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The PAST Foundation: Using Archaeology to Instruct

Sharing science with the public is a major goal of this unique organization that uses a range of techniques to spread the word about archaeology.

by Annalies Corbin and Sheli O. Smith, PAST Foundation, Columbus, Ohio

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PAST stands for Partnering Archaeology with Science and Technology. Our primary mission is to provide public access to archaeology and history--both virtually and physically. Virtually, we make archaeology accessible through documentary films and interactive web sites. Physically, we organize archaeology field schools for all ages, and we work with teachers to develop K-12 interactive curricula for classrooms around the world.

Like all great things worth doing, the PAST Foundation began as a labor of love. Initially more of a project than an endeavor, PAST's original aim was to find a way to bring what many consider an obscure science into living rooms, museums, classrooms, and local communities. Archaeology, for most people, is an odd mix of romance and science popularized by Hollywood and paperback novels. In many people's minds, Indiana Jones and Dirk Pitt--the epitome of the swashbuckling historian/archaeologist heroes, out collecting artifacts with loads of adventure along the way--spell archaeology.

In reality, archaeology is much more. It is the ultimate investigation, both fascinating and exciting. It is part of the greater field of anthropology that seeks to understand the very core of our existence. In short, it answers questions such as: What makes humans different from other species? What makes Americans different from Europeans? and What made our ancestors different from us?

Archaeology Focuses on the Past

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The past is the touchstone of culture, and without the slow evolution of peoples and their lifeways, we would have no present. Through research and excavation, archaeologists study the peoples and processes that have gone before, literally touching the cornerstone of the past, the "things" that our ancestors left behind as representations of what they thought, liked, and created. The reservoir of artifacts, writings, and artwork is vast, but fragile. Some of it is well hidden and hard to find. Traditionally, when a team of archaeologists journeyed into the desert or underwater, only that small group would know the passion of the search and share in the jubilation of the discovery. Much later a very dry report would be printed, which only a handful of people actually read--thus the mystery and obscurity that still surrounds archaeology today. It is no wonder then that Indiana Jones is possibly the only archaeologist that most people can name. But modern technology has handed archaeologists a new set of tools, and now there is no reason that everyone cannot share in the passion and celebrate the discoveries as they happen, no matter where they happen. With the aim of bringing archaeology into the light, of changing mystery to understanding, PAST was launched in 2000.

The Challenge Is Making It Happen

Making sure everyone has access to archaeological sites around the globe is a real challenge. Joining an archaeological excavation is but a dream for many people. Often, remote locations, time constraints, and prohibitive costs make it impossible to join a real excavation. Through the power of documentaries and web-based interactive media, PAST provides virtual access to many physically inaccessible projects around the world. Thanks to our ongoing partnership with the renowned documentary film program at Montana State University, PAST is able to create exciting and award-winning programs for television and education, as well as attract partnerships with network and cable organizations. The combination of documentary film, digital imaging, and interactive web sites enables PAST to bring archaeology into everyone's home as it is happening.

But, if exploring archaeology firsthand is a life-must, PAST provides access to sites through field schools and interactive curriculum. Working with universities, parks, and government agencies, public and private organizations, and industry, PAST can bring kids of all ages to archaeological projects. While learning archaeological techniques, field school participants help create and enhance parks and sites around the world. Using collected information from field schools and projects, PAST partners with teachers to create interactive curricula for classrooms.

Innovative Projects

Founded to promote partnerships between

anthropologists and educators, PAST successfully initiated and implemented projects throughout the United States and has proposed projects that will take it into the international arena. PAST partnered with the History Channel on three separate projects representing the diverse maritime world from the royal yacht of King Kamehameha II to the mysterious German U-166 of World War II. These documentaries were shown on the series Deepsea Detectives. Working with archaeologists and educators in Oklahoma, Texas, and Wyoming, PAST produced curricula that bring history alive in the classroom. These materials are available to teachers across the nation at no charge.

The Marshall Hotel/Firehole River Project is an excellent example of putting innovation in learning into practice in the classroom. The Marshall Hotel, built on the Firehole River in Yellowstone National Park in 1884, formed the center of the first "tourist town" built in a national park. Although the hotel survived only seven years before being replaced by more luxurious facilities at other locations, it represents a historic milestone in the development of Yellowstone National Park. Until recently, what was left of the Marshall Hotel was believed to have been destroyed by later development at the site. In 1993-94, however, archaeologists found that traces of the long-demolished hotel still remained. They also discovered a unique and unanticipated source of artifacts: the remains of trash dumped in the nearby river by the hotel's occupants.

The Marshall Hotel on the Firehole River in Yellowstone National Park.

In 2001, the Marshall/ Firehole Hotel Underwater Archaeology Project was organized as a joint effort between the National Park Service and the PAST Foundation. Participants included archaeologists and volunteers from Yellowstone National Park, the Midwest Archeological Center of the National Park Service, the PAST Foundation, East Carolina University, and the Science Focus Program of the Lincoln, Nebraska, Public Schools.

With a team consisting of two professional archaeologists, two high school teachers, ten high school students, one graduate student, and two volunteer cooks, the first-ever archaeological investigation in a thermal river environment on the planet began. The students were not just laborers; they spent an entire week literally absorbed in the landscape. They participated in history lessons,

theoretical debates on tourism, nature hikes, environmental lessons, and even a night venture to investigate the flight patterns of local bats. For seven days, math, science, English, social science, and art lessons were within the realm of all things Yellowstone National Park.

A team searches the Firehole River for artifacts from the late nineteenth century Marshall Hotel.

Due to these initial efforts, the foundation received the coveted John L. Cotter Award in 2003 for Excellence in National Park Service Archeology for the Marshall Hotel/Firehole River Project.

Implementation in the Classroom

In 2001, PAST partnered with the state of Oklahoma to create curricula ushering in a new way of studying the state's historic past. Working with Valliant Middle School, PAST helped create a program that wove archaeology and history throughout all levels of the middle school curricula. Riverboatin' on the Red was beta-tested and became an excellent replicable model for similar programs statewide.

Currently, PAST is working on an array of projects that provide access virtually and physically. In the Pacific, PAST is partnering with the U.S. National Park Service to bring the ongoing study of one of America's most valued treasures, the USS *Arizona*, to the public as work happens.

For the past two summers, PAST has worked with California's Department of Parks and Recreation to study the Gold Rush Era shipwreck *Frolic*, running field schools and partnering with the History Channel to bring information about the state's newest underwater park to the public's attention.

In the Gulf of Mexico, partnering with the U.S. Minerals Management Service and C&C Technologies on deep sea shipwrecks (Deep Gulf Wrecks), PAST has provided an overall framework into which

educational programming and access have been successfully planned and implemented. And in virtual space, PAST is partnering with The Kelton Foundation in the creation of the Blue World Web Museum.

From these projects, PAST plans to promote new curricula and programs that will be available through the foundation's web site, linked to the web sites of the National Oceanic and Atmospheric Administration, the Minerals Management Service, and the National Park Service. The foundation also continues to work with both the History Channel and the National Geographic Channel.

Using this multicomponent approach, PAST envisions stripping the obscurity from archaeology and bringing the excitement of the field to everyone. The PAST Foundation creates documentaries and web sites; develops and disseminates interactive curricula targeted at middle school and high school students; develops interactive exhibits; runs field schools for both youth and adults; and participates in archaeological research around the world.

The PAST Foundation is a federal 501(c)(3) nonprofit educational foundation. Bringing access to remote or inhospitable projects around the world is our vision. Taking advantage of modern technology, public and private partnerships, and the passion of the PAST team is how we accomplish this goal. As a public nonprofit organization, PAST is committed to creating and sustaining access to our cultural heritage for today and tomorrow.

Visit the PAST Foundation web site for more information.

Annalies Corbin is founder and executive director of the PAST Foundation. She is a nautical archaeologist specializing in inland river transportation and immigration. She is the author of The Material Culture of Steamboat Passengers: Archaeological Evidence from the Missouri River *(2000) and recipient of the 2003 Cotter Award for Historical Archeology and the NPS Cotter Award for Archeological Project of the Year. Email: annalies@pastfoundation.org.*

Shelli O. Smith coordinates the operations of the PAST Foundation. She is a maritime archaeologist with a background in museum and archaeological interpretation. She has led archaeological expeditions and field schools around the world. Email: sheli@pastfoundation.org.

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Teachers and Scientists Create Riverboatin' on the Red

Teachers partner with archaeologists to recreate life on the river in the early nineteenth century for middle school students.

by Sheli O. Smith, PAST Foundation, Columbus, Ohio

As archaeologists we know about our field--the theory, the process, and even the passionate pursuit of bringing historical people and events alive. But, it does not necessarily follow that we know how to successfully present the information to K-12 classrooms. That has not kept archaeologists from trying, but their efforts to insert archaeology into schools enjoy only limited success. In PAST's view, there is a better way: partnerships between teachers and archaeologists to develop exciting, useable, and tested curricula.

PAST teacher workshops use the expertise of teachers and the knowledge of working archaeologists to create exciting and useable curricula that meet the scope and standards of U. S. schools. Working together, scientists and teachers take advantage of current projects, alive with theory and process, to create program concepts that can be translated into reproducible teaching modules and schoolwide programs.

The Red River Wreck

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Annalies Corbin, executive director of PAST, ran the two-day workshop, which was fully documented on film. Archaeologists from the state and project worked with teachers to create a fully integrated understanding of the history of riverboats and the process of archaeology.

In 2001, through a grant from the National Endowment for the Humanities (NEH), PAST and teachers from eastern Oklahoma and northern Texas joined forces to create a middle school curriculum for a week-long program. The module revolved around the discovery of an 1837 riverboat shipwreck that washed out of the banks of the Red River, which forms the border between Oklahoma and Texas. Oklahoma is a landlocked state, and although there are several navigable rivers within its boundaries, travel and settlement have always been viewed as overland events. The shipwreck was Oklahoma's first and opened a whole new way of seeing the historical settlement of the great western expanse known then as Indian Territory. (For more about the shipwreck, visit the Red River Wreck Field School site.

Spreading the Word

Through PAST's commitment to make archaeology accessible, education and the needs of the schools were addressed from the earliest planning phase of the expedition. The support of NEH and the willingness of the Oklahoma Department of Education and Oklahoma Historical Society to partner in the educational effort made the workshop possible.

During the concept phase, teachers took the information presented by archaeologists and worked it into concepts that could be presented across the full array of middle school subjects.

Creating the Program

The Hugo, Oklahoma, School District, located close to the archaeological site, was chosen for the curriculum development and program testing. Funding from the NEH grant provided for substitute teachers, and the Oklahoma Department of Education issued credits to teachers from all over the state who participated in the workshop. During the two-day workshop, teachers and scientists worked side by side to take real archaeological data and develop curricula concepts that covered the full scope of middle school subjects. Participants developed a vehicle theme--the riverboat race--to tie together a week-long school program. The results of the workshop were built into teaching modules for math, language arts, science, social studies, art, and music. The curriculum was called Riverboatin' on the Red and wove history and archaeology into every classroom, every lesson plan, every modality of learning, and, indeed, every facet of the school program for the entire week of the riverboat race. The program was beta-tested at Valliant Middle School in Valliant, Oklahoma, in May of 2001.

The Riverboat Race

The race began in the homerooms, renamed "landings" for the week, where each class named its riverboat and chose its crew. Successfully completed homework in other classes garnered homeroom crews the cargo and fuel needed for their riverboats. Absences and detentions produced snags along the trip, slowing a riverboat down. Daily progress of each homeroom riverboat

was tracked on a large map in the school's entrance hall. The winning crew received the coveted "rack of antlers," just as historic winning riverboats did.

The students learned much more than just how to race a riverboat. Math modules explored scale and cargo capacity in terms of weight and space. English modules worked on journalistic-style writing for crew advertisements and storytelling to recount passengers' impressions of traveling on the riverboat and the captains' stories. The history classes wrote and performed a docudrama. Social studies classes explored the race route, and science classes examined how rivers change over time. Art classes visually captured the look of riverboats, while the school band learned to play "Proud Mary," and the home economics classes produced a fashion/talk show about issues in archaeology and living history.

The program required the commitment of the entire school and the scientists involved. Teachers were challenged to integrate history and archaeology through all the classes and curricula. The challenge for the scientists was to organize the historical and archaeological data so that it was easily understood and readily accessible to the teachers. The product was far greater than either the teachers or the scientists expected.

Classroom Results

The rewards were impressive. Valliant Middle School's principal, Roland Smith, noted that grades improved by 20 percent across all subjects for the week of the project. Detentions and absences fell dramatically. Math teacher Martha Brisco remarked that even her challenged students readily and eagerly learned difficult lessons because the concepts were woven into a much larger story. When archaeologists arrived later in the summer, the whole community eagerly followed the progress of the excavation through daily updates published on the Internet and downloaded the local newspaper. Students and teachers were encouraged to visit the excavation and did.

Little if any of this would have happened if the program had been developed without input from the teachers. The partnership between the teachers and the scientists created in the students an understanding of and appreciation for the historic site.

Shelli O. Smith coordinates the operations of the PAST Foundation. She is a maritime archaeologist with a background in museum and archaeological

interpretation. She has led archaeological expeditions and field schools around the world. Email: sheli@pastfoundation.org.

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PAST Foundation Uses Web to Look Over Archaeologists' Shoulders

It's almost as good as being there when you follow the daily progress of archaeology explorations on the web.

by Andrew W. Hall, PAST Foundation, Columbus, Ohio

Readily available web access has been around for more than a decade--nearly the entire lives of students currently in grades K-12. During that time hundreds, if not thousands, of web-based programs have appeared. Yet, in educational terms, web-based curricula is still in its nascent stage. For archaeology and exploration science it is just beginning. The explosion of the Internet offers many new opportunities for educators. It gives K-12 students, as well as the public, a chance to interact directly with scientists and researchers who are discovering things today that won't appear in school textbooks for years.

The PAST Foundation, while pursuing our goal of bringing together working archaeologists, educators, and students, has embraced the Internet and uses its innovative format as a central medium to access archaeology projects around the globe. The immediate access to archaeology and exploration science provided by the Internet brings the excitement of science and cutting-edge technologies used in the expeditions into classrooms and homes as it happens. The partnership of archaeologists and educators ensures that the presentation of information meets the needs of the students and the scope and standards that govern curricula. For the past five years PAST has sought projects that embrace a holistic approach to science and include educational planning from the inception of the project.

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A Sampling of Projects

A recent example of this approach can be seen in the Deep Wrecks Project, conducted in late summer of 2004. Through funding from the U.S. Minerals Management Service (MMS) and other sources, the project focused on how human-made objects--in this case, ships sunk in the Gulf of Mexico during World War II--affect the marine environment and how the environment affects them. Researchers studied six shipwrecks that ranged in depth from 280 to 6,000 feet, too deep for scuba divers or most research submarines. Small, submersible vehicles, known as ROVs (Remotely Operated Vehicles) and operated from the surface, did all the work on the shipwreck sites. Similar to the way we manipulate games in Play Station or Xbox, pilots fly the small robotic ROVs underwater, using cameras as their eyes and powerful strobe lights to illuminate the shipwrecks in the darkness of great depths.

When PAST, C&C Technologies, and MMS staff sat down to design the Deep Wrecks Project, science, media, humanities, and education were all considered and planned for before the research vessel, *Dominator*, ever left the dock. In short, we knew what types of data we needed to collect and the prepared guide helped ensure that the entire project was documented, educational concepts were carried out, and that we knew who was participating. The project web site, developed by the PAST Foundation, went online before the team put to sea. It included summaries of the interdisciplinary science objectives of the mission, historical background on the ships being studied, and profiles of all team members, from the project director down to the undergraduate students embarking on their first field experiences.

Once the project got underway, the PAST Foundation media team shot still photos and video. Daily narrative updates, written by different members of the crew, were posted on the web site every day of the mission, along with still photos of the day's activities. Narrated, broadcast-quality video segments that included project crew interviews, underwater footage, and historic photos were produced and edited on the ship and uploaded to the web every other day. Special activities aboard ship were planned with K-12 students in mind, such as Operation Scrunch, which dramatically illustrated the effects of water pressure at great depths by crushing common objects like foam coffee cups and soda cans.

Although public outreach was a priority of the project, it was not the only goal of the PAST media team and archaeologists. The PAST media team was responsible for being the "eyes" of the whole project, logging hundreds of hours of video transmitted to the research vessel by the ROV,

interviewing the crew, and documenting the scientific process. The project, with an operational cost well over $60,000 per day, ran around the clock and produced discoveries that electrified the scientific world. So intense was life aboard the *Dominator* that crew members used the project web site to keep abreast of the discoveries being made by other scientists on different shifts.

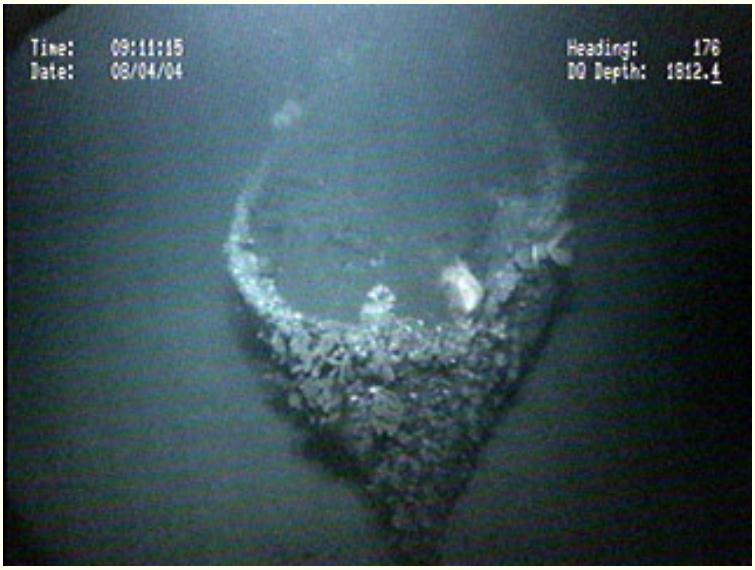
During the course of the project, nearly 17,000 visitors logged on to the PAST web site to follow the project and downloaded 23 gigabytes of text, pictures and video--equivalent to a stack of 3.5-inch floppy disks 163 feet high. More than 650 hours of documentary video were logged, recording a wide range of topics from historical documentation of the shipwrecks to results of extreme pressure, to the fauna and flora that envelop the shipwrecks. PAST is now processing the final stage of the project, converting the recovered science into replicable educational programs for middle school programs in science and the humanities.

Using the Internet for Outreach

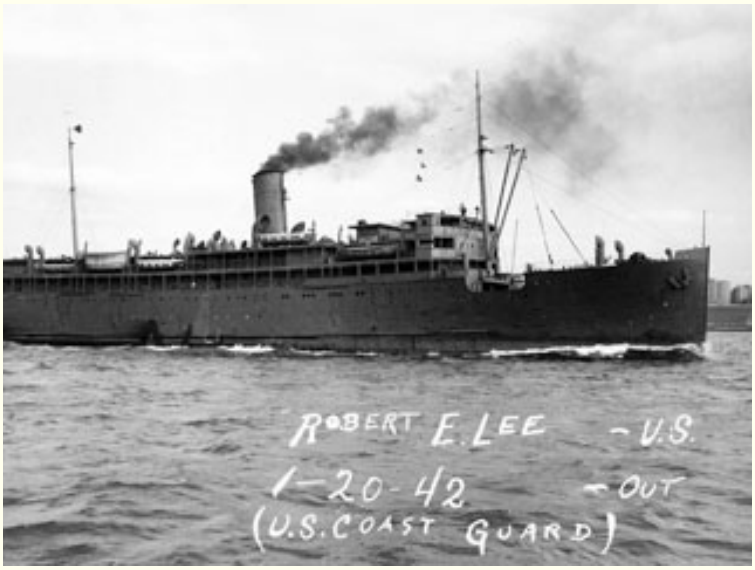
What does it take to accomplish this? Resources like people and equipment are obvious, but above all, it takes a commitment by the project leaders to make their work accessible through the Internet. Although scientists want to share their work, too often they view project web sites almost as an afterthought, just one more thing they have to do. We all know the feeling--with a list as long as your arm of things to accomplish, it is not easy to keep outreach or subsequent educational programs front and center. With this mindset, the end result is usually little more than a carbon copy of a project's final written report, uploaded to a web site weeks or months after the fieldwork is done.

PAST is the partner that keeps access as a priority. Planning and choreographed documentation result in better presentation, more access, and useable educational programs. Easy and open public access to what archaeologists, biologists, and other researchers do on a daily basis generates interest and support for their work, and can inspire students to pursue those disciplines in their own ongoing education. At a minimum, following a field project in real time helps students understand that there are real-world applications for the skills they are learning in the classroom. The PAST Foundation has embraced the web as a critical tool in bringing real-world archaeology into the classroom and works continually to find new ways to team researchers with students and teachers, to the benefit of all involved.

The oil and petroleum tanker Gulfpenn was torpedoed and sank in the Gulf of Mexico in May 1942. The Deep Wrecks project team collected the first video at this site. Photo courtesy of the Mariners Museum, Newport News, Virginia.



This underwater image of the Gulfpenn lifeboat was captured during the Deep Gulf Wrecks Project.



The passenger freighter Robert E. Lee was sunk by a U-boat in July 1942. While its naval escort attacked the German boat, there was no evidence it had succeeded until 2001 when the wreckage of the German U-boat was discovered near the wreck of the Robert E. Lee. Photo courtesy of the Mariners Museum, Newport News, Virginia

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Andrew W. Hall is the web site designer and graphic illustrator for PAST. He combines a background in archaeology and museum studies to produce nautical archaeology web sites and digital graphics. Considered the leading advocate in the field of archaeology regarding the interface between nautical archaeology and the Internet, Hall wrote the corresponding chapter in the International Handbook of Underwater Archaeology. Email: andy@pastfoundation.org.

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More Than Pretty Pictures: Videography in Deep Water Archaeology

Science joins with technology to bring underwater archaeology to the public.

by Dennis Aig, PAST, Columbus, Ohio, and Montana State University, Bozeman
and Keene Haywood , National Geographic Society, Washington, D.C., and Montana State University, Bozeman

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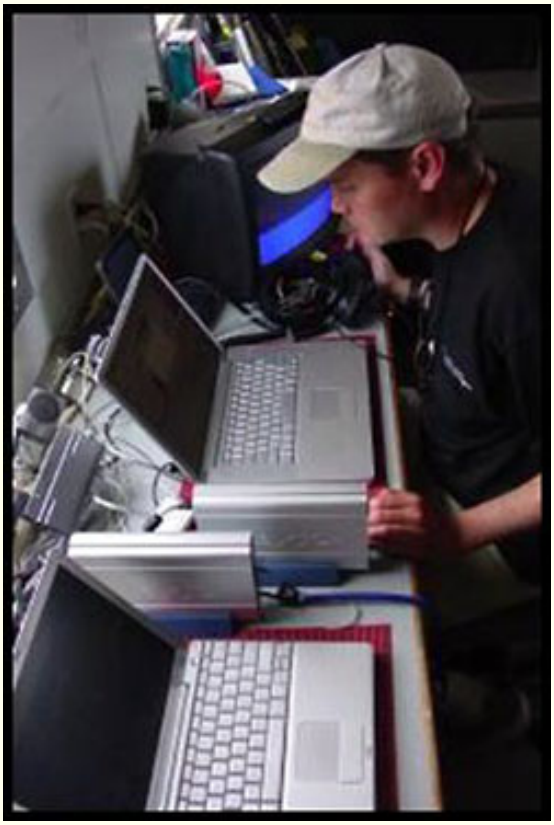
The Deep Gulf Wrecks mission of 2004 in the Gulf of Mexico marked a significant change in the role of videography in scientific deep water exploration. Video technology and its predecessor, cinematography, have been used for several decades both to view depths unreachable by human divers and to provide underwater "tours" of wrecks and habitats. Video and film provided moving snapshots or served more as entertainment than education. In a truly landmark series of decisions, the Deep Gulf Wrecks planners and scientists recognized that videography and its companion--computer technology--were most effective when fully integrated into the scientific goals and activities of the work in the Gulf.

Eyes of the Expedition

In both the planning and execution of the mission, the video very quickly became acknowledged as the "eyes" of the expedition. With work sites ranging from 280 to 6,500 feet below the Gulf's surface, the wrecks and their habitats were beyond compressed air, open circuit

The submersible Remotely Operated Vehicle (ROV) retrieved data via the video filmed at the the wreck site.

scuba diving depths. Given the prohibitive cost of submersibles for this mission, the video shot via the Remotely Operated Vehicle (ROV) served as the major retrieving device for the primary scientific data. Along with this underwater video, footage of the scientists at work and onboard interviews with them explaining their specific responsibilities provided a record of the historic mission's participants and processes. In recognition of these two key roles, the "film crew" quickly was renamed the "media team." They were assigned to their own media lab on the ship's aft deck and were treated on an equal basis with the labs studying underwater biology and microbiology.



The film crew became the media team, with their own lab.

Beyond 'Tastes Like Chicken'

The critical responsibilities of the media team gave the video an importance that far exceeded the traditional illustrative role of expedition photography and cinematography. Tracing their origins to returning explorers delivering illustrated lectures before the Royal Geographic Society, scientific film productions were often presented with exceptional visuals but were light, homespun science. Filled with dazzling cinematography but often-avuncular humor, these productions echoed the condescending explorers of the past who, in describing how in the depths of deprivation they were forced to eat everything from rare birds to their colleagues, inevitably found everything to "taste like chicken." By establishing the video team as a critical part of the scientific exploration work and not just an observer of it, the Deep Gulf Wrecks mission set a much higher bar that led to both informative and scientifically sound results.

Entrusted as integral members of the scientific team, the Deep Gulf Media Lab team served four major functions:

1. *Documentation*. The lab oversaw the recording, cataloging, and protection of the images sent from the seafloor to the ship via the ROV cameras. The lab also documented the activities on board the ship to provide a visual and audio record of method and events.

2. *Analysis*. The lab ensured that the scientists would have the images they needed to assess the wrecks, sea life, and habitat. The angles, focal lengths, and distances from which the wrecks and the sea life around them were videotaped became equally as important as the simple fact that they were photographed.

Recordings were made on board the ship.

3. *Preservation*. The media lab was as much a computer center as a video hub. Because of the relatively limited budget of the project and the extensive footage needed to be shot--250 hours--relatively fragile miniDV tapes were used. To ensure that the data would be preserved so all the scientists would have access at the end of the mission, multiple backups were made onboard ship with the help of computers, external hard drives, and disks. The conversion of the digital tapes to other digital media was critical to the preservation and use of the data.

The media team recorded shipboard activities and interviews with scientists.

4. *Outreach*. There was a great deal of professional and general public interest in the mission. To promote an understanding of the mission, its importance, and its activities, a web site built and maintained by the PAST Foundation became an international source of information about the work in the Gulf as it proceeded. The media lab prepared daily diary text and photo updates, short video updates, and hundreds of still pictures that were uplinked from the ship to the web site via a satellite-based Internet link.

Convergence of Ignorance

During most scientific missions that include media teams, the scientists and the filmmakers are usually in a tense and often adversarial relationship brought about by mutual misunderstanding. The scientists do not understand what the filmmakers do or how they do it. The filmmakers do not understand the scientists or their

respective processes. To its credit, the Deep Gulf Wrecks Mission avoided this convergence of ignorance. The scientists understood the role of the media team and its shooting style. They also understood why, in the middle of an intense 18-hour work shift, it was important to step away from the lab table or the collection basket and engage in the very unnatural exercise of explaining what they were doing as they did it.

For their part, the filmmakers recognized the importance of the mission's goals and the need for courtesy and explanations of the video work process. The media team especially understood the key rule for the successful collaboration of science and media: the scientific events need to lead the filmmakers--the filmmakers should not try to force or lead the events. As the Deep Wrecks Mission demonstrated, when there is respect, understanding, and cooperation among the scientists and filmmakers, there will also be a wealth of exceptional primary data, informative footage of onboard events, and easily accessible public outreach materials.

Expanding the Public Horizon Beneath the Sea

When video is acknowledged as part of the scientific research of a mission, both scientists and filmmakers benefit. The unique skills of each group are used to their best advantage so both the scientists and filmmakers will make each other's work better. The pure science and the video technology will be joined into one cohesive research entity that promotes improved and more easily accessible research. Not only will the scientists and filmmakers benefit, but the general public will also be encouraged to expand their daily vision of the world to include the natural and constructed wonders beneath the sea.

Dennis Aig is PAST's documentary filmmaker. He has produced and directed both documentary and dramatic productions for the Walt Disney Company, National Geographic Television, PBS, Lifetime Television, the Outside Channel, the History Channel, and the Independent Television Service. He is the recipient of more than 100 awards since 1993, including three regional Emmys, a Gold Hugo from the Chicago Film Festival, 13 Tellys, and the Gold Medal from the New York Film Festival. Aig served as head of the media lab team on the Deep Gulf Wrecks Mission. Email: dennis@pastfoundation.org.

Keene Haywood was the technical leader of the Deep Gulf Wrecks Mission. His education includes degrees in the fields of geography, anthropology, marine affairs, and filmmaking. Much of his professional work has been in marine environments. He is currently working for the National Geographic Society. Email: khaywood@ngs.org.

Also on the project, Lansing Dreamer served as director of photography, and Korey Kaczmarek was the location sound mixer and student intern.

Would you like to know more? Read about the challenges of underwater video and tips for success in A Videography Primer for Deep Water Archaeology.

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A Videography Primer for Deep Water Archaeology

Editor's note: In 2004, the Deep Gulf Wrecks Project explored the Gulf of Mexico to determine how ships sunk during World War II impact the marine environment and vice versa. The traditional film crew was replaced by a media team that served as an integral part of the scientific mission. Their functions were to document the exploration activities, provide images for analysis and preservation, and connect the project to the outside world via the Internet. Here the authors examine the unique challenges of filming in deep waters and share what they learned during the successful mission.

by Dennis Aig, PAST, Columbus, Ohio, and Montana State University, Bozeman and Keene Haywood , National Geographic Society, Washington, D.C., and Montana State University, Bozeman

Challenges of Deep Water Media

Examining shipwrecks and habitats in deep water is a difficult and expensive undertaking. The logistics and planning needed to enable media equipment and people to examine often hostile deep water environments is similar to planning an expedition to an extreme remote environment like K2 or outer space. Because of the expense and time involved, the filmmakers, like the scientists, may have only one opportunity to examine the mission area in a lifetime. As in most complicated endeavors, no matter how good everyone_s intentions are, there is never enough time. A workday on a deep water expedition can often be 24 to 48 hours in length. These conditions affected all members of the expedition, but they created specific requirements for the media team. The following were the primary challenges brought about by the situations at sea:

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1. *Environmental impacts*. In the environment of the Gulf of Mexico in summer, there are issues of humidity, corrosion, underwater pressure on cameras, the need for strong underwater lighting rigs, diminished visibility in shallower waters, and camera lens fogging on the ROV. Cameras, lights, computers, drives, tapes and discs must all have adequate protection from the environment, whether they stay onboard or go underwater. Air-conditioned onboard labs are not enough to ensure smooth operations. Care should be taken to acclimate cameras and other electronic gear to wide changes in humidity levels and air temperatures. Take into account that you may be going from climate-controlled labs to hot and humid outside conditions on deck.

2. *Redundancy and backups*. There is no FedEx at sea, and a helicopter trip to the ship from shore costs about $18,000. When you are 30 to 50 miles offshore, you are very far from supply sources. Worst-case scenario planning well before departure is critical. The media team spent much of its prep time charting out what could go wrong. Its 28 boxes of gear were probably the most of any team onboard the ship, but more than 85 percent of the gear was used during the mission. Redundancy and backups are essential. Due to the amount of gear associated with the media team, it is helpful label, store, and organize equipment so it can be accessed 24 hours a day by any of the crew.

3. *Even in the twenty-first century, the sea is a hostile place.* The Deep Gulf Wrecks mission spent part of its time outrunning hurricanes Bonny and Charlie. Even though they never caught up with the mission, they sent some high seas that put everyone on very high alert. The safety of crew, especially daring filmmakers who by nature and training forget the fact of their own mortality, needs to be remembered--always. Equipment also needs safeguarding. Video and computer gear may be transported in tough, difficult-to-open cases, but the electronics are incredibly

fragile--and fickle. Shockproof, waterproof, and humidity-resistant gear boxes are imperative.

4. *The human body is not engineered for a 24/7 schedule.* When the ship reaches a wreck, especially when the goal is to do six sites in less than three weeks, the workday can be very long. Work ships, especially the ones that move through the Gulf, have a limited capacity for berthing and crew amenities. Media teams can wear out very easily, especially if they are shooting, logging, cataloging, editing, and uplinking. The Deep Gulf media team was only four people, with a fifth person graciously lent to the group by the National Oceanic and Atmospheric Administration (NOAA). Probably six people would have been the most efficient to allow more alternating of staff. The smaller group performed incredibly well, but it is essential to have enough people to permit true and reasonable work shifts.

5. *Murphy's Law is an inevitable principle of the universe--especially at sea*. Murphy's portrait should be as ubiquitous and well recognized as Einstein's. If something can go wrong, it will--and at the worst possible time. Plan for that moment of fear and imminent disaster.

6. *Art and engineering are two sides of the same machine.* As with much scientific equipment, the emphasis in the operation of ROVs and the gear they carry is the engineering. In terms of underwater videography, a basic understanding of film principles--the standard master shot, medium shot, close-up sequence, for example--is imperative to ensure adequate coverage of a site that no one may ever visit again. The media team and the ROV pilots need time to confer and devise a taping plan.

Working with Video is Working with Computers

The developments that have brought video to a central position in scientific explorations result largely from computer technology. Video cameras capture the data, but the transformation of this

information into workable units almost always involves a complicated array of computers, editing software, drives, storage media, and Internet connections. At least one member of the video team should be a computer expert.

Among the many considerations that need to be examined when working with media computers on board a deep water mission are the following:

1. *Know your format and the ultimate purpose of your footage.* Are you shooting for a broadcast-quality show or simply to record the data? How many people will need to review the footage? Not all tape is created equal. Beta and DigiBeta are significantly different, as are miniDV and DVcam. Know when to use a camera and when to use a separate deck in viewing or duplicating footage. These are not home videos. The media is not simply your message--it is your primary data.

2. *Understand compression and what it does to the video.* Know an MPEG from a JPEG and what a pixel does. Learn the truth about video captures.

3. *You can never have too much drive space*. Plan for as much data storage as possible within the limits of your budget and onboard space.

4. *Make sure your many pieces of equipment play well together.* Compatibility is essential. One day Bill Gates, Steve Jobs, and SONY will create peace and love throughout the computer and media kingdoms. Until then, make sure all the gear can work with one another.

5. *Make sure there is a safe and temperature-controlled storage place for your media.*

6. *Audio is as important as visuals.* Ships are noisy environments. And so is the sea. Prepare for the soundtrack as well as the picture.

7. *Develop a healthy distrust of technology.* Most equipment, whether it is video or computer, is never as good or as reliable as the manufacturer claims. Marketing, unfortunately, often outpaces

engineering. Plan accordingly.

8. *Plan for backups.* The visual data are vitally important. Make adequate plans for backing up the video as soon as possible, if not immediately, when the footage is captured.

Taking the Data to the World

During the Deep Gulf mission, the media lab also provided information to PAST for posting to the web site. The mission attracted interest among many different communities: archaeologists, microbiologists, historians, World War II aficionados, and veterans and their families. To serve this diverse audience, the media team prepared daily "diary" entries from different members of the mission and sent them along with photos as daily updates to the web site. Every two to three days, a video update would be uploaded from the ship to the web master and posted on the site via a satellite Internet connection. These short pieces were prepared in the style of news reports and focused on specific scientific events (such as the wall of coral on the GulfPenn wreck) or specific areas of research (for example, "rusticle" microbiology).

Ongoing outreach during a mission has considerable educational and political value. As with most things on an expedition in an often uncontrollable environment, there are several precautions that should be taken, including:

1. *What will be uplinked?* The formats and media of the updates must be decided upon with the web master and mission leaders before the beginning of the voyage.

2. *Bureaucracy does not stop at the harbor's edge.* In most situations, someone in authority will need to approve the uplinked material. The most efficient approach is to have someone onboard designated to conduct the reviews and grant the approvals.

3. *The media lab is also the press room.* Make sure a member of the media team can write and spell well.

4. *One person's DSL quality is another person's dial-up.* Satellite technology is incredible, and any updates from a ship have to be appreciated. But even on land the differences among DSL, T-1,

downstream, upstream, and all the other ways of describing how data travel can be confusing. Have a clear idea of what the transmission speed will be before leaving port. Because a ship is usually in motion and constantly changing position, it will often have varying degrees of speed in relation to the satellite that first receives the data. Also find out what other members of the expedition will be using the Internet connection for research purposes during the mission. Video takes considerably longer to upload than text or still photos. Schedule the uplinks for times of low usage. Understand what compression algorithms and technology will yield the smallest video files but the best image quality.

5. *A ship is a relatively small place containing many different worlds.* One of the major audiences for the updates was the mission crew itself. Because of intense works schedules and different shifts, some groups did not know the details of what the other groups were doing. The updates became a way of unifying effort and transmitting information among the mission team.

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Resources

These web sites explore additional archaeological projects, undersea archaeology, and the rationale for using an integrated curriculum in your classroom. Like the PAST site, these demonstrate how to successfully use the web to document a project, make it accessible to the classroom, and increase the interest and excitement of your students.

The PAST Foundation
www.pastfoundation.org
Keep current of all the projects PAST is involved in! Follow along, day by day, on one of their exciting missions.

Career: Anthropologists and Archaeologists
www.collegeboard.com/csearch/majors_careers/profiles/careers/100953.html
Share this with your students who may be intrigued by a possible career in archaeology.

Society for American Archaeology
www.saa.org
SAA is an international organization devoted to research, interpretation, and protection of the Americas' archaeological heritage. Follow the education links on this site to sources of teaching materials, traveling exhibits, guidelines for evaluating classroom materials, and information about professional development opportunities.

The Society for Historical Archaeology
www.sha.org
Here you will find a wealth of publications and research links. Check out the Kids: Is the Past in Your Future for an introduction to historical archaeology and information about jobs and preparing for a career.

Project Archaeology
www.projectarchaeology.org
According to the text on this useful web site,

Project Archaeology uses archaeological inquiry to foster understanding of past and present cultures; improve social studies and science education; and enhance citizenship education to help preserve our archaeological legacy. Teachers of upper elementary grades and up will find publications and resources for students, as well as professional development materials. There are contact people in most states to assist you with classroom projects.

Science and Natural History Filmmaking
naturefilm.montana.edu
Do you have students who excel at science, love technology, and exhibit a strong creative bent? You may want to make them aware of Montana State University's master of fine arts program in Science and Natural History Filmmaking. It is the only program of its kind in the world. What a great way to combine a love of science with a film career.

Mysteries of Catalhoyuk!: An Archaeological Investigation
www.smm.org/catal
Students will have fun doing the interactive activities on this web site designed to teach about excavation techniques and the investigative process used in archaeology. The site focuses on the excavation at Catalhoyuk, Turkey, to provide examples of how archaeologists work in the field and make observations about what they find during their dig. The site includes a weblog, video tour, profiles of staff, and more.

The Cave of Lascaux
www.culture.fr/culture/arcnat/lascaux/en
You will feel as if you are exploring the Paleolithic cave art on this virtual tour of the Cave of Lascaux. The site includes the history of the cave and the techniques and discoveries of archaeologists exploring it. Learn about the cave closure in 1963 when scientists discovered that an excess of carbon dioxide brought in by visitors' breath combined with the water vapor to create carbonic acid that corroded the limestone walls. Today, the cave is remotely monitored by computer for any changes, and a replica has been built to provide the public with access to a similar environment. Be sure to take the virtual tour.

Nautical Archaeology Society
www.nasportsmouth.org.uk
Although not aimed at K-12 educators or students, this site provides additional examples of underwater archaeology projects in Great Britain. This organization seeks to get all divers involved in documenting undersea wrecks and includes reports, video, maps, and more. Visit this site if you or your students want to find out more about activity in undersea archaeology.

NeMO, New Millenium Observatory: A

Seafloor Observatory at an Active Underwater Volcano
www.pmel.noaa.gov/vents/nemo/index.html
Through video, PowerPoint presentations, and interactive explorations, you're invited to tour a seafloor observatory at an active underwater volcano. Be sure to check out the smoker vents and lava flows in your own simulated deep-sea dive. Although there is no archaeology involved, this site provides another good example of how scientists skilled in videography and web site development can support exploration and learning.

Integrated Curriculum
www.nwrel.org/scpd/sirs/8/c016.html
If, as the research shows, developing and using an integrated curriculum takes more time, why should you try it? As this report indicates, an integrated curriculum will help your students acquire positive attitudes, apply study skills, and more. Read what the research says as well as recommendations for implementing an integrated curriculum.

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