling the Silk Road: On the Trail of Marco Polo

Tracing Marco Polo's route, Kate Harris and Melissa Yule carried Wings WorldQuest Flag #1 and their video camera through deserts, remote villages, high mountain passes, and rapidly growing cities across western China. For four months, Kate, Mel, and their companions bicycled nearly 4,000 kilometers through the grueling Silk Road regions of Xinjiang Province and across Tibet.

PLANNING A RIDE TO THE EXTREMES

Kate was inspired by a book written by martial artist Pamela Logan, who cycled across the Kham region of western China and later founded Kham Aid, an organization devoted to educational and medical assistance for Tibetans. Kate and Mel planned to use their trip to raise funds for Kham Aid and also to make a video about the region and its cultural and physical extremes. They trained by pedaling gear-laden bikes up and down mountain roads, unaware of how the extremes of their journey would push them to their limits.

Kate Harris and Mel Yule hold Wings WorldQuest Flag #1 in the Taklamakan Desert.

Route of the 4,000-kilometer Cycling Silk expedition.

THE EXPEDITION ROUTE

Kate, Mel, and their colleague Ben Rawluk began their journey in Urumqi, Xinjiang Province, and planned to explore Xinjiang's Silk Road routes over the Tian Shan mountain range and near the Taklamakan Desert. In Kashgar, they would meet up with Alisha Blechman and then improvise their route.

Michele and Karen share information with John Wayne and Dr. Andrew Moutu at Marovo Lagoon, Solomon Islands.

WHO

Kate Harris and Melissa Yule

WHAT

Four-month, 4,000-kilometer cycling journey

WHERE

Tibet and the Xinjiang and Yunnan provinces of western China

WHY

To raise funds for rural education and health and make a documentary to raise awareness of the Kham region

A 14,000-FOOT PASS AND THE BLISTERING DESERT

For three days the team struggled at below-zero temperatures to reach the summit of the 14,000-foot Tian Shan pass. They pitched their tents in ancient mud-walled ruins, on a grassy ledge in a ravine, and beneath a concrete bridge. They anticipated an easy descent from the summit. Instead they encountered icy winds, stones like daggers, and massive ruts, all of which slowed their progress.

Sustained with water and protected with sunscreen, the group rode 600 kilometers through the Taklamakan Desert toward the town of Minfeng. They had not foreseen the blasting heat, stinging 120-kilometer winds, and sandstorms which buffeted them each afternoon. After days in the desert, they reached Minfeng. With tree-lined streets, motorbikes, donkey carts, diesel-engined semis, herds of sheep, and the scent of roasting kebabs and baking bread, Minfeng felt surreal.

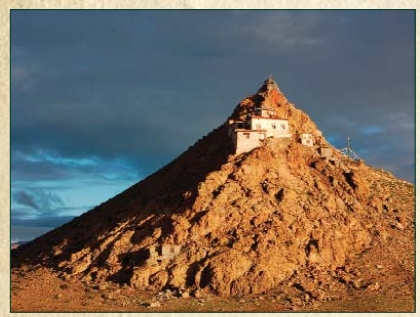
"We rode just 50 kilometers out of Urumqi that first day, and despite biking all last summer, I had totally forgotten how heavy and cumbersome a loaded bike is, how impossibly far a kilometer can be, and how grueling a gentle grade can feel on feeble legs."

– Kate Harris

Read Kate's Journal on the Web:

www.cyclingsilk.com

Serenity of the Taklamakan Desert



Tibetan monastery at sunrise

Mel cycling on the open road of Xinjiang Province

THE PAMIR MOUNTAINS: FROM KARGILIK TO KASHGAR

The group followed a road from Kargilik along a river running deep into the Pamir Mountains. The road was unpaved and filled with sand traps, landslides, and cobble-stones. Although travel was slow, the group treasured their encounters with the local Tajik people who passed by on mules and motorbikes. Many invited the travelers home for chai (tea), food, and a snug place to overnight.

The group rejoiced at the spectacular summit scenery and welcomed the downhill pavement that would speed them toward Kashgar, where they would meet Alisha.

ACROSS THE TIBETAN PLATEAU

From Kashgar, the group decided to tackle the Xinjiang-Tibet highway. As a novice bicyclist, Alisha chose instead to join a Kham Aid fund-raising ride and bicycle through easier Silk Road routes.

Kate, Mel, and Ben set out on a 20-day pilgrimage that covered over 1,000 kilometers, nine high mountain passes, and a week of riding at elevations over 16,400 feet. For days, they were surrounded by indigo skies, castle-like clouds, rumpled mountains, and turquoise lakes.

Boarding a plane in Lhasa bound for Zhongdian in Yunnan Province, they said good-bye to the challenging roads, stirring wilderness, isolation, religious passion, and the many paradoxes of Tibet, the roof of the world.

A yak on a mountain pass in Yunnan Province

YUNNAN: THE JOURNEY'S END

Kate and Mel traveled to several villages in the Kham region of Yunnan Province, where Kham Aid is located. On foot, they circumnavigated the sacred Kara Karpo mountain range. With spectacular peaks above and populated green fields below, the area might have been the fabled Shangri-La.

Although the landscape was stunning, Kate and Mel enjoyed, even more, meeting and talking with the people of the Kham region over bowls of tsampa (roasted barley flour porridge) and yak butter tea. Kate and Mel are assembling a documentary to share the wonders of China's rural Tibetan world with the West.

ABOUT KATE HARRIS AND MELISSA YULE

After graduating with a degree in Biology from the University of North Carolina at Chapel Hill, Kate Harris, a 24-year-old Rhodes Scholar from Canada, is studying the History of Science at the University of Oxford. Kate has experienced environmental extremes in Mongolia, Borneo, and Antarctica.

Melissa Yule is a 24-year-old Canadian, recently graduated from McGill University with a degree in Environmental Sciences and a minor in International Development. Mel has traveled extensively in Asia, Africa, and the wilds of North America.

EXPEDITION SPONSORS

The John Motley Morehead Foundation
Mountain Equipment Co-Op
Patagonia
TriFlow Lubricants
The Trail Shop
Global Sisters
Bicycle Habitat

Learn About the Kham Region:

Kham Aid Foundation
www.khamaid.org

EXPEDITION TEAM

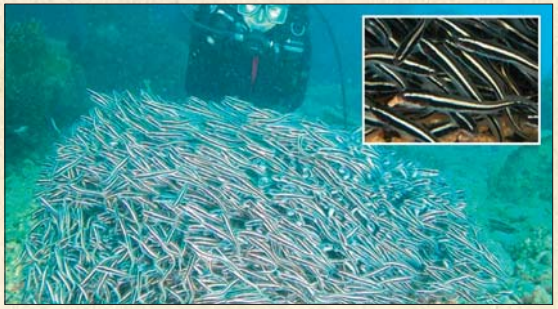
Expedition Leaders:
Kate Harris
Melissa Yule

Riders:
Ben Rawluk
Alisha Blechman

PAPUA NEW GUINEA EXPEDITION

Underwater TV: Convict fish behavior at sunrise and sunset in coral reefs

In January 2006, consummating seven years of studying the behavior of Pholidichthys leucotaenia ("convict fish"), Dr. Eugenie Clark carried Wings WorldQuest Flag #2 to Papua New Guinea to film an underwater television documentary in the coral reefs. Eugenie wanted to show the dazzling spectacle of over 4,000 juvenile convict fish swarming out of their tunneled burrows at dawn and swarming as they return each day, moments before sunset, to rejoin their parents, who maintain the tunnels but are rarely seen.



Juveniles congregate 7.3 meters under Samarai Dock. [Photo: Dinah Halstead]

EXPEDITION TEAM

Dr. Eugenie Clark, Scientific Leader

Dr. Stephen Kogge, Associate Scientist

Yoshiko Shinohara, Director

Hideo Kihara, Underwater Camera

Kenji Miyajima, Camera

Tony Wu, Interviewer and Diver (Singapore)

Maria Teresa Takako Yamamoto de Sato (NHK Tokyo)

Crew of *M.V. Chertan*

EXPEDITION TECHNIQUES

During her previous six expeditions to Papua New Guinea, Eugenie had worked with as many as twelve research divers at a time. For this trip, she worked only with a team from NHK (Nippon Hoso Kyokai) Television and Dr. Stephen Kogge, who designed an endoscopic camera that could probe deep into the tunnels under the coral reefs. He also devised a special airlift to collect fish and mollusks from within the tunnels.

A ROYAL AUDIENCE FOR THE CONVICT FISH

Eugenie was honored to receive a request from the Emperor of Japan, a fellow ichthyologist, to discuss her discoveries. She visited his Tokyo palace and previewed the NHK program for him and the Empress. Eugenie also told the Emperor and the Empress about a new species of symbiotic bivalve mollusk she had retrieved from the convict fish burrows.

Visit Eugenie's website:

www.sharklady.com

Click on her June 2005 National Geographic link to read about the private lives of convict fish

ABOUT DR. EUGENIE CLARK

Dr. Eugenie Clark, the winner of the 2005 Wings WordQuest's Lifetime Achievement Award, is a famed ichthyologist and marine biologist. From her base at the University of Maryland, she has led over 200 dive expeditions to study sand fishes, whale sharks, and deep-sea sharks over the last 50 years. Eugenie has conducted over 71 submersible dives as deep as 12,000 feet. She has published extensively and is known to many readers and TV viewers as "The Shark Lady."

EXPEDITION SPONSORS

NHK Television
University of Maryland Foundation

WHO

Dr. Eugenie Clark

WHAT

Dive to record the behavior of the convict fish

WHERE

Samarai and Kwato Islands, Milne Bay Province, Papua New Guinea

WHY

To create a television program about the unusual group behavior of juvenile convict fish

Dr. Eugenie Clark holds Wings WorldQuest Flag #2 in the midst of thousands of swarming juvenile convict fish at Kwato Island. [Photo: Dr. Stephen Kogge]

At left, expedition dive sites in Milne Bay Province, Papua New Guinea

WYOMING EXPEDITION

Searching for Cretaceous Dinosaurs

In July and August 2006, Dr. Sue Hendrickson carried Wings WorldQuest Flag #3 across the badlands of Wyoming in her continuing quest for new dinosaur discoveries. Best known for her discovery of the nearly complete Tyrannosaurus rex named in her honor, Sue has dedicated her life to continued exploration to inspire others to follow their inquisitive passions.

Having obtained permission, Sue, accompanied as always by her golden retriever Skywalker, explored private ranch land in Wyoming looking for dinosaur bones. Sue knew that the sprawling ranch had not yet been scouted fully for evidence of Cretaceous life, and she offered her sharp eyes and expertise to search for fossils.

Wyoming has historically been one of the premiere sites for dinosaur discovery since the 1870s. Sue and Skywalker were rewarded for their efforts when they spied what turned out to be a Ceratopsian horn poking out of the dry gray earth in the midst of the brittle prairie vegetation. Future work is aimed at yielding the extent of this find and pinpointing the dinosaur species.

WHO
Dr. Sue Hendrickson

WHAT
Search for undiscovered dinosaur fossils

WHERE
Lance Formation, Wyoming

WHY
Explore unsurveyed private ranch land

Dr. Sue Hendrickson and Skywalker with Wings WorldQuest Flag #3 at the site where they discovered a Ceratopsian horn in Wyoming (above left). [Photos: Mary Yon]

HONDURAS EXPEDITION

Looking for New Fauna in Jungle Caves

In October 2006, Dr. Sue Hendrickson next carried Wings WorldQuest Flag #3 to the tropical jungles of Honduras to explore a network of caves. Jorge Ferrari, a reptile and amphibian expert, convinced her to accompany him into some unexplored caves that might contain new species. Sue, Jorge, and Joana Capdevilla probed deep into the dark caverns, searching for a small mammal previously unreported in Honduras, as well as a new type of gecko and other fascinating creatures.

WHO
Dr. Sue Hendrickson

WHAT
Explore unstudied set of caves

WHERE
Honduras

WHY
Search for new flora and fauna

Joana Capdevilla illuminates aa cave inhabitant

ABOUT DR. SUE HENDRICKSON

As a paleontologist and marine archaeologist, Dr. Sue Hendrickson is constantly in demand by colleagues to dive to explore ancient wrecks, to scout sunken cities, to walk the Cretaceous-Tertiary boundary that marks the end of the Age of Dinosaurs, to run workshops, and to inspire young explorers. In 2000, Sue received an honorary degree of Doctor of Humane Letters from the University of Illinois.

See Sue's other discoveries on the web:

sue-hendrickson.net

Skywalker with Wings WorldQuest Flag #3

BAHAMAS EXPEDITION

Collecting Geochemical Samples from a Cave on San Salvador Island

In December 2005, Dr. Stephanie Schwabe traveled with her students to San Salvador Island, carrying Wings WorldQuest Flag #6 into the dark recesses of Alter Cave. Stephanie had spent much of her life diving into the underwater caves in and around the Bahamas, and she continued to seek clues as to how these spectacular underwater caves were formed. She climbed into terrestrial Alter Cave to see if it would yield any evidence.

APPROACH TO UNRAVELING AN UNDERWATER MYSTERY

In geological terms, the underwater caves in the Bahamas are geologically young – only 12,000 years old. Stephanie knew that caverns formed when carbon dioxide (CO_2) broke down the surrounding limestone, but she wondered what type of geochemical conditions caused such large expanses of rock to be eroded in such a brief geologic span of time.

She devised a lab test to study how natural elements interacted. But first, she and her students crawled deep into a cave positioned above these underground caverns to collect sterile rainwater, cave wall rock, and drip water from the stalactites. She would analyze the water's chemistry as it moved through the ceiling rock and into the groundwater of the caves below.

Dr. Stephanie Schwabe emerges from Alter Cave on San Salvador Island as her students hold Wings WorldQuest Flag #6.

Learn about Stephanie and the Rob Palmer Blue Holes Foundation:

www.blueholes.org

GROUNDBREAKING LAB FINDINGS

In the lab, Stephanie and her colleagues, Rodney Herbert and Jim Carew, tested the degree to which CO_2-generating bacteria in their samples would grow in natural settings. They measured the levels of microbe-generated CO_2 and calculated how various elements would mix together as water permeated the earth below. Their findings refuted long-held beliefs and confirmed Stephanie's own hypotheses.

Adding evidence from her 25 years of research on carbonate islands, Stephanie and her colleagues proved that a wide range of bacteria species was generating enough CO_2 to dissolve vast areas of limestone under the sea. The result is enormous underwater caves; their collapsed entryways form "blue holes."

ABOUT DR. STEPHANIE SCHWABE

Dr. Stephanie Schwabe is well known for her exploration and scientific analysis of the caves within carbonate platforms of the Bahamas. She has a Ph.D. in biogeochemistry, as well as a law degree with a specialty in international environmental laws.

Stephanie is a diver, scientist, and legal advocate working to understand and protect the pristine Bahamian underwater environment.

Stephanie has been diving for 25 years, primarily in the Bahamian blue holes, and has been part of 25 scientific expeditions there. As director of the Rob Palmer Blue Holes Foundation, she is an advocate of preservation of Bahamian caves, the unique underwater caverns, and their associated terrestrial and marine ecosystems.

WHO

Dr. Stephanie Schwabe

WHAT

Climb into a terrestrial cave to collect geochemical samples

WHERE

Alter Cave, San Salvador Island, Bahamas

WHY

To understand how extensive underwater caverns were created

San Salvador, the site of Stephanie's cave exploration, is one of 700 islands in the Bahamas.

INDIA EXPEDITION

Studying the Habitat of the Greater One-Horned Rhino in West Bengal

For her 2005-2006 field season, Gitanjali Banerjee carried Wings WorldQuest Flag #6 into the lush grass floodplain of the Jaldapara Wildlife Sanctuary near the Torsa River. This expedition was part of Gita's multi-year project to provide wildlife managers with information about the feasibility of available grass and plants to sustain endangered populations of co-existing herbivorous wildlife.

Top: An endangered female one-horned rhino (Rhinoceros unicornis) protects her calf in the tall river grasslands of northeast India.

Bottom: Location of Gita's study area in northeast India

MEASURING COMPETITION FOR GRASSLANDS IN WILDLIFE "ISLANDS"

India has set aside land to preserve rhinos, gaur (Indian bison), and other large species of the subcontinent. Gita, a wildlife scientist currently pursuing her doctorate, felt it was critical to understand how large herbivores interact and to determine if these grassland animals continue to thrive.

Little was known about the nutritional ecology of greater one-horned rhinos vis-à-vis other herbivore species. Gita wondered if one-horned rhinos and gaur were competing for the same food, or if they and other herbivores obtained their fodder from separate sections of the sanctuary.

PUTTING THE SANCTUARY INTO A HUMAN CONTEXT

Jaldapara Wildlife Sanctuary is in a beautiful setting, flanked by the Bhutan hills on one end and the Torsa River on the other. Jaldapara is surrounded by a rich mix of tribes with distinct lifestyles and traditions, as well as by small clusters of refugees from neighboring Nepal and Bhutan.

Many people use grass from the sanctuary for thatching the roofs of their mud huts and for feeding their livestock. They also collect other plant life and firewood. Pressure from the human population is felt across Jaldapara's protected area and its perimeter – a major source of concern for the long-term existence of rhinos and other endangered species.

FIELD TECHNIQUE: OBSERVING WILD RHINOS AND BISON SAFELY

Gita designed a study plan that required a daily perusal of several defined parcels of land (transects) within the Jaldapara reserve. She planned to count and to observe the large animals in each transect daily, to examine the animals' droppings, and to take small samples of their fodder.

Gita needed courageous assistants. The prospect of collecting samples amid 13- to 15-foot-tall grass, where rhinos, Indian bison, and elephants could be lurking undetected, dismayed even the most able-bodied men. Why not conduct research from elephant back?

The local park officials gave Gita permission to use park-patrol elephants for her day-to-day observation. She found two brave assistants – Montu Rai and Shyamal Urao, a 14-year-old resident of the sanctuary. Each morning around 5:00 A.M., the three met their elephant drivers ("mahouts") and climbed on top of the camp elephants. While the elephants lumbered forward, Gita and her assistants scanned the sea of grass for signs of life.

"There have been innumerable memorable occasions on this expedition. The thrill of sighting a rhino, and especially one with a calf, is unparalleled to most aspects of wildlife watching…. The worst moments were being stranded at the top of a tree in the heart of the sanctuary surrounded by a herd of Indian bison around its base for almost 3 hours and startling a rhino at a waterhole that charged us at a distance of less than 50 feet!"

– Gitanjali Banerjee

WHO
Gitanjali Banerjee

WHAT
Study the grassland habitat of the greater one-horned rhino

WHERE
Jaldapara Wildlife Sanctuary, Jalpaiguri, West Bengal, India

WHY
To understand if park grasslands are sustaining large endangered herbivores

Top: Gita's research vehicle containing grassland samples from a day's work.

Middle: Montu, Shyamal, and Gita temporarily seek shelter from alarmingly close wildlife.

Bottom: Gita displays a leech clinging to a leaf – another potential risk while conducting research in a floodplain. [Photos: Suzi Zetkus]

FIELD TECHNIQUE: COLLECTING FIELD DATA AND SAMPLES

Gita, Montu, and Shyamal began each day by recording herbivore abundance along the clearly marked transects in different types of habitat – tall grasslands, short grasslands, and woodland. Morning work focused on recording the phenology (cyclic changes) of the grasslands, noting signs of fresh grazing, and counting spoor droppings.

Obtaining samples was challenging in rhino-inhabited grasslands. If fodder samples were collected, the team had not only to dry, store, and mark the samples, but to keep them safe from goats, mold, and fungus until they could be transported to Gita's lab.

Different transects were monitored in late afternoon and early evening. After dusk, it was time to enter data and to prepare for the next day's tasks. Gita found the mahouts and field guards to be invaluable sources of information for both wildlife and field logistics.

EXPEDITION RESULTS

Gita felt that the expedition was successful because it resulted in an extensive database assembled about the large herbivores living in the sanctuary. The team documented tiger pugmarks (paw prints) along a riverbank in one of the marked transects, which was the first documentation of tiger presence in the park in five years – an indication that the tigers' prey base is increasing.

When analysis of the fodder samples is complete, wildlife officials will have ecological data to better manage the sanctuary. Best of all, her team's work has led to discussions with forest officials regarding enhanced monitoring techniques in the sanctuary, as well as future projects that might be undertaken together.

Read Gita's Blog:

"Notes from Rhino Land" at:
www.columbia.edu/~gb2025

ABOUT GITANJALI BANERJEE

Gitanjali Banerjee, a doctoral student at Columbia University in New York City, completed her master's degree in Wildlife Science at the Wildlife Institute of India, Dehra Dun, India. Her master's work concentrated on the relationship between nutritional quality of grasslands and habitat use patterns of the Indian rhino, the wild buffalo, the swamp deer, and the hog deer at India's Kaziranga National Park, which holds the world's largest population of wild one-horned rhinos. Her doctoral work continues to focus on conservation biology, management issues concerning small populations of rhinos and other endangered herbivores, and the development of creative, practical solutions to human-animal conflict.

Above: Three of the 108 rhinos that live within Jaldapara Wildlife Sanctuary, one of the five remnant herds in India. [Photo: Suzi Zetkus]

Top right: Gitanjali Banerjee holds Wings WorldQuest Flag #6 as a rhino watches from a safe distance in Jaldapara Wildlife Sanctuary. [Photo: Suzi Zetkus]

EXPEDITION SPONSORS AND FUNDING

Funding:
Whitley Laing Foundation, U.K.
Wings WorldQuest, U.S.A.

Support:
West Bengal Forest Department, India
Jaldapara Wildlife Sanctuary, India,
Wildlife Institute of India, India
Columbia University, U.S.A.
Wildlife Trust, U.S.A.

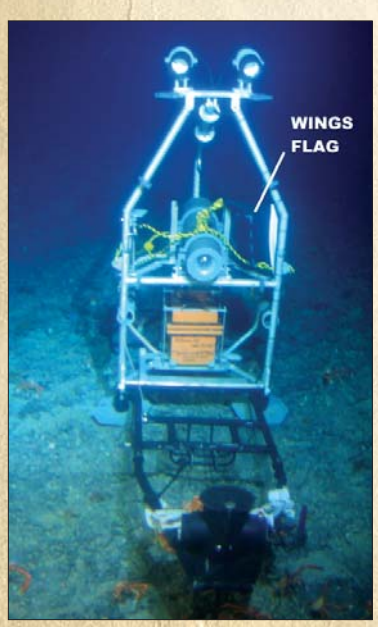
FLORIDA & CALIFORNIA EXPEDITIONS

Deep-Sea Exploration with New "Eyes and Ears"

Dr. Edie Widder and her graduate student, Erika Raymond, carried Wings WorldQuest Flag #8 deep into the ocean to study how brightly lit and noisy Remote Operated Vehicles (ROVs) and submersibles influence what deep-sea explorers see.

Edie developed the Eye-in-the-Sea camera to answer the question: "How many creatures are we not seeing because they flee when they hear or see us coming?" Deep-sea explorers have traditionally collected marine organisms by dragging nets behind ships. The truism among oceanographers, however, is that "nets only capture the slow, the stupid, and the greedy."

With the advent of submersibles and ROVs, new wonders were revealed, especially fragile jellyfish, which are destroyed by nets. Submersibles and ROVs, however, use noisy thrusters for propulsion and bright spotlights to probe the darkness. One can assume that any creature with sight, hearing, and sense would try to evade such behemoths. By contrast, Edie's Eye-in-the-Sea sits quietly on the bottom, recording life in the depths with red light that is invisible to most marine life.



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OPENING A WINDOW INTO THE DEEP SEA

To tempt marine life into the camera's field of view, Edie uses traditional bait, as well as an unusual lure – an electronic jellyfish that mimics a brilliant bioluminescent display believed to attract predators. The first time Edie deployed this lure, during a 2004 Gulf of Mexico expedition, she recorded a video of a large squid, over six feet in length, so new to science that it cannot be placed in any known scientific family. Astonishingly, this squid appeared only 86 seconds after the lure was turned on for the first time.

Although the squid recording was proof of the effectiveness of the Eye-in-the-Sea, further evidence was required. As part of Erika's research, a hydrophone was added – converting the Eye-in-the-Sea into an Eye-and-Ear-in-the-Sea – in order to learn about how marine life responds to the sounds made by submersibles and ROVs.

THE DEEP FLAG AND A SUBMERSIBLE DIVE IN FLORDA

In June, Wings WorldQuest Flag #8 traveled to a depth of 940 feet, attached to Edie's Eye-in-the-Sea, where it remained on top of the Miami Terrace, 15 miles off the coast of Fort Lauderdale, Florida, to record the activity of deep-sea life for 48 hours. During this dive, Erika rode in the *Johnson-Sea-Link* submersible, which was initially transported to the site by the Harbor Branch Oceanographic Institution's R/V *Seward Johnson*. Not long after the Eye-in-the-Sea camera was deployed from the submersible, a 12-foot-long six-gill shark arrived to investigate the bait, nearly pushing the deep-sea camera on its side.

Some 15 miles off the coast of southern Florida, the Miami Terrace rises like a backbone from the sea floor. This unique undersea habitat is rich with deep-sea coral thickets and a myriad of specialized creatures. Because the dive occurred in the evening, many basket stars were fanned out along the coral, extending their long tentacles into the food-rich current. Groups of fish dodged the submersible. Some species darted back to the safety of the coral, while others were attracted to the bright lights and the hum of the thrusters.

"In order to be good stewards of the ocean, we need to know how many animals there are, how they are distributed, and how they behave"

– Dr. Edie Widder

WHO

Dr. Edie Widder

WHAT

Exploring ocean depths with new technological "eyes and ears"

WHERE

940 feet deep on the Miami Terrace off Florida and 2,896 feet deep in the Monterey Canyon off California

WHY

To record how the lights and noise of exploration vehicles impact marine life

photo caption

Read about Edie's work on the Web:

www.oceanrecon.org/research.html

THE DEEPEST FLAG AND ROV DIVES IN CALIFORNIA

photo caption

In September, Wings WorldQuest Flag #8 plunged to a depth of 2,896 feet in the Monterey Canyon, where it remained attached to the Eye-in-the-Sea for 48 hours. A series of tests were run with the ROV *Ventana* – transported by the Monterey Bay Aquarium Research Institute's vessel, the R/V *Pt. Lobos* – to record how much noise it produced at different distances from the hydrophone and when it activates different thrusters. The next day, a similar series of tests were run with the ROV *Tiburon*. In the interim, the camera was programmed to record the behavior of fish and other aquatic animals when viewed alternately under far-red light or white light.

EXPEDITION TEAM

Principal Investigator:
Dr. Edie Widder, Ocean Research & Conservation Association

Graduate Student:
Erika Raymond, Ocean Research & Conservation Association and Johns Hopkins University

Engineer:
Lee Frey, Harbor Branch Oceanographic Institution

Ship Support:
Captain and crew, R/V *Pt. Lobos*
ROV pilots, *Ventana*

Captain and crew, R/V *Seward Johnson*
Submersible pilots and crew, *Johnson-Sea-Link*

EXPEDITION RESULTS

The team was elated about the hydrophone results from the submersible and the ROV dives. Recordings demonstrated that the ROV *Ventana's* hydraulic pump created a piercing noise in the audible range that greatly reduced the amount of marine life seen around the camera. The ROV *Tiburon* and the submersible, however, which are primarily operated without the use of hydraulics, were quieter and less disturbing to the oceanic fauna.

The 48-hour deployment in Florida revealed a strong day/night cycle in many of the species present. Wreckfish, a species whose numbers have dramatically declined over the past decade, appeared to be thriving in this region, and many new observations were made about their undisturbed behavior.

ABOUT DR. EDIE WIDDER

Dr. Edie Widder is president and senior scientist of the Ocean Research & Conservation Association in Fort Pierce, Florida. She also is an adjunct research professor in the Earth and Planetary Sciences Department of Johns Hopkins University; a Distinguished Scientist Adjunct at the Monterey Bay Aquarium Research Institute; and an adjunct professor of biological science at Florida Institute of Technology, at Florida Atlantic University, and at Bigelow Laboratory for Ocean Sciences. She is a world authority on marine bioluminescence, and as an ocean explorer, she has participated in over 60 research expeditions. Inn 38 of these expeditions, she was the chief scientist. She is also a certified deep-submersible pilot. Her research in bioluminescence has been featured in numerous nature programs that have aired on the BBC, PBS, Discovery Channel, and National Geographic. Edie was the recipient of the 2006 Wings WorldQuest *Women of Discovery Sea Award*.

EXPEDITION SPONSORS

National Science Foundation
Monterey Bay Aquarium Research Institute
Harbor Branch Oceanographic Institution

Top: caption

Middle: caption

Bottom:caption

GUATEMALA EXPEDITION

Jaguar Habitat: The Laguna del Tigre National Park in Guatemala

In July 2006, carrying Wings WorldQuest Flag #10, Dalia Amor-Conde traveled by air, water, and land to assess the status of the habitat of the elusive jaguar of Central America. For seven years, Dalia and her colleagues have tracked, captured, documented, and released this large cat of the Americas. To understand the range of the jaguar's habitat and the status of the species, the data retrieved from jaguar radio-collar transmission is immensely helpful.

CRISIS IN THE JUNGLE

The danger encountered in trapping the top predator of the jungle pales in comparison to the dangers of working in a region with rampant and violent drug trafficking. Vast deforestation of the Central American jungle and the construction of roads into pristine wilderness are causing massive disruption to the environment, and the capture of endangered animals is widespread. Organizations such as ARCAS (Asociación de Rescate y Conservación de Vida Sivilestre) rescue, rehabilitate, and reintroduce hundreds of wild animals confiscated from illegal traffickers. Fighting for the ecosystem and meticulously documenting the changes they see, Dalia and her team continue to push forward in spite of the devastation, violence, and disorder.

Aerial view of roads and cleared forest

EXPEDITION TEAM

Expedition Leader:
Dalia Amor-Conde

Lucrecia Masaya, Defensores de la Naturaleza

Gabriel Gamez, Biologist, Biological Station of the Guacamayas

Michael Tennessen, Reporter

MAYAN FOREST RECONNAISANCE

Dalia traveled on new roads in the park, shot photos from an airplane, and traveled by boat down rivers near the park. On these journeys, she took many GPS (Global Positioning System) readings so that new landscapes could be correlated with earlier satellite photographs. Dalia met with the Guatemalan jaguar research team and the road analysis teams of international conservation organizations to discuss her eye-witness interpretation of data she will use to model the impact of roads on the Mayan forest.

Read about Dalia's expedition:

http://www.nicholas.duke.edu/dukenvironment/f06/action-jaguar.html

ABOUT DALIA AMOR-CONDE

Dalia Amor-Conde is a doctoral student in landscape ecology at the Nicholas School of the Environment and Earth Sciences at Duke University. Since 1999, Dalia has worked with Unidos para la Conservación (UPC) in Mexico to develop sustainable projects with forestry communities in the Mayan rainforest. In 2005, Dalia received the Wings WorldQuest Field Work Rolex Award for her use of GPS technology to analyze the effects of deforestation on jaguar populations and habitats.

EXPEDITION SPONSORS

Conservation Strategy Foundation
Unidos para la Conservación AC

WHO

Dalia Amor-Conde

WHAT

Collect data to monitor incursion of roads into and deforestation of the Mayan Forest

WHERE

Laguna del Tigre National Park, Petén, northern Guatemala

WHY

To ensure the conservation of travel corridors for jaguars from Panama to Mexico

LAGUNA DEL TIGRE – RIO ESCONDIDO PROTECTED BIOTOPE

Established: 1986

Status: Largest conservation area in Guatemala, and largest protected wetlands in Central America

Biodiversity: 40 mammal species, 180 resident and migratory birds, and 55 fish species

Dalia and a baby temazate, confiscated from an illegal trafficker, at the ARCAS rescue station

Wings WorldQuest Flag #10 is held by Dalia Amor-Conde and Fernando Martinez, the director of ARCAS and its world-renowned Petén Rescue Center.

MOJAVE DESERT EXPEDITION

Building a Pyramid with Wind Power and Ancient Technology

In June 2006, carrying Wings WorldQuest Flag #11, Dr. Maureen Clemmons traveled with her team to Antelope Valley in the Mojave Desert of California. This would be the fourth in a series of engineering experiments testing the hypothesis that the ancient, seafaring Egyptians, who are credited with inventing the sail, might have harnessed wind power to build their magnificent pyramids.

EXPEDITION TEAM

Expedition Leader:
Dr. Maureen Clemmons

Project General Manager:
Ed Van O'Linda II,

Granite Construction (Equipment):
Chuck Taylor

Kiteship:
Dave Culp and Dean Jordan

Construction:
Mark Cripe

Engineering:
Mohammed El Tawansy

Wind Forecasting:
Ed Teets, NASA

Ruth Reid
Bill and Sue Edmonton

Maureen had already discovered how to use the wind and a silk kite to raise a 16-ton obelisk in less than an hour, without requiring human effort to push or pull the stone. She had also used spheroidal river rocks as natural ball bearings, which allowed two people to place 2-ton stones so closely that a playing card could not fit between them.

PLACING PYRAMID STONES WITH ROPE AND A KITE

The goal was to test the feasibility of building a 24-ton step pyramid out of twelve 2-ton stones. Recognizing that the Egyptians would have had only a limited supply of wood for a wooden scaffold, Maureen designed a "soft" scaffold made from rope that would allow the kite to fly within 180 degrees. When the kite was launched, the rope would become taut, and a pyramid stone could be pulled into position. Would it work on a ramp at a 40-degree incline?

EXPEDITION RESULTS

When the wind shredded their shellac-coated silk kite, Maureen realized that linen would have been a better choice. Still, she and her volunteers made significant discoveries – designing viable "soft" scaffolding, demonstrating the efficacy of bronze rollers (rather than logs) on the ramp, and discovering that a 13-mph wind was sufficient to move 2-ton stones up a 40-degree ramp. In 2007, using everything they have learned about ancient engineering techniques, Maureen and her volunteers will go to Mexico to build a 106-ton pyramid.

ABOUT DR. MAUREEN CLEMMONS

Dr. Maureen Clemmons is the president of Transformations, a change-management consulting practice in Los Angeles. She is also a professor of innovation at the Universidad de Monterrey. She holds both a doctorate in Organization Change from Pepperdine University and a Master of Business Administration degree. Her work has attracted the attention of the National Aeronautics and Space Administration and the aeronautics department of the California Institute of Technology. A documentary about her work aired on the History Channel in 2004 and 2005.

EXPEDITION SPONSORS

Wings WorldQuest
Mumm Champagne

WHO

Dr. Maureen Clemmons

WHAT

Continue experiments to use wind and materials available to the ancient Egyptians to build a 24-ton step pyramid

WHERE

Antelope Valley, Mojave Desert, California

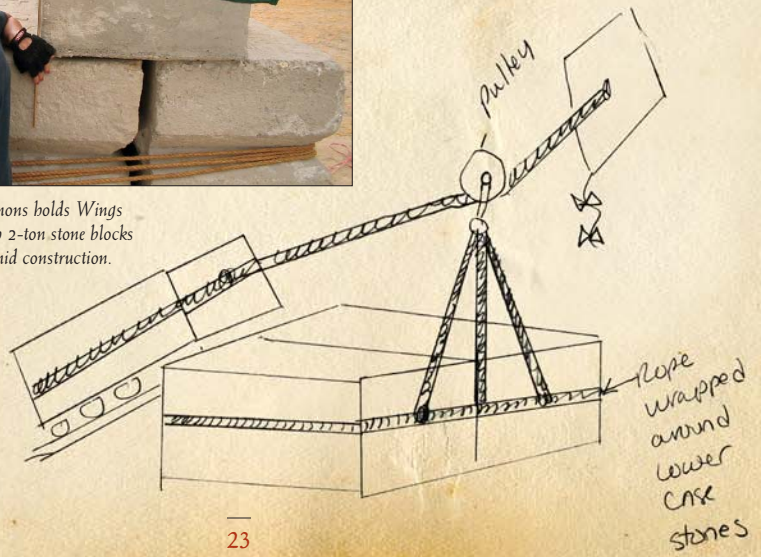
WHY

To test whether ancient Egyptians could have used wind power to erect their pyramids

Above: Dr. Maureen Clemmons holds Wings WorldQuest Flag #11 with 2-ton stone blocks used to test Egyptian pyramid construction.

Far left: Maureen viewing the final preparation of a ramp with metal rollers.

Right: Diagram of her rope scaffold, pulley, and kite capable of lifting stone blocks into place



BRITISH COLUMBIA EXPEDITION

Drilling into the Past: Mt. Waddington Ice-Coring Expedition

In July 2006, Dr. Erin Pettit helicoptered to a glacier that flanks the highest mountain in British Columbia. As part of an exploratory expedition that would be the first to drill ice cores at this site, she carried Wings WorldQuest Flag #13. The best ice-core climate records are from Greenland and Antarctica, where snow rarely melts in summer, but clues to the warmer Pacific Northwest climate history must be gathered closer to home. When ice-core geochemist Dr. Eric Steig invited Erin to join his expedition to Mt. Waddington, she was ready and eager to go.

EXPEDITION TEAM

Expedition Leader:
Dr. Eric Steig, University of Washington (Ice-core geochemist)

Glacial Geologist:
Dr. Doug Clark, Western Washington University

Glaciologist:
Dr. Erin Pettit, Portland State University, University of Washington

Driller:
Bella Bergeson, Ice Core Drilling Services

Research Assistant:
Jeff Langston, University of Washington

INSIGHTS OF A GLACIOLOGIST

Erin's role was to provide information about the glacier. How fast is the glacier ice moving? How deep is the ice? Is there evidence of past avalanches below the ice surface? Erin's insights would guide the drilling strategy in the field and the analysis back in the laboratory. While the drilling team was busy all night, Erin, Dr. Doug Clark, and Jeff Langston worked all day collecting data with an ice-penetrating radar system and high-precision Global Positioning Systems (GPS). The team found that a layer of "warm" ice, precisely at freezing temperature, existed 100 feet below the surface. This layer suggests warm summer surface melts, which alter the climate information contained in the core.

EXPEDITION RESULTS

The team was successful in extricating the ice core, which was transported by helicopter to a storage facility down the mountain. The expectation is that information will be revealed about the region's climate history, including the amount and the chemistry of the snow, the concentration

of impurities, and the temperature. Erin hopes there will be sufficient data to warrant continued forays into the beautiful remote landscape of Combatant Col.

ABOUT DR. ERIN PETTIT

As she studies the behavior of glaciers, University of Washington glaciologist Dr. Erin Pettit enjoys the combination of field science and living outdoors. She conducts critical research into the dynamic behaviors of ice divides, the movement of glaciers, and the formation of glacial ice riffs.

EXPEDITION SPONSORS

National Science Foundation
(Small Grant for Exploratory Research)

WHO

Dr. Erin Pettit

WHAT

Drill, extract, and interpret an ice core from a glacier

WHERE

Combatant Col near Mt. Waddington, British Columbia, Canada

WHY

To determine how well this glacier ice preserves the climate history of the Pacific Northwest

Above: Only 100 miles from Vancouver, B.C., Mt. Waddington was unknown until 1925. [Smithsonian]

Top left: The helicopter lifts boxes of ice cores off the glacier.

Top right: Combatant Mountain towers above the drill tower and glacier camp.

Bottom: Erin stands at Combatant Col (3,000 meters elevation), holding Wings WorldQuest Flag #13.

CASCADE MOUNTAINS EXPEDITION

Girls on Ice: Mt. Baker 2006

Leading a group of adventurous young women as part of her 2006 "Girls on Ice" expedition, glaciologist Dr. Erin Pettit carried Wings WorldQuest Flag #13 into the Metcalfe Moraine region of Mt. Baker in the Cascades. Nine teenagers from the United States and Spain had been selected from over 100 applicants to spend eight days with Erin and her colleagues on a mountaineering backpacking trip to explore the Easton Glacier.

EXPEDITION TEAM

Expedition Leader:
Dr. Erin Pettit

Expedition Mountaineer:
Cecelia Mortenson

Ice Geochemist:
Sarah Fortner

Girls On Ice:
Diana Diaz, 15 (New York)
Molly Holleran, 17 (Pennsylvania)
Kelsi Kruger, 16 (Washington)
Lucia Havarro, 16 (Spain)
Amy Rarig, 17 (Texas)
Tiffany Reisenberg, 15 (Washington)
Sabrina Ryan, 18 (Washington)
Brittney Wyatt, 15 (Alaska)
Cate Zielinski, 17 (Maine)

EXPLORATION TECHNIQUES

Since many of the teenaged girls had never backpacked before, Erin, Cecelia Mortenson, and Sarah Fortner gave them advice about managing their loads, setting up equipment, and stepping safely on and off the glacial ice. Erin encouraged the girls to observe the ecology and geology surrounding them on their daily forays from base camp and to be aware of how their bodies were reacting to the demands of the wilderness.

GETTING TO KNOW A GLACIER

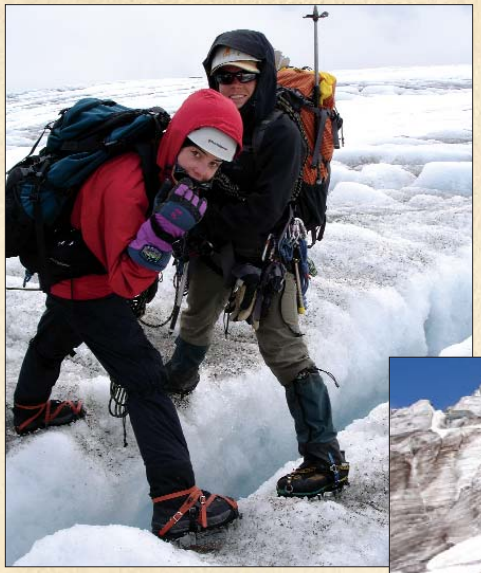
For six days, the group peered into crevasses, viewed puffing volcanoes, scrambled up the moraine, and jumped across streams flowing from glaciers. A highlight was the discovery and exploration of a cave below the glacier that glowed with eerie blue light. Each day, the girls were encouraged to consider how science and the natural world connected to their lives back home.

ABOUT "GIRLS ON ICE"

Since 1999, Erin and the Northern Cascades Institute have provided unique opportunities for young women to gather glaciology data in the field as they improved their outdoor skills and learned about science. All the girls attended tuition-free in 2006 – a benefit that Erin hopes can be extended in the future to other young explorers enrolled in the program.

EXPEDITION SPONSORS

North Cascades Institute
Katherine Olsen Foundation



Apply to "Girls on Ice"

Erin is looking for nine interested young women to join the 2007 expedition. Apply at: www.ncascades.org/programs/youth/girls_on_ice/

WHO

Dr. Erin Pettit

WHAT

Explore the Metcalfe Moraine on the east side of Easton Glacier

WHERE

Mt. Baker, a volcano in the North Cascade Mountains, Washington State

WHY

To encourage girls to explore the Pacific Northwest and challenge themselves physically, intellectually, and socially

Far left: Cecelia Fortner helps Tiffany Reisenberg navigate a crevasse.

Top: Sarah Fortner holds up a single ice crystal, which began as a snowflake.

Left: Cecelia Mortenson and Lucia Havarro look into a crevasse.

Below: Dr. Erin Pettit's team holds Wings WorldQuest Flag #13 in front of an ice fall on Easton Glacier.

WINGS
WORLDQUEST

2006 WINGS WORLDQUEST FLAG LOG

FLAG #1

Michele Westmorland and Karen Huntt
Papua New Guinea and Solomon Islands:
Retrace the steps of the 1920s Mutineer
expe

Jean
Beliz
river

FLAG #3

Dalia Amor Conde
Dry Tortugas: Bird banding, May 2005

oration,

Need Current Info

FLAG #5

Nathalie Cabrol
Bolivia: High-altitude lakes of the Altiplano, July 2005

Anna Roosevelt
Brazil: Amazon archaeology, October 2005

FLAG REPORT EDITORS

Sally Anderson
Susan Bednarczyk
Leila Hadley Luce
Milbry Polk

To carry our Flag, the applicant must be a woman who is conducting original field research or documentation and who plans to write reports, make a film, or otherwise share information about the discovery. All must file a report to Wings. Women of Discovery awardees are automatically eligible, all others must apply to Wings WorldQuest.

Design of the *2006 Flag Expedition Report* by Brightgreen Design, www.brightgreendesign.com