

Conserving the Underwater World through Citizen Science and Reporting

The Evolution of Project Baseline

Todd Kincaid, Ph.D.

Vice President – Global Underwater Explorers

Director – Project Baseline

Environmental Decline & Elusive Baselines

Environmental problems are inevitably personal whereby individuals or groups of individuals subjectively internalize a given level of environmental quality. The decline of the underwater world is no different. My personal and visceral confrontation with underwater degradation occurred in the Florida springs. I am a Floridian, born and bred, and from my perspective, to be a Floridian is to be a lover of water. Some of my earliest memories are of springs and lakes and beaches distributed throughout the state. I began scuba diving in the Florida Springs at 11 and by 18 I had become an avid cave diver. I studied geology in college and while my classmates lamented their inability to see the rocks due to Florida's flat terrain, I saw miles of it every week underneath most every river and a great number of farms from Tampa to Marianna, the whole of the northern half of the peninsula and most of the panhandle.

When I left Florida in 1994 to pursue my study of groundwater and caves, my memories were filled with images of the white Ocala limestone and cream colored Suwannee limestone comprising the walls of caves, some as large as the largest indoor arenas, and lining the spring basins to which they connected. In the daylight, the spring basins appeared cobalt blue because of the light refraction off of the clean white walls through air-clear water. The spring runs and rivers were lined with tall leafy eel grass leaving only narrow passages to swim through on the way to and from the caves. And the grasses, they were filled with all manner of fish and snails, and of course some alligators and snakes to make things interesting. These were the places where I had logged hundreds, maybe thousands of hours over the past several years passing the time on long decompressions after exploring and mapping caves.

I returned to Florida in 2001, just seven years after I left, to springs and rivers that were literally devoid of the images from my memories. In nearly every spring basin I returned to, the limestone was covered with black or green algae leaving the water green and putrid instead of cobalt blue and clean. The grasses were either completely gone or covered with algae themselves. Many of the spring runs were either choked with pillars of algae, dense mats of invasive weeds, or completely barren due to chemical or physical stripping performed in reaction to the overgrowth. My shock peaked on one particular day as I floated in the basin of my favorite spring and my then new wife struggled through the pillars of black and green algae wondering how I could have spoken so highly of this cesspool. All the while, I listened to

a couple standing on a boardwalk overlook above my head made for the newly created State Park remarking about the beauty of the emerald green water.

It struck me at that moment that in the absence of historical perspective, “environmental quality” is left open to naive impressions that effectively strip the political will from efforts aimed at restoration. Unfortunately, the accuracy or relativity of such impressions somehow becomes beside the point for most people. Yet, in a world of shifting environmental baselines it becomes impossible to determine an objective level of environmental quality and negative even the best conceived efforts at environmental protection. Others have described the process as *Environmental Generational Amnesia*.

Global Underwater Explorers

In the 1980s and 1990s, cave diving and deep diving were regarded more as an affliction than a sport. In those days, the few people that gravitated to those endeavors naturally came to know one another and dive together in small teams who often became lifelong friends. My story is no different. Early in my career I was lucky to find a like-minded friend and dive partner in Jarrod Jablonski. Jarrod and I met in the University of Florida Academic Diving Program where we both became instructors and taught all levels of scuba diving to sustain ourselves in college and more importantly to fuel our addiction to cave diving. We were dive buddies, friends, and roommates for several years and when we weren't diving we were generally dreaming or scheming about diving. What evolved from those dreams was a loosely defined idea to one day start an organization focused on exploring the great underwater places of the world, caves, walls, wrecks, and reefs. We envisioned an organization populated by the most capable and ambitious divers teamed together to reach places thought impossible by the divers of the day. We also envisioned an organization that would contribute the knowledge gained through exploration to science and conservation with the goal of protecting the environments we would explore.

As is common in life and lives, we gravitated in different directions. My love for springs and caves and my studies in geology evolved into an obsession with understanding the patterns of water flow from rock to cave to spring. Jarrod's love for diving and insatiable quest for perfecting our diving system evolved into a passion for improving diver training particularly as pertained to the challenges of extreme environments. Despite our own evolutions, we never lost sight of our vision for a diving organization dedicated to exploration and conservation.

We founded the non-profit organization *Global Underwater Explorers (GUE)* in 1999 with an added component to the mission, team-based diver training. It was through the training component of our mission that we have been able to establish and sustain lasting partnerships with groups of like-minded, equally capable, and identically trained and equipped teams of explorers across the world. Through those partnerships, our teams have explored all manners of environments from underwater caves to ship wrecks, from high mountain lakes to reefs and vertical walls across the globe. We've trained north of 10,000 divers over the past 15 years and though I'm admittedly bias, I firmly believe that they comprise some of the best trained, most capable, safest, and most dedicated divers on the planet.

We've repeatedly drawn on our global network of divers to create teams for numerous exploration efforts in all manners of environments who have effectively worked together despite not having dived together and often working against potentially debilitating language barriers to accomplish unbelievably challenging underwater missions. In 2009, Jarrod and I developed an idea that leverages those teams and their capabilities to combat the baselines problem we saw in Florida's springs:

- build a platform to permanently record diver observations through image media and numeric data;
- encourage our divers to direct some of their endless energies toward perpetually populating that platform;
- then use their images and data to foster environmental baselines in every type of underwater environment across the globe.

Project Baseline's Mission

Project Baseline is an endeavor to connect people with the alarming changes that are occurring in our underwater world, from mountain lakes to ocean reefs and all waters in between. Project Baseline aims to provide the people who can see these places and these changes with an effective voice to promote and support much needed and forever sustained conservation. At its heart, Project Baseline is a great experiment that tests the significance and role of the common but passionate citizen in the growing global struggle to protect the vast and vulnerable life beneath the waves. We believe this role is to observe and to give voice to this life that is mostly otherwise invisible and mute. We believe that the significance of this role is literally immeasurable.

Project Baseline works by organizing and mobilizing a global network of highly skilled and passionate divers to create a lasting visual legacy of underwater environmental conditions one photo and one video at a time. Their images, descriptions, and data are moved into an online database designed to render their observations accessible to the world. Their images create a baseline for environmental quality. When stitched together, those images create a time lapse revealing how that quality is changing. When we couple our divers with scientists and resource managers struggling to understand and protect the ecosystems where we dive, the worth of our effort becomes greater than the sum of its parts. And, when compiled into mini-documentaries, our observations and collaborations become compelling stories that will inspire the far greater numbers of people that do not dive and cannot see the change to demand effective and lasting environmental conservation.

The Project Baseline Process

The process is straight-forward. Divers join Project Baseline and become *Project Managers* by selecting at least one location that they commit to monitoring on a regular basis: yearly, monthly, weekly, the more the better but a specific periodicity is not mandated. They are encouraged to establish one or more specific stations to document and then to photograph those stations from a consistent point of view on every visit and, where possible, also collect basic data describing the environment. For starters, we suggest temperature, visibility (water clarity), and depth primarily because these measurements are commonly accessible to all divers. For all observations, our goal is to condition our teams to collect data in a consistent and reproducible manner thereby increasing the value of their observations and making them effective as potential partners in scientific collaborations. A quality control rank is provided for all data entered in the database and is a function of the instrumentation used for collection and the training and experience of the divers collecting the data.

After their dives, we ask our Project Managers to submit their images, data, and short narrative condition reports via email to our database manager who checks the submissions for consistency and uploads everything to the Project Baseline database. On the back end, our Program Director and Program Manager work to identify and promote collaborative relationships between our Project

Baseline teams and other entities working to understand and/or protect the same water bodies and the ecosystems they support. They also work with internal and contracted media specialists to compile their images, narratives, objectives, and where applicable collaborative efforts into short documentary videos that are used to more effectively disseminate the team's work to the broader public and to promote financial support for the individual teams.

As of July 2015, we have 60 active projects spanning 28 countries. In most cases, what began as the interest and effort of a single person or very small group has grown into small communities of similarly skilled and passionate divers that work together on a regular basis to document their sites and stations. Our teams therefore establish what we like to call a *Permanent Positive Presence* focused on specific water bodies and the specific challenges that confront them. In several cases, we've seen their persistent efforts expand into productive relationships with other entities: universities, conservation organizations, and even local businesses, that have an interest in understanding and protecting the water bodies in which our teams are working. We have seen and believe that the products and media stemming from these relationships inspire the needed changes to the social and regulatory constructs that ultimately determine the fate of the water bodies and the ecosystems that depend on them.

Proof of Concept

A case in point is the project that inspired the creation of Project Baseline. The location is Wakulla Springs in north Florida, USA approximately 16 miles (26 km) south of the State capital Tallahassee. Wakulla is listed as the 3rd largest spring in Florida discharging 250 million gallons per day (2,600 m³/day) and is the head water for the Wakulla River that flows south into the Gulf of Mexico. It is commonly considered the Crown Jewel of the Florida State Park system and attracts around 200,000 people per year who come to see the spectacularly diverse ecosystem supported by the spring and river and ride in glass bottom boats to view the spring vent that spans more than 250 feet (75 m) in breadth and descends 125 feet (38 m) below the water surface through water that was typically crystal clear for approximately half of every year.

In the 15 years between 1980 and 1995, the spring basin became progressively overgrown by algae and the invasive species hydrilla. By 2002, scientists working for the water resource management entities linked the explosion of algae to a persistent rise in nitrate levels derived from human wastewater disposal. Those scientists also identified the Tallahassee as the largest single source of nitrate in the Wakulla Springs contributing zone. Other science however indicated that groundwater velocities were too slow to render the City's wastewater disposal site a probable source of the nitrate despite the correlation between the timing of the site development and the start of the problems at Wakulla. Alternative scientific experiments were proposed to more accurately characterize groundwater flow velocities and pathways in the region but funding for those studies was not forthcoming. Ultimately, both the City and the State were sued by parties working to protect and restore the environmental quality in the spring and river but due to the conflicting science of the day, the case had reached a stalemate. Meanwhile, the spring continued to degrade.

At about the same time as some scientists were linking the nitrate to human wastewater and questioning the previous assertions of very slow groundwater flow, a few divers with one of GUE's foundational projects, the Woodville Karst Plain Project, began to offer and deliver regular public presentations. The focus of those presentations was simply to describe what they saw and knew about

the spring from their perspective looking out and up from beneath the water surface. The project's mission was to explore and map the underwater caves that emanated away from the springs and sinkholes in the region surrounding Wakulla Spring. Their observations consisted of the maps they made of the caves and video footage that they collected underwater from the caves, springs, and sinkholes.

Within a few short years, their audiences grew both in number and diversity. The scientists working to understand and identify the sources of water and nitrate to Wakulla Spring realized that the diver's maps and videos supported a new and evolving theory of those sources that was predicated on substantially faster groundwater flow. The public became engaged and lobbied the government to support and fund the new science needed to accurately define groundwater velocities and definitely determine if the City was the source or a substantial source of the problem.

By 2005 that science was funded and by 2006 it indeed proved that groundwater was more than 1000 times faster than had been previously thought and that the City's wastewater disposal site was certainly a major source of the nitrate killing Wakulla Spring. In that same year, the lawsuit was settled with the City agreeing to spend 250 million dollars to upgrade the wastewater treatment and disposal system specifically targeting substantially higher nitrate removal. Today, the City releases less than 25% of the nitrate that it did between 1980 and 2006.

The Wakulla story is a Project Baseline success story. Divers from a broad spectrum of backgrounds, but very few of them scientists and none of them politically connected, were the key players in the story. It was their work, their maps, their videos, and their stories, that inspired the public to support and demand the science that ultimately decided the issue. If not for them, the science would never have been done and the situation would very likely have remained unchanged or progressively worsened. It didn't because they got involved. They shared what they knew and they changed the widely held perceptions of the world surrounding Wakulla Springs, north Florida, USA.

Fast forward to 2015. We now have 60 Project Baseline teams working at 470 Sites in 28 different countries. Few involve caves or even springs but the effort and the process are the same for them as for the divers in the Woodville Karst Plain Project that decided to get involved. The results will be the same as well. The divers will come to know their environment at a deeper level than before. They will get engaged with their communities and the people working to better understand and protect their water bodies. They will become effective vehicles for productive and lasting conservation.

Baseline Explorer

In 2014, Project Baseline added a new and powerful dimension to its mission. Through sponsorship from major donors, our partner and fellow GUE Board member Robert Carmichael started a company, *Brownies Global Logistics* that acquired a capable research vessel, the *Baseline Explorer* and two observation submersibles, *Nemo* and *Nomad*. Robert's goal, which became the Brownies Global Logistics mission was and is to dramatically advance Project Baseline. Specifically, the goal is to take Project Baseline to critical places not accessible by our shore-based teams and to leverage the combination of the ship, subs, and divers to establish and sustain productive collaborations with scientific institutions that will foster improved understanding of our underwater world and the much needed conservation of its fragile ecosystems.

The ship carries a dedicated crew to operate the vessel and the submersibles and to organize, lead, and support the dive teams. On every mission, the crew will be augmented by volunteers from GUE's global community of highly skilled divers. The goals are to team free swimming divers with scientists and regional experts in the submersibles to explore, document and establish baselines for marine environments between the surface and 400 feet (120 m) and where needed to extend that mission to 1000 feet (300 m) with the submersibles working alone.

As of July 2015, the Baseline Explorer team has conducted ten missions with five scientific institutions in five countries focused on exploring, documenting, and establishing baselines for threatened but poorly documented shallow and meso-photic coral communities. Our work has supported efforts to cease the discharge of inadequately treated wastewater effluent into the nearshore waters off the coast of Florida; document freshwater resources contained by caves in the Bahamas; establish and strengthen marine protected areas designated for meso-photic *Oculina* coral reefs in Florida; establish marine protected areas designated for black corals in the Azores; and establish marine protected areas designated for red corals in the Algarve Portugal. Its ongoing mission will focus on documenting and establishing protections for shallow and meso-photic coral reefs offshore of Florida, the Bahamas, in the Gulf of Mexico, and in the Northern Caribbean Sea. Future goals focus on replicating the Baseline Explorer platform and mission in every ocean and making Project Baseline a significant contributor to the global efforts aimed at marine conservation.

Call to Action

The underwater world is imperiled. It is degrading in very many places yet the causes of that degradation and the consequences to the associated ecosystems go largely or even entirely unseen. In most of those places there exists no baseline for what is pristine or even what is tolerable. Until such baselines can be established there can be little hope that effective local and focused conservation measures can be enacted. Beyond those imperiled areas, there remain however astoundingly beautiful and thriving ecosystems in our marine and freshwater bodies that are also largely or entirely unseen at least at the level needed to establish baselines. Project Baseline, our global community of highly skilled and passionate volunteer divers, our research vessel and submersibles, and the collaborations we foster endeavor to rectify this problem.

Project Baseline's mission is therefore ambitious yet stunningly simple: to effect positive change within the world's aquatic environments measurable in terms of improvement within our lifetimes and to establish the permanent positive presence across the globe that will be needed to sustain those improvements. To achieve our mission, we need your help. If you're a GUE diver or a competent, active, and passionate non-GUE diver, become a Project Manager or join an existing team and start working to establish baselines for your favorite diving locations. We will need an increasing number of volunteer GUE divers at all levels of training to fill the roles needed aboard Baseline Explorer and its future sister ships. If you're a scientist or water resource manager, seek a collaboration with Project Baseline. If you care about protecting the underwater world, join us as a member of Project Baseline and lend your voice to our cause.