

An Introduction to:

Blue Economy

CIE's Alliance for the Blue Economy

Presented to Smart Oceans

UNCW Center for Innovation and Entrepreneurship



UNCW
Center for Innovation
and Entrepreneurship

Presentation

- What is the Blue Economy?
- Why focus on the Blue Economy?
- UNCW's *All Blue: The Alliance for the Blue Economy*
- Who's Involved
- Activities underway
- Time permitting a problem-solving solution

BLUE ECONOMY

The Blue Economy is sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health.

The Blue Economy encompasses many activities...

RENEWABLE ENERGY

Sustainable marine energy can play a vital role in social and economic development.



TOURISM

Ocean and coastal tourism can bring jobs and economic growth. Coastal Least Developed Countries and Small Island Developing States receive more than **41 million visitors** per year.



CLIMATE CHANGE

The impacts of climate change on oceans—rising sea-levels, coastal erosion, changing ocean current patterns, and acidification—are staggering. At the same time, **oceans are an important carbon sink** and help mitigate climate change.



FISHERIES

Marine fisheries contribute more than **US\$270 billion** annually to global GDP. More sustainable fisheries can generate more revenue, more fish and help restore fish stocks.



MARITIME TRANSPORT

Over 80% of international goods traded are transported by sea, and the volume of seaborne trade is expected to double by 2030 and quadruple by 2050.



WASTE MANAGEMENT

80% of litter in the ocean is from land-based sources. Better waste management on land can help oceans recover.



U.S. Blue Economy

As of 2020 the Blue Economy contributed an estimated \$304 billion (2018 data) to the U.S. gross domestic product and produces 3.3 million jobs annually. The value of the Blue Economy will only grow in the coming years as artificial intelligence (AI), unmanned aerial and submersible systems (UxS), genomics, and other emerging technologies dynamically transform ocean industries.

Marine economy continues to power American prosperity, despite 2020 downturn

American 'blue economy' accounts for \$361 billion (GDP) 18.8% 



Diverse Industries.

\$610B sales & 3.3 million jobs)



Marine Sectors Sales in 2020 (Inflation Adjusted)

	Tourism and Recreation	\$191 Billion
	Defense and Public Administration	\$187 Billion
	Offshore Minerals	\$97 Billion
	Transportation	\$54 Billion
	Fisheries and other Bio-products	\$27 Billion
	Ship and Boat Building	\$16 Billion
	Coastal Utilities	\$15 Billion
	Research and Education	\$11 Billion
	Construction	\$7 Billion



Oceans = *the new economic frontier?* But not all are sustainable.



There is Enormous Opportunity Because, There are Lots of Problems to Solve



CRISIS



A time of danger;



A time of opportunity;

We're In a Crisis

- We believed “dilution is the solution to pollution” and ocean capacity was boundless.
- We undermined its functions at the same time as we expected ever more from it.
- As seafood demand increased, we harvested down the food web, stressing fisheries and wiping out species.
- **90% of global trade is by sea, and CO₂ must be taken up, at an ever-faster pace.**
- Coastal populations have grown; at least ~50% now living less than 100 km from a coast.
- For U.S. coasts, high-tide flooding is 300% to 900% more frequent than 50 years ago.

Why?

Blue Economy Has Big Problems Conflicting Paradigms

Social or environmental problems that are difficult or impossible to solve for four reasons: 1) incomplete or contradictory knowledge, 2) the number of people and opinions involved, 3) the large economic burden, and 4) **the interconnected nature of these problems with other problems.**

New Blue Economy

Innovation Hubs

A new set of ocean industries—the *new blue economy*—is taking shape, driven by global demand and powered by technology. The Organization for Economic Cooperation and Development forecasts the global ocean economy will grow from **\$1.5 trillion in 2010 to \$3 trillion by 2030**. New products and demands for more sustainable use of the ocean.

These hubs are a result of regional collective action seeking to capture the opportunity for their respective communities.”

Mark Huang, Co-Founder SeaAhead, Boston

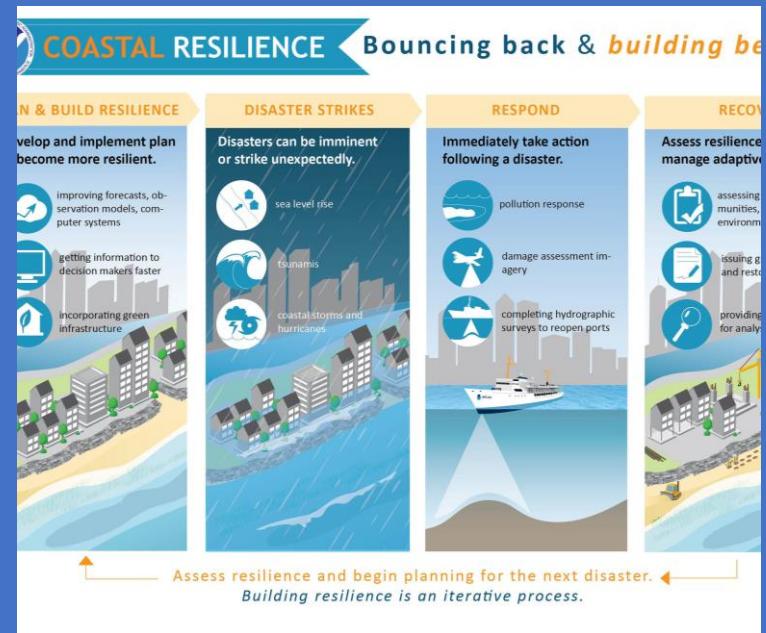
Blue Economy Initiative – Grew into *All Blue*

In May 2020, the CIE convened interested individuals from campus and the community to design a collaborative regional strategy to **grow research capacity and fuel business ventures** in marine robotics, aquaculture, marine biotechnology, and areas impacting coastal resiliency with the idea of growing these efforts in a **Sustainable** way.

Our Goal: provide a “**Blue**” economic development platform to provide sustainable solutions to developing issues in the Cape Fear Region. Through the development of Innovation Hubs that address emerging issues.







Blue Economy Quadrants

Five Sectors of All Blue (*but room for more*)



Marine Robotics and Engineering



Marine Biotechnology



Tourism, and Recreation



Aquaculture and Fisheries Resources (Sustainable Seafood)



Coastal Resilience



Offshore wind



New Blue Economy: Early Wins

All Blue Week (Nov 2021):

17 Events over 6 days, broad community engagement, **750 attendees**, **27,000+ social media**, **8,000 volunteer hrs** and a community that is looking for more

Blue Index: under development to promote investment in companies participating in sustainable blue economy.

All Blue Internship Program: UNCW Students working directly with businesses and startups in the blue economy. (currently we have interns from policy, marketing, marine science, entrepreneurship...)

\$248K Marketing and Digital Tools for the NC Shellfish Industry- Training going live this month.

All Blue 101: Course to provide a platform to education about the blue economy and involve the community in various aspects of the blue economy.

MECC- students from NC A&T and UNCW compete on a nationally.

Blue Economy: Opportunity

NOAA Aquaculture: additional food resources must come from cultivation practices and we need to replace ~30% of current use with aquaculture/mariculture

Coastal Aquaculture: NC has adopted a shellfish Initiative targeting \$100M industry

Bio Pharma: Drug discovery

Issues in water security: both quality and quantity

Sea Level Rise: tracking flooding and beach renourishment. **UNCW funded to look at novel sources of sand.**

Data Gathering: We need more and better data gathering (and reporting) capabilities.

Coastal Resiliency: Prep for the storm before there is a storm.

Oceans contain more than 80% of diverse plant and animal species in the world.

BioPharma: Seventy-five percentage of earth's surface is covered by water but research into the pharmacology of marine organisms is limited, and most of it remains unexplored. Aquatic organisms are screened for antibacterial, immunomodulator, anti-fungal, anti-inflammatory, anticancer, antimicrobial, neuroprotective, analgesic, and antimalarial properties. They are used for new drug developments extensively across the world.

Synthetic Horseshoe-Crab Blood:

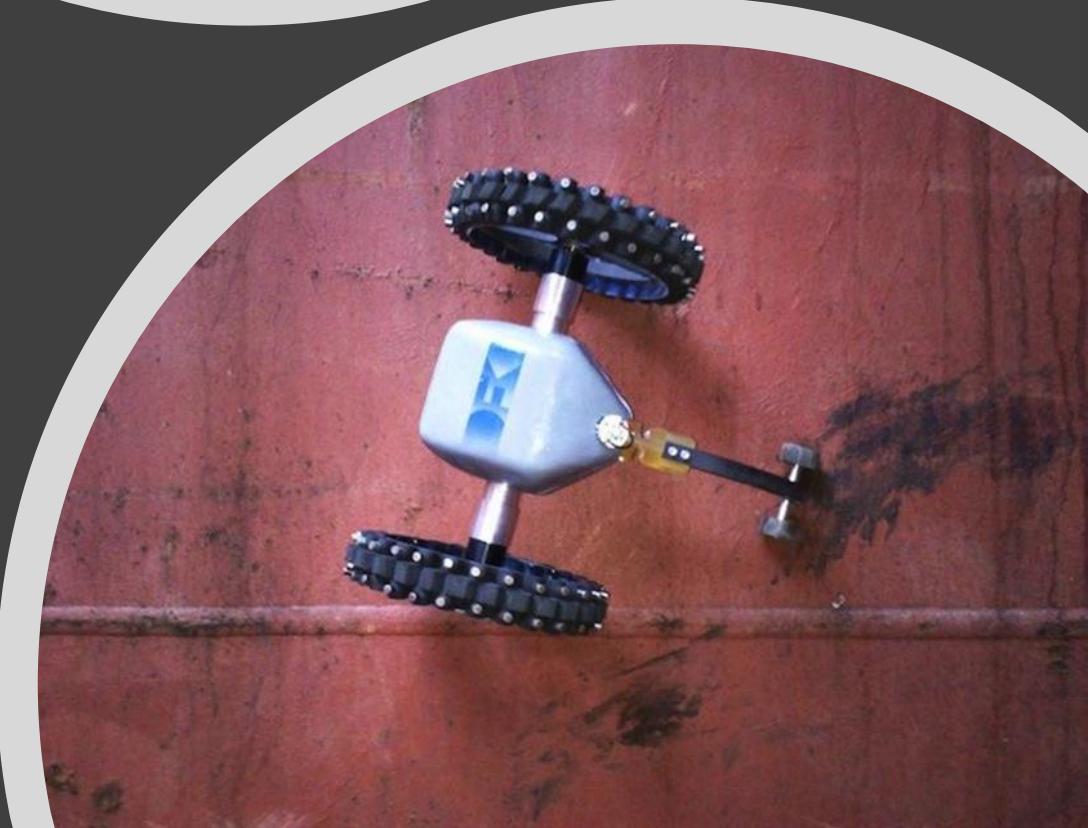
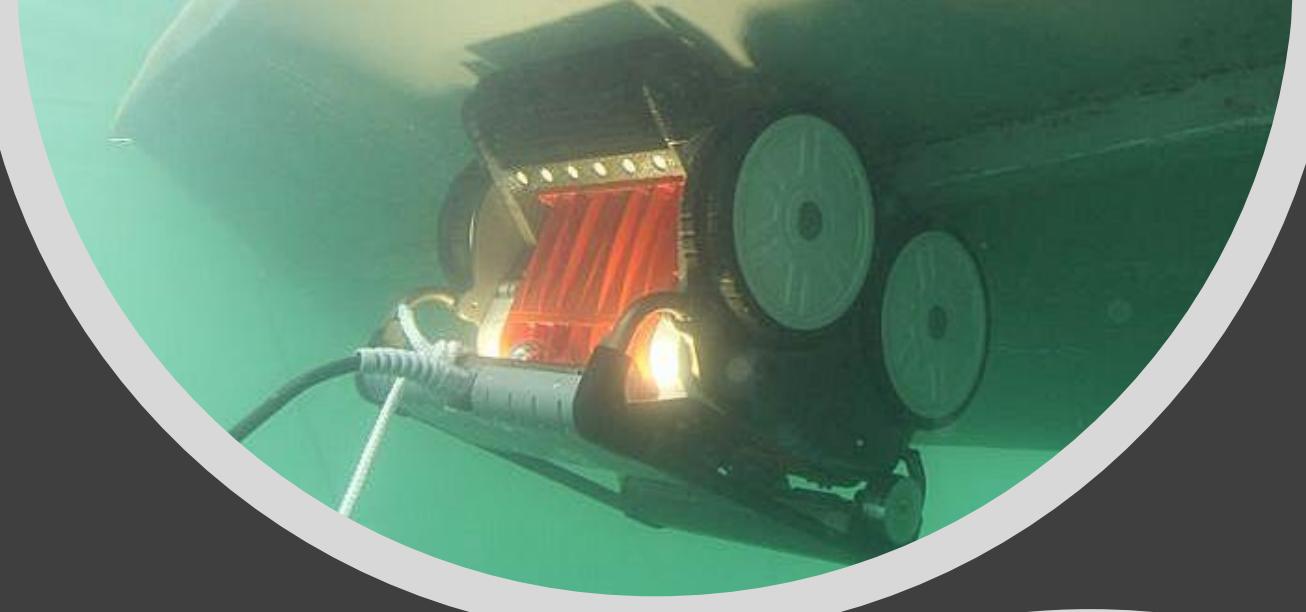
Every year, 400,000 crabs are bled for the miraculous substance that flows through their bodies – and half will die. Horseshoe-crab blood is used to test for contamination during the manufacture of anything that might go inside the human body: every shot, every IV drip, and every implanted medical device.



On hold since the start of the pandemic

Marine Robots to Meet Developing Needs

- **Hull Cleaning Robots:** “HullBUG” With increasing need for green shipping, technologies that help increase fuel efficiency and reductions of emissions are in demand.
- **Inspection Robots:** Inspection of huge cargo ships for cracks, corrosion, or any wear, to ensure that they comply with rising safety standards



- **Unmanned Vessels:** A robotic unmanned surface vehicle (USV) has been developed by US Navy to sweep across the ocean to detect mines using magnetic and acoustic technologies namely Unmanned Influence Sweep System (UISS).
- The US Navy's UISS program, based on Textron Systems' Common Unmanned Surface Vehicle (CUSV) will soon enter low-rate initial production (LRIP) after receiving a milestone C decision.
- Feb. 2020



- **Aquaculture:** Underwater drones, automated feeders and other high-tech tools give a glimpse into the future of fish farming. Deep Trekker, Inc.'s premier product is the DTX2 ROV – an underwater remotely operated vehicle (ROVs) that's hand-held, battery-powered and widely used by aquaculture companies internationally.



Startups In our Ecosystem

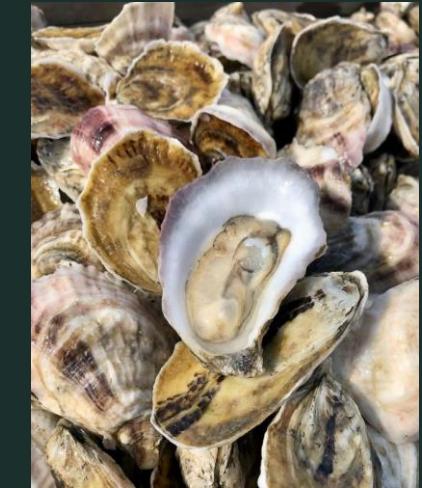


KEPLEY BIOSYSTEMS INC



THE FOLLOWING IS A BRIEF DESCRIPTION OF PROBLEM SOLVING IN THE BLUE ECONOMY OF NC

- Problem
- In the early 2000's intensive culture of shellfish emerge with a strong shift from on bottom to cage culture.
- Situation
- Management fielding complaints from adjacent property owners and potential grower- potential legal
- Shift in industry methods leading to increased user conflicts.



Photos courtesy of Middle Sound Mariculture LLC

GROWING INDUSTRY WITH DEVELOPING NEEDS

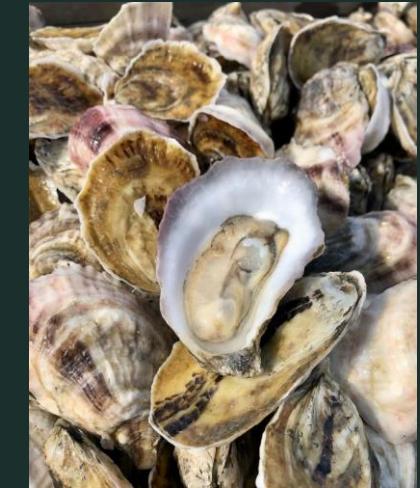
- The development of shellfish aquaculture in NC has been the focus of a number of stakeholder groups over the last decade and half
- The industry has shifted from largely extensive cultch planting and harvest to combination of intensive and extensive methods
- Much of the focus over the last 5+ years has been how to manage the growth of the industry



Photos courtesy of Middle Sound Mariculture LLC

GROWING INDUSTRY WITH DEVELOPING NEEDS

- As intensive culture developed, lease permits requests increased
- The time period to receive permits also increased 20+ month
- Little organization in placement of leases
- Very reactive rather than proactive
- Management geared toward wild resource management



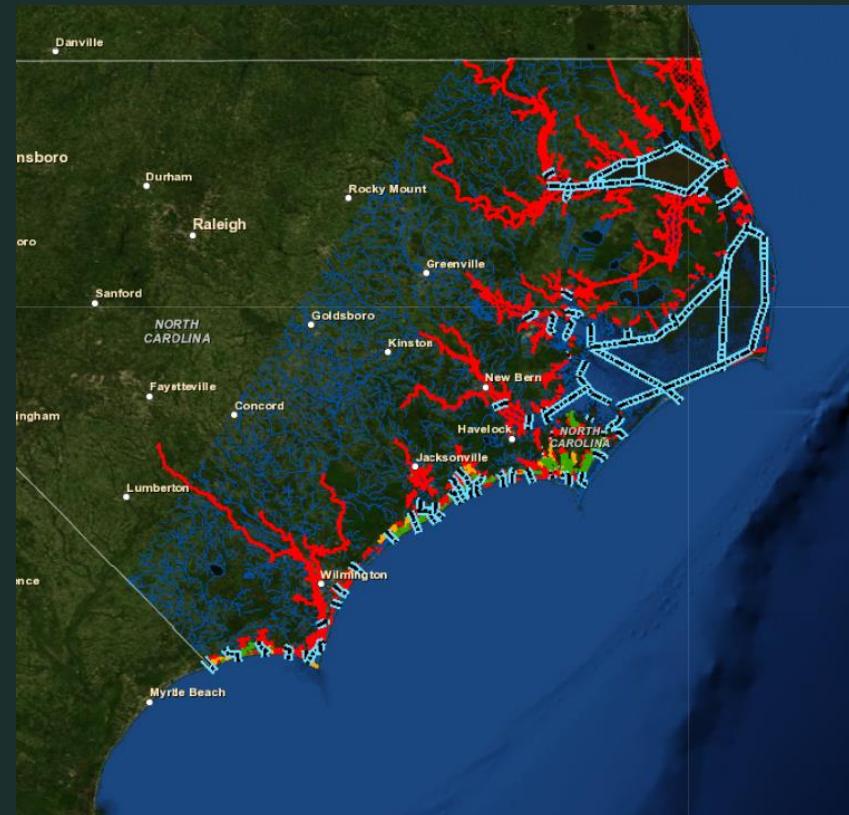
Photos courtesy of Middle Sound Mariculture LLC

HOW TO SELECT NEW AREAS

- New to the industry or new to the area
- Provides some info on classification and conditions
Always changing/ updating
- Provides only public information
Many time from unintended uses
- For those that are familiar with your growing area Historical data and metadata
Past might be a good predictor

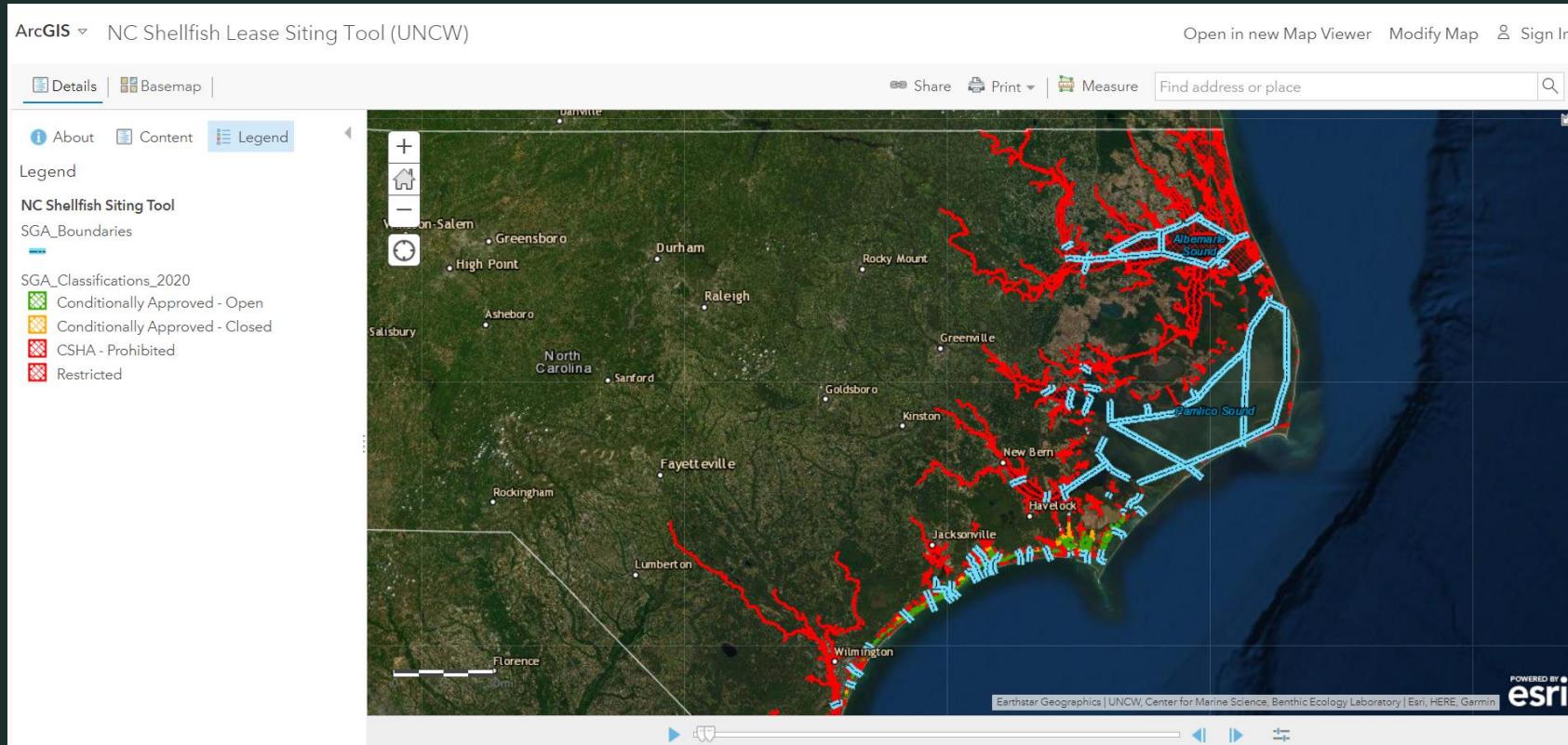
BEFORE YOU GET STARTED

- Type of operation
 - Shell on bottom*
 - Spat on shell
 - Floating bags*
 - Bottom cages*
- Effort you can commit
- How much area can you afford to work



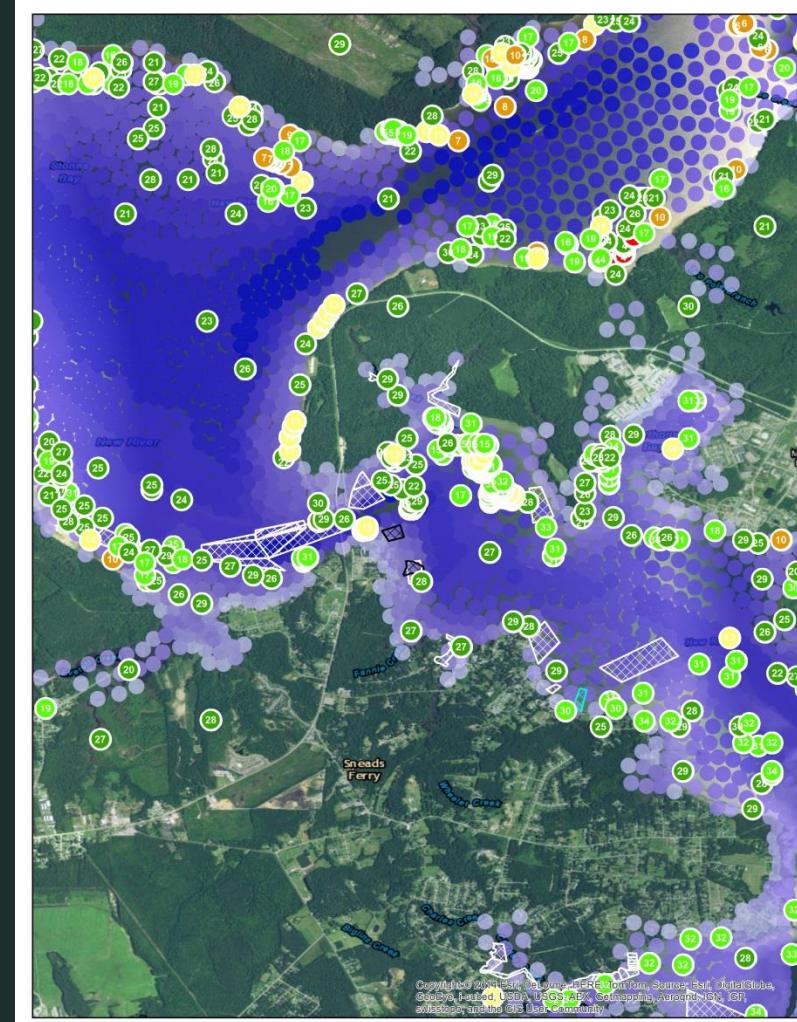
INFORMATION ACCESS

- The UNCW's NC Shellfish Aquaculture Siting Tool came online in 2011
 - Decision-support tool to provide data access



WHAT PARAMETERS ARE MOST IMPORTANT?

- Based on stakeholder input
- Tier I
 - Classification*
 - Depth*
 - Salinity*
 - Existing Leases*
- Tier II
 - Bottom Type*
 - Land-use*
 - % impervious surface*
 - Rainfall*



HOW DOES IT WORK

HTTP://UNCW.EDU/BENTHIC/

The screenshot shows a Microsoft Edge browser window displaying the [Benthic Ecology Laboratory](http://uncw.edu/benthic) website. The URL is visible in the address bar. The page features the University of North Carolina Wilmington logo and a search bar. A large black arrow points from the left towards the sidebar menu.

Benthic Home
Research Personnel
NC Shellfish Lease Siting Tool
Research
Projects
Publications
Links
Picture Archive

Welcome

Researchers in the Benthic Ecology Laboratory at the University of North Carolina Wilmington are taking a population and community approach to understanding coastal habitats. Using infauna, epifauna and nekton as indicators, we are interested in factors controlling food web structure in coastal and estuarine habitats, the importance of various habitat types, especially oyster, seagrass and salt marsh, as nurseries and foraging areas, and the influence of anthropogenic changes on coastal communities.

CONTACT US

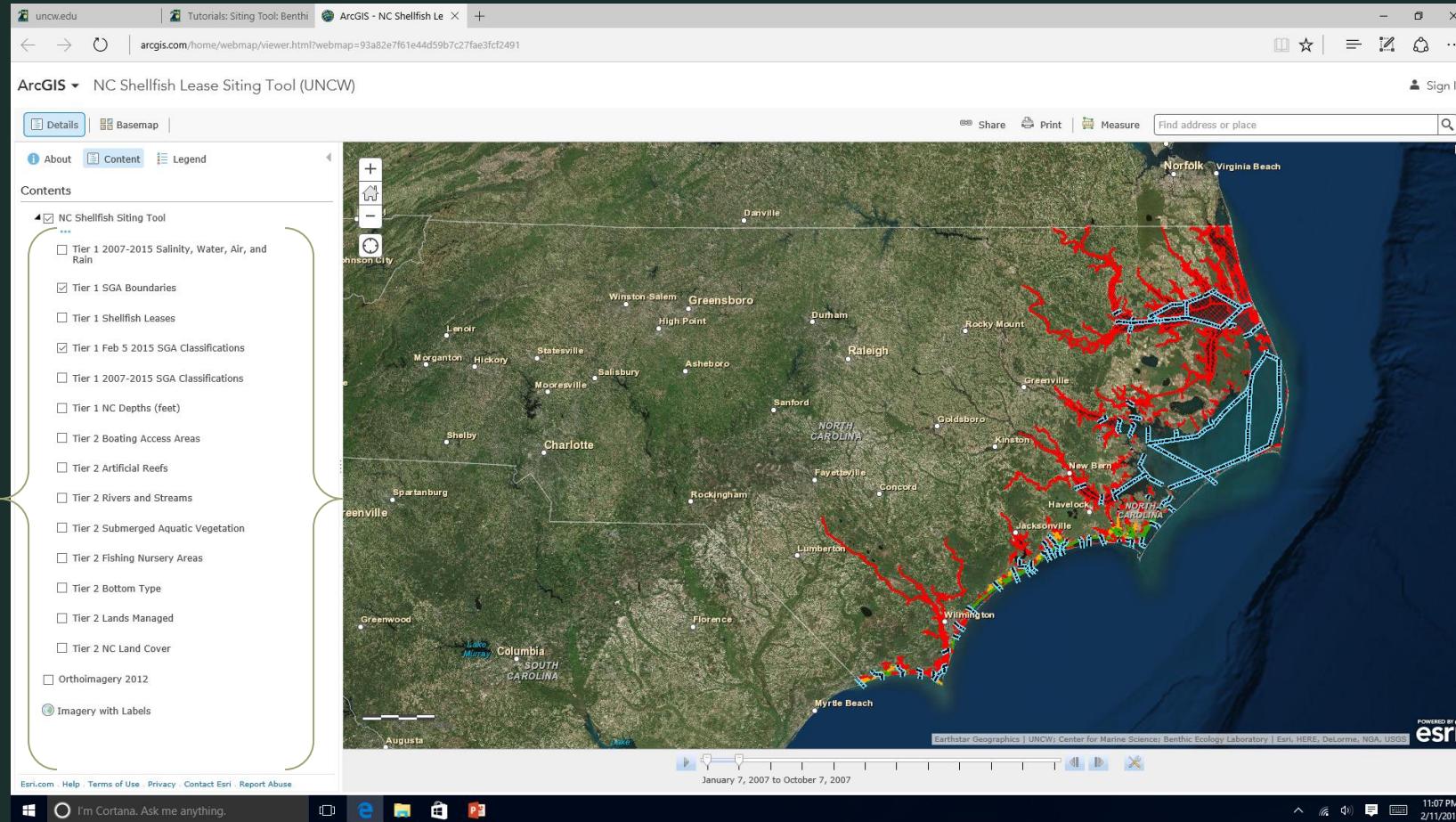
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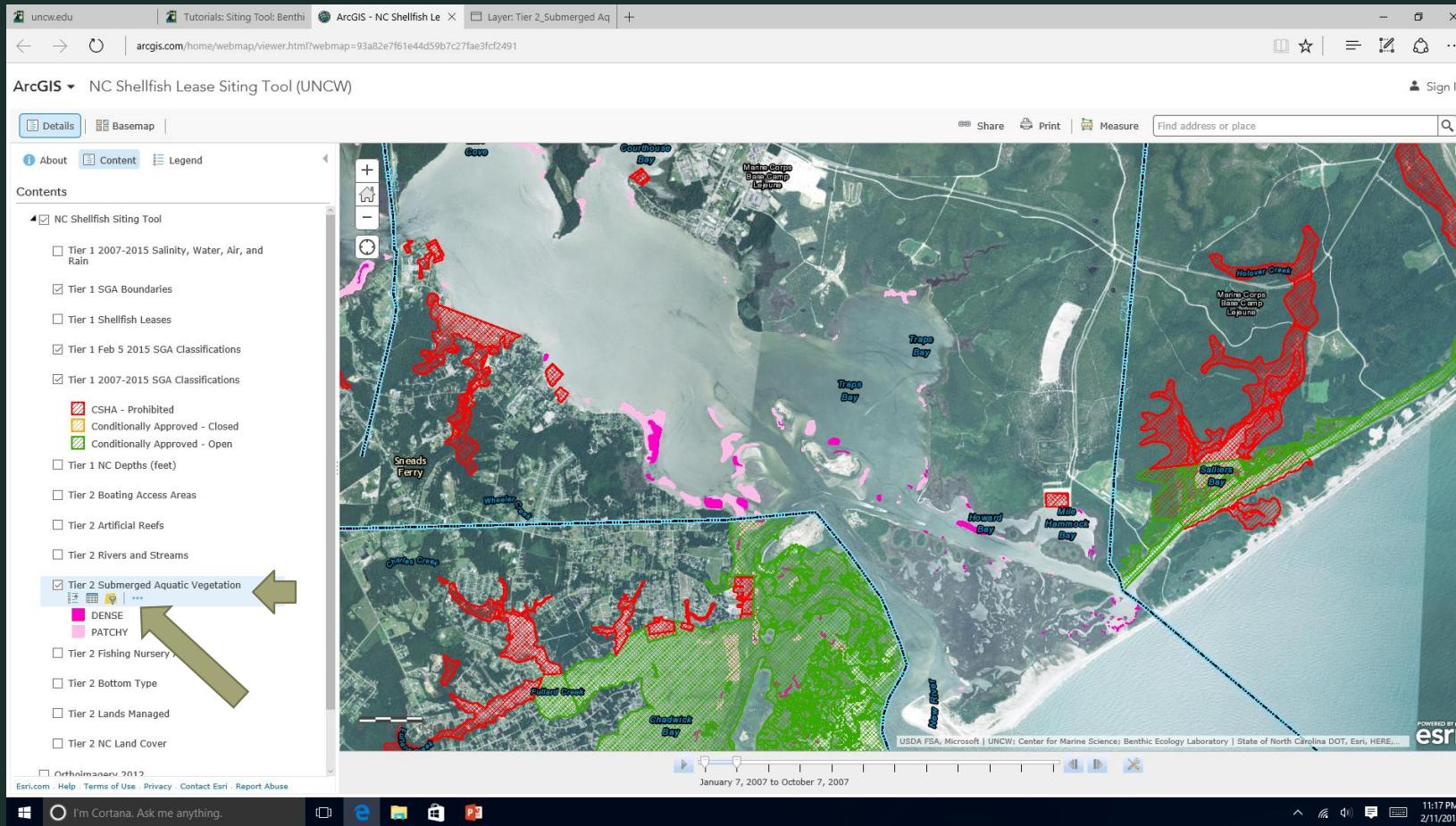
Windows taskbar at the bottom: I'm Cortana. Ask me anything., Edge, File Explorer, Mail, Photos, OneDrive, Powerpoint.

HOW DOES IT WORK

HTTP://UNCW.EDU/BENTHIC/



EXPLORE THE DATA SOURCE AND ATTRIBUTES



DID IT WORK? [HTTP://UNCW.EDU/BENTHIC/](http://uncw.edu/benthic/)



Yes



As of last month~90 new application
2022



Strategic placement



Working to identify user conflicts



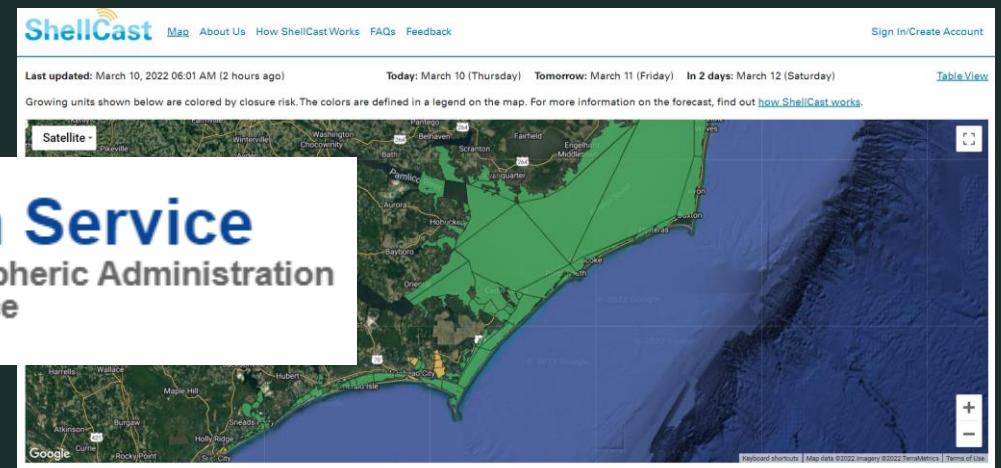
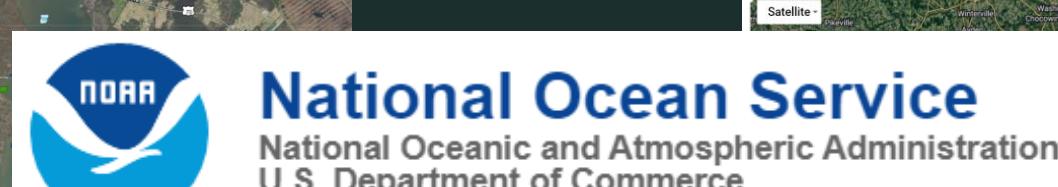
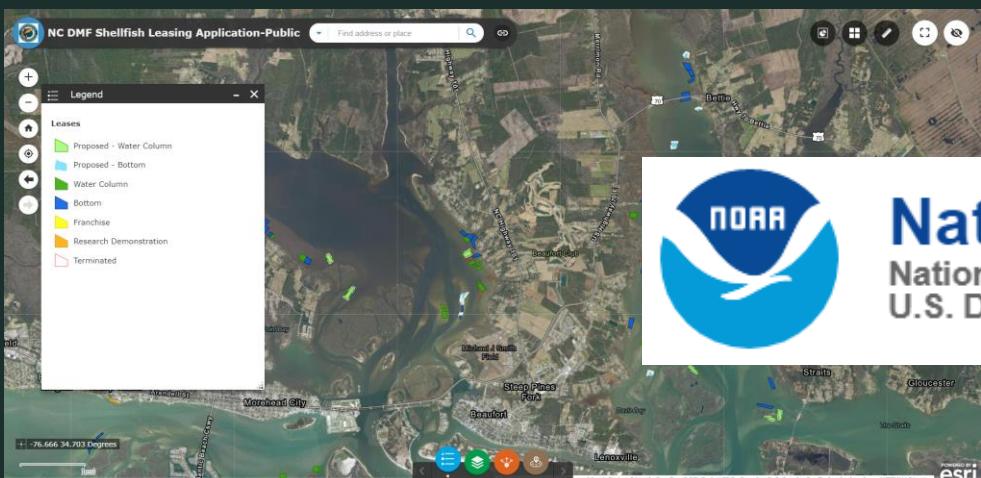
Provide business training



Year	Shellfish Leases						
	Applications			Approved			
Bottom	Water Column	Total	Bottom	Water Column	Total		
2005	3	1	4	9	0	9	
2006	5	1	6	12	0	12	
2007	3	0	3	15	1	16	
2008	5	0	5	5	0	5	
2009	0	0	0	1	0	1	
2010	1	1	2	15	0	15	
2011	1	1	2	12	0	12	
2012	8	6	14	16	2	18	
2013	6	10	16	10	6	16	
2014	8	7	15	15	6	21	
2015	9	2	11	21	8	29	
2016	10	11	21	47	6	53	
2017	52	46	98	45	11	56	
2018	36	33	69	62	33	95	
2019	58	48	106	50	22	72	
2020	32	26	58	16	14	30	
Total	237	193	430	351	109	460	

INFORMATION ACCESS

- The UNCW's NC Shellfish Aquaculture Siting Tool came online in 2011
 - Decision-support tool to provide data access
- Since that time there have been several other tools and mappers created to address the needs of a developing industry



QUESTIONS?

