



PROJECT BASELINE





www.globalsubdive.com

Robert M. Carmichael
Founder/CEO
Brownie's Global Sub Dive

Founding Board Member



Submersible Exploration
Team Leader/Pilot



Conserving the Underwater World Through Citizen Science and Reporting

Documenting Change

1957



1980s



credit: monroe county public library

Shifting Baselines – Does it



Query Result Fields

Select Country
Costa Rica

Select Project
Playa Herradura

Select Site
Playa Herradura

Select Station
Yellow Coral

Site Manager: Chris Karrer
Date of most recent dive: 2014-12-06 00:00:00
Number of Stations in selected Site: 1
Number of Dives logged at selected Site: 7

Station Description:
Pesebre is a partly submerged volcanic rock formation about 400 meters/yards from shore, just outside of the Bay of Playa Herradura in Costa Rica. The strong currents from the 7-10 ft tidal movement creates a interesting dive site trough its abundance in marine life living on and around this L-shaped rock formation. This site had a very rare yellow coral i monitored for several years , documenting how it grew, till in May 2014 i discovered that she died fur unknown reasons.

Temperature Plot Data

Image Detail

Yellow Coral - Playa Herradura 2014-01-19 00:00:00

© Chris „Chrigel“ Karrer 2014.01.19

Credit: Chris Karre

Site Images

Oldest Image: 2010-12-03 00:00:00 Newest Image: 2014-12-06 00:00:00

A horizontal gallery of five small images showing the progression of the yellow coral colony over time. The images show the coral growing and then declining in health and size.

All of us depend on the ocean and the resources it provides

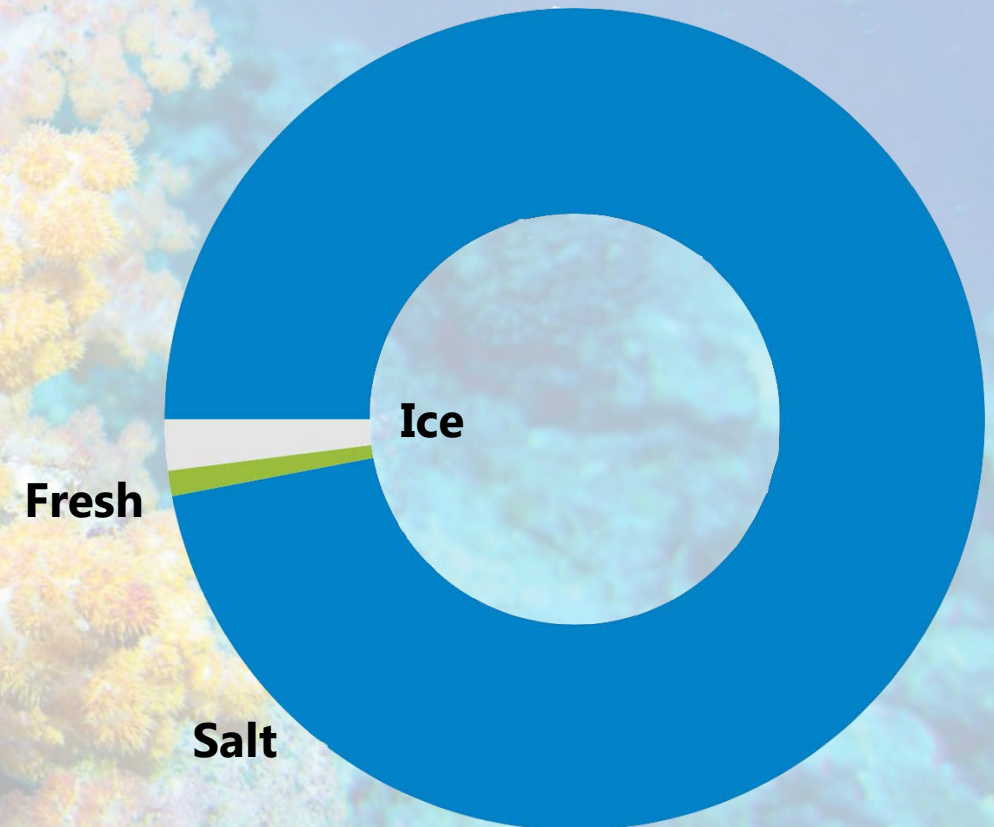
for:

- Climate regulation
 - Food
 - Economy
 - Transportation
 - Medicine
 - Recreation
 - Natural shoreline protection against storms and floods
- Fresh water is found in glaciers, lakes, reservoirs, ponds, rivers, streams, wetlands and even groundwater.

Freshwater provides:

- drinking water
- sustains crops through irrigation
- provides food in the form of fish
- provides hydroelectricity
- method of transportation of commodities

Earth's Water Supply



Freshwater in Peril



Freshwater is being severely damaged by human activities and are declining at a much faster rate than terrestrial ecosystems.

Marine Environments in Peril

The effects of coastal degradation and a loss of these services are felt inland and often a long way from the coast.

The major drivers of change, degradation, or loss of marine and coastal ecosystems and services are mainly anthropogenic.



“The human species, while buffered against environmental changes by culture and technology, is ultimately fully dependent on the flow of ecosystem services.”

What if?

- We had captured divers' memories?
- We had established baselines when conditions were pristine?
- Resource managers shared divers' perspective?
- Divers regularly shared what they see with the public?
- Divers worked with scientists and resource managers to extend their reach and capabilities?
- Effectively engaged the other 99% of the population?

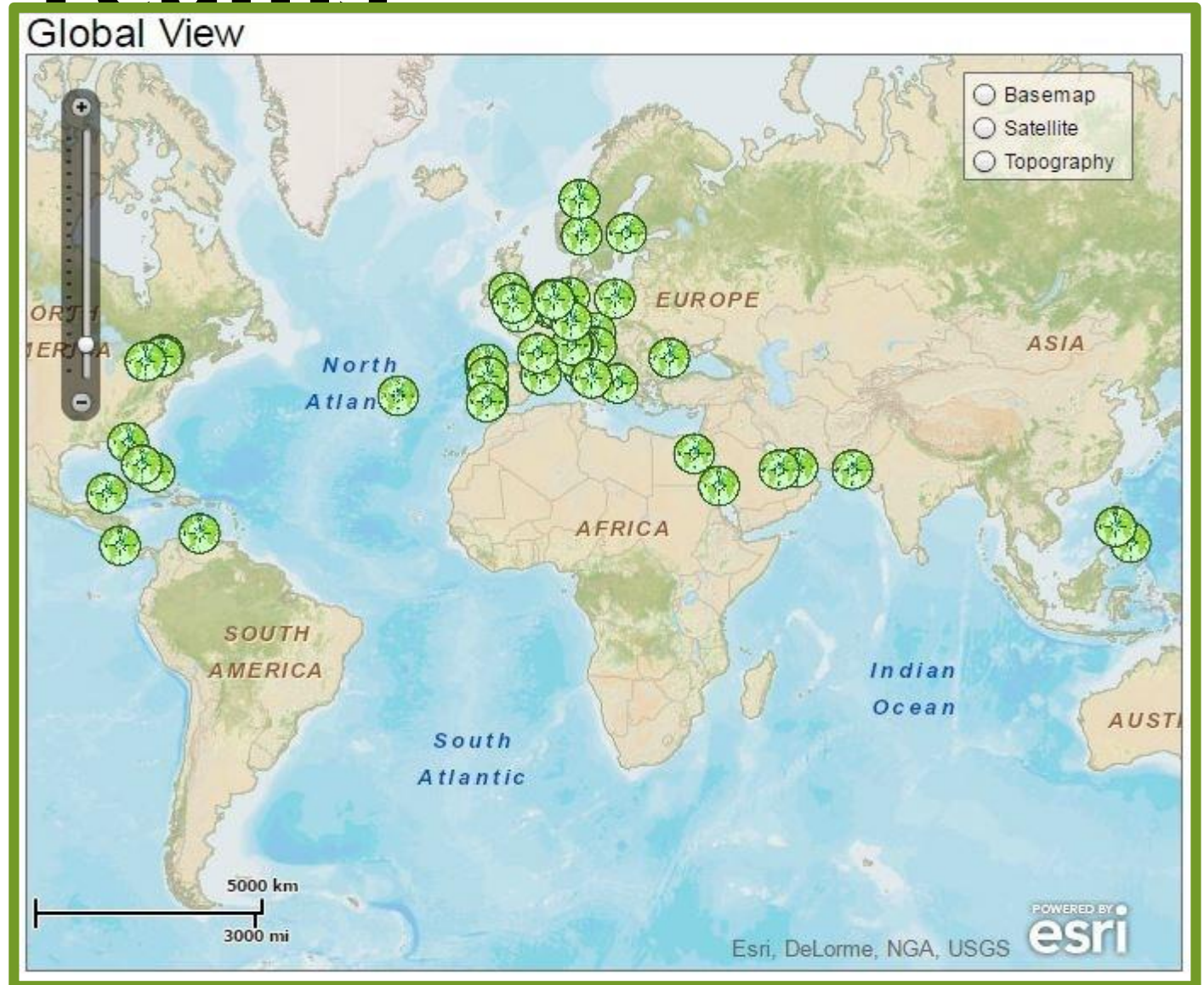
Project Baseline, founded by Global Underwater Explorers in 2009, empowers a global network of scuba divers and water lovers alike to create a lasting visual legacy of conditions in oceans, lakes, rivers, springs, and caves all over the world.



Project Baseline Volunteer Teams

- 95+ Projects
- In 35+ countries
- Just under half document **freshwater** environments while just over half document **marine** environments

<http://projectbaseline.org/database/>



Project Baseline Volunteer Teams

~275 Strong and
Growing

Collecting data:

- Images / Video
- Water Temperature
- Water Depth
- Visibility Estimates
- Flora and Fauna Counts
- Human Impacts

Teams are **expanding** Station
documentation and outreach:

- 3D imagery
- Photomosaic
- HD video site characterizations and transects
- Personal story telling supported by data/imagery to engage the other 99%.

Informing scientific research through collaborations and first-hand observations

Many of PB teams collecting data for entities external to Project Baseline

- Includes: academic, scientific, government and other non-profit entities
- Most teams approach entities to offer their volunteer services
- In a small number of cases, teams were approached by entities to gather data



Pictures and Video

compelling...and they inspire everyone to get involved.

Grecian Rocks Star Coral 1988-2007

Images: Eugene Shinn / USGS
coastal.er.usgs.gov/african_dust/gallery.html

Stations

- Established by volunteers based on real or perceived environmental issue
- Established by volunteers visiting a location for the first time ever leading to initial and sometimes only baseline documentation
- Established at the request of scientific or environmental research entities to address their own research





Example of one motivated diver:

Motivation

- Wants to make sure his lake stays "super"

Initiation

- Established 5 Stations at points of interest in lake

Follow Through

- Teamed with SETL Project, Ghostfishing.org, local schools/businesses, journalist, professional underwater photographer
- Organizes beach and underwater clean up days (+40 volunteers)

Impact

- Won local business support
- Increased regional public awareness about lake/underwater world through radio, web and print media
- Bridged gap between sport fisherman and divers
- Records and organizes meticulous biological records

Team

- Regular dive team: 10 divers
- Expanded project dive team: +20 divers
- <http://www.nationalgeographic.nl/galerij/schoonmaakduik-in-haarlemmermeerse-bos/te-water>

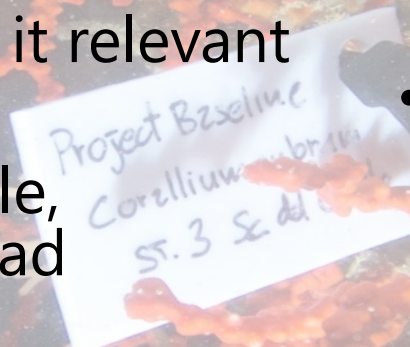


Axel Gunderson
Site Manager
Haarlemmermeerse bos/NL

Telling A Team's Story...

In a way that...

- Motivates people to pay attention
- Inspires people to action
- Brings data to life and make it relevant to people's daily lives
- Make information memorable, repeatable, and easy to spread
- Shapes new beliefs and change minds
- Gathers and unites an authentic community
- Provides purpose to otherwise mundane exercise's in daily lives



- Increased Public awareness
- Advance research

PROJECT BASELINE



- Exploration Documentation
- Get researchers, media and public officials underwater



Brownie's Global Logistics
www.globalsubdive.com

Ship & Submersibles

Highly capable,
mission oriented
volunteer divers:
Project Baseline and
GUE community





**Our twin Triton 1000/2 (305 meter) submersibles
“NEMO” and “NOMAD” near the Osborne Tire Reef last
year.**

A blue-tinted underwater photograph showing a submersible with a circular hatch open. Two people are inside; one is sitting and holding a tablet, while the other is lying down. Outside the hatch, a diver in a full diving suit is visible, and various pieces of equipment and cables are scattered around the submersible.

The Ship and Subs Naturally Attract Attention:

- A powerful dimension to Project Baseline's mission.
- Sponsorship and Charter clients from a range of interest/industries support the ship and two observation submersibles.

Ship/Sub Goals

- Take Project Baseline to critical places not accessible by our shore-based teams
- Leverage the combination of the ship, submersibles, and divers to establish and sustain productive collaborations with scientific institutions to gain large scale exposure to the general public via the emerging media interest.
- Leading to improved understanding of our underwater world and the much needed conservation of its fragile ecosystems.

Accomplishments-2016

Four missions with over ten other organizations or universities in 2016 and 2017.

- focused on exploring, documenting, and establishing baselines for threatened but poorly documented environments.

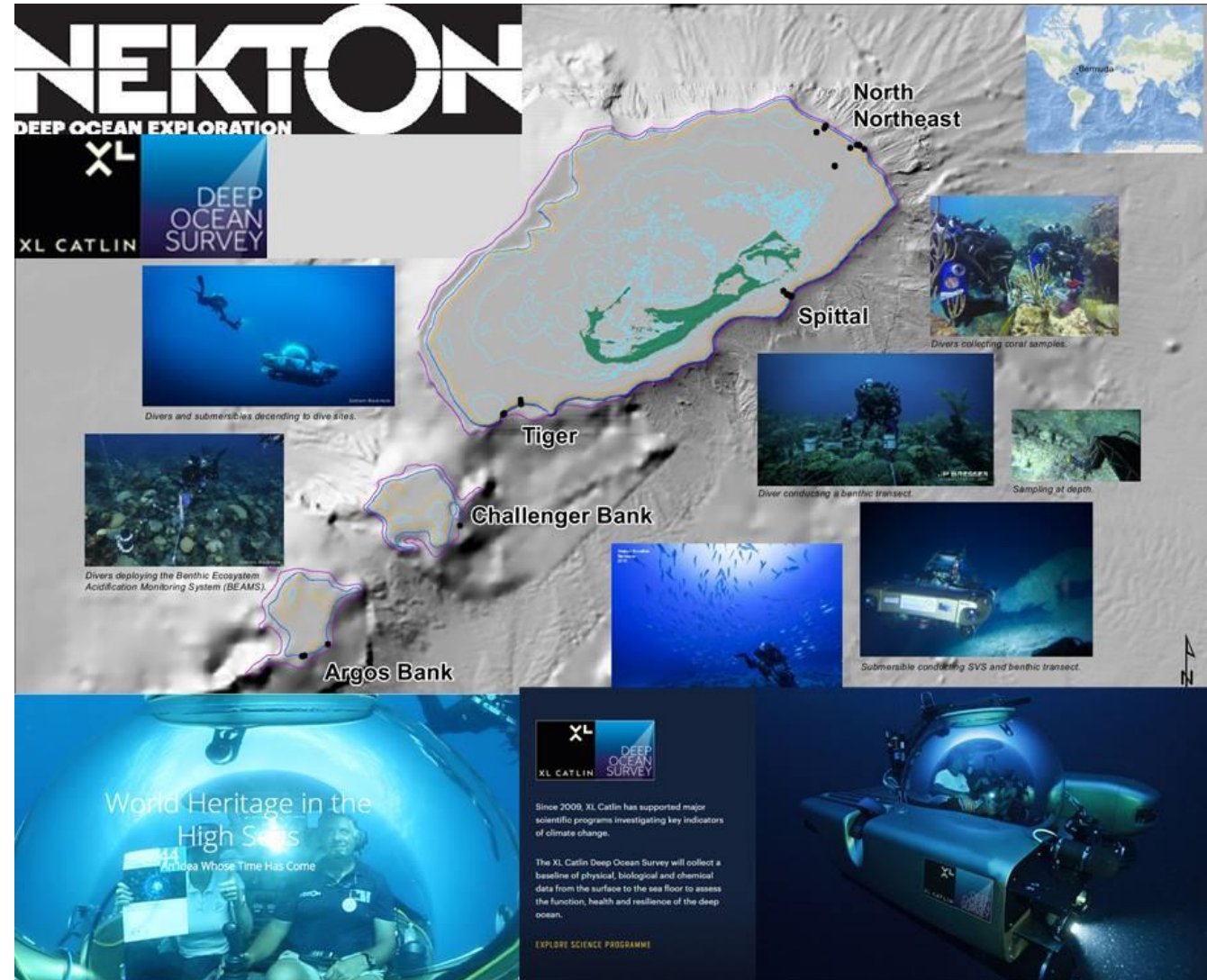


- Teamed up with Miami Waterkeepers for a two-day event to increase understanding and awareness of coral reef conditions near Port Everglades in advance of dredging to expand the port.

- Scuba and submersible divers collected valuable baseline data from sections of the Florida Reef Tract surrounding the Port Everglades shipping channel, freshwater resources contained by caves in the Bahamas. Special guest appearance by renowned explorer and environmental advocate, Philippe Cousteau brought international attention to the project and the problem.

Accomplishments-2016

- Teamed with scientists from several universities including Oxford & Stanford to execute the first mission of the XL Catlin Deep Ocean Survey.
 - Explored & documented 5 sites at depths between 15 and 300 meters: submersibles at 300, 200 & 150 m and volunteer divers at 90, 60, 30, and 15 m. Identified ~300 new species of coral, sponge, and algae. Carried journalists and UNESCO representatives to depth to announce the world's 1st High Seas World Heritage Site – the Sargasso sea.



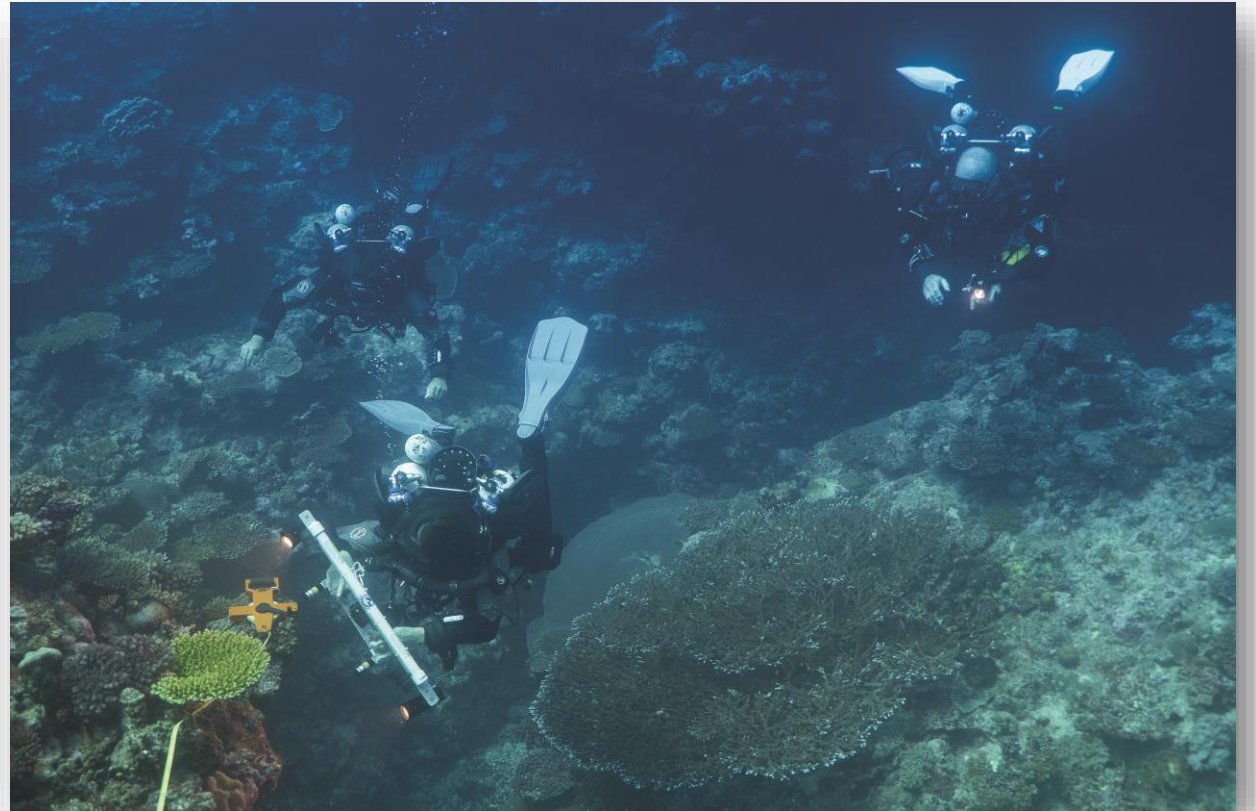
Accomplishments-2016



- Teamed with scientists from National Marine Sanctuaries, Bureau of Ocean Energy Management and Office of Ocean Exploration & Research to conduct laser and photogrammetry surveys of wrecks that sank in battle off of North Carolina in WWII and had not been seen since.
- The work completed here will advance NOAA's goal of expanding the Sanctuary and foster ongoing Project Baseline collaborations.

Accomplishments-2017

- In 2017 we teamed with GUE NZ for a ten day mission on board the m/y Ad-Vantage in Fiji to document coral reef conditions around the island. Worked with Scientists from the University of the South Pacific and Nova Southeastern University.
 - The work once completed will be used to monitor changes in the environment in the area, add to the ocean health index, and be used as a PhD student's project.



OTIWATO

40+ years of this



Attacking this

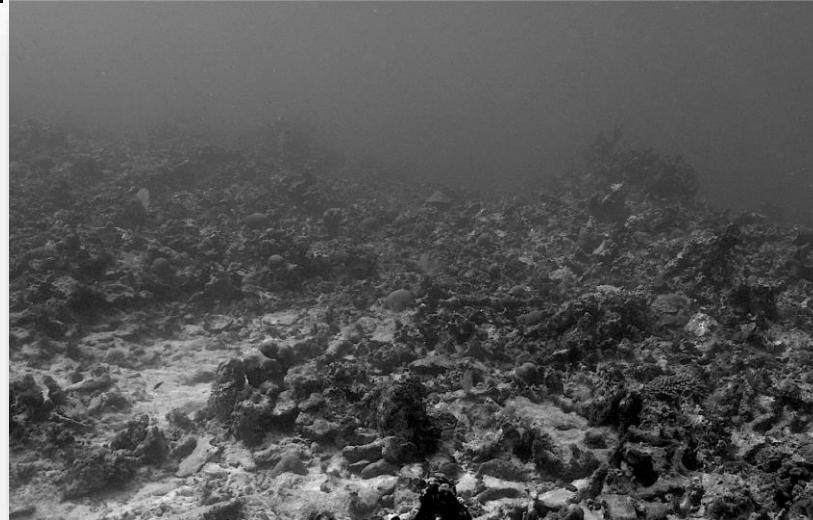


When I first visited here (Fort Lauderdale) at the age of 16 in 1978, my father, a brilliant mechanic, gave me his version of a scuba lesson; "strap this on like your backpack, regulator stays in your mouth and don't hold your breath on the way up".

I was hooked on being underwater any way I could and gave up living in the Blue Ridge mountains of North Carolina that day. I had no idea that those captivating clear blue waters of south Florida would evolve to a "satisfactory" green in my lifetime, nor did I know that those incredible hard coral habitats up and down our coast were to all but disappear in exchange for an algae community of today.

I recall my dad questioning the sensibility of the tire reef with reluctance at support that eventually gave into untested "theories". I do not recall any pondering over the sewage outfalls, at the time this solution seemed obvious, after all, the oceans are so large, it was barely a drop in the bucket. Later in life, one of my mentors in life support systems engineering lived by the phrase "OTIWATO" or **One Test Is Worth a Thousand Opinions**. And now we know!

Produces this



Green is the new Blue

South Florida's coral reefs and sea grasses exist next to a highly urbanized area with over 6 million residents and 38 million annual visitors. However, in some instances wastewater infrastructure may not have kept up with population growth and sea level rise. Many coastal communities use septic systems and the existing sewer systems may be close to, or exceeding, their expected life spans. Failing systems will likely become inundated with seawater so reuse could be considerably more expensive or cost prohibitive. Due to the porous nature of south Florida's limestone geology, it is likely these sources are impacting our coastal ecosystems. Additionally, legislation was passed in 2008 to phase out ocean outfalls - pipes discharging approximately 536 million gallons per day of secondarily treated wastewater effluent within the coastal waters of mainland southeast Florida - by 2025; however, there are concerns of delay due to local infrastructure costs and lack of consensus on path forward. Significant financial and technical support is needed to protect the ecologically and economically valuable coastal ecosystems.

There are 5 (of 6) active wastewater outfalls in Miami-Dade, Broward, and Palm Beach counties. The outfall pipes discharge from one to three miles offshore. Combined, they contribute approximately 536 million gallons per day of secondarily treated wastewater effluent within the coastal waters of SE FL. This is the equivalent of roughly 500 giant swimming pools - each the length of a football field and 50 feet deep.

Primary treatment breaks down and removes particulates (large pieces of waste) from the waste water effluent. Secondary treatment adds disinfectant to the effluent of Primary treatment to kill pathogens. Disinfectant is not 100% effective. Live human pathogens have been found in secondary treated effluent of the Hollywood outfall (Futch et al. 2011).

Secondary treatment removes most of the total suspended solids and further reduces biological oxygen demand not eliminated during primary treatment. To do so secondary treatment relies on biological processes i.e. microbes to consume dissolved organic matter missed in primary treatment. Additional treatments at this stage may include chlorination and ultraviolet disinfection to target pathogenic organisms. Secondary treatment does not remove nutrients, hormones, pharmaceuticals, personal care products (e.g. shampoo, conditioner, deet, sunscreen, etc.) and has been documented in southeast Florida coastal waters (Singh et al. 2009).

However, nutrients, primarily nitrogen and phosphorous, and contaminants of emerging concern (CECs), such as prescription and OTC drugs, caffeine, and hormones, are not removed at this stage and may be impacting south Florida's coral reefs and fishes due to the latter's designed intent to induce physiological effects in humans at low doses. Another groups of CECs not removed by secondary treatment include the thousands of compounds used in personal care products (PPCPs), such as sunscreens, microbeads and acetone, which wind up in the waste stream. Advanced specialized technology is required for the removed of CECs and PPCPs, whereas tertiary treatment can be used to eliminate nutrients.

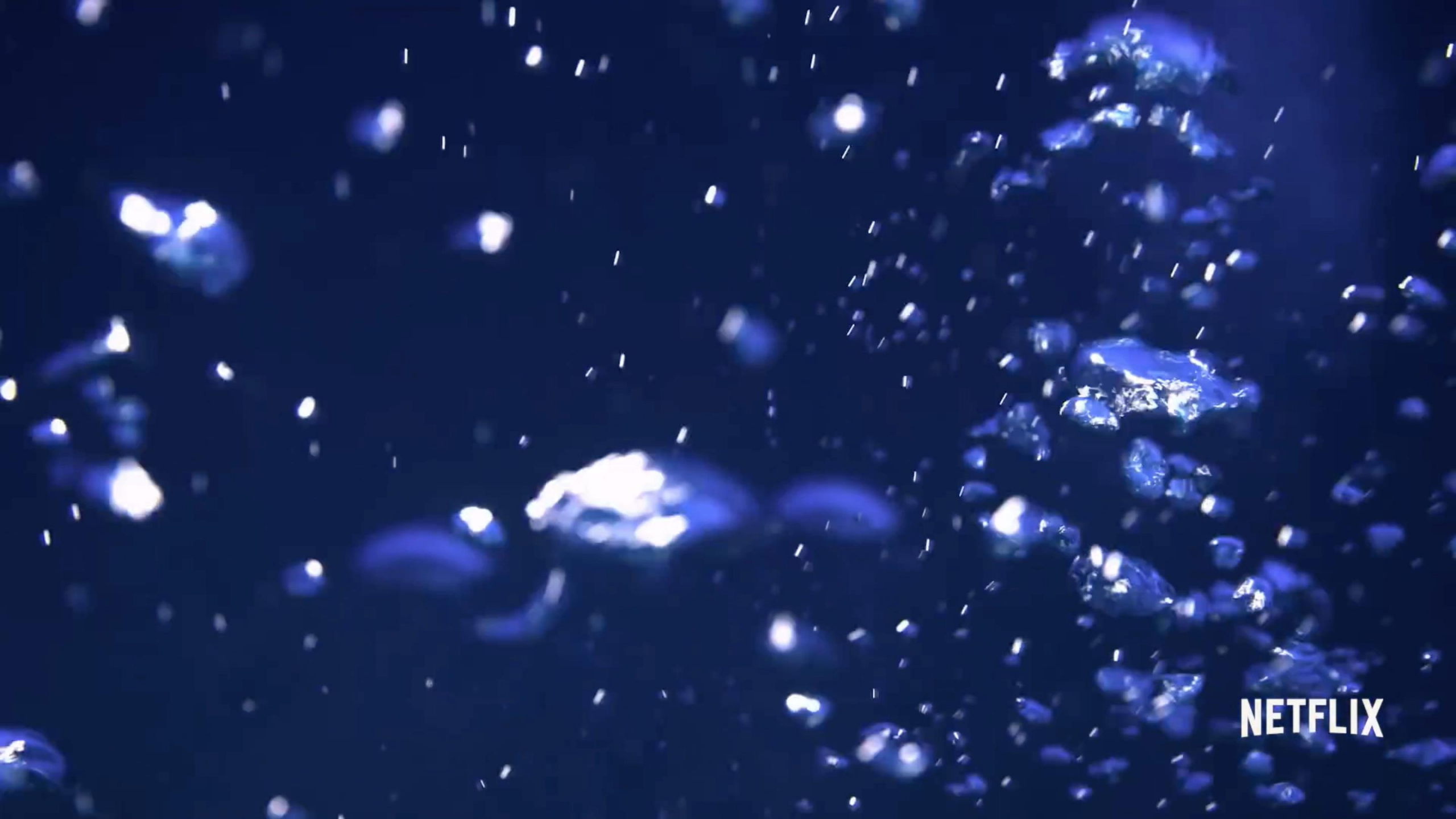
Futch, J. C., D.W. Griffin, K. Banks, E.K. Lipp. 2011. Evaluation of sewage source and fate on southeast Florida coastal reefs. Marine Pollution Bulletin 62: 2308-2316.

Singh, S. P., A. Azua, A. Chaudhary, S. Khan, K.L. Willet, P. R. Gardinali. 2009. Occurance and distribution of steroids, hormones and selected pharmaceuticals in South Florida coastal environments. Ecotoxicology 19:338-350.

So What Do We Do



- Inform the Public About the Problem and How We Got Here,
- Connect with the Public at their Core using Visual and Emotional Content
- People Protect What they love-Show the Public the Solutions and the Upside of Wise Development
- Rally the Public to Support Policy Makers in Moving Ahead at an Entrepreneurial Pace,
- Keep the Problem and Solution in Front of the People
- Re-Brand South Florida as Leading the Way into the Future of Sustainability.



NETFLIX



- Embrace the decades of knowledge and share with the youth and emerging industry leaders to “create” and execute the cure.
- Explain how corals are living animals and how they are so much like us and important to our quality of life.
- Engage celebrities to give the many great researchers the audience that science and exploration of our inner space deserves.
- Keep the contrasting and compelling images that support the data in front of the new and traditional media outlets. If a picture tells a thousand words, imagine what the millions of Go Pro’s in the hands of volunteers can do!





Thank you!

www.projectbaseline.org

