NC Aquaculture Development Conference
27 years of a public/private partnership

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  – Pentair Aquatic Eco-Systems
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- Government/Agency Sponsors
  - NC Aquaculture Association
  - NCDA&CS
  - NCSU College of Ag & Life Sciences
  - NCSU Department of Applied Ecology
  - NC Small Business Tech. Dev. Center
  - NC Farm Bureau
  - NC Sea Grant
  - NC Shellfish Growers Association
A ‘partnership’ for NC Aquaculture

- SBTDC – Michael Twiddy
- NCDA – Ron Fish, John Aydlett
  Debra Sloan, Pete Anderson
- NCCE – Steve Gabel, Mike Frinsko
- Sea Grant – Jack Thigpen, Chuck Weirich
- NC Farm Bureau – Debbie Hamrick
- NCSU – Cathy Smith, Chrissie Shepard
- NCAA – Randy Gray, Nancy Sugg
Thank you to all of the farms and agencies that provided data for this presentation!

For a copy, please see our website: www.ncaquaculture.org
• **NCSU & NC Extension**
  - Harry Daniels: Freshwater Aquaculture Production

• **NC Sea Grant**
  - Chuck Weirich: Marine Aquaculture Production

• **NCDA&CS**
  - Ron Fish: Aquaculture Industry Value & Resources

For a copy, please see our website:
www.ncaquaculture.org
NC Aquaculture - Regional Production

Cool & coldwater
Flow-through
Tank production

Recirculating tank
production

Warmwater pond &
marine aquaculture
2005 NORTH CAROLINA
Aquaculture Operations and
Farm Gate Value
170 Farms &
208 Shl. Leases
Farm Gate =
$31,210,200*
(up 19%)

2009 NORTH CAROLINA
Aquaculture Operations and
Farm Gate Value
146 Farms &
257 Shl. Fish Leases
300 Crab Shedders
Farm Gate = $29,924,237
$29,953,722 (in 2008; - < 0.1%)

The Math
“Problem”

2012 North Carolina Aquaculture Industry
Summary- Farm Gate
- Includes :
  - Marine species
  - Fingerling production
    - 134 farms
    - 287 crab shedding permit holders
  - Value = $33,069,209
    (+3.8%)
By the Numbers...

- 710 Licenses issued since 1998
- NCDA License Database = 342 ‘Active’ Licenses

*authorization to sell, more grown with WRC /self-consumption
2014 NC Aquaculture Industry Survey – License Update/Renewal*

* Required

2014 NC Aquaculture Industry Survey
PAGE 2 – Species and Production Information

*All production information is confidential and will not be shared.*

1. Please list the MAJOR aquatic animal produced at your facility:
What is the name and type of fish you grow? Example: tilapia. All secondary species will be listed on page 13. Only one per line.

2. This aquatic animal being produced for:
Please choose all applicable.
☐ Food production
☐ Recreation (Fish Stocking)
☐ Aquarium Fish
☐ Other

3. Please choose the production method for the animal being produced on your farm:
What do you grow your fish in?
☐ PONDS
☐ RACEWAYS
☐ RAS
☐ CAGE CULTURE

4. For the choice above, please list the total number on your farm in production:
How many ponds/tanks/raceways/cages do you have for this aquatic animal?

5. What is the approximate total size in production for your MAJOR aquatic animal:
How much space are you using to grow this 1 aquatic animal? Please list number of water acres for ponds, gallons for tanks, cubic feet for cages and raceways
## Side by side comparisons

*Work with what you got...*

<table>
<thead>
<tr>
<th>Traditional Method</th>
<th>NCDA Database Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Trout</td>
<td>70</td>
</tr>
<tr>
<td>– Catfish</td>
<td>11</td>
</tr>
<tr>
<td>– HSB</td>
<td>13</td>
</tr>
<tr>
<td>– Tilapia</td>
<td>11</td>
</tr>
<tr>
<td>– Prawn</td>
<td>3</td>
</tr>
<tr>
<td>– Crawfish</td>
<td>5</td>
</tr>
<tr>
<td>– Other</td>
<td>2</td>
</tr>
<tr>
<td>* TOTAL ........... 115</td>
<td>* TOTAL ........... 342</td>
</tr>
</tbody>
</table>

*– “All”*
2014 North Carolina Freshwater Aquaculture
Farms (current number) reporting production in 2014

- 115 farms reporting
  - Trout (70)
  - Catfish (11)
  - Hybrid Striped Bass (13)
  - Tilapia (11)
  - Fresh Water Prawns (3)
  - Crawfish (5)
  - Yellow Perch (0)
  - Sturgeon (2)
10 Years of NCADC Surveys

Total number of farms according to NCADC State Update Presentations

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>170 (170)</td>
</tr>
<tr>
<td>2006</td>
<td>169 (169)</td>
</tr>
<tr>
<td>2007</td>
<td>147 (147)</td>
</tr>
<tr>
<td>2008</td>
<td>146 (146)</td>
</tr>
<tr>
<td>2009</td>
<td>126 (126)</td>
</tr>
<tr>
<td>2010</td>
<td>139 (139)</td>
</tr>
<tr>
<td>2011</td>
<td>134 (134)</td>
</tr>
<tr>
<td>2012</td>
<td>125 (125)</td>
</tr>
<tr>
<td>2013</td>
<td>115 (115)</td>
</tr>
</tbody>
</table>

Showing decline?
10 Years of NCADC Surveys
Total dollar value from the NC Aquaculture Industry according to NCADC State Update Presentations

Holding steady!

What about 2014?

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollar Value ($ Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>58.5</td>
</tr>
<tr>
<td>2006</td>
<td>55.5</td>
</tr>
<tr>
<td>2007</td>
<td>50.9</td>
</tr>
<tr>
<td>2008</td>
<td>53.8</td>
</tr>
<tr>
<td>2009</td>
<td>52.2</td>
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<tr>
<td>2010</td>
<td>52.9</td>
</tr>
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<td>2011</td>
<td>55.4</td>
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<tr>
<td>2012</td>
<td>57.5</td>
</tr>
<tr>
<td>2013</td>
<td>57.5</td>
</tr>
<tr>
<td>2014</td>
<td>???</td>
</tr>
</tbody>
</table>
• **NCSU & NC Extension**
  - Harry Daniels: Freshwater Aquaculture Production

• **NC Sea Grant**
  - Chuck Weirich: Marine Aquaculture Production

• **NCDA&CS**
  - Ron Fish: Aquaculture Industry Value & Resources

For a copy, please see our website:
www.ncaquaculture.org
North Carolina Aquaculture Technical Assistance
NCSU Campus-Based

Dr. Harry Daniels
NC State, Raleigh
(919 515-4589)

Dr. Jeff Hinshaw
NC State, Fletcher
(828 684-3562)

Dr. Ben Reading
NC State, Raleigh
(919 515-3830)
Aquaculture Research Personnel

Dr. Russell Borski
NC State, Raleigh

Dr. Harry Daniels
NC State, Raleigh

Dr. Ben Reading
NC State, Raleigh

Dr. Wade Watanabe
UNC Wilmington
NCSU College of Veterinary Medicine

Dr. Michael Stoskopf
Dr. Jay Levine
Dr. Greg Lewbart
Dr. Craig Harms
Mr. Skip Thompson
Area Aquaculture Agent
Waynesville, NC
(828 456-3575)

Dr. Jeff Hinshaw
Aquaculture Specialist
Fletcher, NC
(828 684-3562)
North Carolina Aquaculture Technical Assistance
NC Cooperative Extension (East)

Mr. Steve Gabel
Area Aquaculture Agent
(252 482-6585)

Mr. Mike Frinsko
Area Aquaculture Agent
(252 448-9621)

Dr. David Green
Seafood Specialist
(252 222-6304)
2014 North Carolina Freshwater Aquaculture

Farms (current number) reporting production in 2014

- 115 farms reporting
  - Trout (70)
  - Catfish (11)
  - Hybrid Striped Bass (13)
  - Tilapia (11)
  - Fresh Water Prawns (3)
  - Crawfish (5)
  - Yellow Perch (0)
  - Sturgeon (2)
2014 North Carolina Trout Industry

- Food fish production
  34 producers (n/c)
  5,003,000 lbs. (n/c)
  $1.76/ lbs. (-3.3%)

- Farm gate value=
  $8,805,280 (-3.3%)
2014 North Carolina Trout Industry

- Fingerling production
  15 Hatcheries (n/c)
  7,880,500 fingerlings (+18%)
  $0.11/ fingerling (+10%)

- Farm gate value=
  $866,855 (+30%)
2014 North Carolina Trout Industry

- Fee fishing operations
  - 21 operations (n/c)
  - 242,500 lbs. (n/c)
  - $5.18/ lb. (+6.1%)

- Farm gate value=
  - $1,256,150 (+6.1%)
2014 North Carolina Trout Industry

- Processing
  - 3 processors (n/c)
  - 1,665,000 lbs. (+13%)
  - Avg. price $6.44/ lb. (-1.5%)

Value = $10,722,600 (+11.5%)
2014 North Carolina Trout Industry

• Trends
  – Industry stable
  – Demand is strong

• Total Combined Value
  Farm gate and processing

* $21,650,885 (+5.3%)
2014 North Carolina Catfish Industry

- Food fish production
  11 producers (-2)
  1 Broodstock farm
  1440 pond acres (-50 ac)
  4,200,000 lbs (-10.6%)
  $1.18/lb. (+9.3%)

- Farm gate= $4,960,000 (-2.3%)
2014 North Carolina Catfish Industry

- Fingerling production
  - 1 producer (n/c)
  - 3,500,000 (-18%)
  - $0.10 each (n/c)

Farm gate = $350,000 (-18%)
2014 North Carolina Catfish Industry

• Processing
  1 Processor
  (Carolina Classic Catfish Inc.)
  All 4,200,000 lbs processed

Processed value
  $8,550,000 (-1.7%)
2014 North Carolina Feeds Production

- 1 Mill – Greenville, NC
  6,900 tons fishfeed

Production value = $3,480,000 (+3.9%)
2014 North Carolina Catfish Industry

• Trends
  Slight decrease in production
  Slight increase in price
  Imports and high feed costs
  Remains a major NC cultivar

• Total Combined Value
  Farm gate, processing, feed milling
  * $17,340,000 (-1.2%)
2014 NC Hybrid Striped Bass Industry

- Food fish production
  14 producers (-1)
    13 pond producers
    1 tank producers
  2,810,400 lbs. (+25%)

Market:
- Live $4.10/lb. (-3.5%)
- Box $3.80/lb. (-3.1%)
- Farm gate = $11,101,080 (+21%)
2014 NC Hybrid Striped Bass Industry

- Fingerling production
  3 producers (-1)
  3,000,000 fingerlings produced (+10.5%)
  - $0.24 / fingerling
    Phase I - 3,000,000 (15%)
    Phase II - 0 (-100%)

Farm gate value $720,000 (-52%)
2014 NC Hybrid Striped Bass Industry

- The Fish Connection Cooperative

- Trends
  - Food fish Production increased
  - Slight decrease in price
  - Demand for fingerlings on the rise
  - Additional demand outside of NC

- Total Combined Value
  - Food fish and fingerlings *$11,821,080 (+10.6%)
2014 North Carolina Tilapia Industry

- Food fish production
  11 producers (+2)
  Tank-based RAS
- 1,426,057 lbs. (-14%)
  $2.30/ lb. (+0.88%)
- Farm gate=
  $3,279,931 (-13%)
2014 North Carolina Tilapia Industry

- Fingerling production
  - 8 producers (+2)
  - 1,860,000 on farm (+41%)
  - 356,750 sold (-42%)
  - $0.90/fingerling (+15%)

Farm gate =
$321,075 (-33%)
2014 North Carolina Tilapia Industry

• Fresh Keepers Cooperative

• General Trends
  – Production decreased
  – Slight price increase
  – Increase in fingerling production for on-farm

• Total Combined Value
  Food fish and fingerlings
  * $3,601,006 (-15.7%)
2014 NC Freshwater Prawn Industry

- 3 active producers (-8)
  * 7 sat out to build sales
- 6.5 water acres (-83%)
- 5600 lbs produced (-81%)
  $8.00/lb. whole prawn (-11%)
- Farm gate=
  * $44,800 (-83%)
2014 NC Freshwater Prawn Industry

- American Prawn Cooperative
- 0 Nurseries (-1)
- 1 producer has sold out all product in 2014 to a regional commercial contract buyer and is expanding to add 2 new ponds in 2015, while renovating 2 old ponds for 2016.
- In this instance, regional demand is increasing. 1 producer has obtained nursery equipment for installation in 2016.
2014 North Carolina Crawfish Industry

- 5 active growers (n/c)
- 33 pond acres (+10%)
- 9,200 lbs. produced (+77%)
- $4.00/lb. (n/c)

Farm gate =
* $36,800 (+77%)
2014 NC Yellow Perch Production

- 0 fingerling growers (-1)

- Due to marketing issues, NC’s only commercial yellow perch fingerling producer did not operate in 2014.
2014 North Carolina Sturgeon Production

• 2 production facilities
  – La Paz Group, Happy Valley, NC
  – Marshallberg Farms, Marshallberg, NC

• 3 species of sturgeon produced in NC:
  – Atlantic
  – Siberian
  – Russian
2014 North Carolina Sturgeon Production

• Sturgeon caviar and meat production
  – Caviar - ~ $441,440
  – Meat - ~ $54,560

• Product value=
  * $496,000 (+62%)
• **NCSU & NC Extension**
  - Harry Daniels: Freshwater Aquaculture Production

• **NC Sea Grant**
  - Chuck Weirich: Marine Aquaculture Production

• **NCDA&CS**
  - Ron Fish: Aquaculture Industry Value & Resources

For a copy, please see our website:
www.ncaquaculture.org
Shellfish and Soft Shell Crab Production Information

Many thanks to:

Wanda Jacobs, Alan Bianchi, Don Hesselman, and Brian Conrad
2014 North Carolina Shellfish Aquaculture Status
Leases and Acreage

233 Leases (+ 2.6%)

1,728 Acres (- 22.5%)

Leases

<table>
<thead>
<tr>
<th>Year</th>
<th>Leases</th>
</tr>
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<tbody>
<tr>
<td>2011</td>
<td>232</td>
</tr>
<tr>
<td>2012</td>
<td>227</td>
</tr>
<tr>
<td>2013</td>
<td>222</td>
</tr>
<tr>
<td>2014</td>
<td>233</td>
</tr>
</tbody>
</table>

Acreage

<table>
<thead>
<tr>
<th>Year</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>1,745</td>
</tr>
<tr>
<td>2012</td>
<td>2,229</td>
</tr>
<tr>
<td>2013</td>
<td>2,209</td>
</tr>
<tr>
<td>2014</td>
<td>1,728</td>
</tr>
</tbody>
</table>
2014 NC Shellfish Aquaculture Leases and Acreage by County

- Beaufort: 2 leases, 6 acres
- Pamlico: 18 leases, 111 acres
- Hyde: 7 leases, 28 acres
- Carteret: 23 leases, 424 acres
- Hyde: 72 leases, 288 acres
- New Hanover: 77 leases, 642 acres
- Brunswick: 31 leases, 222 acres
- New Hanover: 3 leases, 8 acres
2014 North Carolina Shellfish Aquaculture Status
Clam Production and Farm-Gate Value

3,200 Bushels (- 9.7%)  $188,822 (- 12.6%)  1,025 Trips (- 18.5%)
2014 North Carolina Shellfish Aquaculture Status
Oyster Production and Farm-Gate Value

21,157 Bushels (+ 46.0%), $343,245 (+ 10.8%), 1,217 Trips (- 21.9%)
North Carolina Shellfish Aquaculture Industry Trends and Issues

Increased number of leases and acreage devoted to water column leases

2014 – 25 leases (+ 78.6%)
76 acres (+ 100.0%)
2014 NC Shellfish Aquaculture
Water Column Leases and
Acreage by County

- 11 leases, 29 acres
- 2 leases, 6 acres
- 4 leases, 21 acres
- 1 lease, 2 acres
- 1 lease, 2 acres
- 3 leases, 4 acres
- 2 leases, 10 acres
- 11 leases, 29 acres
- 2 leases, 10 acres
- 1 lease, 2 acres
- 1 lease, 2 acres
- 3 leases, 4 acres
North Carolina Shellfish Aquaculture Industry Trends and Issues

Intensive culture using containerized systems expanding
North Carolina Shellfish Aquaculture Industry Trends and Issues

Market for cultured shellfish remains strong and is growing

Significant potential for market development, including value-added products
North Carolina Shellfish Aquaculture Industry Trends and Issues

Siting

NC Shellfish Siting Tool
Troy Alphin, UNCW
alphint@uncw.edu
(910) 962-2395

Application costs
SAV
North Carolina Shellfish Aquaculture Industry Trends and Issues

- Selective breeding and improved strains
- Culture gear evaluation
- Species diversification
2014 North Carolina Blue Crab Shedding Industry Status
Permits

279 permits (+ 4.1%)
2014 NC Blue Crab Shedding Permits by County

- Dare: 94
- Currituck: 17
- Pasquotank: 15
- Currituck: 1
- Pasquotank: 4
- Chowan: 1
- Camden: 1
- Perquimans: 32
2014 North Carolina Blue Crab Shedding Industry Status
Production and Farm-Gate Value

367,939 lbs (+ 15.9%)

$2.48 mill (+ 18.7%)

### Production (lbs)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>446,397</td>
</tr>
<tr>
<td>2012</td>
<td>325,426</td>
</tr>
<tr>
<td>2013</td>
<td>317,426</td>
</tr>
<tr>
<td>2014</td>
<td>367,939</td>
</tr>
</tbody>
</table>

### Value ($ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>2.08</td>
</tr>
<tr>
<td>2012</td>
<td>4.66</td>
</tr>
<tr>
<td>2013</td>
<td>1.50</td>
</tr>
<tr>
<td>2014</td>
<td>6.73</td>
</tr>
</tbody>
</table>
North Carolina Crab Shedding Industry Trends and Issues

Dependence on wild “caught” product, reductions in stock
Production based on seasonal availability (highly weather dependent)
Strong market demand, price- timing is critical
North Carolina Crab Shedding Industry Trends and Issues

Support research addressing reduced blue crab populations

Hatchery and nursery production of peeler crabs

Use of recirculating aquaculture systems

Alternate crops for off-season production
On the Horizon (Developmental)

Marine finfish production

Super-intensive (biofloc) shrimp culture

Marine invertebrate and plant culture
• **NCSU & NC Extension**
  - Harry Daniels: Freshwater Aquaculture Production

• **NC Sea Grant**
  - Chuck Weirich: Marine Aquaculture Production

• **NCDA&CS**
  - Ron Fish: Aquaculture Industry Value & Resources

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Marketing

Aquaculture is the business of farming aquatic plants and animals. In North Carolina, farmers grow trout, catfish, hybrid striped bass, prawn, crawfish, ornamental fish, baitfish, clams and oysters.

North Carolina is one of the most aquaculture-friendly states in the US. The NC Department of Agriculture and Consumer Services is the lead agency for aquaculture, and contacts in the Department are here to assist you.

NCDA&CS Marketing Division, Agribusiness Development - Ron Fish
1020 Mail Service Center Raleigh, North Carolina 27699-1020
Phone: (919) 707-3119 – FAX: (919) 733-0999
NCD&A&CS and the NC Aquaculture Industry
Business Planning, Permitting & Marketing Assistance for North Carolina Aquaculture

John Aydlett
Seafood Marketing
(252) 331-4773

Debra Sloan
Aquaculture-Agribusiness Advisor
NASAC President, NC Representative
Western NC (828) 524-1264

Pete Anderson
Aquaculture Consultant
NCAA Representative
(252) 633-1477
2014 North Carolina Aquaculture Industry Value Summary - Freshwater Species (food fish)

% of Pounds from Food Fish Sold
13,454,257 lbs.

- Trout: 37%
- Catfish: 21%
- HSB: 31%
- Tilapia: 11%
- Prawns: 0%
- Crawfish: 0%

% of Dollar Value from Farm Gate Food Fish Sales
$28,227,891

- Trout: 31%
- Catfish: 18%
- HSB: 39%
- Tilapia: 12%
- Prawns: 0%
- Crawfish: 0%
2014 North Carolina Aquaculture Industry Summary - All Except Processed Product

- Includes:
  - Freshwater foodfish
  - Marine species
  - Fingerling production
  - All farms
  - 233 shellfish leases
  - 279 crab shedding permit holders

Value = $35,250,038 (-1.7%)
2014 NC Aquaculture Industry Summary

• Processors and product value
  – 4 processing facilities, 3 Trout, 1 Catfish (n/c)

Processed product value = $19,272,600 (+5.2%)
2014 NC Aquaculture Industry Summary

- Total Value
  Includes:
  - Production farm gate
  - Processed product
  - Feed produced

Value to NC = $58,002,638 (+.84%)
So how do we keep it growing?

Total dollar value from the NC Aquaculture Industry according to NCADC State Update Presentations

What does the next 10 years hold?

Back to $58M!
Aquaculture Education in North Carolina

Teaching Science & Math through Aquaculture

• High Schools
  – South Brunswick High School, Barry Bey
Aquaculture Education in North Carolina

• NC Community College System

Carteret Community College
(252 222-6114)

Brunswick Community College
(910 755-7432)
2015 NC Aquaculture Development Conference
Student Scholarship Application

Student Name: __________________________________________

Home Street Address: ____________________________________
(where your check will be sent)

City, State, Zip Code: ___________________________________

School Attending: _______________________________________

Instructor/Professor: _____________________________________

The NC Aquaculture Association (NCAA) is sponsoring partial scholarships for your attendance to this year’s Aquaculture Development Conference. The scholarships will cover $30 off the $55 student registration fee, leaving you the ability to attend for only $25.

There is a limited number of 30 scholarships available and offered on a first come, first serve basis ranked by postmark date. (Historically the number of scholarships has been under 30 students for past conferences.)

Please register online at: http://www.ncaquaculture.org/registration.html
NC Aquaculture Association Representatives

Your Farm, Your Voice, Your Success = OUR GOAL!

NCAA Board Members and Areas
Randy Gray – President – ALL*
Nancy Sugg – Vice President – HSB
Christie Potts – Secretary – Markets
Dale Pridgen – Tilapia & RAS
Sterling Davenport – Crawfish
Sally Eason – Trout
Gary Dillon – Catfish
Charlene Jacobs – Prawn
NC Aquaculture Development Conference
27 years of a public/private partnership
THANK YOU AND ENJOY THE CONFERENCE!

• Premier Sponsors
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  – NC Aquaculture Association
  – NC Farm Bureau

• General Sponsors
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  – Skretting
  – YSI