Bycatch Reduction Device (BRD) Testing
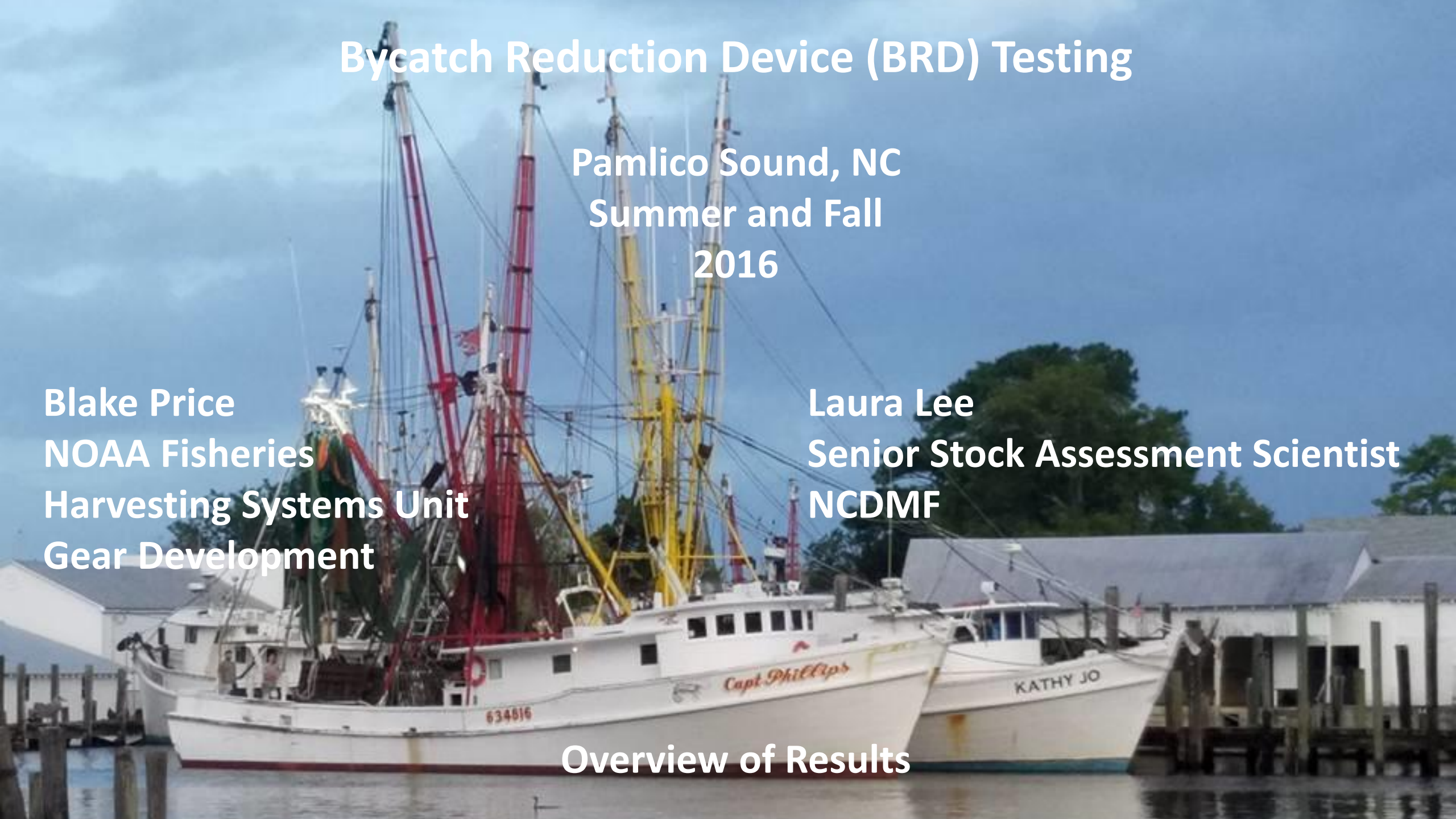
Pamlico Sound, NC
Summer and Fall
2016

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Overview of Results

BRD Testing Design and Protocols

Summer and Fall 2016

- 4 BRD's Tested

- Matched Paired Testing – Control vs. Experimental

- Gears Switched to Eliminate Side Bias

- Target of 30 Tows For Each BRD Tested

- All Tows Made in Pamlico Sound

- Two Observers For Every Tow

- Entire Catches Sampled (Sorted by species groups and weighed separately for Control and Test Gears)

- Controls for each Test Remained the Same: 4" TED, 1 ½" tailbag, and 1 Fisheye (state)

BRDs Tested

Summer 2016

- **Virgil Potter – Standard 4" TED, Funnel, 1 ½" in Tailbag, 1 FFE**

Radial Escape Section of 8 ½" stretch mesh, 5 meshes long by 27 meshes around. The funnel was 1 ½" stretch mesh, 30 meshes long by 100 meshes at forward opening and 42 meshes at aft opening

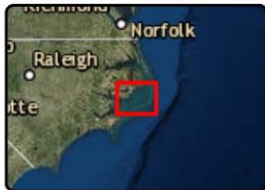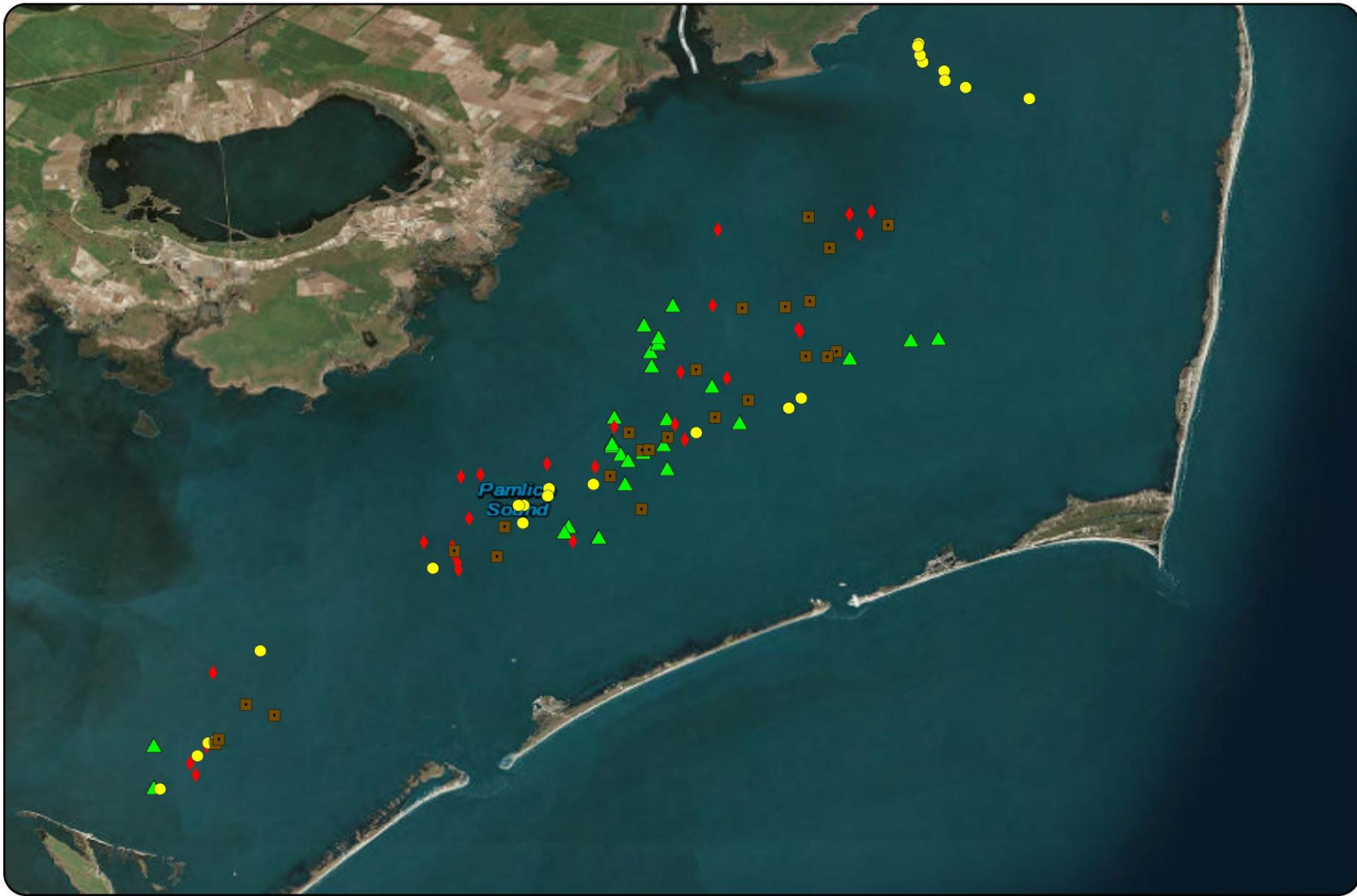- **3 inch TED, 2 Federal Fisheyes, and 1 ¾ inch Tailbag**

- **4 inch TED, 2 Federal Fisheyes, and 1 ¾ inch Tailbag**

Fall 2016

- **Virgil Potter – Standard 4" TED, Funnel, 1 3/4" in Tailbag, 1 FFE**

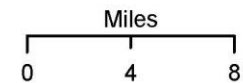**NCMFC's Conservation Fund Gear Testing (2016)**

Rep Gear Description

▲ Virgil Plotter BRD   ◯ 2 Fed FFE, 1 ¾" tailbag

◆ 2 Fed FFE, 1 ¾" tailbag, 3" TED   ◼ Virgil Potter BRD, 1 ¾" tailbag

Miles

0   4   8

NC

Marine Fisheries
ENVIRONMENTAL QUALITY

Analyses

- Calculate average weight of catch for shrimp and finfish for both control net and experimental net

- Calculate percent difference in catch weight between control net and experimental net

- Apply test to evaluate whether the difference is significant (i.e., does it matter?)

  - Significance is usually determined via P values
  - P values less than 0.05 are usually considered significant
  - A significant P value means the difference is likely "real"
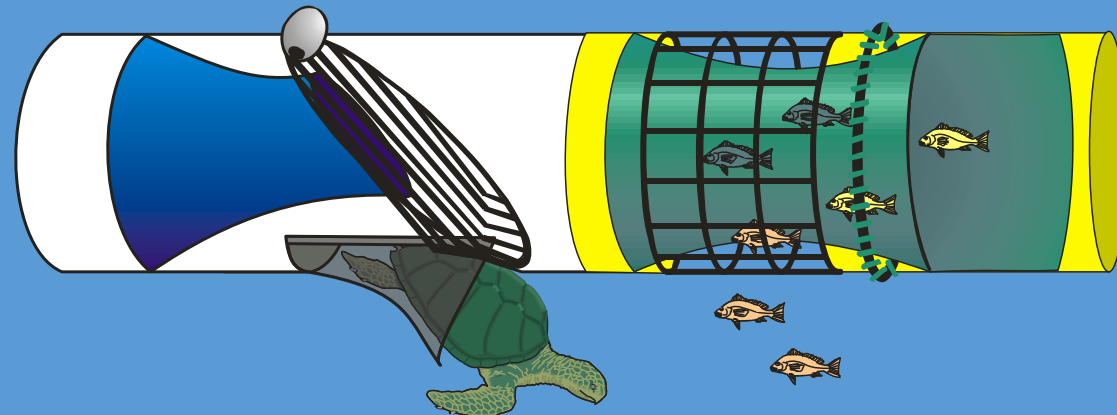
Tests Applied

- t-Test
  - Assumes normally distributed data (i.e., bell curve)
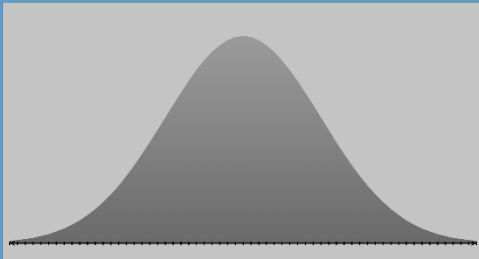
  - Often robust to assumption of normality

  - Approximation based (performance with small samples ?)

- Randomization test
  - No distribution assumption
  - Exact

Why Two Tests?

- Improved confidence in results

- Note that t-test applied to data with "drops", to avoid side bias; ensure test gear was evenly 'tested' on port and starboard

- Randomization test applied to all data

Results

- 3 inch grid, 2 Federal Fisheyes, 1 ¾" Tailbag

Species Group	n	Average Catch All (kg)		Percent Change		P value	
		Control	Experimental	all	w/drops	t-Test	Random
Shrimp	30	27.0	25.7	-4.85	-4.85	0.436	0.224
Finfish	30	115	63.6	-44.9	-44.9	**< 0.001**	**< 0.001**
Other Inverts	30	2.09	1.81	-13.1	-13.1	0.423	
Sharks	30	1.60	1.30	-19.0	-19.0	0.391	
All Bycatch	30	119	66.7	-44.0	-44.0	**< 0.001**	
Total Catch	30	146	92.3	-36.8	-36.8	**< 0.001**	

Conclusion: No difference in shrimp catch
Significant difference in finfish catch

Results

- **4 inch grid, 2 Federal Fisheyes, 1 ¾" Tailbag**

Species Group	n	Average Catch All (kg)		Percent Change		P value	
		Control	Experimental	all	w/drops	t-Test	Random
Shrimp	8/24	27.7	23.3	-15.9	-6.32	0.294	**< 0.001**
Finfish	8/24	167	76.0	-54.5	-51.9	**< 0.001**	**< 0.001**
Other Inverts	8/24	5.24	4.98	-4.96	-0.289	0.989	
Sharks	8/24	2.00	2.78	39.0	83.2	0.285	
All Bycatch	8/24	175	83.7	-52.2	-48.9	**< 0.001**	
Total Catch	8/24	202	107	-47.0	-43.4	**0.001**	

Conclusion: Significant decrease or no change in shrimp catch (depends on test). Significant decrease in finfish catch.

Results

- **Virgil Potter (summer); 1 ½" Tailbag**

Species Group	n	Average Catch All (kg)		Percent Change		P value	
		Control	Experimental	all	w/drops	t-Test	Random
Shrimp	30/34	60.9	67.4	10.7	11.7	**0.0380**	**0.0134**
Finfish	30/34	147	108	-26.5	-23.9	**< 0.001**	**< 0.001**
Other Inverts	30/34	1.03	0.865	-16.0	-16.3	0.403	
Sharks	30/34	1.39	1.45	4.32	4.29	0.781	
All Bycatch	30/34	149	111	-25.5	-23.5	**< 0.001**	
Total Catch	30/34	210	178	-15.2	-12.7	**0.0159**	

Conclusion: Significant increase in shrimp catch.
Significant decrease in finfish catch.

Results

- **Virgil Potter (Fall); 1 ¾" Tailbag**

Species Group	n	Average Catch All (kg)		Percent Change		P value	
		Control	Experimental	all	w/drops	t-Test	Random
Shrimp	22/25	31.3	29.5	-5.75	-7.25	**0.00936**	**0.0109**
Finfish	22/25	172	96.1	-44.1	-45.0	**< 0.001**	**< 0.001**
All Bycatch	22/25	172	96.2	-44.1	-44.9	**< 0.001**	
Total Catch	22/25	204	126	-38.2	-39.0	**< 0.001**	

Conclusion: Significant decrease in shrimp catch.
Significant decrease in finfish catch.

Summary

- Results are considered preliminary for now

- Results are encouraging for brown and white shrimp fishery in 2016

- 1 7/8" tailbag seems to be a factor for finfish reduction

- 3 Inch: same amount of shrimp and fewer finfish

- 4 Inch: maybe fewer shrimp, fewer finfish; potential side bias

- Virgil Potter (summer): more shrimp and fewer finfish

- Virgil Potter (fall): fewer shrimp and fewer finfish

Next Steps

- Continue BRD testing in 2017

- Incorporate small boat operations

- Begin constructing/acquiring model BRDs for workshop in 2018

- Generate outreach material (e.g., flyer) to educate public and industry on successes to date

- Decide next gears to be tested…

Proposed Gears - 2017

- Summer
  - Double Federal Fisheye, 1 ¾ inch tailbag, 4 inch TED
  - Small Boat: Double State Fisheye, 1 5/8 inch tailbag, 4 inch TED

- Fall
  - Double Federal Fisheye, 1 ¾ inch tailbag, 3 inch TED
  - Small Boat: Double State Fisheye, 1 5/8 inch tailbag, 3 inch TED