

JENNETTE'S PIER

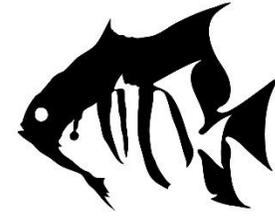


JENNETTE'S PIER – 2019 ANNUAL REVIEW

February 5, 2020

Mike Remige - Director

- Visitation
- Operations
- Projects & Exhibits
- Research & Ocean Observing
- Community Events & Activities
- Facility Rentals
- Education & Outreach
- Conservation & Sustainability
- Highlights & Notables
- 2020



JENNETTE'S PIER





JENNETTE'S PIER

Visitation

2019

- Pier visitors – 178,912
 - Fishing admissions – 28,435
 - Sightseeing admissions – 150,477
- Events and Program participants – 22,903





Pier Shop renovations



Pier Shop renovations





Pier Shop renovations



Pier Shop renovations

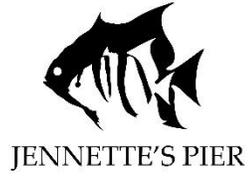


Pier Shop Gross Sales up 16%
Closed from Jan. 1, 2019 – Mar. 12, 2019



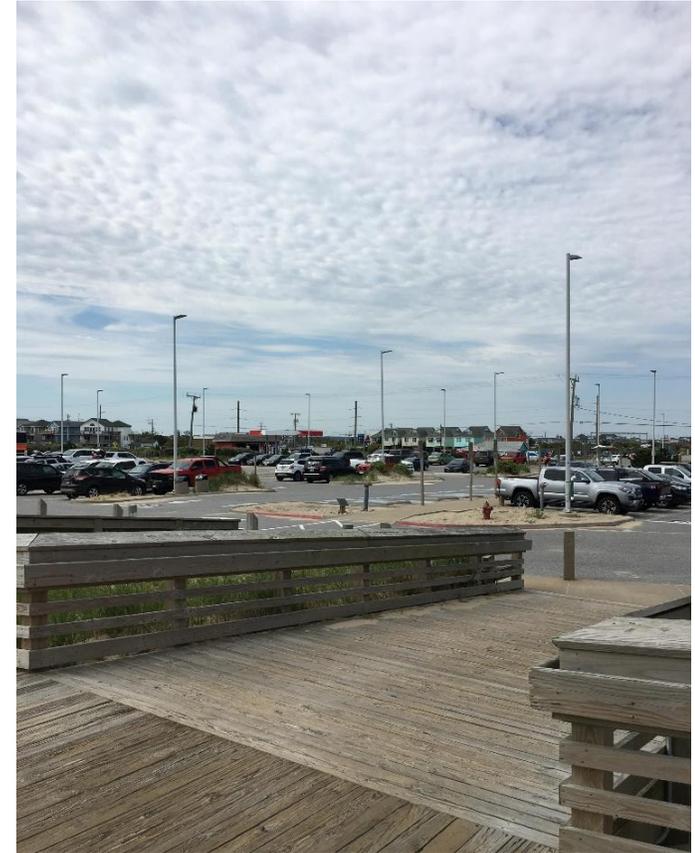
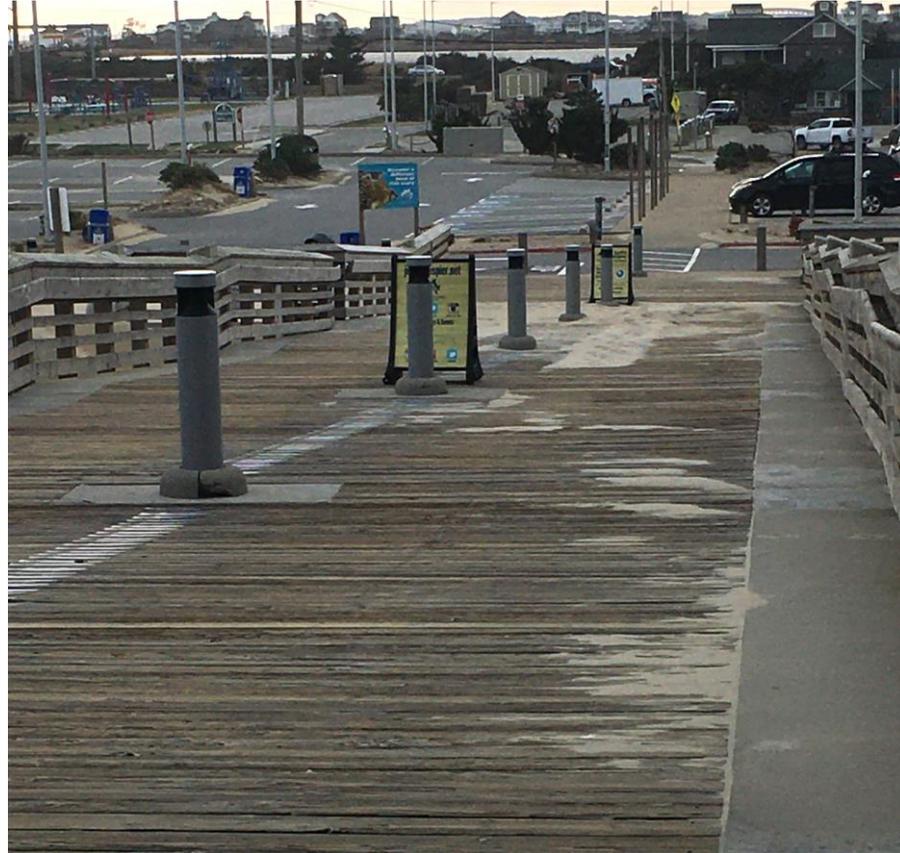
Pier Shop Conservation Efforts

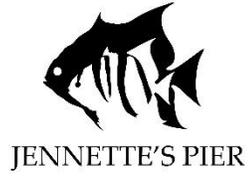




Jennette's Pier Projects

Entrance Lighting

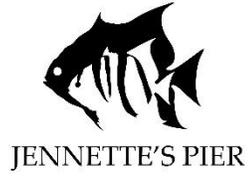




Jennette's Pier Projects

Parking Lot and Stormwater Management

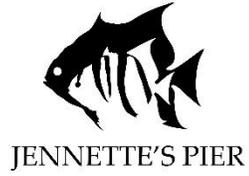




Jennette's Pier Projects

Fire Suppression System

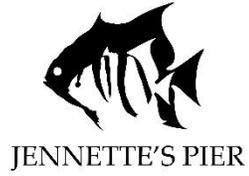




Jennette's Pier Projects

Entrance Branding

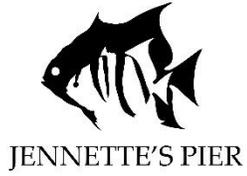




Jennette's Pier Exhibits

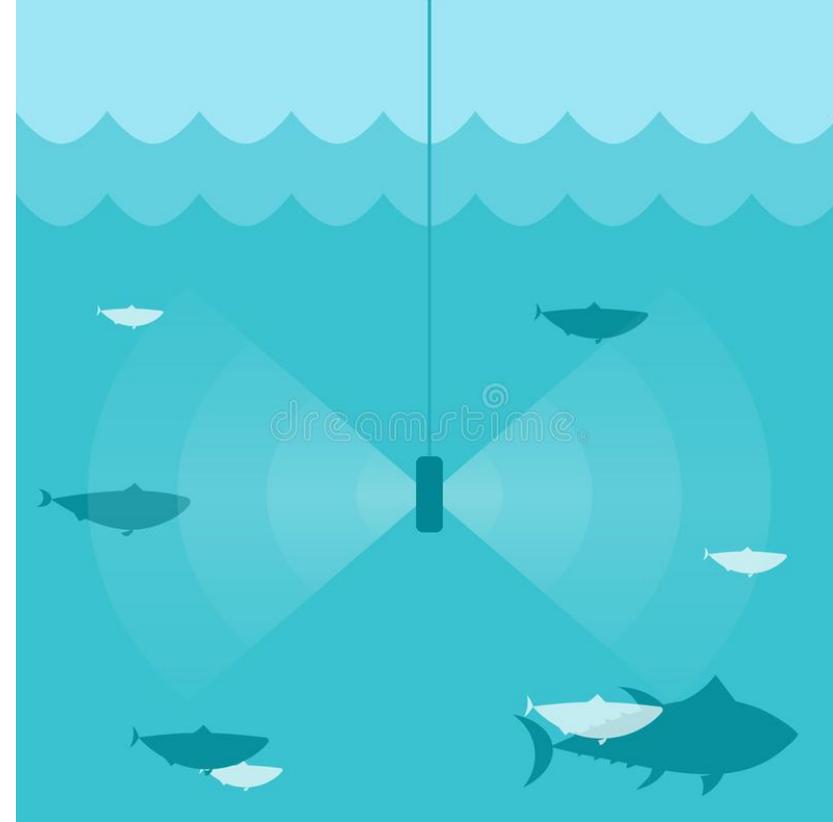
Bottlenose Dolphin Skeleton



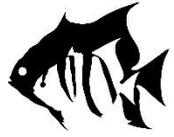


Jennette's Pier Research & Ocean Observing

in partnership with the Coastal Studies Institute



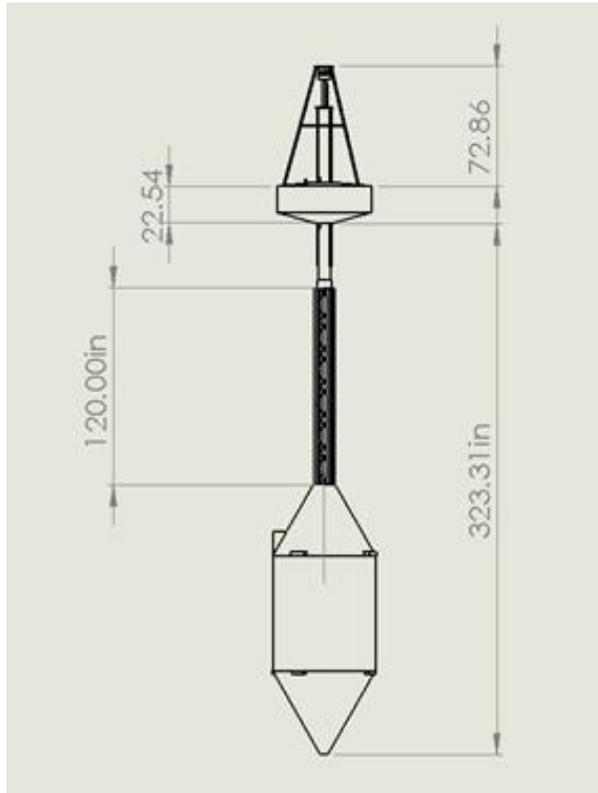
Renewable Ocean Energy Program Collaborative Grants



JENNETTE'S PIER

Jennette's Pier Research & Ocean Observing

in partnership with the Coastal Studies Institute



VA Tech



Triton Systems

Marine Hydrokinetic Equipment Tests



JENNETTE'S PIER

Jennette's Pier Research & Ocean Observing

in partnership with the USACE FRF Duck Pier



#CoastSnap

Utilizing citizen scientists to help us record our ever-changing coastline

SANDIA REPORT

SAND2015-7963
Unlimited Release
Printed September 2015

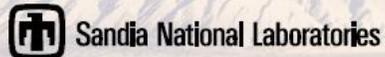
Characterization of U.S. Wave Energy Converter (WEC) Test Sites: A Catalogue of Met-Ocean Data 2nd Edition

Ann R. Dallman, Vincent S. Neary

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Approved for public release; further dissemination unlimited.



NOTE: This is Part 2 of 'Characterization of U.S. Wave Energy Converter (WEC) Test Sites: A Catalogue of Met-Ocean Data, 2nd Edition' by Ann R. Dallman and Vincent S. Neary. Please see [en.openei.org/wiki/Characterization_of_U.S._Wave_Energy_Converter_\(WEC\)_Test_Sites](http://en.openei.org/wiki/Characterization_of_U.S._Wave_Energy_Converter_(WEC)_Test_Sites) for the other parts of the report.

5. JENNETTE'S PIER WAVE ENERGY TEST CENTER

5.1. Site Description

Jennette's Pier, owned by the State of North Carolina and managed by the NC Aquarium Division, is a unique public facility that provides education and outreach including displays of experimental data and monitoring equipment. The University of North Carolina Coastal Studies Institute (UNC CSI) began a partnership with Jennette's Pier in 2004 to foster research, ocean energy device testing and monitoring, outreach, and education. Part of this partnership is the Jennette's Pier Wave Energy Test Center. The site was used for the first time in December 2011 by Resolute Marine Energy.

The Jennette's Pier Wave Energy Test Facility has two test berth locations, one approximately 80 m north of the pier structure at 6 m water depth (35.9119 N, 75.5933 W) that is called the 'nearshore berth' and one approximately 600 m east of the seaward end of the pier at 11 m depth (35.9123 N, 75.5863 W) that is called the 'offshore berth.' The seabed is sandy at both locations. Figure 33 shows the gently sloping bathymetry around the site, which consists of a wide shelf.

The wave climate at the test site varies seasonally, with calmer seas in the summer compared to more energetic seas in the winter. The wave environment at Jennette's Pier is characterized by an annual average power flux of about 6.08 kW/m at 12.6 m depth.

The nearby University of North Carolina (UNC) Coastal Studies Institute (CSI) offers a wide range of technical and testing infrastructure support services for WEC developers. Jennette's Pier has small scale, shallow water wave energy resources, and is suited for scaled devices.

Jennette's Pier Wave Energy Test Facility

Approach:

- Shallow water platform for testing marine hydrokinetic energy devices and monitoring of the impacts of devices on the surrounding environment

Benefits of Pier partnership:

- Simplified permitting (existing protocols and structure)
- Opportunities for public engagement



Permitted test berths



Jennette's Pier at Nags Head North Carolina Aquarium Division N.C. Dept. of Natural and Cultural Resources

Concrete pier structure opened in 2011

Public facility providing:

- Public access to the oceanfront and recreational fishery
- Public educational programming
- Ocean observing and research platform
- Sustainable technology demonstration (LEED platinum certification)

Located on the Atlantic Ocean in Nags Head, NC (Outer Banks)

400,000+ annual property visitors



Jennette's Pier Wave Energy Test Facility

Presentation to the Water Power Technologies Office, U.S. Dept. Energy

Michael Remige, Director at Jennette's Pier

Michael Muglia, Assistant Director for Science and Research

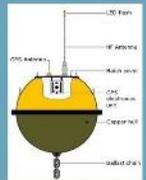
Corey Adams, Research Operations Manager

Lindsay Dubbs, Associate Director

NC Renewable Ocean Energy Program (NCROEP) - Coastal Studies Institute (CSI)

Existing observation assets

- Acoustic Wave and Current Meter (AWAC)
 - directional wave spectra, water temperature, and current profiles
 - collaboration with the US Army Corps of Engineers
- Meteorological station
 - wind velocity, temperature, and humidity
 - in collaboration with Weatherflow Inc.
- Datawell Waverider buoy
 - CDIP buoy 243
 - 26 meter isobath on a Wave Information Study (WIS) test point
 - collaboration with the US Army Corps of Engineers



Vessels

- Duffy - 42'
- Privateer - 28'
- Zodiac - 12'



Program assets

- 34 engineering and science professors from 5 North Carolina institutions
- Wave computational modeling – NCSU (Casey Dietrich and Alejandra Ortiz)
- 40 year wave hindcast dataset – CSI
- Extensive oceanographic field experience – CSI
- Technical diving program - CSI



Deployments at Jennette's Pier Wave Energy Test Facility

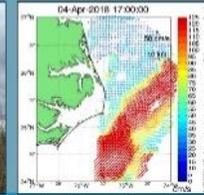
Previous Experiments:

- Resolute Marine Energy (2011) - surge WEC
- SAROS (2013) - wave-powered desalination buoy
- Nortek (2013) - scour monitor validation
- NCSU (2013) - In situ erosion evaluation probe (ISEEP)



Auxiliary observation assets

- Datawell Waverider buoy
 - Coastal Data Information Program (CDIP) buoy 192 (NDBC 44095)
 - 30 km southeast off of Oregon Inlet
- HF radar ocean surface current measurements



Opportunities for public engagement

Research and OE testing spotlighted in permanent Research Center display and temporary deployment-based displays

- Allows public exposure and engagement of Pier visitors - from 2014 to 2018, annual visitation between 172,000 and 189,538 people each year
- Allows agency interactions and exposure
- NC DEQ - interest in learning about environmental synergies and impacts from small-scale deployments
- BOEM - numerous offshore wind public meetings held at Jennette's Pier





Fri 2/8/2019 5:21 PM

Gore, Simon (FELLOW) <Simon.Gore@ee.doe.gov>

[External] DOE Workshop Invitation: Wave Energy-Powered Desalination Prize

To Remige, Michael P; 'dubbs@email.unc.edu'; 'mugliam@ecu.edu'

Cc Spence, Heather (FELLOW); Jenne, Dale (NREL); Garson, Jennifer; Geerlofs, Simon; Lemke, Alexandra (CONTR)

 Follow up. Completed on Monday, February 18, 2019.
You replied to this message on 2/15/2019 7:43 AM.

Suggested Meetings

+ Get more add-ins

Hello Michael, Lindsay, and Mike

The WPTO very much appreciated your presentation on Jeannette's Pier and the Coastal Studies Institute. It was also good for us to vet some questions even if we cannot share all of the details just yet on some of our future work. I'd like to welcome you to participate in a workshop we are planning for March 14th-15th in Golden, CO. See below for an invite message from the WPTO's director and please let me know if you have any questions:

On behalf of the U.S. Department of Energy's Water Power Technologies Office you are invited to join a workshop to help with planning for a potential new prize competition to spur innovation in wave energy-powered desalination systems. We hope to leverage your experience with desalination, marine energy, and water technology systems to inform the design of the Energy Department's first-ever prize on this subject.

Wave and tidal power technologies can provide locally-sourced and reliable energy to coastal communities and ocean industries, particularly where access to electricity is limited or prohibitively expensive. Wave energy is one of the few technologies that can produce clean water without the need to convert energy to electricity. For example, wave energy converters can pump seawater at high pressure and directly drive a reverse osmosis desalination system bypassing the largest cost driver: electricity costs.

This workshop is a unique opportunity to network with a diverse group of professionals, including experts from the Energy Department, national laboratories, and the private sector. Moreover, your valuable input will ensure the Department focuses on areas that would lead to important advances for both the marine energy and desalination industries.

The event will occur over a day and a half, and feature background on the prize, discussion of feasible overall prize structures, important potential technical metrics for competitors, possible competition locations, and most importantly, the prize rules.

We hope you can to attend the workshop at the National Renewable Energy Laboratory in **Golden, Colorado on March 14-15**. **Please confirm by February 18th** by emailing Alexandra Lemke (alexandra.lemke@ee.doe.gov) and Simon Gore (simon.gore@ee.doe.gov). A full agenda and briefing materials will be circulated closer to the event.

We sincerely hope to see you in Golden, CO.

Simon Gore, on behalf of
Alejandro Moreno
Director, Water Power Technologies Office

Simon J Gore

Environmental Science and Policy Specialist
AST Supporting - Water Power Technologies Office

Department of Energy

DOE Announces Prize Competition for Wave Energy Water Desalination

FEBRUARY 25, 2019



[Home](#) » [DOE Announces Prize Competition for Wave Energy Water Desalination](#)

Prize Builds on DOE Efforts to Spur U.S. Innovation through Competition to Accelerate Technology Development

WASHINGTON, D.C. –Today, the U.S. Department of Energy (DOE) announced a prize competition to spur innovation in wave energy-powered desalination systems. The Waves to Water Prize will draw upon U.S. innovators to accelerate technology development through a series of contests to demonstrate small, modular, cost-competitive desalination systems that use the power of the ocean to provide potable drinking water to remote coastal and island communities.

“The United States is committed to meeting the global need for a vital resource – safe, secure, and affordable water,” said Assistant Secretary Daniel Simmons, speaking at Oceanology International: Americas. “The Waves to Water Prize will accelerate the development of next generation desalination technologies through the power of competition amongst the best and brightest. We



U.S. DEPARTMENT OF ENERGY

WAVES TO WATER PRIZE



U.S. DEPARTMENT OF
ENERGY



Propose a Wave Powered System
Up to 20 Winners (\$200,000 Cash Prize Pool)

Develop Detailed Plan and Model
10-20 Winners (\$800,000 Cash Prize Pool)

Demonstrate Working Principles
Up to 10 Winners (\$500,000 Cash Prize Pool)

Test & Demonstrate in the Ocean
Grand Prize up to \$500,000; and
Individual Metrics Prizes up to \$500,000



JENNETTE'S PIER

Jennette's Pier Event Site

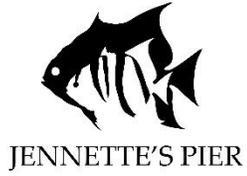
in partnership with the Town of Nags Head and the Outer Banks Visitors Bureau

COMMUNITY EVENTS & ACTIVITIES

Official event site for:

- WRV Outer Banks Pro
- Eastern Surfing Association Championships & Mid-Atlantic Regionals
- OBX Running Company "Sunrise 5k/Sunset 5k"
- NHSFC & NCBBA "Fritz Boyden Memorial Youth Fishing Tournament"
- NC Lions Club "Visually Impaired Persons Fishing Tournament"
- Jennette's Pier's "Family Fishing Tournament" & "Red Drum Tournament"
- Surfing for Autism
- Best Day Foundation
- OBX Skim Jam

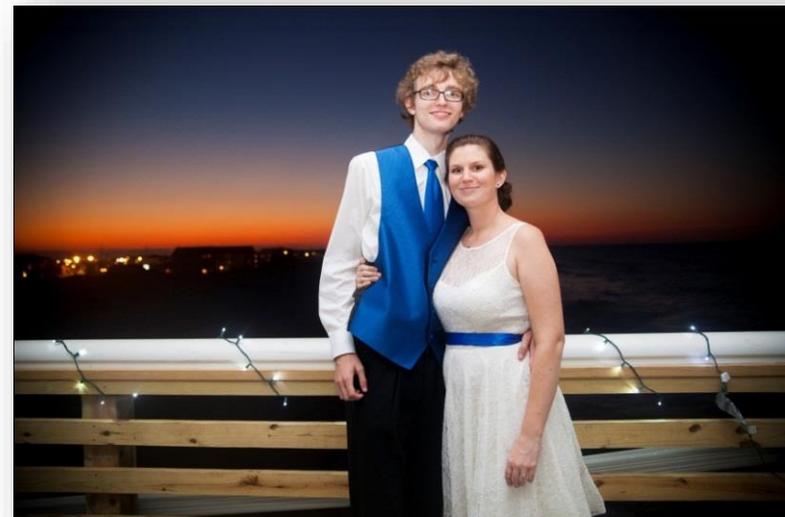


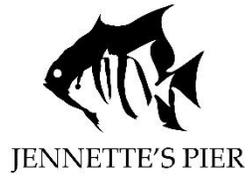


Jennette's Pier Facility Rentals

Total Events – 2020

- Weddings - 33
- Conferences/Meetings/Receptions/Socials/Dances /Concerts/Expos/Memorials - 35





Jennette's Pier Facility Rentals

Recognition



- WeddingWire “Couples’ Choice Award”
2015, 2016, 2017, 2018, 2019, 2020
- The Knot’s “Best of Weddings” Award
2015, 2016, 2017, 2018, 2019, 2020

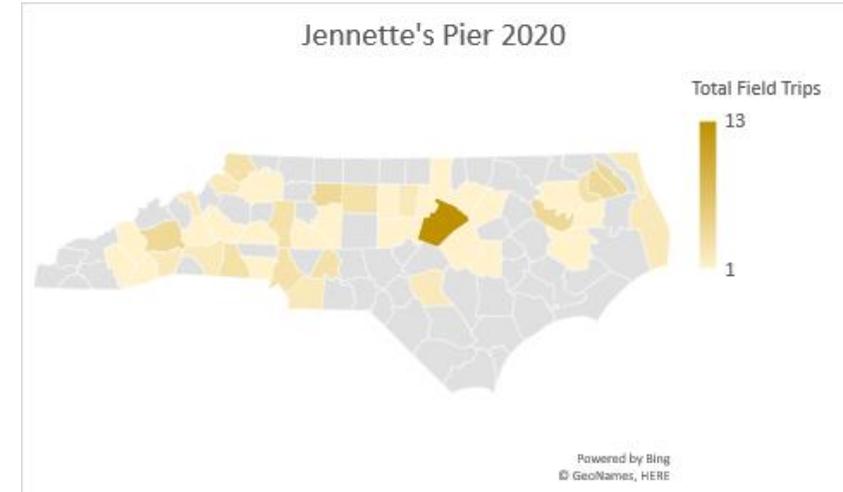


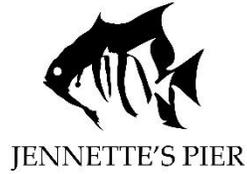


Jennette's Pier Education Department

2019

- Public programs – 80
- Public program attendance – 1,035
- NC school field trips – 118
- NC school programs – 354
- NC school student visits – 9,210 from 43 counties





Jennette's Pier Education Department

Aquarium Scholars

Aquarium Scholars is a partnership between the NC Aquariums, NC public schools and the NC Aquarium Society through which private donors help fund access to **STEM (Science, Technology, Engineering & Math)** based Aquarium education programs for low-income students across the state.

2019

16 school groups

2,034 students

5-Outreach

11-Field Trips





Summer Camps

Lilly Scholarship Fund

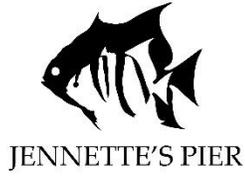
- 17 weeklong summer camps – 214 campers (23 scholarships)
- 2 Exceptional Day camps – 16 campers (16 scholarships)
- 2 overnight camps – 20 campers (20 scholarships)

**Dare County Friends of Youth Sponsor of the Year
2020**

A woman wearing a yellow beanie, sunglasses, a red jacket, and dark overalls stands on a sandy beach. Behind her lies a large, dark whale carcass, likely a humpback whale, with its characteristic ribbed skin. The ocean and a cloudy sky are visible in the background.

Marine Mammal Stranding Network

Humpback Whales – Pygmy Sperm Whales – Dwarf Sperm Whales – Bottlenose Dolphins – Risso's Dolphin – Common Dolphins –
Harbor Porpoises – Harbor Seals – Gray Seals – Harp Seals



Jennette's Pier Wildlife Conservation

OBX Marine Mammal Stranding Network
Public Outreach



Thanks to the Town of Nags Head for partnering with Jennette's Pier's outreach efforts in support of the OBX Marine Mammal Stranding Network!

Seven MMSN information signs have been placed at key beach accesses throughout the Town.

Jennette's Pier Wildlife Conservation

Tagged Sand Tiger Shark Tracking

Acoustic Telemetry

Atlantic Cooperative Telemetry Network - hundreds of researchers and 1000's of acoustic transmitters:

May – October 2019

- Atlantic tarpon
- **Atlantic Sturgeon - 1**
- Black drum
- **Blacktip shark – 1**
- Bull sharks
- **Cownose ray – “LOTS”**
- Finetooth shark
- Gray triggerfish
- Lionfish
- Red snapper
- Red drum
- **Sand Tiger Sharks – 3 Adult Females from Morehead City NC, and 1 Subadult Male from Delaware Bay**
- Speckled trout
- Spiny dogfish
- Spot fish
- Summer flounder
- Thresher shark
- Tripletail
- **Unknown Tag – 1 (not in ACT Network)**

<http://www.theactnetwork.com/>



Responsible
Pier
Initiative

Keep your BUTTS off our BEACH

Cigarette butts contain plastic, are NOT biodegradable, and can be **TOXIC** to fish, birds, and other wildlife.

Please do your part to keep them out of our oceans by always disposing of your butts in proper receptacles.

While at Jenette's Pier, look for marked CIGARETTE BUTT RECYCLING BINS to dispose of your smoking supplies.

Discarded cigarette butts alone create over **90 MILLION POUNDS** of harmful plastic litter each year.

Butts collected at the Pier are sent to TerraCycle, where their components are separated and recycled into useful materials.



Sustainability Projects

Cigarette litter reduction and terra-cycling pilot program

Funded by an NC Aquarium Society Sustainability Grant





Notable:

- Key NCAQ, NCAS & JP vacancies have been filled
 - AQ Division Director – Maylon White
 - Pine Knoll Shores Director – Liz Baird
 - Roanoke Island Director – Larry Warner
 - NCAS President – Jay Barnes
 - NCAS Development Director – Jim Mulvey
 - JP Business Manager – Lorelei Zumbrunnen
- NCAS Board changes –
 - 5 members move to Emeritus (Ray White)
 - 6 new members elected (Ronnie Sloan, Tess Judge, Clark Twiddy)

The
Outer Banks
Hospital

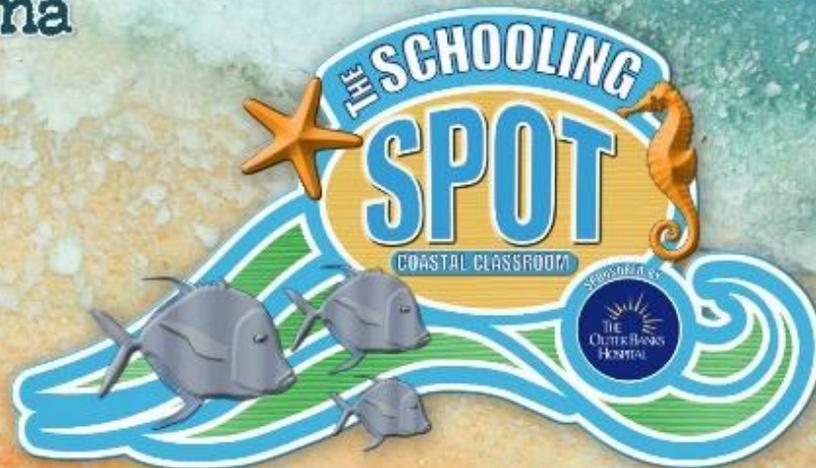
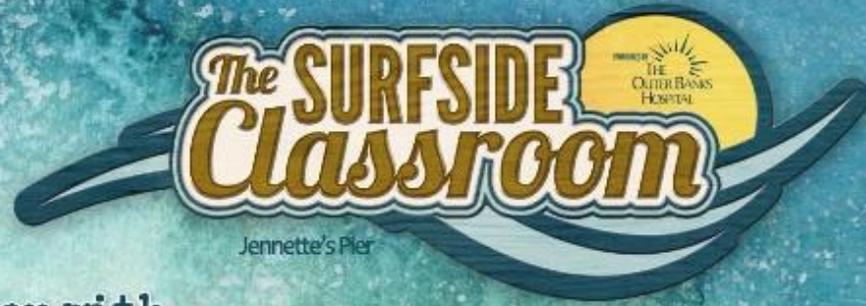
is proud to partner with

the North Carolina
Aquarium on
Roanoke Island

and

Jennette's Pier

by fostering future
ocean ambassadors.



North Carolina Aquarium
on Roanoke Island



Highlight:

The Outer Banks Hospital is partnering with the NCAS to support education efforts at both Jennette's Pier and the NC Aquarium on Roanoke Island



Notable: Hurricane Dorian

CLOSED – Sept. 4-7

Significant damage to all roof structures and wind turbines



HOOK, LINE & SCIENCE

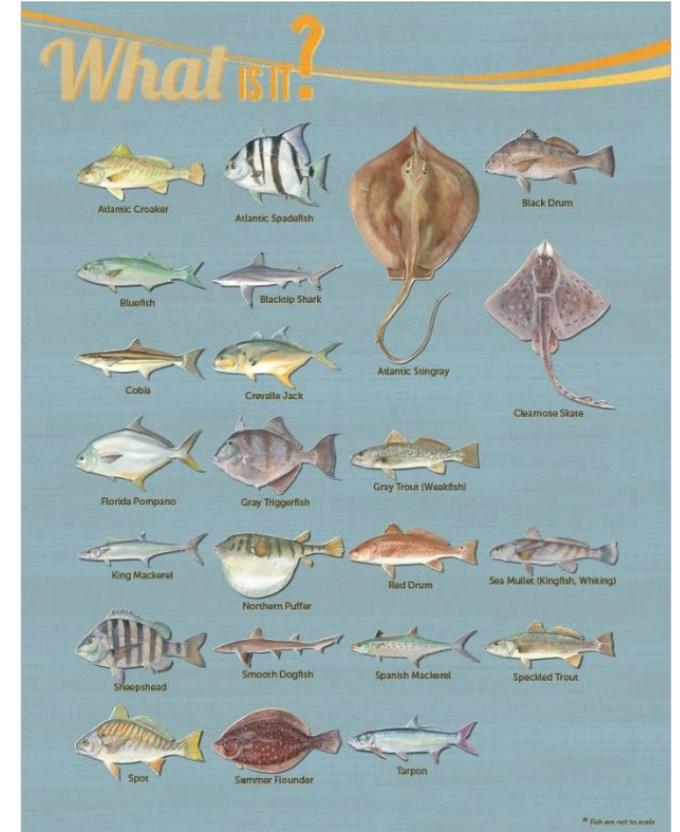
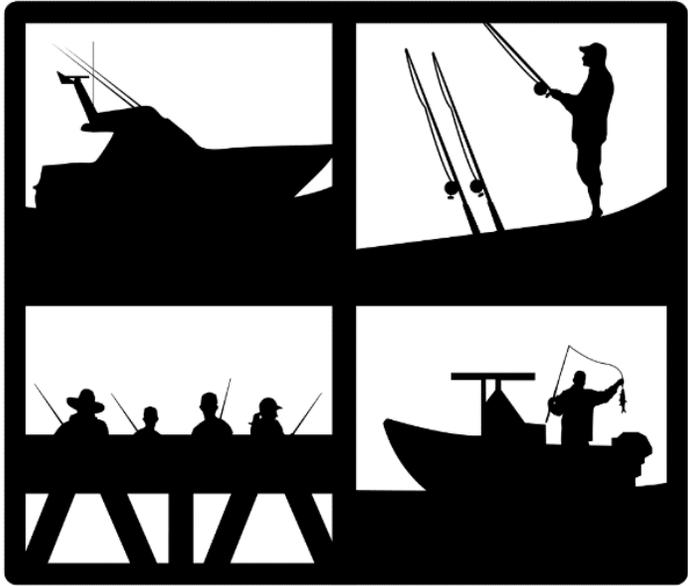


Exhibit Redesigns - 2020



Thank you!
