

Critical Success Factors 2017



Regulation

Leasing
Monitoring
Enforcement

Research

Seed Stock
Disease Resistant
Environmental Impact
Grower Technology

Education

K12
Community Colleges
Environmental Groups
Local Outreach
Workforce Development

Investment

Business Case
Seed Money
Investors
Low Cost Loans
Grants
Insurance

Marketing /Distribution

Community Engagement
Tourism
Export
Branding



North Carolina
Oyster Summit
2019

SMAC- Oyster Mariculture Blueprint

- Planning launched May 2017
- Coastal Federation Convened Group 50 Stakeholders / Grew to 150+
- UNC Collaboratory Funding approved
 - UNC / IMS Pete Peterson & Chris Voss Project Leads
 - Monthly Meetings over 18 Months
- Summer 2018 Dr. Fodrie & Chris Baillie Join to Complete Recommendations



North Carolina Shellfish Mariculture Plan



TEN YEAR PLAN GOALS &
METRICS



INDUSTRY LEADERSHIP
STRUCTURE



SITING SHELLFISH
MARICULTURE
OPERATIONS



CREATING A CONDUCIVE
BUSINESS CLIMATE



PROTECTING & GROWING
WATERS TO ENSURE SAFE
AND RELIABLE HARVEST



APPLIED RESEARCH &
DEVELOPMENT

NC Strategic Plan for Shellfish Mariculture: a Vision to 2030



March 12, 2019
2019 North Carolina Oyster Summit

Legislative Mandate

S.L. 2016-94 Section 14.11.(d) & Senate Bill 257 Section 13.13.(b)

- Shellfish Mariculture Advisory Committee should examine topics to bolster NC's shellfish industry via stakeholder meetings
- Submit Strategic Plan to NCGA Joint Committee on Agriculture and Natural and Economic Resources

Result = 21 Major Recommendations (+4 Supplementary)

- Vision of Industry Development
- Supporting Shellfish Growers
- Meeting Promotional Needs
- Efficient Regulatory Structure
- Statutory Changes
- Improving Water Quality
- Research Needs

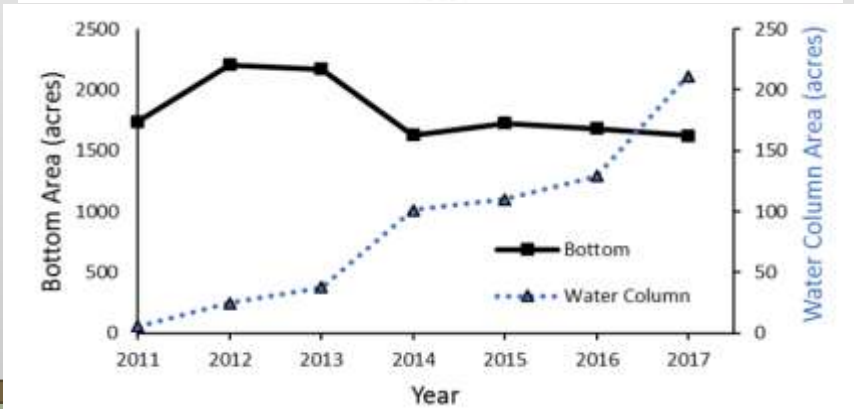
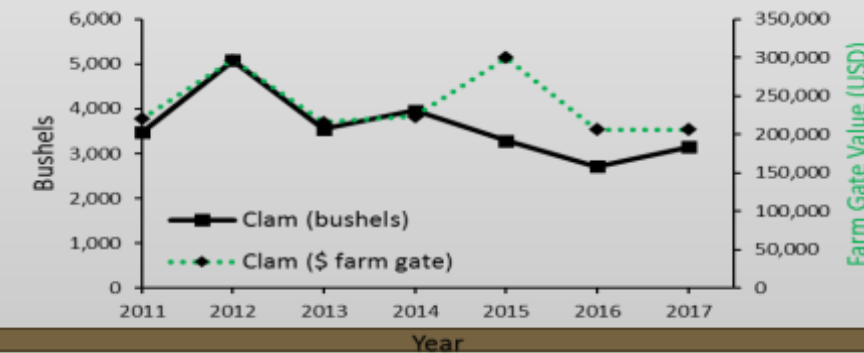
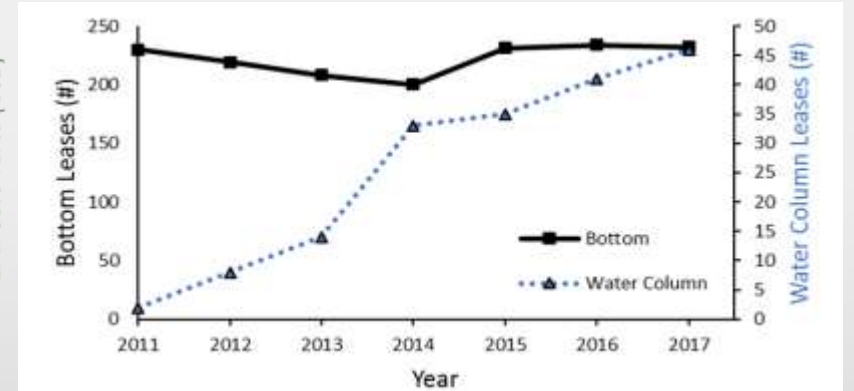
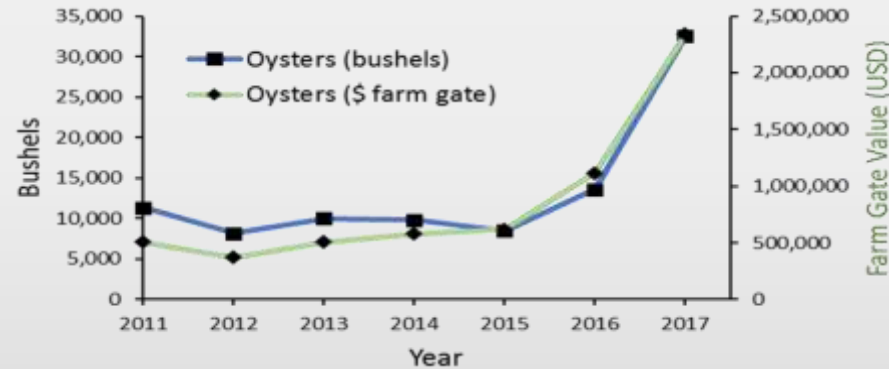


Interdisciplinary Membership and Broad Stakeholder Participation







NC Shellfish Mariculture as a Economic Force: Current Trends and \$33M Farm-Gate Goal



Constraints on Industry Growth

 Inadequate insurance

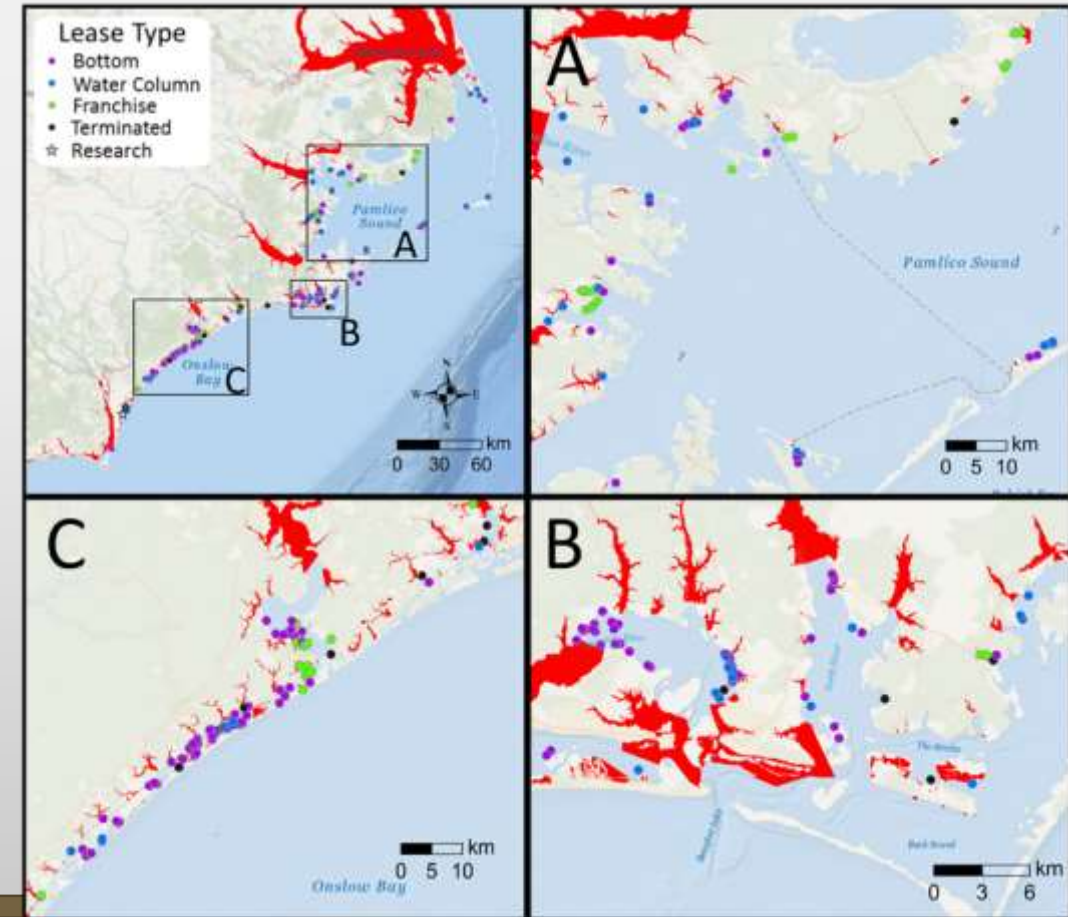
Solution: State support for NCSGA's efforts to develop a pilot Federal Crop Insurance Program for Farmed Shellfish

 Lack of financing

Solution: State-supported low-interest loan program (MARBIDCO model)

 Permanent and temporary water closures

Solutions: (A) Strengthen NCDEQ water resources staffing
(B) State-funded grant scoring should account for benefits to growing waters
(C) Require LID for State projects as feasible



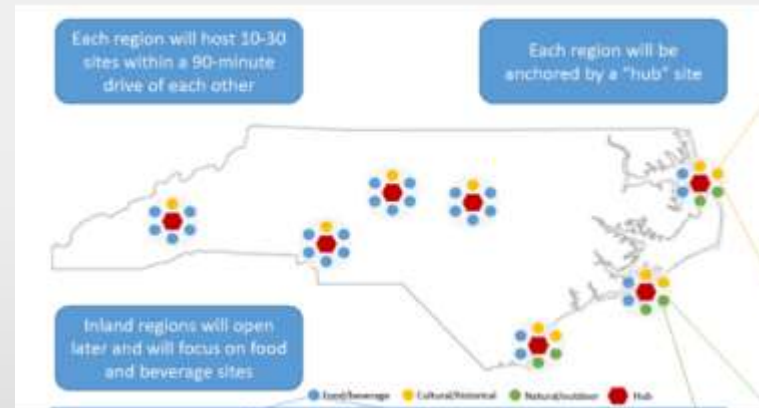
Expanding NC Oyster Market Share and Distribution



Conduct market analysis for NC oysters

Build NC brand and marketing strategy (NCDA&CS involvement)

Implement NC Oyster Trail



Cultural & Historic

N Aquarium A	U Historical Site P	A Museum U
Ex. Pine Knoll Shores Aquarium Pine Knoll Shores, NC	Ex. Fort Macon State Park Bogue Banks, NC	Ex. NC Maritime Museum Beaufort, NC

Natural & Outdoors

P Guided Tour A	N Nature Walk U	P Adventure A
Ex. Sandbar Oyster Company Beaufort, NC	Ex. Living Shoreline Newport, NC	Ex. Roosevelt Natural Area Paddle Trip Pine Knoll Shores, NC

Food & Beverage

U Restaurant N	N Brewery A	U Winery P
Ex. Captain Georges Seafood Kill Devil Hills, NC	Ex. Ponysaurus Brewing Company Durham, NC	Ex. RayLen Vineyards and Winery Mocksville, NC

What is the Right Growth Model for NC to \$33M?

State	Leases						Production								Shellfish Aquaculture Jobs			State Staffing for Mariculture Governance
	Water Column		Bottom		Cumulative		Oysters			Clams		Oysters	Clams	Data Year	Direct	Indirect	Year	
	# Leases	Acreage	# Leases	Acreage	# Leases	Acreage	Bushels	Pieces	Value	Pieces	Value	Bu/acre	Bu/acre					
ME	--	--	--	--	110	557	N/A	8,804,391	\$5,964,214	--	--	53	--	2014	500	500	2016	6.5**
NH	1.0	2.3	24.0	68.4	25	71	N/A	329,156	\$246,441	--	--	16	--	2017	24	--	2015	1
MA	--	--	--	--	360	1,259	N/A	38,251,358	\$21,711,683	5,554,641	\$132,806	101	11	2016	769	140	2013	2
RI	--	--	--	--	73	296	N/A	8,434,541	\$5,752,886	71,000	\$18,460	95	1	2017	194	--	2016	1
CT	326.0	30,669.0	674.0	22,422.0	1000	53,091	73,367	22,010,000	\$8,010,682	106,323,500	\$17,405,028	1	5	2010	350	--	2018	--
NY	--	--	--	--	859+	4,621	--	--	--	--	--	--	--	--	--	--	--	0 ^{\$}
NJ	--	--	--	--	1742	<3876	N/A	2,029,500	\$1,370,060	--	--	2	--	2016	319+	--	2016	6
DE	--	--	--	--	21	21	Leasing began 2017, no production reported							2017	84+	--	2011	1.5
MD	57.0	222.0	309.0	3,960.0	334	4,182	21,362	3,838,037	\$2,769,867	--	--	8	--	2014	498	--	2014	8
VA	--	--	--	--	5500	120,000	27,000	38,900,000	\$15,900,000	176,000,000	\$37,500,000	1	4	2017	965	--	2016	--
NC	46.0	211.0	232.0	1,626.0	278	1,837	20,983	3,459,740	\$2,400,000	1,260,000	\$206,500	18	2	2017	228+	--	2011	2***
SC	--	112.4	--	946.0	23	1,058	2,520.0	--	\$375,117	2,969,865.0	\$407,333	2.4	7.0	2018	--	--	--	--
GA	--	--	--	--	17	29,186	1,328.0	--	\$119,876	9,488,160	\$1,611,613	0	0.8	2017	--	--	--	--
FL	60.0	156.0	549.0	1,259.0	609	1,415	--	--	--	126,600,000	\$11,900,000	--	224	2012	400	--	2016	7
AL	14.0	28.0	0.0	0.0	14	28	--	2,698,755	\$1,956,766	--	--	321	--	2016	30	--	2016	--
MS	0.0	0.0	7	623.2	7	623	--	299,900	--	--	--	2	--	2010	--	--	--	6
LA	--	--	--	--	8020	403,461	--	227,737,226	\$40,500,000	--	--	2	--	2013	--	4800	--	--
TX	--	--	--	--	43	2,270	--	28,571,428	\$3,700,000	--	--	42	--	2014	--	--	--	0 ^{\$}
CA	--	--	--	--	17	878	--	16,121,835	\$16,096,460	257,640	\$42,940	61	1	2016	200	80	2010	5
OR	--	--	--	--	77	3,837	88,631	--	\$3,102,098	--	--	23	--	2017	--	--	--	0 ^{\$}
WA	--	--	--	--	121	2,058	175,863	--	\$34,853,940	0	\$0	85	0	2013	1900	810	2010	--
AK	39.0	177.0	17.0	87.0	56	264	--	1,161,518	\$796,945	0	\$0	15	0	2016	166	--	2016	5**

(--) Data Unavailable

**Administer all forms of mariculture (e.g. shellfish, seaweed, urchins)

*** 5 Additional staff assist, but budgetted from Benthic Mapping and Habitat Enhancement Sections

^{\$} Administered by employees under non-shellfish mariculture budgets

Statutory Changes Needed to Reach \$33M

Increased lease area

not unreasonably interfere

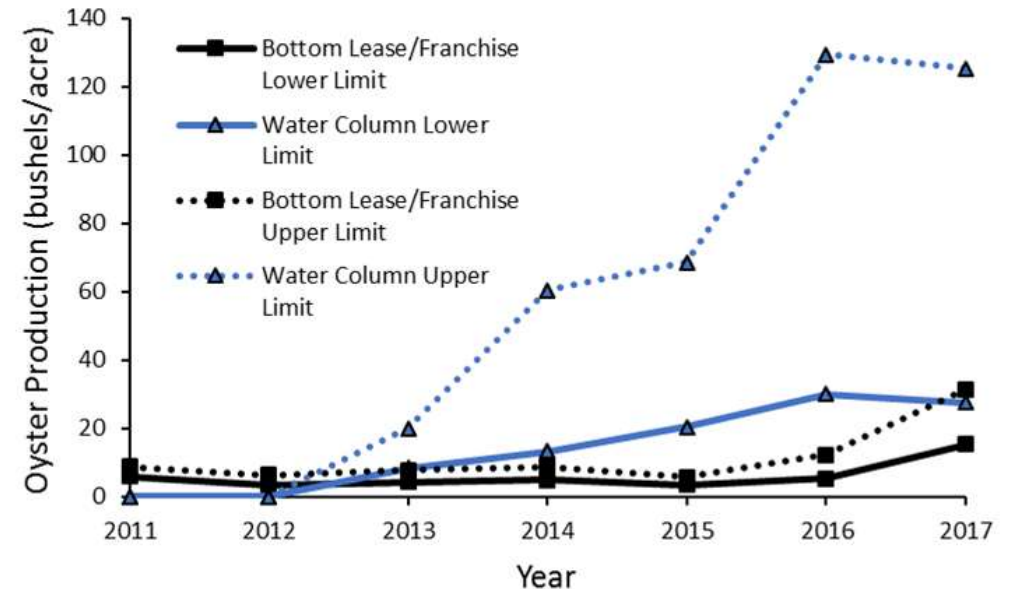
← CRITICAL CHANGE

1. Reduce litigation: *Cultivation of shellfish in leased areas will ~~be compatible~~ with [other public uses] ... N.C.G.S. §113-202*
2. Shellfish Enterprise Areas (SEAs): multiple, connected parcels to be applied for and managed by the NC Division of Marine Fisheries
3. Ease paperwork for permitting a few 50-acre leases in Pamlico Sound

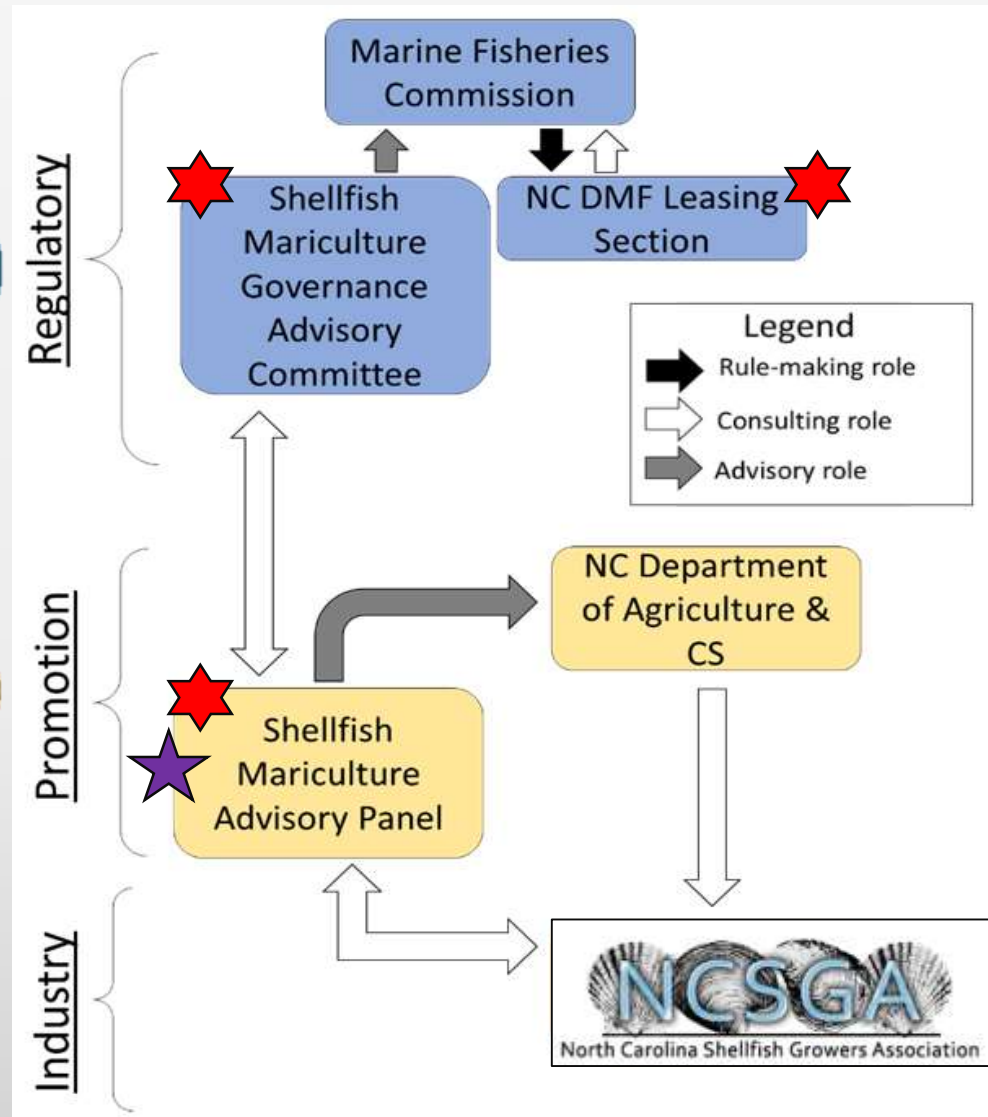
Increased lease unit-area production*

- Bottom leases: 40 bushels acre⁻¹ yr⁻¹ (up from 10)
- Water-column leases: 100 bushels acre⁻¹ yr⁻¹ (up from 40)

* *production OR investment options*



Regulatory and Promotion Frameworks to Support NC Shellfish Farming



- ★ New (i.e., needs to be created)
- ★ Responsible for annual report to NCSGA (i.e., accountability)



Addressing Shellfish Mariculture Research Needs

- Shellfish Mariculture Grant program (NCSG administered)
 - Spatial planning/siting, triploid lines, human health (*Vibrio* spp.), etc.
- Mariculture Resource Grant program (NCSG administered)
 - Grower-led projects: technology transfer, product safety, crop diversification, etc.
- Aquaculture Business Agent (NCSG)

NCGA and NC Agency Actions Already Supporting Shellfish Farms

- UNCW Shellfish Research Hatchery appropriations
- Northern Shellfish Sanitation Laboratory appropriations
- NCSU Shellfish Pathology Laboratory appropriations
- CCC's Aquaculture Technology Program appropriations
- Increasing % of NCDEQ expenditures directed toward shellfish mariculture
- N.C.G.S. §106-759 directing NCDA&CS to promote aquaculture
- Post-Florence inclusion of shellfish farmers in disaster recovery support



What the NCGA can act on now!

Recommendation		Cost	
#	Summary	Non-Recurring Appropriation (\$)	Recurring Appropriation (\$)
1	Embrace a \$100 Million Industry Valuation Goal	\$0	\$0
2	Provide FCIC/RMA Concept Proposal Start-Up Funds	\$30,000	\$0
3	Establish a Low-Interest Loan Program	\$2,000,000	\$60,000
4	Specify Eligibility of Shellfish Growers for Agriculture Disaster Funds	\$0 ¹	\$0
5	Commission a Market Analysis	\$30,000	\$0
6	Fund a Shellfish Mariculture Advisory Panel at NCDA&CS	\$0	\$30,000
7	Fund Development of North Carolina Oyster Trail	\$0	\$200,000
8	Establish a Shellfish Mariculture Governance Advisory Committee	\$0	\$30,000
9	Establish a Shellfish Leasing Section at NCDMF	\$0	\$165,000*
10	Amend G.S. 113-202: Increase Secretary's Discretion	\$0	\$0
11	Establish Shellfish Enterprise Areas (SEAs)	\$0	\$0
12	Permit a capped number of larger leases	\$0	\$0
13	Increase Utilization Requirement	\$0	\$0
14	Increase Penalties for Theft from Shellfish Leases	\$0	\$0
15	Allow Nurseries in Prohibited Waters	\$0	\$0
16	Appropriate Funding for Additional NCDEQ Water Resources Staff	\$0	\$183,000*
17	Revise State Grant Scoring to Benefit High Priority Growing Areas	\$0	\$0
18	Require Low-Impact-Development for State Projects	\$0	\$0**
19	Establish a Shellfish Mariculture Grant Program	\$0	\$250,000
20	Establish a Mariculture Resource Grant Program	\$0	\$150,000
21	Fund an Additional Position at North Carolina Sea Grant	\$0	\$80,000 [§]
Totals		\$2,060,000	\$1,138,000

¹ Not a special ask for shellfish growers: Eligibility for disaster relief funds available to other forms of agriculture.

* Three Full Time Equivalent Positions (fringe included)

** Unknown indirect cost

[§] One Full Time Equivalent Assistant Position (fringe included)



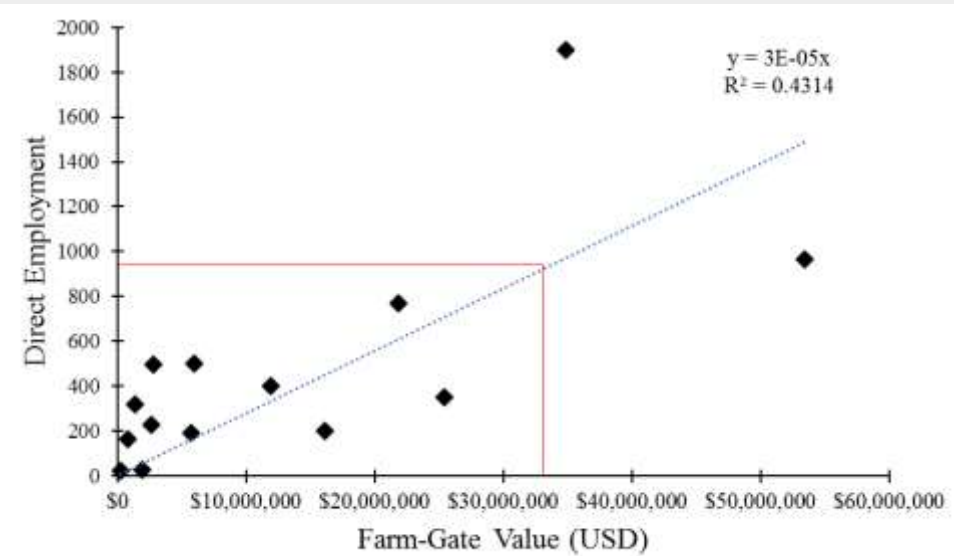
Farm Income		
NC Rank	Commodities	2016
		<i>x 1000 Dollars</i>
1	Broilers	3,091,561
2	Hogs	2,103,444
3	Turkeys	993,389
4	Tobacco	668,596
5	Soybeans	543,241
6	Chicken eggs	444,403
7	Corn	429,589
8	Sweet potatoes	342,000
9	Cattle and calves	255,295
10	Dairy products, milk	164,160
11	Cotton	159,601
12	Cotton lint	131,619
13	Wheat	76,426
14	Peanuts	68,283
15	Blueberries	66,924
16	Hay	60,078
17	Tomatoes	51,894
18	Watermelon	29,198
19	Cottonseed	27,982
20	Strawberries	26,928
--	Mariculture Oysters	1,100
--	Mariculture Clams	260

Justification for Appropriations

\$33M farm-gate * 3x conservative multiplier = \$100M industry

Expands economic opportunities in coastal regions where K-12 schools, county administrations, hospitals, and Walmart are typically largest employers

Achieving \$33M farm-gate could support 1,000 on-the-water jobs. NCGA investment per job per year = 13.5K (an extremely efficient return)

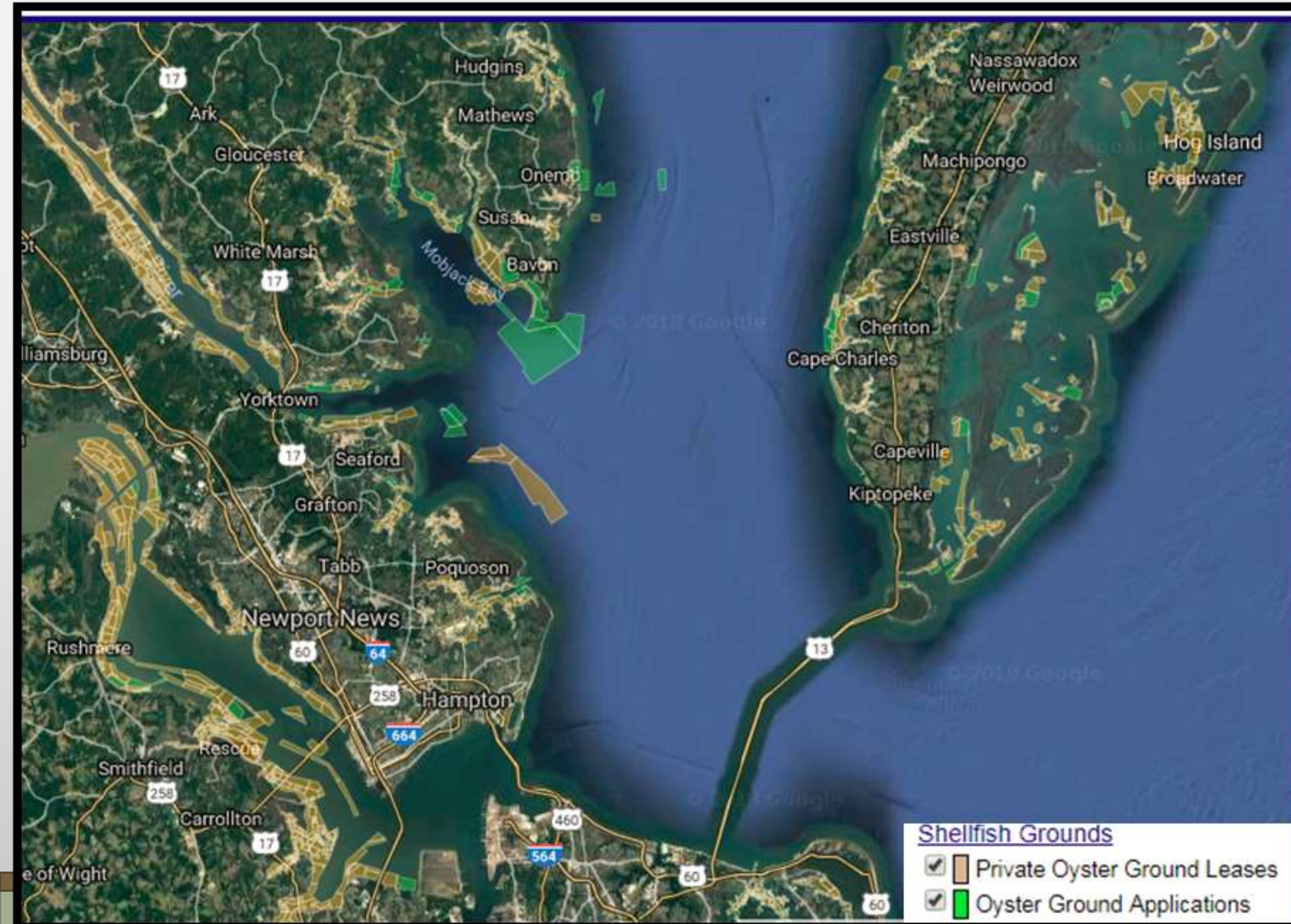


Shellfish farming promotes environmental benefits related to water quality enhancement and finfish/crustacean fishery production that are unique compared to land-based agriculture

VA Example

Expansive area leased: 120,000 acres

Low Production



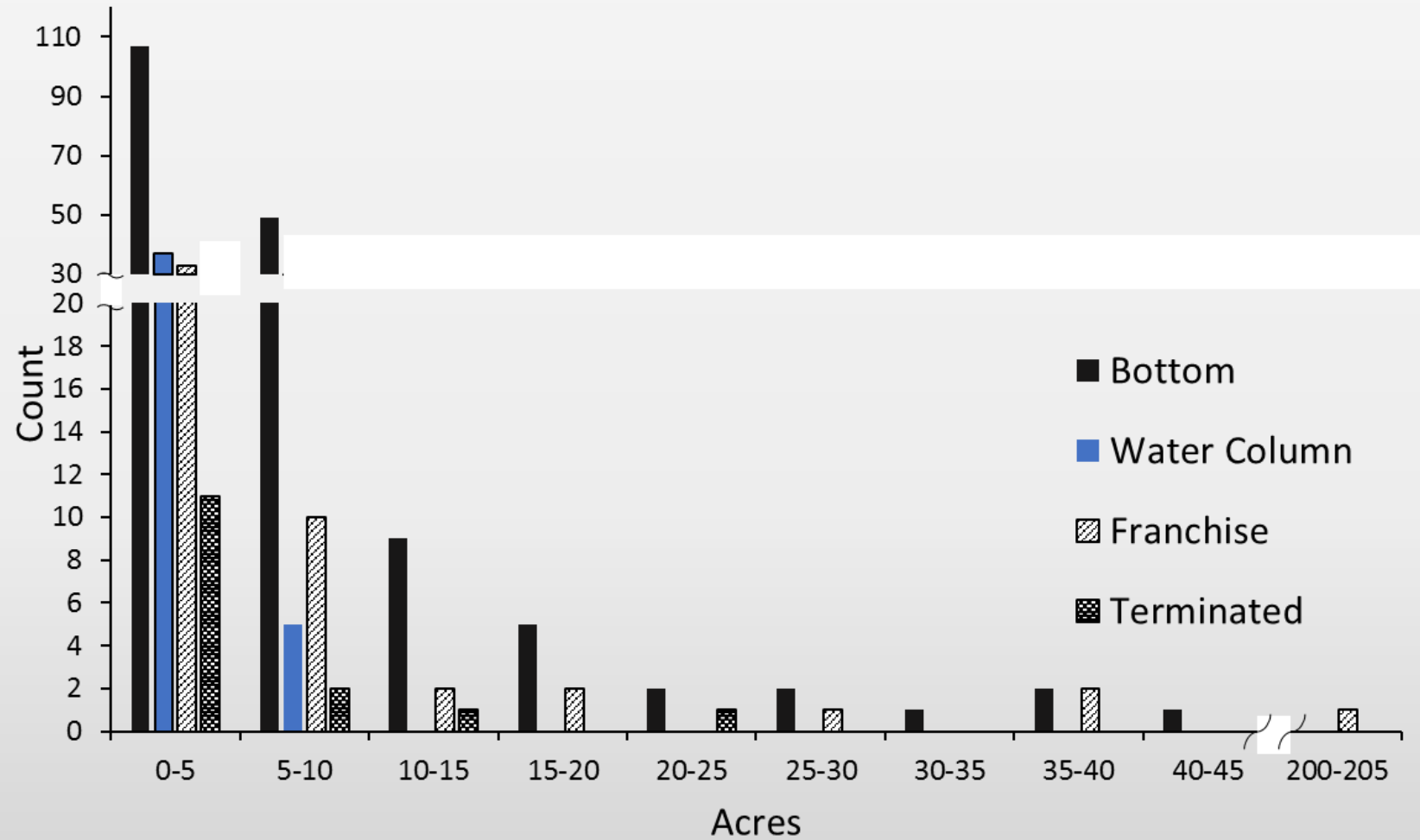


Figure 3. Histogram of lease acreage by lease type. Terminated leases are those terminated since 2005. Data extracted from North Carolina OneMap GeoPortal.

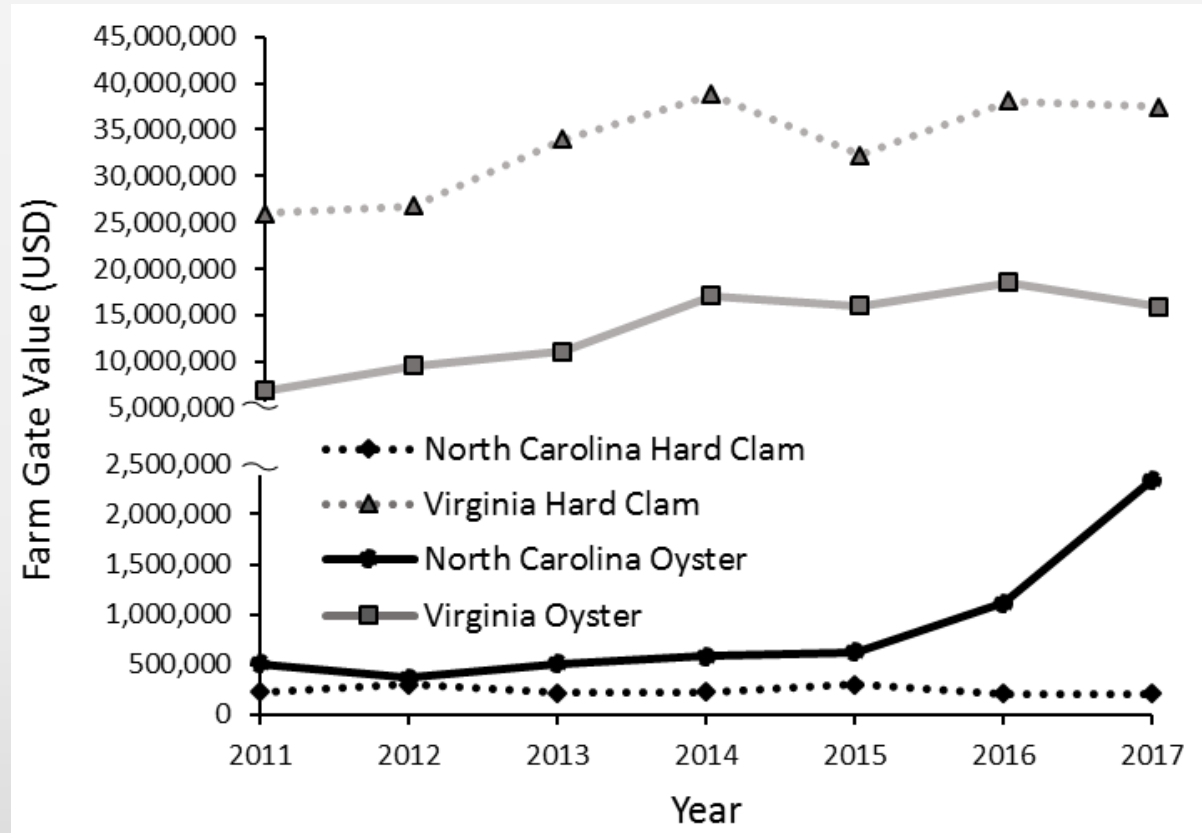


Figure 7. Production and farm-gate value of mariculture oysters and clams in North Carolina and Virginia between 2011 and 2017. Source: North Carolina data was provided by the North Carolina Division of Marine Fisheries. Virginia data was obtained from Murry and Hudson, Virginia Shellfish Aquaculture Situation and Outlook Report: 2011-2017.

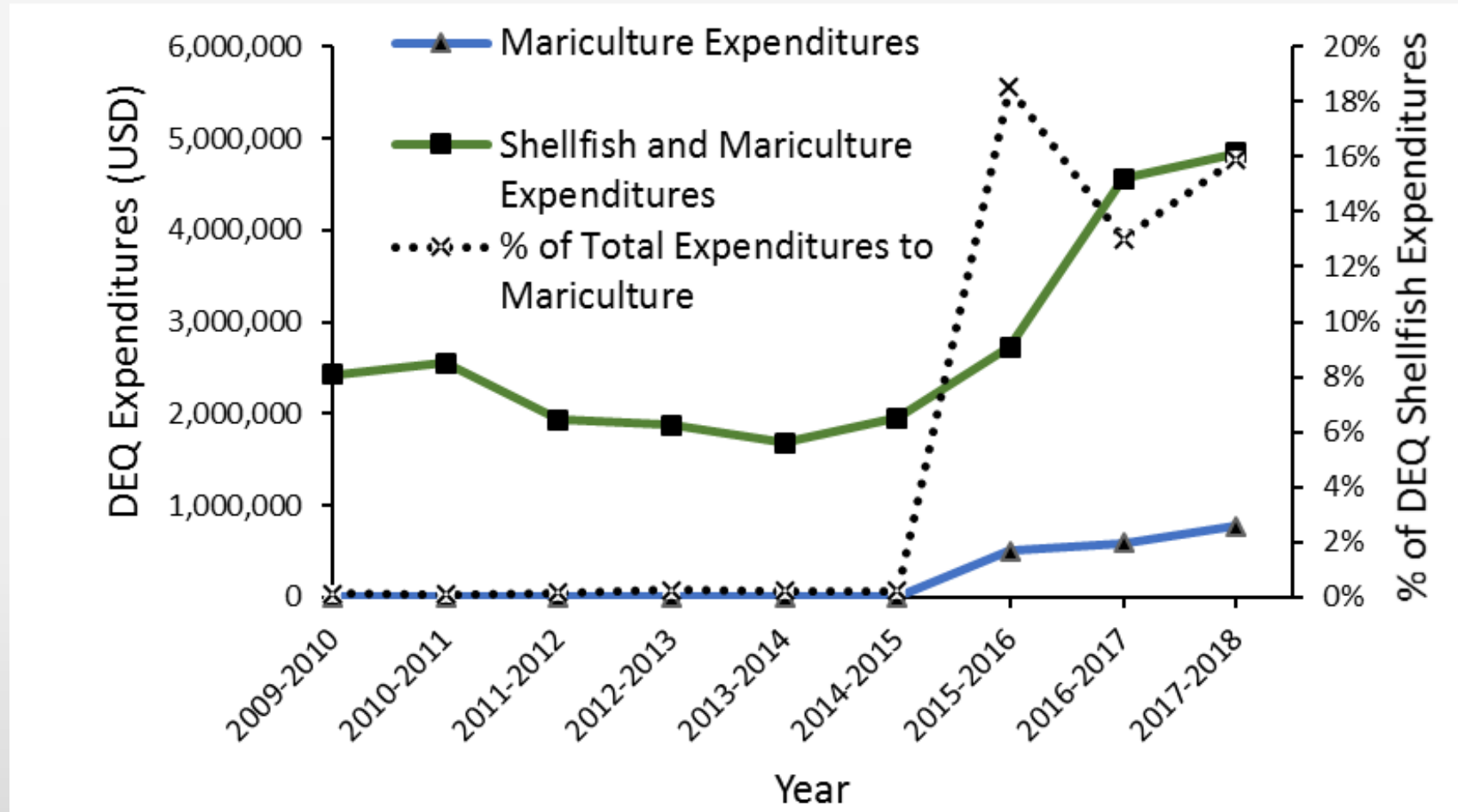


Figure 8. North Carolina Division of Environmental Quality funding for Shellfish, Oysters, and Aquaculture Fiscal Year 2009-2010 through 2017-2018: Total expenditures, mariculture specific expenditures, and percent of total allocated to mariculture. Source: North Carolina Policy Collaboratory.

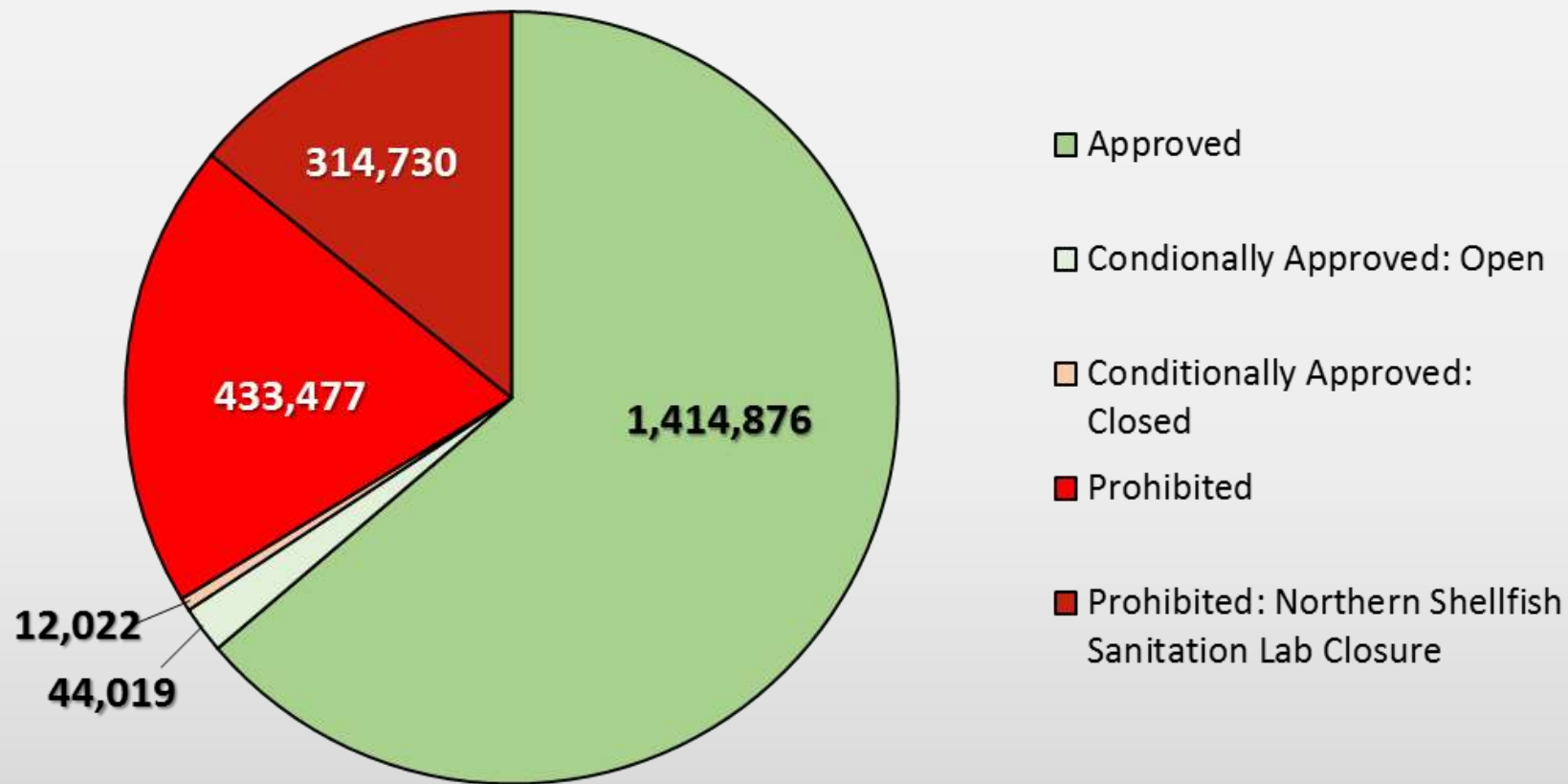


Figure 9. Coastal water shellfish classification acreages for 2017. Source: Shellfish Sanitation, North Carolina Division of Environmental Quality.

	Top Employers by County (2017)				Poverty Rate (2013)	Unemployment Rate (Jan 2018)
	County	Employer	Sector	Employees		
	Beaufort	Beaufort County Schools	Education & Health Services	1000+	20.5	5.4
	Bertie	Perdue Products Inc.	Manufacturing	1000+	26.6	6.3
	Brunswick	Brunswick County B.O.E.	Education & Health Services	1000+	16.1	6.9
		Progress Energy Service Co	Trade, Transportation, & Utilities	1000+		
		County Of Brunswick	Public Administration	1000+		
	Camden	Camden County BOE	Education & Health Services	250-499	9.5	4.5
	Carteret	Carteret County B.O.E.	Education & Health Services	1000+	15.2	5.1
		Carteret County General	Education & Health Services	1000+		
	Chowan	Edenton-Chowan Schools	Education & Health Services	250-499	22.2	5.7
		Vidant Medical Center	Education & Health Services	250-499		
		Meherrin Ag & Chem Co	Trade, Transportation, & Utilities	250-499		
	Craven	Army Navy & Air Force	Public Administration	1000+	16.6	4.8
		Carolina East Medical Center	Education & Health Services	1000+		
		Craven County B.O.E.	Education & Health Services	1000+		
		BSH Home Appliances Corp	Manufacturing	1000+		
	Currituck	Currituck County B.O.E.	Education & Health Services	500-999	11.7	5.2
	Dare	Dare County Schools	Education & Health Services	500-999	11.1	10.5
		County Of Dare	Public Administration	500-999		
	Gates	Gates County B.O.E.	Education & Health Services	250-499	18.2	4.5
	Hertford	Hertford County B.O.E.	Education & Health Services	100-249	24.9	6
		Vidant Medical Center	Public Administration	100-249		
	Hyde	Hyde County B.O.E.	Education & Health Services	500-999	22.9	14.6
		Nc Dept Of Public Safety	Education & Health Services	500-999		
	New Hanover	New Hanover Reg Med Center	Education & Health Services	1000+	18.9	4.5
		New Hanover Schools	Education & Health Services	1000+		
		UNC Wilmington	Education & Health Services	1000+		
		PPD Development Llc	Professional & Business Services	1000+		
		County Of New Hanover	Public Administration	1000+		
		Cape Fear Community College	Education & Health Services	1000+		
		Celco Partnership	Information	1000+		
		City Of Wilmington	Public Administration	1000+		
	Onslow	Onslow County B.O.E.	Education & Health Services	1000+	16.9	5.3
		Department Of Defense	Public Administration	1000+		
		Marine Corps Community Services	Trade, Transportation, & Utilities	1000+		
		Wal-Mart Associates Inc	Trade, Transportation, & Utilities	1000+		
		County Of Onslow	Public Administration	1000+		
		Onslow Memorial Hospital	Education & Health Services	1000+		
	Pamlico	Pamlico County Schools	Education & Health Services	250-499	19	5.1
	Pasquotank	Elizabeth City County Board	Education & Health Services	500-999	21.8	6.1
		Sentara Internal Med. Physicians	Education & Health Services	500-999		
		U.S. Dept. Homeland Security	Public Administration	500-999		
	Pender	Pender County Schools	Education & Health Services	1000+	18.3	5
	Perquimans	Perquimans County Schools	Education & Health Services	250-499	20.9	5.8
	Tyrell	Tyrell County B.O.E.	Education & Health Services	100-249	27.2	10.6
		Nc Dept Of Public Safety	Public Administration	100-249		
	Washington	Domtar Paper Company Llc	Manufacturing	250-499	25.5	7.6
		Washington County B.O.E.	Education & Health Services	250-499		
	NORTH CAROLINA				17.9	4.5

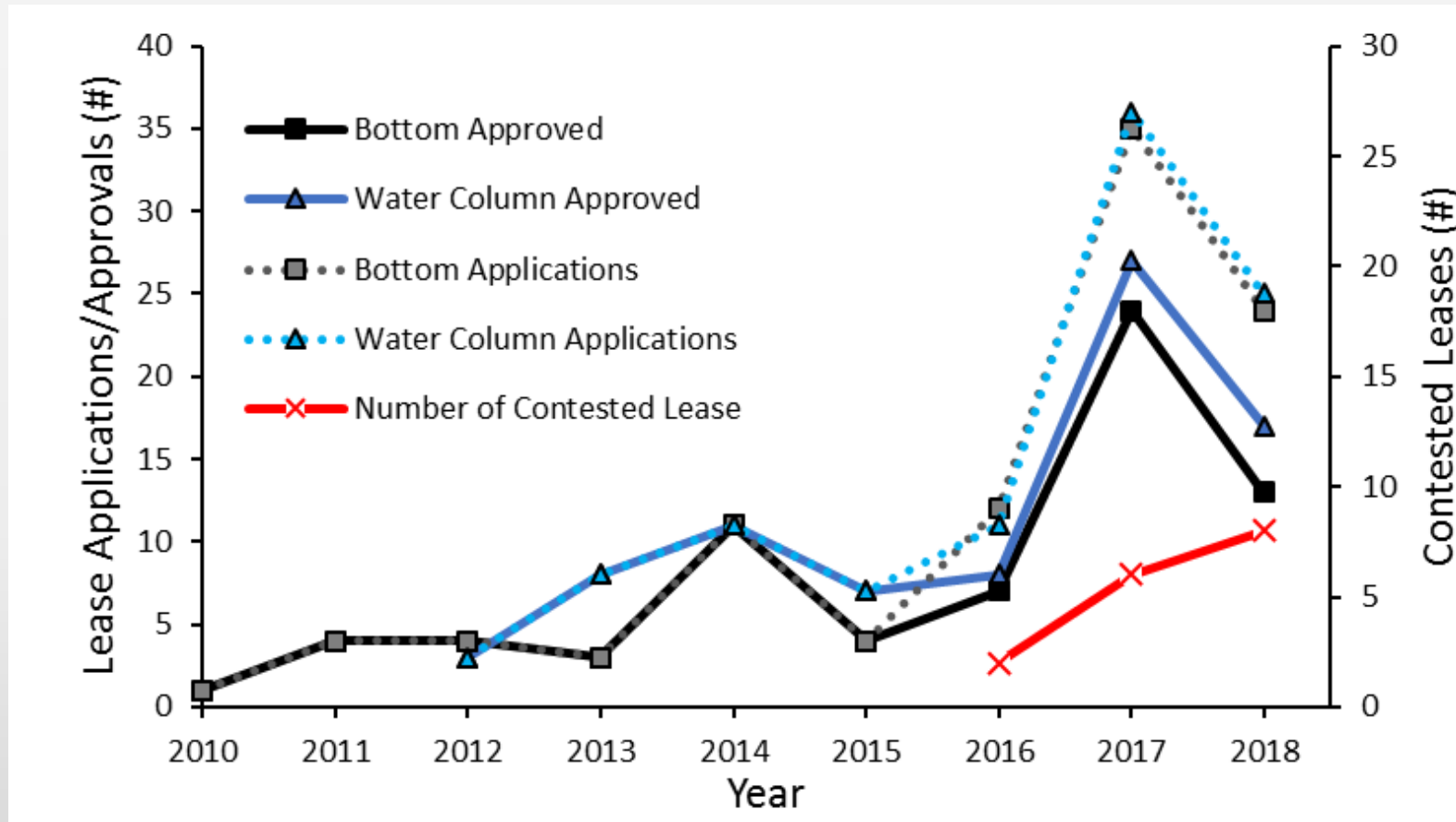
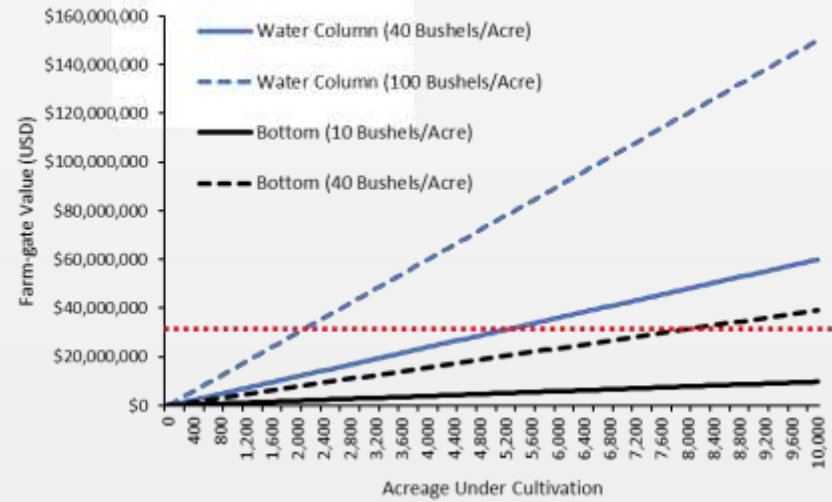


Figure 11. Number of applications and approvals for bottom and water-column leases in North Carolina since 2010, and number of lease decisions contested by applicant or aggrieved third party since 2016. Data for 2018 represent mid-year totals. Source: North Carolina Division of Marine Fisheries.

A



B

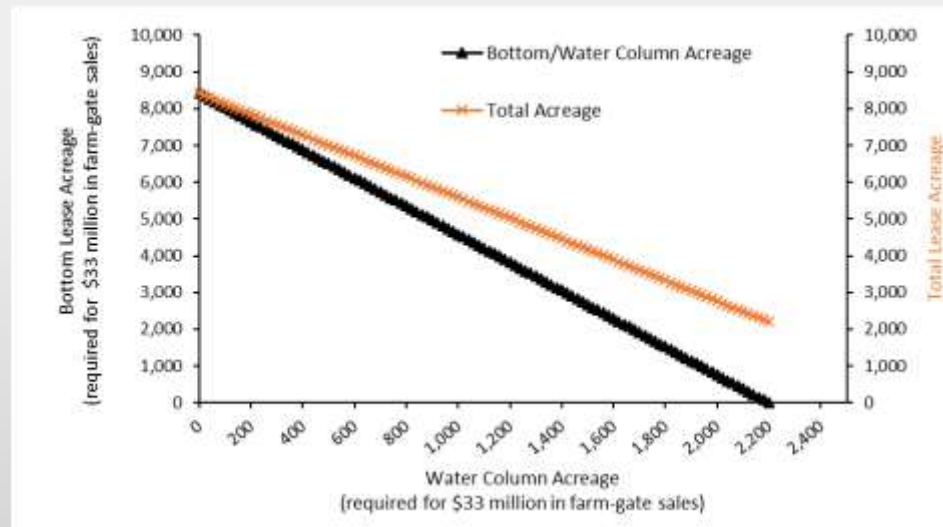


Figure 13. Acres of water column (blue) or bottom (black) shellfish leases required to achieve \$33 in farm-gate sales (red dashed line) under current (solid) or increased (dashed) production requirements (A). Acreage of bottom leases and total leased acreage required to achieve \$33 million in farm-gates sales as a function of water column acreage. Analysis assumed production of 100 bushels acre⁻¹ for water column leases and 40 bushels acre⁻¹ for bottom leases (B). For all analyses, it is assumed that all water column produced shellfish and half of the shellfish produced on bottom leases are sold individually for \$0.50 a piece. The other half of bottom produced shellfish are assumed to be sold at a price of \$46 bushel⁻¹.

State	Cumulative federal and matching funding between 1990 and 2015 (Adjusted to 2015 USD; rank among U.S. states and Territories)*					
	All Shellfish		Oysters		Clams	
	\$	Rank	\$	Rank	\$	Rank
ME	\$7,956,605	5	\$2,825,175	9	\$785,041	4
NH	\$2,560,805	17	\$1,106,424	16	\$252,663	6
MA	\$3,136,555	14	\$860,210	17	\$136,735	11
RI	\$4,924,554	10	\$4,027,087	6	\$0	12
CT	\$2,644,633	16	\$812,797	18	\$0	12
NY	\$963,795	19	\$179,417	21	\$231,195	8
NJ	\$7,921,403	6	\$4,714,939	4	\$427,130	5
DE	\$3,269,646	11	\$3,269,646	8	\$0	12
MD	\$6,889,295	8	\$5,092,110	3	\$194,000	10
VA	\$11,504,397	2	\$7,461,672	2	\$1,215,437	3
NC	\$2,700,673	15	\$1,991,753	12	\$0	12
SC	\$2,232,450	18	\$1,504,245	15	\$221,753	9
GA	\$567,494	20	\$567,494	19	\$0	12
FL	\$10,918,144	3	\$1,664,759	14	\$2,583,420	1
AL	\$3,245,498	13	\$2,530,535	11	\$240,921	7
MS	\$190,166	22	\$0	22	\$0	12
LA	\$8,100,216	4	\$7,783,068	1	\$0	12
TX	\$559,234	21	\$312,941	20	\$0	12
CA	\$5,511,714	9	\$2,602,236	10	\$0	12
OR	\$6,909,655	7	\$3,560,067	7	\$0	12
WA	\$11,802,166	1	\$4,527,992	5	\$1,305,072	2
AK	\$3,247,602	12	\$1,729,447	13	\$0	12

*Federal Grants from DOD, DOE, EPA, HHS, NASA, NOAA, NSF, USAID, USDA

Major Legislative Accomplishments in Support of the North Carolina Shellfish Mariculture Industry			
Actions to Support the Shellfish Industry		Outcome Achieved	Complete
Appropriate funding for shellfish pathology lab		Position funded at NCSU CMAST	✓*
Appropriate funds to reopen the northern Shellfish Sanitation		Re-opening of administratively closed waters	✓*
Funding a research shellfish hatchery at UNCW		Significant progress in development of superior performing broodstock	✓*
Commission a Shellfish Mariculture Advisory Committee		Identification of actions for ecologically, economically, and socially sustainable growth of the shellfish farming industry in NC	✓
*Strongly Recommend Continuation of State Support			
Metrics of Success in Fulfilling the SMAC Strategic Plan for Shellfish Mariculture: Present through 2030			
Recommendation		Metrics of Success	Complete
#	Summary		
1	Embrace a \$100 Million Industry Valuation Goal	Provide additional resources to growers, regulatory body, and promotional agency	
2	Petition for Farm Bill Insurance and Support NCSGA efforts to develop a Shellfish Mariculture Insurance Program	Successful submission of Concept Proposal, Shellfish growers covered under Farm Bill Insurance	
3	Establish a Low-Interest Loan Program	Establish funding mechanism and have fewer growers report financing as a major challenge compared to Turano <i>et al.</i> 2011	
4	Specify the Eligibility of Shellfish Farmers for Agricultural Disasters Relief Funds	All future disaster relief funds appropriated to the NCDA&CS specify mariculture inclusion	
5	Commission a Market Analysis	Market analysis completed	
6	Fund a Shellfish Mariculture Advisory Panel at NCDA&CS	Establishment of advisory committee	
7	Fund Development of North Carolina Oyster Trail	Completion of Implementation Phases 1-6 (Appendix D) by 2022	
8	Establish a Shellfish Mariculture Governance Advisory	Establishment of Advisory Committee	
9	Establish a Shellfish Leasing Section at NCDMF	Section established, reduced lease application backlog	
10	Amend G.S. 113-202: Increase Secretary's Discretion	Reduction in percentage of challenged lease decisions	
11	Establish Shellfish Enterprise Areas (SEAs)	Establishment of at least one SEA	
12	Permit a Capped Number of Single-Application 50-Acre Leases	Larger leases available by early 2020s; Feedback on Impacts available early 2026	
13	Increase Utilization Requirement	All leases meeting utilization requirement, 100% monitoring	
14	Increase Penalties for Those Convicted of Illegal Taking of Shellfish from Leases	Statutory language changed. Increased average penalties for convicted shellfish poachers	
15	Afford the Secretary discretion to permit shellfish nurseries in prohibited waters	Statutory language changed	
16	Appropriate Funding for Additional NCDEQ Water Resources Staff	Three new staff positions funded	
17	Revise State Grant Scoring to Benefit High Priority Growing Areas	Scoring criteria modified. Increased proportion of funding going to projects benefitting high priority growing waters	
18	Require Low-Impact-Development for State Projects	New statute passes requiring EISA-like LID standards for state funded construction	
19	Establish a Shellfish Mariculture Grant Program	Recurring funds appropriated for grant program	
20	Establish a Mariculture Resource Grant Program	Recurring funds appropriated for grant program. Affirmation of value by the NCSFA	
21	Fund an Additional Position at North Carolina Sea Grant	Additional position at North Carolina Sea Grant funded	