A Method to Reduce Winter Flounder Retention Through the Use of Avoidance Gear Adaptations in the Small Mesh Trawl Fishery Within the Southern New England/Mid-Atlantic Winter Flounder Stock Area

Commercial Fisheries Research Foundation – Southern New England Collaborative Research Initiative (SNECRI)

CORNELL UNIVERSITY COOPERATIVE EXTENSION MARINE PROGRAM

Project Summary

- **Developed a trawl modification to reduce winter flounder bycatch in the *Loligo* fishery.**

- **The gear modification tested was a large mesh belly panel in the 1ˢᵗ belly of the net.**

The large mesh panel was made 2 meshes deep of 80cm (32") 6mm poly webbing. With the 'saw-toothing' of the 16cm (6") mesh this yields an effective opening of 3 full meshes, a total of about 7' of large mesh. The panel attaches five 16cm meshes (approximately 2.5') behind the footrope and goes from gore to gore (22 meshes wide and approximately 30').

- **The F/V Rianda S was chartered to conduct all sea sampling trips.**

- **The F/V Rianda S operated with two identical trawls (one modified with the belly panel). A control trawl was compared with the experimental trawl on a sequentially similar course for each tow. Comparisons of the control and experimental net were based on differences in winter flounder and Loligo retention and total catch.**

- **16 trips conducted**

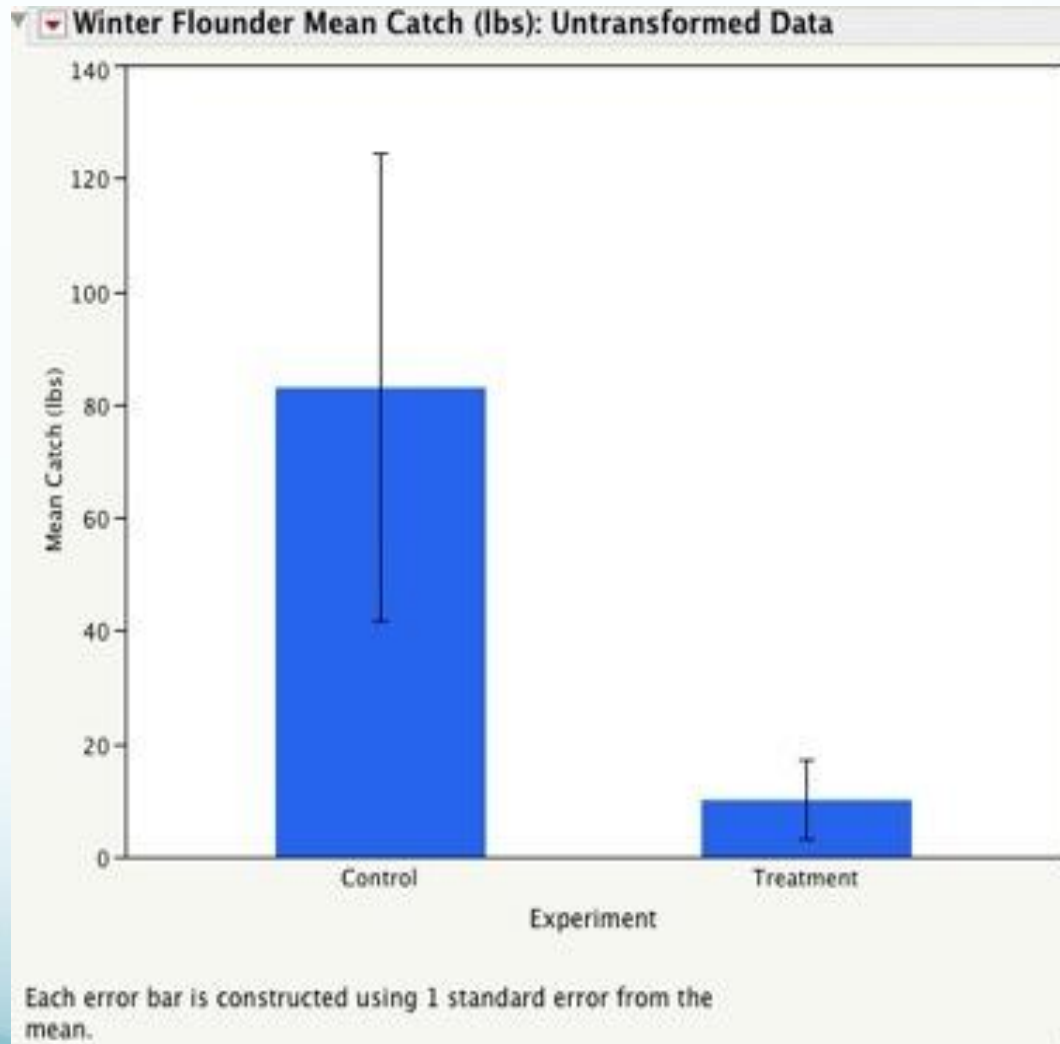- **90 tows (45 tows each for the control and experimental nets)**

Data

Mean Catches by Species for all Trips
Control Net vs. Treatment (Belly Panel)

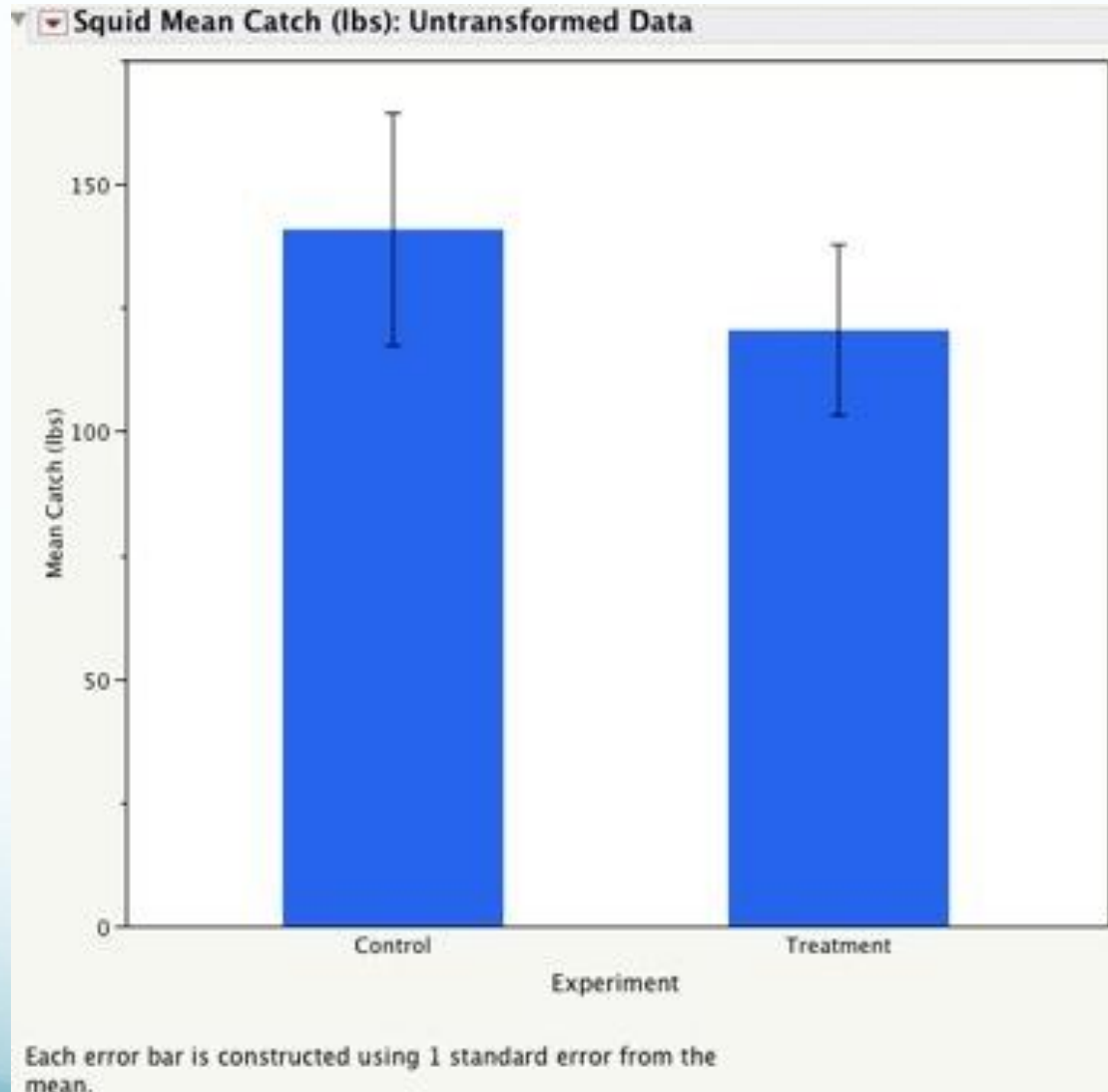**88 % Reduction of Winter Flounder Between Control and Treatment**

Winter Flounder Mean Catch (lbs): Untransformed Data

Each error bar is constructed using 1 standard error from the mean.

Winter Flounder

Mean Catches by Species for all Trips
Control Net vs. Treatment (Belly Panel)

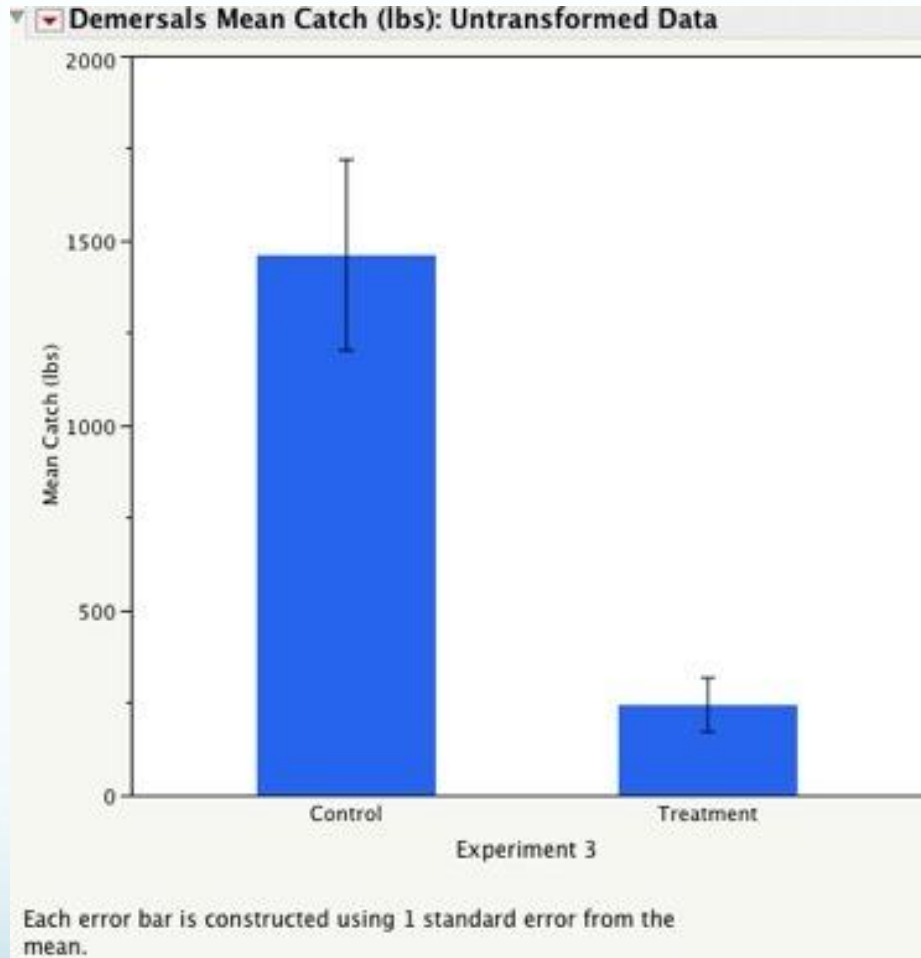**20 lb Difference Between Control and Treatment for Mean Catches of Squid**

Squid Mean Catch (lbs): Untransformed Data

Each error bar is constructed using 1 standard error from the mean.

Loligo Squid

Mean Catches by Species for all Trips
Control Net vs. Treatment (Belly Panel)

83% Reduction Of Demersal Species Between Control and Treatment

Demersals Mean Catch (lbs): Untransformed Data

Each error bar is constructed using 1 standard error from the mean.

Demersal Species
(windowpane flounder, summer flounder, four-spot flounder, skates, dogfish, sea robins)

Comparison of Winter Flounder & Squid Catch in the Control & Experimental Nets

Data was analyzed to determine if a statistical difference exists in the catch of winter flounder and squid between the control and experimental nets.

Comparison of Winter Flounder & Squid Catch Differences
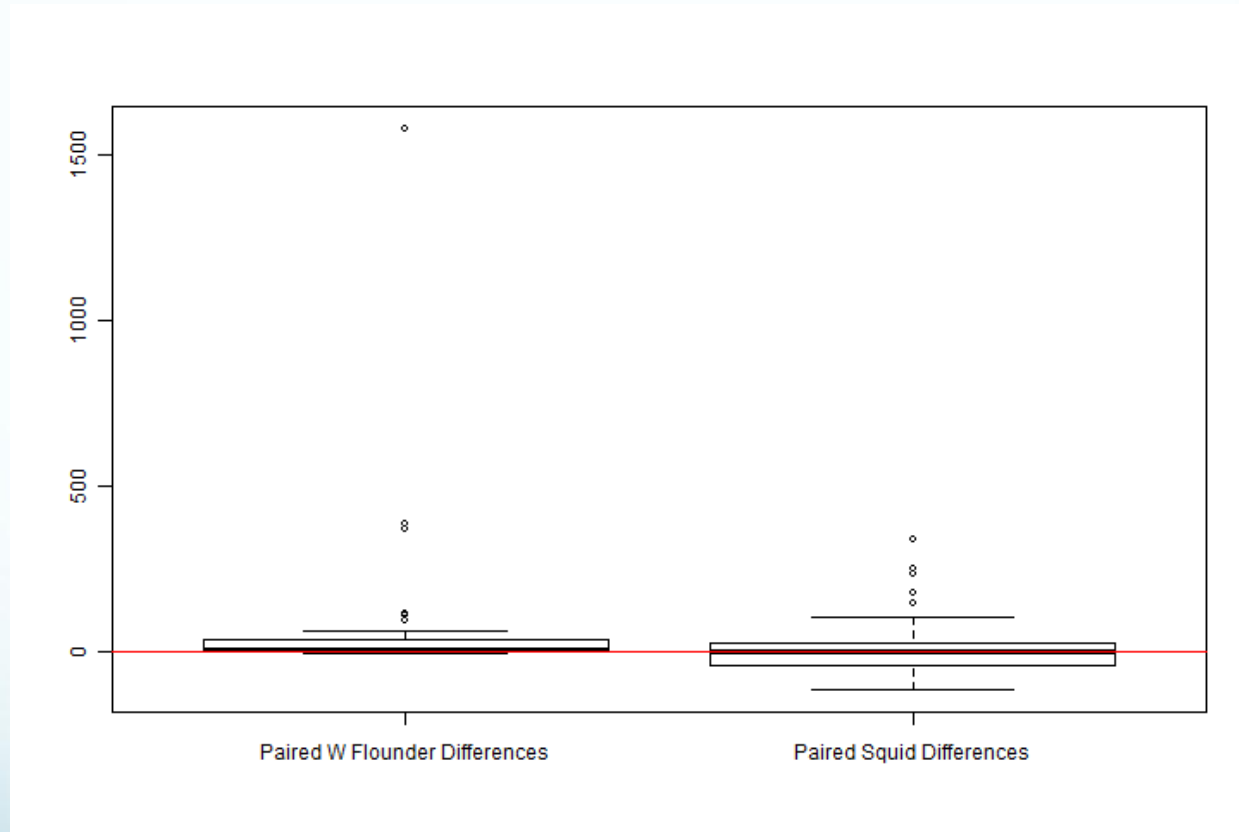
Boxplot distributions of differences between paired control and experimental tows for winter flounder and squid weights

Paired T- Test Results for Winter Flounder Catch Weights

p-value = 0.06321

Marginally significant

Paired T-Test Results for Squid Catch Weights

p-value = 0.2744

Not significant

Wilcoxon Signed Rank Test Results for Winter Flounder & Squid Catch Weights

Nonparametric test for Winter flounder weight

Wilcoxon signed rank test with continuity correction

P-value = <.0001

highly significant

Nonparametric test for Squid weight

Wilcoxon signed rank test

P-value = 0.9493

not significant

Winter Flounder and Squid Catch Summary

- Statistical Analysis indicates that there is a significant difference in catch in winter flounder, but not in squid in the Control Vs. Experimental Nets.

- The experimental net reduces the quantity of winter flounder bycatch.

Comparison of Demersals & Total Catch in the Control & Experimental Nets

- Data was analyzed to determine if a statistical difference exists in the catch of demersals and total catch between the control and experimental nets.

- Demersal species include flounders, skates, dogfish and sea robins.

Comparison of Demersal & Total Catch Weight for Control & Experimental Nets
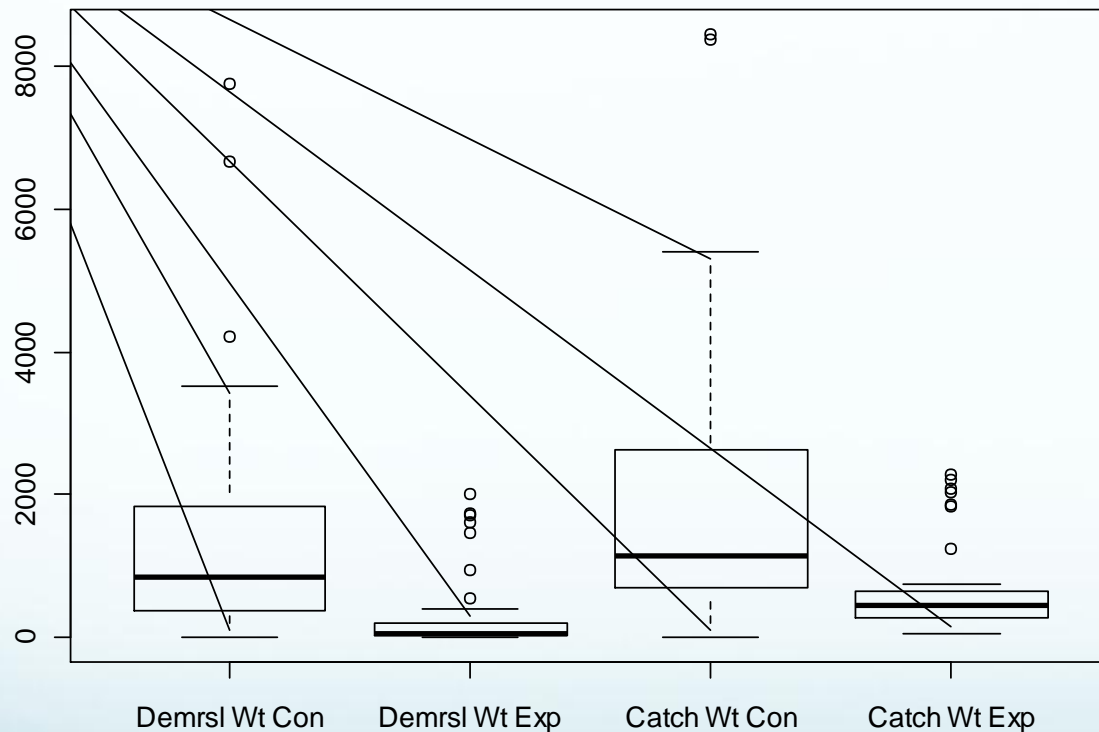
Boxplot distribution of demersal weights for the control and experimental tows and total catch weights for the control and experimental tows.

Paired T- Test Results for Demersals & Total Catch Weights

<u>Demersals</u>
p-value = <.0001

highly significant

<u>Total Catch Weights</u>
p-value = <.0001

highly significant

Wilcoxon Signed Rank Test Results for Demersals and Total Catch Weight

Nonparametric test:

Demersals

p-value = <.0001
highly significant

Total Catch Weight

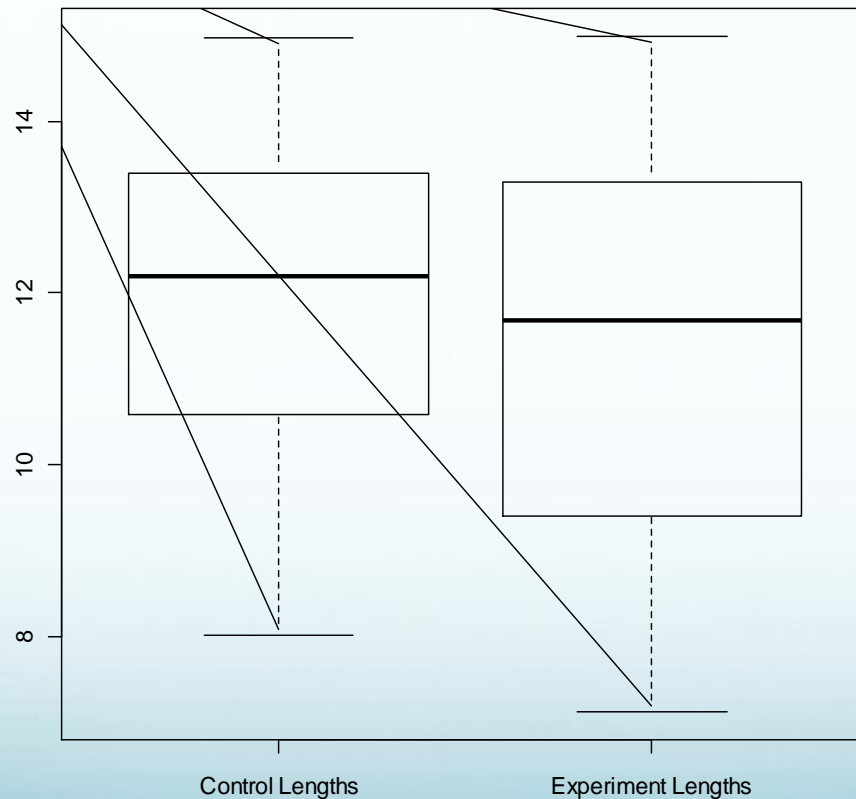p-value = <.0001
highly significant

Demersals and Total Catch Summary

- Both demersals and total catch were significantly lower in the experimental tows using the large mesh belly panel.

Analysis of Winter Flounder and Squid Lengths

- The average lengths were calculated for both winter flounder and squid.

- The paired differences in average length were compared in the control and experiment nets.

Difference in Squid Lengths in the Control Vs. Experimental Nets

Difference in Average Squid Lengths in the Control Vs. Experimental Nets
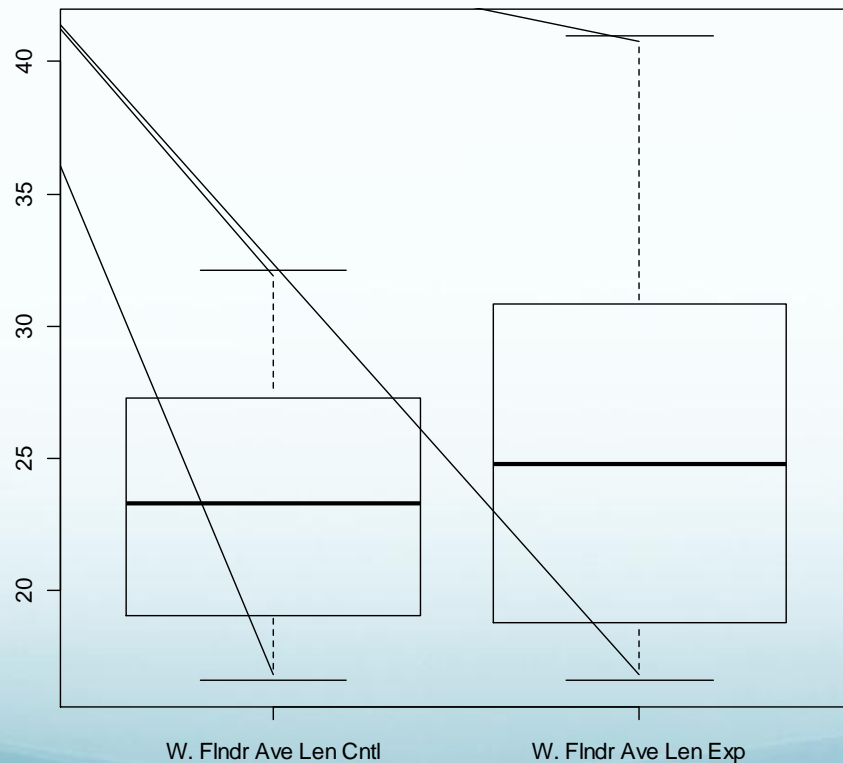
Paired t-test

p-value = 0.02269

significant

Wilcoxon signed rank test

p-value = 0.02363

significant

Difference in Winter Flounder Lengths in the Control
Vs. Experimental Nets

Difference in
Average Winter Flounder Lengths in the Control Vs. Experimental Nets

Paired t-test

p-value = 0.0138

significant

Wilcoxon signed rank test

p-value = 0.007443

significant

Length Frequency Summary

- Squid are 0.50 cm smaller in the experimental tows.

- Winter flounder are approximately 3 cm larger in the experimental tows.

Summary of Results

- The experimental large mesh belly panel has proven to be functionally effective in significantly reducing the quantity of winter flounder bycatch as well as demersal species.

- The panel is capable of effectively reducing winter flounder and bycatch of other demersal species while retaining levels of *Loligo* squid comparative to the control net.

Coordination & Cooperation

Appreciation

- **Commercial Fisheries Research Foundation**

- **F/V Rianda S – Captain Charles Weimar and Crew**

- **Superior Trawl Inc. –Jonathan Knight**

- **Montauk Inlet Seafood**