

Aquatic Research Opportunities with the National Park Service

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Abstract

The United States National Park Service (NPS) protects and preserves unparalleled natural aquatic resource diversity. Ecosystems range from marine coral reefs, freshwater lakes and estuaries, to cave system aquifers; the NPS's unique resources are unmatched. The National Park Service Dive program consists of thirty programs that span the United States and its outlying territories. Each program is governed by the National Park Diving Control board under the authority of the Law Enforcement, Security, and Emergency Services department of the National Park Service. The National Park Mission Statement outlines "...*The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation....*". In an effort to conserve and protect these areas the NPS encourages natural and cultural research within the parks. The National Park Service and The American Academy of Underwater Sciences are working to establish a formal relationship to bring the academic and diving capabilities shared by the two organizations together to provide researchers opportunities and to investigate topics that promote natural and cultural resource conservation. This paper explains the scope of the National Park Service Dive program, a description of individual park capabilities, opportunities available for research within the parks, and the benefits of developing partnerships with individual parks.

Keywords: American Samoa, diving research projects, National Park Service

Introduction

Perhaps the best-kept secret of our National Parks is the underwater realm, including millions of acres of submerged lands, only a fraction of which have been explored by divers. From the geysers on the bottom of Yellowstone Lake to the coral reefs of American Samoa, the National Parks have much to offer aquatic scientific researchers.

The National Park Service (NPS), which is a division within the US Department of Interior (DOI), is comprised of 397 units, including National Parks, Recreation Areas, Monuments and other designations (hereafter referred collectively as parks). To manage and protect these resources, the NPS depends on reliable and current scientific data to assist in management decisions.

Knowledge of the state of resources is vital to achieving the NPS mission; *"The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations"*.

Within the National Park Service, thirty units have an active dive program (Figure 5 and Table 4). In striving to achieve its goals, the National Park Service encourages collaborative partnerships with academic and private researchers to enhance public awareness and to provide continued monitoring and protection of America's natural and cultural resources.

Background

The National Park Service was the first civilian federal agency to formally adopt scuba diving as a management tool. By 1960, NPS had divers trained and using "modern" SCUBA to manage and monitor resources within the NPS protected areas. In 1963, NPS had developed a formal diving policy. Initially NPS diving was a job responsibility of Law Enforcement Rangers to aid in the protection of submerged park resources and a tool for body recovery due to park visitor accidents. Perhaps the biggest change in the role of the NPS dive program since its conception in 1960 is that diving has become a scientific, interpretive and facility management tool. Currently NPS divers recover drowning victims, conduct biological and archeological surveys, create interpretive and educational products, and monitor the condition of historical shipwrecks sunk on submerged park lands. The NPS dive policy was originally based, for a short period, on a US Navy model, but by the mid-1960's NPS divers had adopted the Scripps model. This model later served as a "genesis" for the diving policies of a large number of academic and public services agencies. The American Academy of Underwater Science (AAUS) is essentially a modified Scripps policy (Lenihan, nd). Scripps Institute of Oceanography Dive Safety Officer Jim Stewart worked with early NPS divers like Jack Morehead and Jim Randall to standardize new NPS protocols and provide training to the first of NPS "diving" rangers.

NPS dive program capabilities have evolved with new management issues, advances in dive technologies, and environmental issues. NPS divers have participated in projects using not only open circuit scuba but mixed gas diving, cave diving, deep wreck diving, closed circuit rebreather diving and surface supplied diving. Due to the vast scope of missions for the NPS diver, they are afforded a less restrictive approach in accomplishing our goals than other civilian government agencies. This is all done with the highest attention being paid to diver safety. In over 50 years of organizational diving NPS has never had a diver fatality.

NPS Dive Structure

The National Park Service covers 4,502,644 acres of oceans, lakes and reservoirs. Addressing issues in various areas of the system can differ completely in topic and/or approach, but in many cases there is an overlap or similarities in diving operations and safety issues which necessitates a singular system approach evaluated and managed through a hierarchy structure

Documentation Authority:

The DOI authorizes the use of diving in the work place at divisional levels through the *Department of Interior Manual 465 Ch. 27 "Safety and Health Standards, Procedures and Guidelines"* (1997). The National Park Service placed *Director's Order #4* (1999) which permitted diving within NPS, guided by *Reference Manual #4- Diving Management (RM-4)* (2000). RM-4 requires and dictates the administration of all dive operations through the NPS National Dive Control Board.

Organizational Structure:

National Dive Control Board (NDCB)

The NDCB is comprised of the NPS Dive Safety Officer, five Regional Dive Officers (RDO's), Deputy Chief of Law Enforcement and Emergency Services, and a representative from risk management, cultural and natural resources. Responsibilities of the NDCB include recommending changes in NPS diving policy, providing annual review of Regional Dive Programs, developing/maintaining liaison with other agencies/groups, adjudicating appeals from divers, parks or

regions, approving NPS dive instructors, securing funding for service-wide training and conducting dive program reviews as needed. The NDCB grants management oversight to each individual region to the Regional Dive Officers.

Branch Chief, Emergency Services

The Branch Chief, Emergency Services (WASO) provides leadership and direction to the NPS NDCB in the development of the program’s Directors Order and Reference Manual. The branch chief secures funding for service-wide training and equipment while also maintaining an advocacy in the Washington Directorate.

Regional Dive Officer (RDO)

Due to the large coverage of the National Park Service, dive program management has been divided into five diving regions; Intermountain, Midwest, Northeast, Pacific West and Southeast. Each region has a Regional Dive Officer appointed by the NPS Regional Director to manage all dive operations within their region. This individual plans, directs, develops, coordinates, and advises on all phases of the Regional Diving Program. In doing so, the RDO serves as a technical advisor to the Associate Regional Director for Park Operations, or their designee. It is required that each RDO possess a nationally recognized Instructor or Dive Master credential. A contact list of Regional Dive Officers is found in Table 1.

Table 1. Regional Dive Officer List

Region	Regional Dive Officer	Email	Phone
Intermountain	Brett Seymour	Brett_Seymour@nps.gov	303-969-2993
Southeast	Shelby Moneysmith	Shelby_Moneysmith@nps.gov	305-230-1144
Pacific West	Dave Kushner	Dave_Kushner@nps.gov	805-658-5773
Northeast	Michael Croll	Michael_Croll@nps.gov	570-426-2470
Midwest	Steve Martin	Steve_A_Martin@nps.gov	906-487-7175

Dive Safety Officer (DSO)

The DSO is an active NPS diver administered by the Branch Chief, Emergency Services and supervised by the Submerged Resources Center Program Manager. This individual plans and manages a professional, comprehensive, and complex dive safety and training program. Under the direction of the NDCB, the DSO plans and implements multiple aspects of the dive safety program. It is required that the DSO possesses a nationally recognized instructor credential.

Park Dive Officer (PDO)

In Parks/Units having diving programs, the Park Superintendent/Program Manager shall be responsible for its management. The Superintendent/Program Manager shall appoint a PDO to fulfill Park/Unit obligations in keeping diving records, dive planning, dive operations management, training, etc. Experience and leadership ability should play an important part in the selection of the PDO. The PDO will perform as the area's subject matter expert on diving matters pertaining to overall park management and goals.

NPS Dive Statistics

Over the past decade, with heightened public concerns of global climate change, NPS has increased its dive efforts to better investigate this phenomenon. The world’s aquatic environments play a critical role in and are dramatically affected by climate change. NPS divers, along with outside researchers, have spent more time underwater to better investigate these changes. Along with more natural

resource research being done in America's National Parks; divers are spending many more submerged hours studying America's cultural resources. Rebreathers, mixed gases and remotely operated vehicles provide researchers with various tools to investigate cultural and natural resources that have been unreachable in the recent past. A review of the NPS dive statistics over the past seven years illustrates that more dives are conducted each year and more divers are participating in the NPS dive programs (Table 2)

Over the past seven years the NPS dive program has increased its number of divers by 56%, its number of dives by 75% and its total dive hours by 40% (Table 2) (Figures 1,2,3). The National Oceanographic and Atmospheric Administration (NOAA) is largely considered to be the biggest and most active civilian federal dive program; this provides a good measuring tool to compare against NPS dive numbers. Over the past seven years the NOAA dive program has remained largely stable while the NPS dive program is a growing program. As NPS recognizes the need for aquatic research we see that more of our resources and budgets are being directed to the aquatic environments of our national parks.

Table 2. NPS/NOAA Yearly Statistics.

2011			2010		
	<u>NPS</u>	<u>NOAA</u>		<u>NPS</u>	<u>NOAA</u>
Number of divers	204	423	Number of divers	209	466
Number of dives	10516	13859	Number of dives	10464	13987
Number of dive hours	5177	8168	Number of dive hours	5289	9099
2009			2008		
	<u>NPS</u>	<u>NOAA</u>		<u>NPS</u>	<u>NOAA</u>
Number of divers	171	486	Number of divers	153	508
Number of dives	7803	13430	Number of dives	9146	14630
Number of dive hours	6674	8149	Number of dive hours	5887	8765
2007			2006		
	<u>NPS</u>	<u>NOAA</u>		<u>NPS</u>	<u>NOAA</u>
Number of divers	150*	457	Number of divers	149	516
Number of dives	7000*	14906	Number of dives	6766	16910
Number of dive hours	5000*	8954	Number of dive hours	4079	10424
2005					
	<u>NPS</u>	<u>NOAA</u>			
Number of divers	131	476			
Number of dives	6008	13232			
Number of dive hours	3705	7419			

*number(s) extrapolated due to data loss

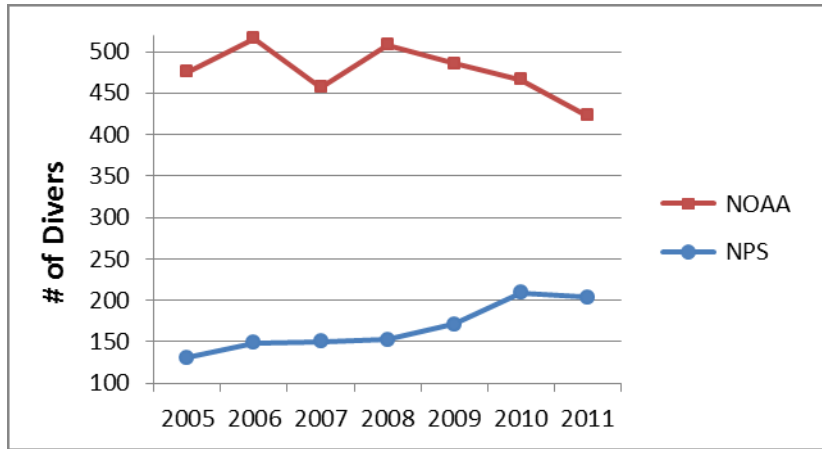


Figure 1. Number of Divers by Year.

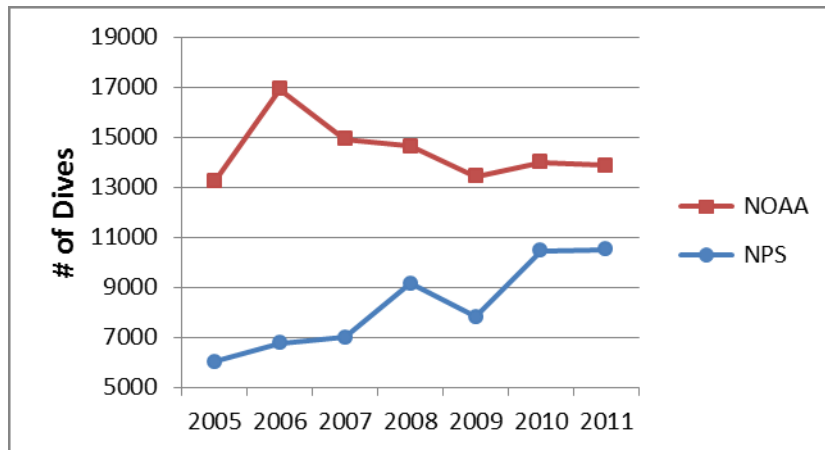


Figure 2. Number of Dives by Year.

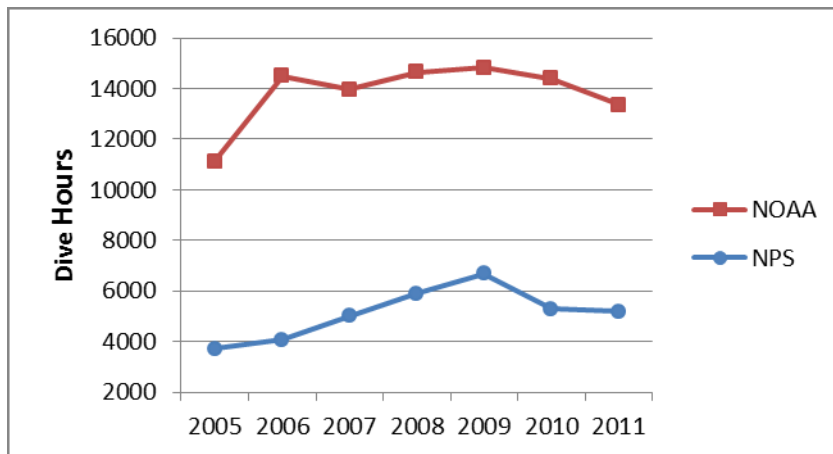


Figure 3. Dive Hours by Year.

A review of dive 2011 statistics shows that a majority (70%) of NPS diving is for the purposes of natural and cultural resource management. The next greatest obligation is training and proficiency (Figure 4).

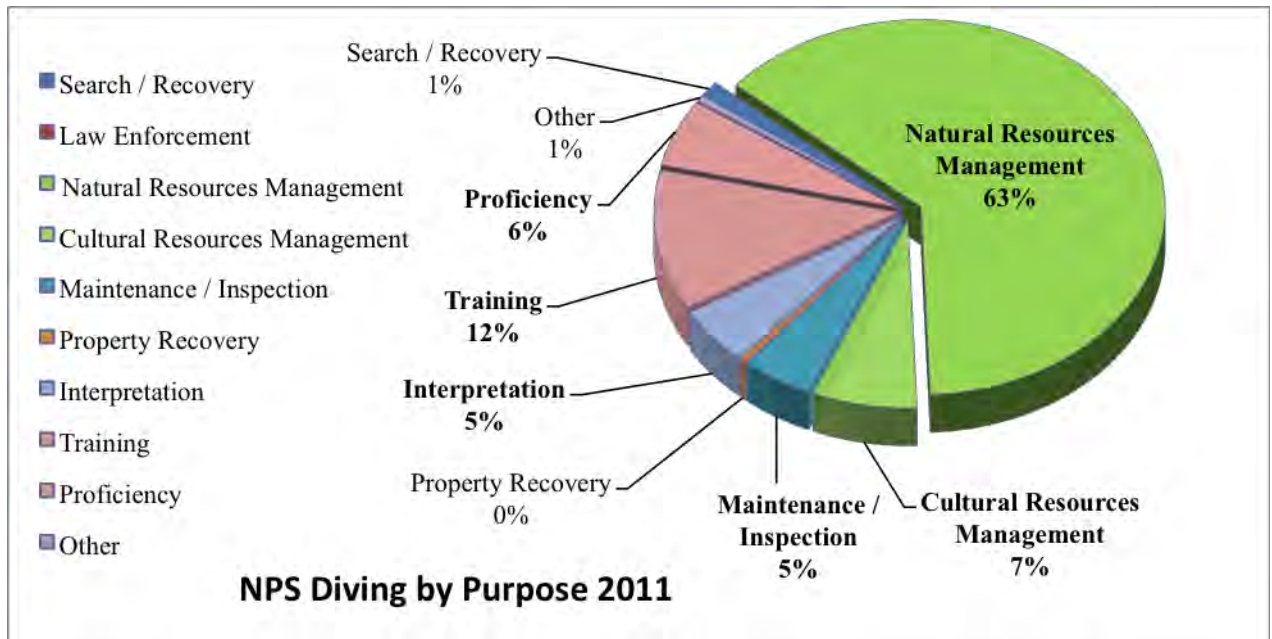


Figure 4. Summary of NPS dive purposes by percentage.

Research Application and Usage of National Parks

A *Scientific Research and Collecting Permit* is required for most scientific activities pertaining to natural resources or social science studies in National Park System areas that involve fieldwork, specimen collection, and/or have the potential to disturb resources or visitors. Each NPS unit requires researchers to submit an “application and usage” request. These requests are reviewed on an individual basis. Upon approval, each park will govern the extent of research permitted within its boundaries. Items often addressed include; the period of time research is permitted, limitation regarding investigation and final dissemination of research results to the federal government.

The National Park Service’s Research Permit and Reporting System (RPRS) will provide the following services for interested parties seeking permission to conduct a natural resource or social science study in a unit of the national park system. RPRS allows researchers to review NPS scientific permit requirements and application procedures. RPRS provides potential researchers with the following:

- Ability to review permit conditions before beginning the permit application process
- Ability to review accomplishments of previous research conducted in a park before planning a new study
- Ability to review the types of research specific parks are especially interested in attracting
- Ability to complete and submit an application for a scientific research and collecting permit

Most parks have a Research Coordinator who can be consulted for more information. To access the NPS Research Permit and Reporting System and learn more about the NPS scientific permit application process, go to <http://science.nature.nps.gov/research>.

NPS Resource Availability

The NPS contains thirty diving units. Within these units, the diving operations span a wide spectrum of skills and specialties. Each unit, within an active program, independently supports and regulates diving within their boundaries. For authorization and use of resources with NPS support, each unit must be contacted independently or through their applicable PDO and/or RDO.

Geographic location coupled with resource diversity necessitates that each dive operation operates their own unique dive program within the guidance of the national dive program. Each dive unit has particular tools and procedures used to manage their diving needs (i.e. resource management, cultural preservation, facility management and law enforcement). To obtain the most accurate available resources available to an outside researcher, interested parties should contact specific Park Managers and/or Park Dive Officers. Figure 5 and Table 3 show specific locations of diving units within the National Park Service. A brief description of each of these units is also provided. Along with a description, applicable information such as dive capabilities, support operations, current research, desired research and contact information are also provided.

Amistad National Recreation (AMIS) is located on the US and Mexico border near Del Rio, Texas and is between San Antonio and Big Bend National Park. The park is 150 miles west of San Antonio

For possible projects at AMIS please contact:

Regina Klien, Park Dive Officer - regina_klien@nps.gov (830) 775-7492 x2213

Special use permits: (830) 775-7492 ext. 200

Bighorn Canyon National Recreation Area (BICA) is located in north-central Wyoming, and south- central Montana. The aquatic resources are typical of those in freshwater reservoir systems associated with lakes formed by man-made dam structures. The Yellowtail Dam was constructed for flood control and electrical power generation on the Big Horn and Shoshone rivers.

BICA supports a man-made resource of two reservoirs separated by the Yellowtail Dam. Currently, BICA conducts minimal cultural and resource investigations. Both Wyoming and Montana state fish and wildlife agencies have conducted fish research and population studies using surface visual counts from netting and shocking techniques.

The majority of diving in the dive program consists of maintaining anchor systems, docks, navigation buoys, and performing visitor services for lake facilities. The program could provide air fills for bottles and a support crew for diver assistance if special funding were obtained.

Some issues which BICA warrants further studies include:

- Determining locations of spawning / rearing sites for freshwater fish species below the dam
- Habitat changes and effects of flushing flows in the river below the dam
- Monitoring for aquatic invasive species
- Monitoring and or mapping of underwater dam construction conditions

Water clarity above stream from the Yellowtail Dam makes underwater visibility poor and limits the effectiveness of underwater research. Water clarity below the Yellowtail Dam is good for freshwater conditions; however, water temperatures are usually within the range of 35 – 50° F.

For possible projects at BICA please contact:

Keith Biermann, Park Dive Officer - Keith.Biermann@nps.gov (406) 666-2412

Ms. Cassity Bromley, Natural and Cultural Programs Cassity.Bromley@nps.gov (307) 548-5416

Park Offices: (406) 666-2412

Curecanti National Recreation Area (CURE) is located in Western Colorado outside the town of Gunnison. It is comprised of three man-made reservoirs including the largest in Colorado, Blue Mesa Reservoir, with 96 miles of shoreline. Blue Mesa, Morrow Point and Crystal reservoirs are collectively called the Wayne N. Aspinall Storage Unit, and were created primarily to provide water storage to the Upper Colorado River Basin states of Colorado, Wyoming, New Mexico and Utah.

Human occupation of the Curecanti area dates back at least 10,000 years. Fossils, primarily dinosaur bones, from the Jurassic Morrison formation are also found at CURE. These are a couple of resources that could make CURE a place of interest to outside researchers

Currently, CURE dive team's main purpose is public safety. Starting summer of 2012, the dive team is going to assist the Resource Management Division in completing invasive mussel surveys. The team is going to conduct underwater searches for invasive mussels.

Some issues which CURE warrants further studies include:

- Topographical underwater survey to explore/locate possible ancestral rock shelters
- Submerged survey for fossil deposits—including human habitation and primarily dinosaur bones, from the Jurassic period

It should be noted that the diving environment at Blue Mesa Reservoir can be challenging, although rewarding, even with the best conditions. High altitude conditions exist as full pool elevation is 7,519 feet. The reservoir is typically ice covered from January through April and water temperatures remain cold year round (ranging from 66° in the summer to 34° F in the winter). Visibility at Curecanti NRA is always limited, ranging from 0 – 15 foot. Generally, visibility will be in the 3-5 foot. range.

For possible projects at CURE please contact:

Melissa Post, Park Dive Officer - melissa_post@nps.gov (970) 641-2337 x246

Park Offices: (970) 641-2337

Glen Canyon National Recreation Area (GLCA) straddles the Arizona and Utah borders and surrounds Lake Powell the second largest man-made lake in the country. With over 1900 miles of shoreline and depths in excess of 500 foot Lake Powell presents many underwater opportunities.

The area around and within GLCA contains multiple ancient ruins and artifacts. Many of these sites have been inundated by the waters of Lake Powell. These sites were inventoried pre-inundation but no research or inspections have been made since. Most of the sites are mapped and can be located with a reasonable amount of effort.

The Underwater Recovery Unit (URU) at Glen Canyon maintains twelve divers and a remotely operated vehicle (rov) capable of diving to 1100'. The URU has two vessels assigned to them a 46 foot landing craft and a 28 foot. tender both equipped with cranes and other necessary equipment. The

Unit can also draw from the parks fleet any number or type of vessel needed for any particular assignment.

The unit's primary duties are maintenance of docks and marinas, and the search and recovery of drowning victims. Recent scientific efforts undertaken by the Underwater Recovery Unit (URU) include the determination of the source of the water to Montezuma's Well in Central Arizona, where divers lowered sampling devices into the crevice that feeds the well and removed samples from deep in the crevice, and the completion of the ten year study of Crater Lake National Park where the URU's ROV was used to collect samples in over 38 transects of Crater Lake from depth ranging from 100 - 800 ft. deep. Currently the URU is involved in monitoring the lake facilities for aquatic invasive species and removing waste and debris from the lake bottom in the Marina areas.

Scientific projects that could benefit the park:

- Recovery of a sandstone slab that contains dinosaur footprints left while the creature was sitting down; these tracks are on a soft sandstone slab that can be lost if the slab is mishandled
- Survey and document the effects of the reservoir on ancient structures
- Monitoring of invasive species within the reservoir

For possible projects at GLCA please contact:

Patrick Horning, Park Dive Officer - pat_horning@nps.gov (928) 608-6514

Park Offices: (928) 608-6404

Grand Teton National Park (GRTE) located in northwestern Wyoming, Grand Teton National Park protects spectacular mountain scenery and a diverse collection of wildlife.

For possible projects at GRTE please contact:

Rick Guerrieri, Park Dive Officer - rick_guerrieri@nps.gov (307) 739-3619

Park Offices: (307) 739-3300

Lake Meredith National Recreation Area (LAMR) is located in Fritch, TX which lies on the high plains of the Texas Panhandle. The lake itself was created by Sanford Dam on the Canadian River. The 50,000-acre national recreation area includes a 10,000-acre reservoir.

LAMR currently supports no research activity. LAMR dive team is established for Law Enforcement Protection.

For possible projects at LAMR please contact:

Paul Jones, Park Dive Officer - paul_jones@nps.gov (806) 865-3874 x37

Park Offices: (806) 857-3151

Channel Islands National Park (CHIS) is located in Ventura, California. CHIS includes the islands of San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara. The islands' isolation has left them relatively undeveloped. The significance of Channel Islands National Park stems from the islands' remote, isolated position at the confluence of two major ocean currents, a region of persistent oceanic upwelling, and the border of two tectonic plates. The park contains examples of two biogeographical provinces in the ocean, the Oregonian and the Californian, and a dynamic transition zone between them. Cool, nutrient-rich oceanic waters rise into abundant sunlight and mix with warm coastal waters, accelerating photosynthesis and growth rates of myriad forms of sea life from

microscopic plankton to blue whales. CHIS ecosystems encompass kelp forest, soft bottom and eel grass communities.

Facility and logistical support of research divers is based on availability and funding. With proper notification a 60 ft. dive boat and all the diving necessities may be available.

CHIS staff is actively involved in kelp forest monitoring and submerged cultural resource surveys.

For possible projects at CHIS please contact:

David Kushner, Park Dive Officer - david_kushner@nps.gov (805) 658-5773

Park Offices: (805) 658-5730

Crater Lake National Park (CRLA) is located in southern Oregon. The lake is 1,943 ft. deep at its deepest point which makes it the deepest lake in the United States, the second deepest in North America and the ninth deepest in the world.

For possible projects at CRLA please contact:

Mark Buktenica, Park Dive Officer - mark_buktenica@nps.gov (541) 594-3077

Park Offices: (541) 594-3100

Death Valley National (DEVA) is located east of the Sierra Nevada in the arid Great Basin of the United States. The only diving is a very limited access to Devil's Hole pupfish (*Cyprinodon diabolis*), the last known surviving fish species of what is thought to have been a large ecosystem that lived in Lake Manly, which dried up at the end of the last ice age leaving the present day Death Valley in California.

For possible projects please at DEVA contact:

Bailey Gaines, Park Dive Officer - bailey_gaines@nps.gov

Park Offices: (760) 786-3200

Kalaupapa National Historical Park (KALA) is located on the Island of Molokai, Hawaii. Kalaupapa cannot be reached by automobile. No roads lead to the park because of the surrounding ocean and steep cliffs. The park can be reached by air from Oahu, Maui and Ho'olehua, Moloka'i located topside. Flights to Kalaupapa Airport (LUP) can be arranged through Pacific Wings, Moloka'i Air Shuttle and Paragon Air.

Some of the natural and cultural resources in the park include rugged lava boulder habitat with coral reef communities, the highest fish biomass levels found in the Pacific parks, and submerged cultural resources such as the wreck of a 1936 freighter found in 12ft of water.

KALA dive program capabilities include an onsite air compressor with 20 tanks and enough weights to support 4 divers. KALA also have a 19ft and 22ft Boston Whaler with 3 full-time marine staff to support diving projects.

Projects being conducted in the park include monitoring of the benthic communities, fish assemblages, and water quality characteristics/nutrient studies for the cesspool upgrade, examining near-shore oceanographic characteristics, surveys in support of the harbor improvement project, and supporting outside research projects such as the UH-Hilo herbivore study.

Research projects that would benefit KALA include:

- Current studies to document the flow regime around the park

- Examining movement patterns of large, apex predators

For possible projects at KALA please contact:

Eric Brown, Park Dive Officer - eric_brown@nps.gov (808) 567-6802, x1502

Park Offices: (808) 567-6802

Lake Mead National Recreation Area (LAME) is located in southeastern Nevada and northwestern Arizona.

For possible projects at LAME please contact:

Marc Burt, Park Dive Officer - marc_burt@nps.gov (928) 767-3401

Park Offices: (702) 293-8990

National Park of American Samoa (NPSA) is located in the South Pacific Ocean about 2,298 miles southwest of Honolulu and 2,220 miles northeast of New Zealand. NPSA is really 'three parks' on three separate islands--Ta'u, Ofu, and Tutuila.

NPSA contains the greatest coral reef biodiversity in the National Park System, with over 250 coral species, 1,100 species of marine fishes and local populations of hawksbill and green sea turtles. The Samoan archipelago is a calving ground to the less studied populations of Southern Humpback and Sperm whales. Unique to Ofu Island is an atypical coral population that has developed a natural protection against temperature gradient stresses. This unique population is being investigated to help understand how coral populations may be resistant to global warming (Smith et al., 2008; Oliver and Palumbi, 2010).

The NPSA dive team's primary responsibilities involve inventory and monitoring of marine resources. The dive team maintains six vessels including one 30ft, one 25ft, two 14ft and one 10ft vessel. The staff maintains three air compressors and one Nitrox membrane compressor, thirty scuba cylinders, two DPV's and multiple sets of "loaner gear". With advance notice and NPS approval staff divers can support research projects with mixed gas and rebreather diving.

Currently staff research includes a Humphead wrasse (*Cheilinus undulatus*) tracking project and water quality sampling project. Recent outside research has been conducted on ocean acidification, coral bleaching, coral tumor monitoring, the effects of waste water run off on coral populations and marine sponge distribution.

Research projects that would benefit NPSA are:

- Ocean currents and larval transport mechanisms
- Archipelago fish population dynamics
- Life history of reef fishes

For possible projects please contact:

Jim Nimz, Park Dive Officer - jim_nimz@nps.gov (684) 633-7082 ext. 43

Sean Eagan, Cultural & Natural Resources - sean_eagan@nps.gov (684) 633-7082 Ext. 40

Tim Clark, Marine Resources - tim_clark@nps.gov (684) 633-7082 ext. 41

Olympic National Park (OLYM) is located in Washington State on the Olympic Peninsula. The park can be divided into four basic regions: the Pacific coastline, alpine areas, the west side temperate rainforest and the forests of the drier east side. The coastal portion of the park is a rugged, sandy beach along with a strip of adjacent forest. It is 73 miles long but just a few miles wide, with native communities at the mouths of two rivers. The beach has unbroken stretches of wilderness ranging from 10 to 20 miles. While some beaches are primarily sand, others are covered with heavy rock and very large boulders. The Elwha Ecosystem Restoration Project is the second largest ecosystem restoration project in the history of the National Park Service after the Everglades restoration. The primary purpose of this project is to restore anadromous stocks of Pacific Salmon and Steelhead to the Elwha River.

For possible projects at OLYM please contact:

Mark O'Neill, Park Dive Officer – mark_o'neill@nps.gov (360) 374-5460

Park Offices: (360) 565-3130

WWII Valor in the Pacific (USAR) is a United States National Monument honoring several aspects of American engagement in World War II. It encompasses 9 sites in 3 states totaling 6,310 acres (2,550 ha).

Hawaii: USS Arizona Memorial and Visitor Center, USS Utah Memorial, USS Oklahoma Memorial, Six Chief Petty Officer Bungalows on Ford Island, Mooring Quays F6, F7, and F8, which formed part of Battleship Row

Alaska: Battlefield remnants on Attu Island, Japanese occupation site on Kiska Island, Crash site of a B-24D Liberator bomber on Atka Island.

California: Tule Lake Segregation Center. Due to these sites being considered national monuments honoring deceased Americans, diving is very restricted and permitting to do any cultural and/or natural research is very limited. Permitting often requires extensive investigation and applications.

For possible projects at USAR please contact:

Scott Pawlowski, Park Dive Officer - scott_pawlowski@nps.gov (808) 423-7300 x7300

Park Offices: (808) 423-7300

War in the Pacific National Historical Park (WAPA), WAPA is comprised of multiple protected areas on the islands of Guam and Saipan. Guam is located in the western Pacific Ocean. It is one of five US territories with an established civilian government. WAPA's divers provide continual monitoring of surrounding coral reefs and fish populations.

For possible projects at WAPA please contact:

Justin Mills, Park Dive Officer – justin_s_mills@nps.gov, (671) 477-7278 x1012

Park Offices: (671) 477-7278

Biscayne National Park (BISC) is located in southern Florida, due east of Homestead. The park preserves Biscayne Bay, one of the top scuba diving areas in the United States. The park covers 172,971 acres. Ninety-five percent of which is water. In addition, the shore of the bay is the location of an extensive mangrove forest. Biscayne National Park is the largest Marine Park in the National Park System. Biscayne National Park is noted for many features, including the blue waters of the bay itself, extensive coral reefs, fish and other marine animals, many different varieties of sea birds, subtropical vegetation, and trails on the islands and the mainland. This park, only 30 miles from downtown Miami, contains the longest undeveloped shoreline on Florida's east coast. There is great

need to develop population dynamics models and conduct fishery-independent surveys for these resources.

For possible projects at BISC please contact:

Shelby Moneysmith, Park Dive Officer – Shelby_moneysmith@nps.gov (305) 230-1144 x3009
Park Offices: (305) 230-1144

Buck Island Reef National Monument (BUIS) is a small, uninhabited, 176 acre (712,000 m²) island about 1.5 miles (2.4 km) north of the northeast coast of Saint Croix, U.S. Virgin Islands. Buck Island Reef National Monument was established by Presidential proclamation in 1961, and expanded in 2001, in order to preserve "one of the finest marine gardens in the Caribbean Sea." The park is now one of only a few fully marine protected areas in the National Park System. The 176-acre island and surrounding coral reef ecosystem support a large variety of native flora and fauna, including several endangered and threatened species such as hawksbill turtles and brown pelicans. The Elkhorn coral barrier reef that surrounds two-thirds of the island has extraordinary coral formations, deep grottos, abundant reef fishes, sea fans and gorgonians.

For possible projects at BUIS please contact:

Ian Lundgren, Park Dive Officer – ian_lundgren@nps.gov (340) 773-1460 x236
Park Offices: (340) 773-1460

Dry Tortugas National Park (DRTO) Almost 70 miles west of Key West lies a cluster of seven islands, composed of coral reefs and sand, called the Dry Tortugas. Along with the surrounding shoals and waters, they make up Dry Tortugas National Park. The park is accessible only by seaplane or boat. Ferries leave from Key West. Monitoring for the coral reef fish assessment project, which includes game species, is conducted every two years in collaboration with an interagency Florida Keys reef fish assessment project. The goal of the coral monitoring and assessment project is to evaluate the ecological status of the common and rare reef coral communities in the park through annual monitoring. Dry Tortugas National Park offers unique opportunities for research and scholarship. Modern scientific research in the Tortugas dates back to the late nineteenth century. Geographic isolation and a long history of resource protection continue to provide opportunities to study tropical marine ecosystems in the park.

For possible projects at DRTO please contact:

Clay Douglas, Park Dive Officer – clay_douglas@nps.gov (303) 215-4767
Park Offices: (305) 242-7700

Everglades National Park (EVER) was first created to protect a fragile ecosystem. The Everglades are a network of wetlands and forests fed by a river flowing .25 miles per day out of Lake Okeechobee, southwest into Florida Bay. Everglades National Park is home to 36 threatened or protected species including the Florida panther, the American crocodile, and the West Indian manatee and 300 species of fresh and saltwater fish. Freshwater sloughs are perhaps the most common ecosystem associated with Everglades National Park. These drainage channels are characterized by low-lying areas covered in fresh water, flowing at an almost imperceptible rate of 100 feet per day. The largest body of water within the park is Florida Bay, which extends from the mangrove swamps of the mainland's southern tip to the Florida Keys. Over 800 square miles of marine ecosystem lies in the park range. Coral, sponges, and seagrasses serve as shelter and food for crustaceans and mollusks, which in turn are the primary food source for larger marine animals. Sharks, stingrays, and barracudas also live in this ecosystem, as do larger species of fish that attract sport fishing.

For possible projects at EVER please contact:

Clay Douglas, Park Dive Officer – clay_douglas@nps.gov (303) 215-4767

Park Offices: (305) 242-7700

Gulf Islands National Seashore (GUIS) is a wild 150-mile stretch of barrier islands and coastal mainland in Mississippi and Florida. The warm waters of the Gulf of Mexico nourish 11 separate units that include bayou, salt marsh, live oak and southern magnolia forest, and snow-white beaches.

For possible projects at GUIS please contact:

Matthew Johnson, Park Dive Officer – matthew_w_johnson@nps.gov (228) 230-4139

Park Offices: (850) 934-2600

Virgin Islands National Park (VIIS) comprises about 58% (14 square miles) of St. John Island, with 5050 acres to adjacent marine parks. St. John is one of the U.S. Virgin Islands located 990 miles SSW of Miami in the Lesser Antilles, Caribbean Sea. It is an unincorporated territory of the United States. Natural/cultural resources which would interest outside aquatic researchers include coral reefs, seagrass, algal plain and mangrove habitat, coral reef fishes, invasive lionfish, historical shipwrecks, near shore and nearly submerged burials of enslaved people, as well as protection of Acroporid (Elkhorn and staghorn) corals (ESA Threatened species).

VIIS is a small and taxed program with myriad duties. Minimal vessel support and minor logistical support may be possible with sufficient lead time.

Recently outside researchers have been studying benthic habitat and characterization, comparative study of fisheries between territorial and park protected waters, ongoing monitoring of Elkhorn coral populations, reef damage mitigation efforts, long term coral reef monitoring, effects and control of invasive lionfish populations, protection and preservation of historical shipwrecks and protection of near shore and nearly submerged burials of enslaved people.

Some issues which VIIS warrants further studies include;

- Determine the impacts of local stressors: anchor damage, runoff from development of park “inholdings”, contaminants from upland watersheds, and release of sewage may increase the vulnerability of corals to bleaching and disease
- Determine effects of contaminants and poor water quality on park resources
- Determine the status of threatened coral species and use the NOAA *Acropora* Recovery Plan as a guide for further actions to help promote recovery of these species
- Determine links/connections among the NPS units in the Virgin Islands, and their links to upstream and downstream Marine Protected Areas
- Investigation of Hurricane Hole mangrove ecosystems: determine if the high coral and sponge diversity in H. Hole is unique in the Caribbean and therefore greater protection is warranted
- Support research on corals (particularly framework-building reef corals) that survived the massive bleaching in 2005 and subsequent disease outbreak (determine genotypes and genotypic diversity on park reefs)
- Further investigate lionfish control measures and impacts

For possible projects at VIIS please contact:

Thomas Kelley, Park Dive Officer – Thomas_kelley@nps.gov (340) 693-8950 ext 225..
Rafe Boulon Chief RM (340) 693-8950 ext 224,
Jeff Miller, Fisheries Biologist (340) 693-8950 ext 227,
Ken Wild, Cultural RM/Archeologist (340) 693-8950 ext 223,
Park Offices: (340) 776 6201

Delaware Water Gap National Recreation (DEWA) is an area preserves almost 70,000 acres (28,000 ha) of land along the Delaware River's New Jersey and Pennsylvania shores, stretching from the Delaware Water Gap northward almost to the New York state line. Middle Delaware National Scenic River is a designated 40-mile section of the river entirely within the recreation area.

For possible projects at DEWA please contact:
Mike Croll, Park Dive Officer – michael_croll@nps.gov (570) 426-2470
Park Offices: (570) 588-2435

Saint Croix National Scenic Riverway is a federally protected system of river ways located in eastern Minnesota and northwestern Wisconsin. It protects 252 miles of river, including the St. Croix River (on the Wisconsin/Minnesota border), and the Namekagon River (in Wisconsin), as well as adjacent land along the rivers.

For possible projects please contact:
Byron Karns, Park Dive Officer – byron_karns@nps.gov (715) 483-2281
Park Offices: (715) 483-3284

Isle Royale National Park (ISRO) is located In Lake Superior about 20 miles west of the NE tip of Minnesota, headquartered out of Houghton, MI. ISRO consists of the main Island, about 450 surrounding islands, and Lake Superior waters and bottom lands extending 4.5 miles out from the park land areas. The Lake Superior waters and bottom lands total about 438,000 acres, ranging from the shoreline to several hundred feet deep. The main Island is about 45 miles long by 9 miles wide at the widest point, and includes several inland lakes which have been cut off from Lake Superior waters for about 5000 years.

Natural/cultural resources consist of shipwrecks, the possible remnants of past use by Native Americans, underwater sites associated with historical, cultural, and archaeological land sites. Fresh water mussels at Isle Royale occur at densities not seen since pre-settlement. Inland lakes include endemic species that have been isolated for about 5000 years. Isle Royale has aquatic invasive species concerns.

Logistical capabilities of the park include boats, air/NITROX compressor, support staff, and logistical support might be made available based on availability and whether the research meets park needs and priorities. The compressor on-island is capable of mixing nitrox.

Most of the scientific diving being done in the park on a regular basis consists of assessment and monitoring of shipwrecks representing 70 years of Lake Superior maritime history. In 1999 the NPS partnered with USGS to survey our inland lakes for freshwater mussels. (USGS divers were amazed at the density of freshwater mussels, and also found sponges larger than previously encountered). Currently the park is working with Great Lakes Shipwreck Preservation Society on a study to assess the bottom of a bay for remnants of Native American occupation and use.

ISRO has an interest in the gathering of research data pertaining to:

- Baseline for studies of atmospheric deposition
- Biogeochemical controls on mercury cycling
- Studies of food web theory
- Study of climate change impacts on biogeochemistry

For possible projects at ISRO please contact:

Steve Martin, Park Dive Officer - steve_a_martin@nps.gov (906) 487-7175

Natural Resources Chief, Paul Brown - paul_brown@nps.gov. (906) 487-7154

Cultural Resources Program Manager, Seth DePasqual - seth_c_depasqual@nps.gov (906) 487-7146

Sleeping Bear Dunes National Lakeshore (SLBE) is located in northern lower Michigan, near Traverse City, MI. The park encompasses 10 inland lakes, two rivers and has over 30 miles of Lake Michigan Shoreline in addition to the two Manitou Islands.

SLBE works in collaboration with University of Wisconsin-Milwaukee/NPS directed research on aquatic invasive species such as zebra mussel and round gobies, proliferation of *Cladophora* algae, as well as monitoring the underwater scientific equipment.

Facilities are available for housing and support of diving operations in the park. With advanced notice SLBE has a large 42ft landing vessel that is an excellent support craft during the research dives and the shipwreck dives in Lake Michigan.

Diving activities are normally accomplished between the months of May and November.

For possible projects at SLBE please contact:

Chris Johnson, Park Dive Officer - chris_b_johnson@nps.gov (231) 334-3756

Mike Duwe, Chief of Natural Resources - Michael_duwe@nps.gov (231) 236-5135

Laura Quackenbush, Cultural Resources - Laura_Quackenbush@nps.gov (231) 236-5134

Submerged Resources Center (SRC) Working with park staff and other agencies, the SRC's mission is to inventory and evaluate submerged resources throughout the national park system. Projects the SRC has been involved in include work on USS Arizona, the shipwrecks of Isle Royale National Park, mapping the shipwrecks of Dry Tortugas National Park, and many others.

For possible projects please contact:

Brett Seymour, SRC Dive Officer – brett_seymour@nps.gov (303) 969-2993

Discussion

With an increasing awareness of climate change and public concern of submerged cultural resource, the National Park Service dive program has been increasing in budget and commitment to assist outside researchers. The National Park Service encourages scientific resource investigation into our countries protected resources. Many of these resources have been protected from human encroachment and facilitate a near baseline experimental platform from which changing environments can be evaluated. The natural and cultural resources belong to the people of the United States and should be used for the benefit of our citizens. The knowledge achieved through resource investigation

can benefit our entire US population. We at the National Park Service encourage researchers to contact their local parks or parks of interest and pursue research to improve the knowledge and facilitate the conservation of resources for future generations.

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