# Shrimp Trawl Bycatch Reduction

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# Presentation

- Proposed certification criterion
  - Revised list of allowable BRDs
- Status of research on bycatch reduction technology
- Future research plans

## Proposed modifications to the BRD certification criterion

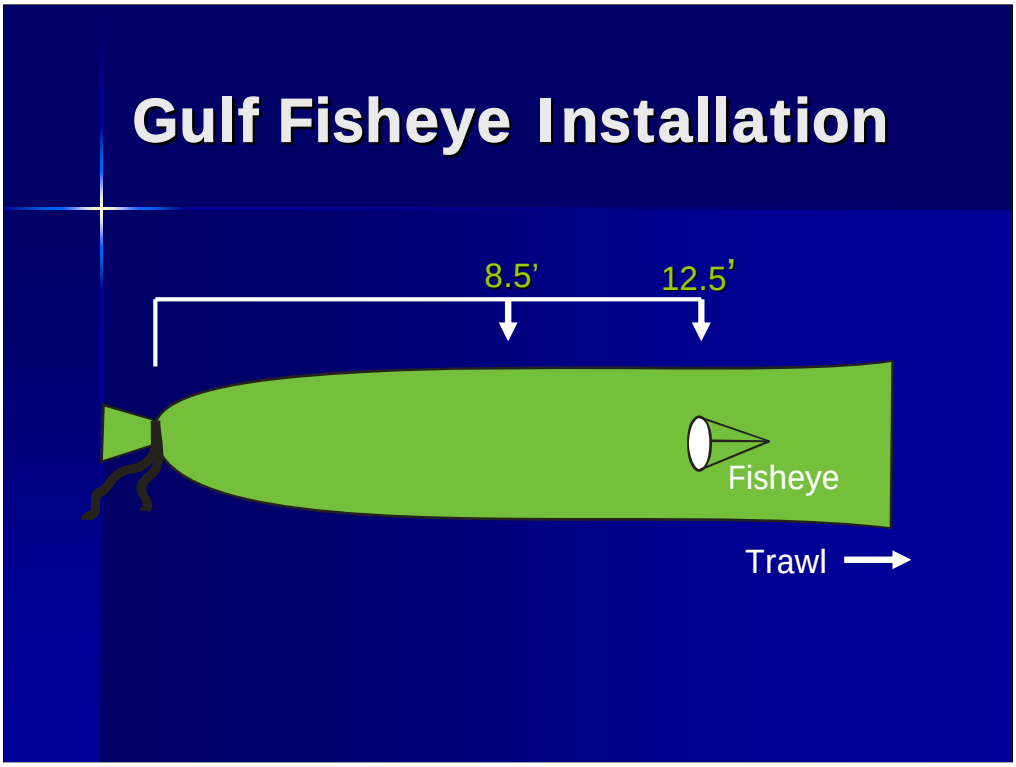
- Gulf and South Atlantic
  - Demonstrate a 30% reduction in finfish by weight
- Provisional Certification
  - BRDs demonstrating a 25% reduction in finfish (time-limited)

# Fisheye 2001 - 2003

| Species | n | Reduction Rate (%) | 95% C.I. |
|---|---|---|---|
| Shrimp | 2190 | 2.0 | 1.1 – 2.9 |
| Total Fish | 2089 | 16.5 | 15.2 – 17.8 |
| Red Snapper F | 1226 | 11.7 | 4.3 – 19.1 |

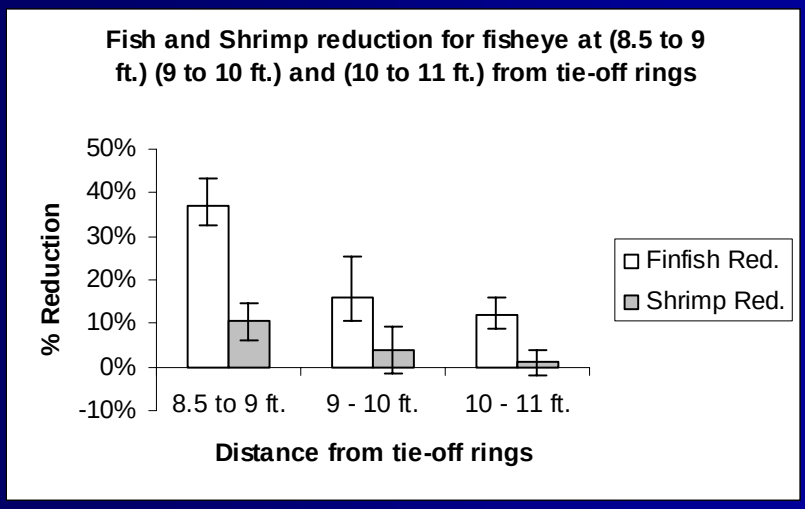
$F = (.3)R_0 + (.7)R_1$

The estimated shrimp reduction rate for the Gulf Fisheye is 2.0% with a 95% confidence interval of 1.1% - 2.9%. Total finfish reduction estimate was 16.5% with a 95% confidence interval of 15.2% - 17.8%. The estimated F reduction for red snapper was 11.7% with a 95% confidence interval of 4.3% - 19.1%.

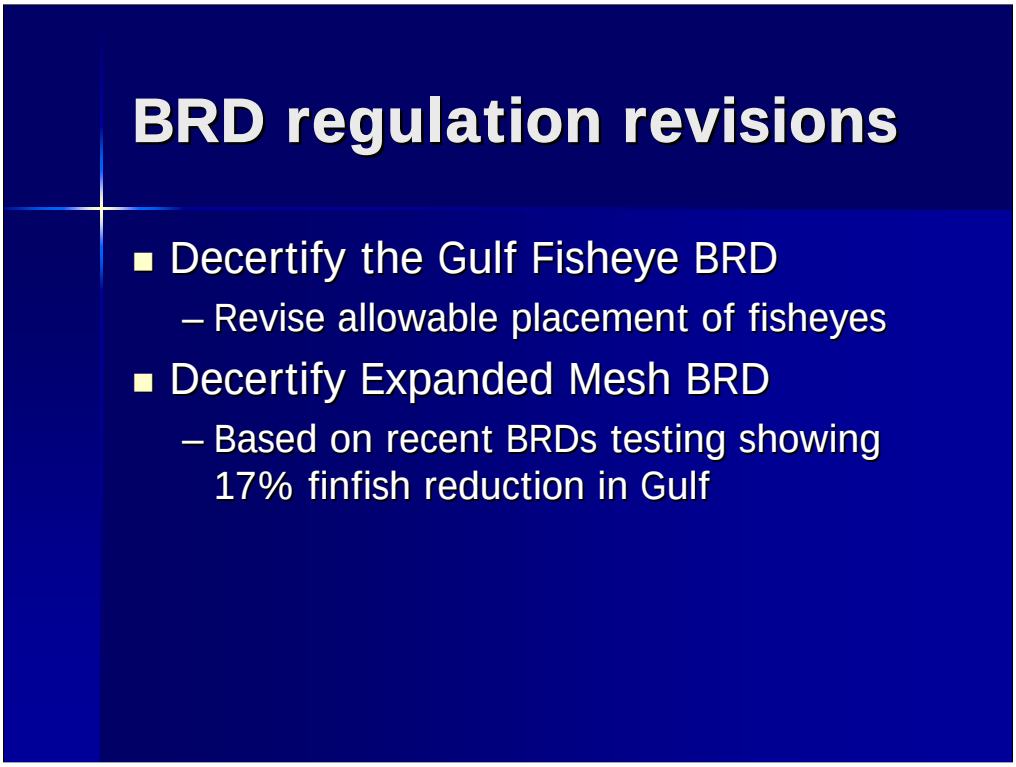



Current regulations allow the Gulf Fisheye to be placed in the codend from 8.5 to 12.5 ft. from the tie-off rings.

# Fisheye Placement




Analysis of Fisheye performance in fish reduction by distance from tie-off rings indicates the Fisheye will meet the proposed criteria of a minimum of 30% reduction in finfish when the Fisheye is positioned less than 9 ft. from the tie-off rings.




Under the proposed certification criteria, the Gulf fisheye would be decertified and the placement of fisheyes would be restricted to less than 9 ft. from the tie-off rings. The Expanded mesh, which is currently certified for use in the eastern Gulf would be decertified based on resent data that indicate a rate of finfish reduction at 17%.

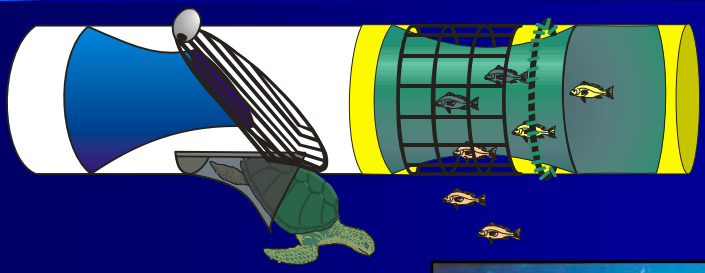
# BRD Certification

| | % Finfish Reduction | % Shrimp Reduction |
|---|---|---|
| Fisheye < 9' from tie-off rings | **37.0 (30.6-43.3)** | **10.4 (6.2-14.6)** |
| Modified Jones Davis | **33.1 (30.3-36)** | **3.2 (1.4-4.9)** |
| Extended Funnel* | **26.6 (21.7-31.6)** | **2.2 (-1.7 – 6.0)** |
| Composite Panel* | **25.1 (20.9-29.4)** | **5.4 (1.7-9.1)** |

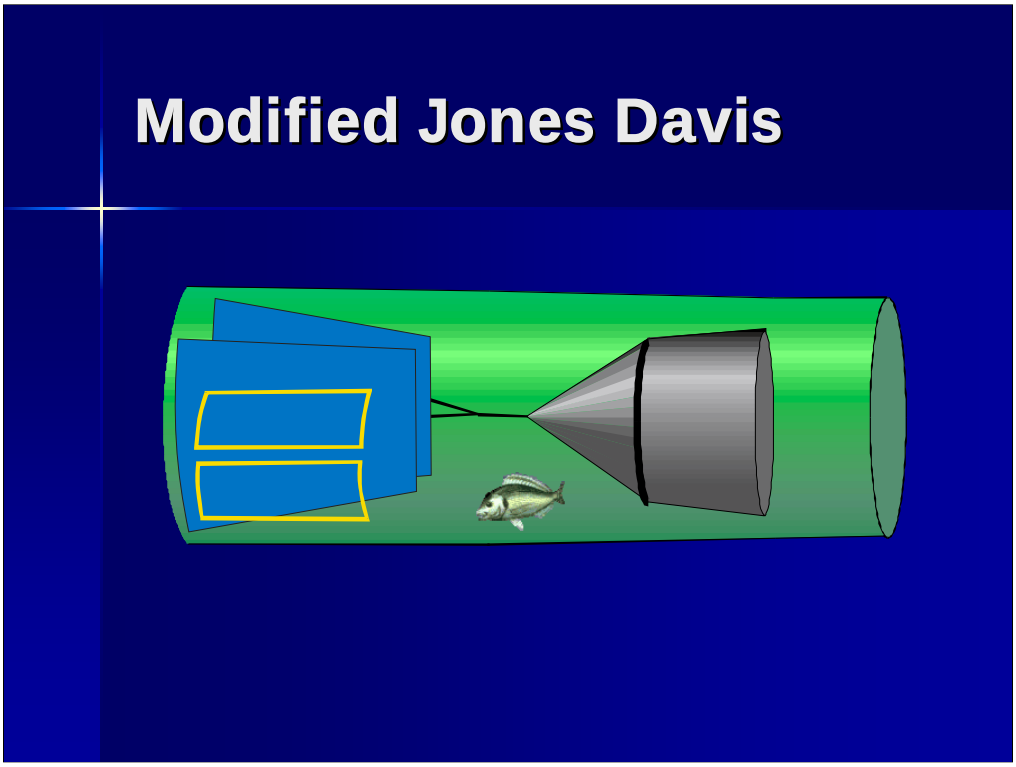
***Provisional Certification**

BRD designs that meet the 30% finfish reduction requirements under the proposed criterion are the Fisheye (no more than 9 ft. from the tie-off rings), the Jones Davis, and the Modified Jones Davis. Devices that meet the 25% reduction requirement for provisional certification are the Extended Funnel and Composite Panel BRDs. Ranges presented in parenthesize represent the 95% confidence interval.

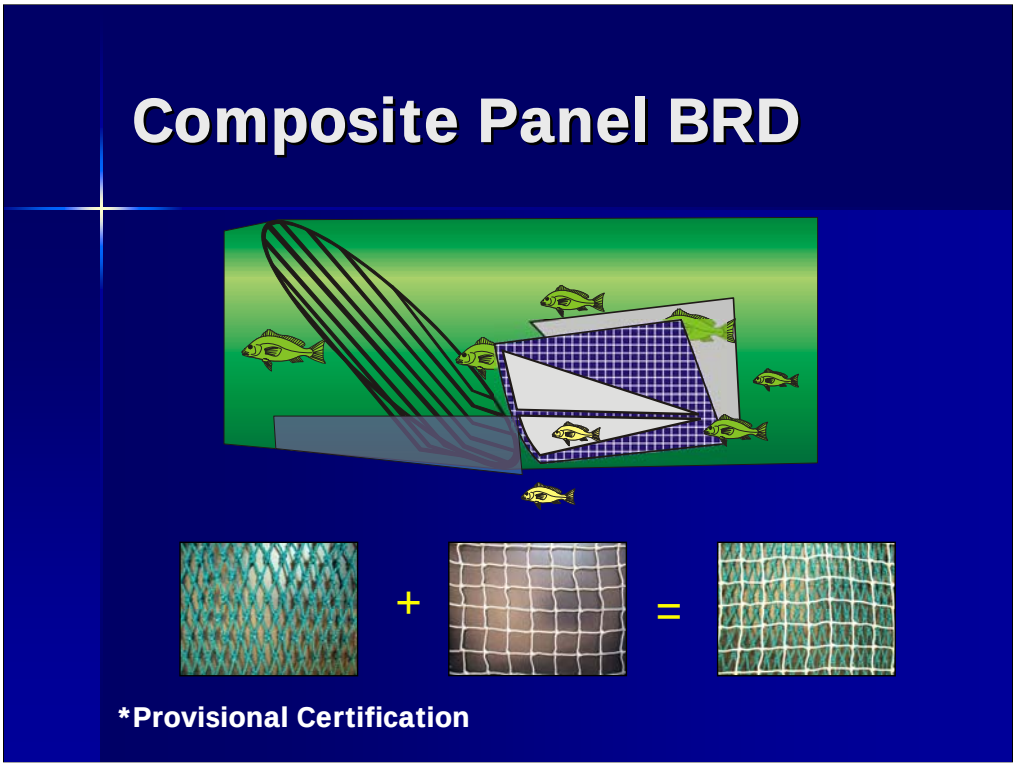
# Extended Funnel



*Provisional Certification

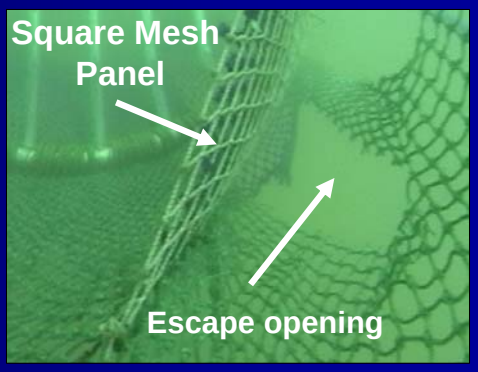



The Modified Jones Davis is a simplified design that addresses some of the operational and construction issues that fishermen have with the original design. The extension hoops were eliminated which greatly reduces the labor cost of the device. The hoops are also easily damaged during haulback activities. The funnel has been replaced with two webbing panels due to the ease of construction as well as the fact that funnels sometimes have clogging issues with debris piling up in the bottom of the trawl just ahead of the funnel. Modifications in the new Jones Davis will likely cut the construction cost of the original Jones Davis ($300 or more) by approximately half.




In order to eliminate the need for the hoops found in conventional funnel BRDs, research focused around redesigning the funnel to maintain the space between the funnel and extension. In this BRD design, the funnel was replaced by two composite webbing panels installed in the extension just behind a Turtle Excluder Device (TED).

# Composite Panels

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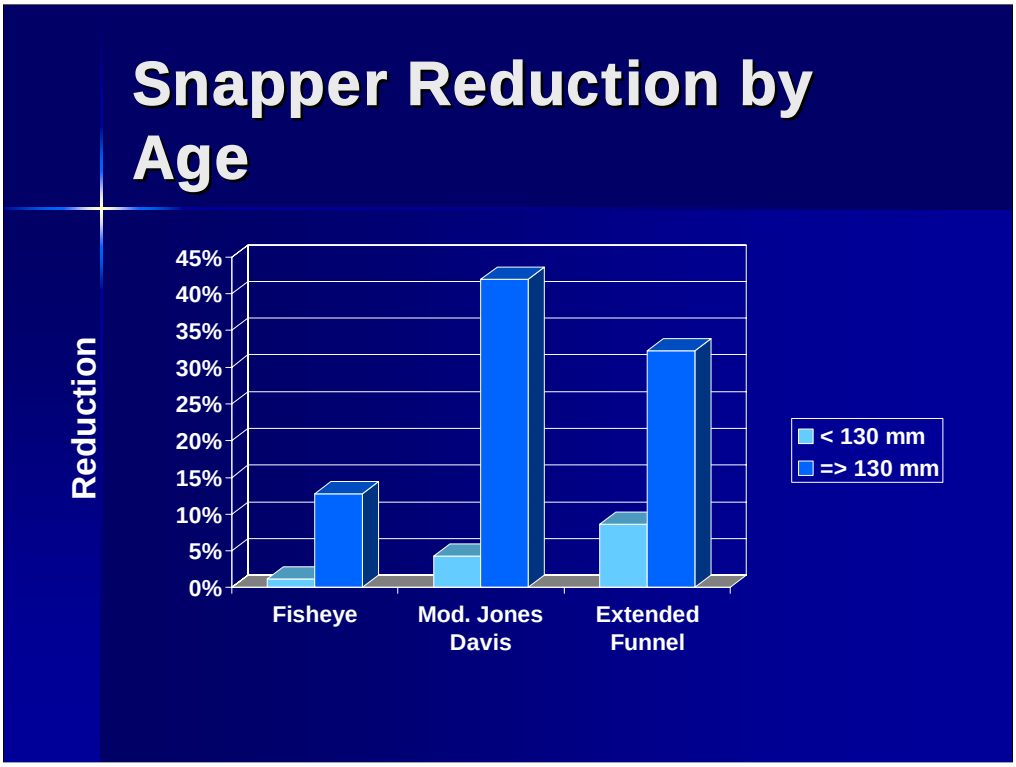
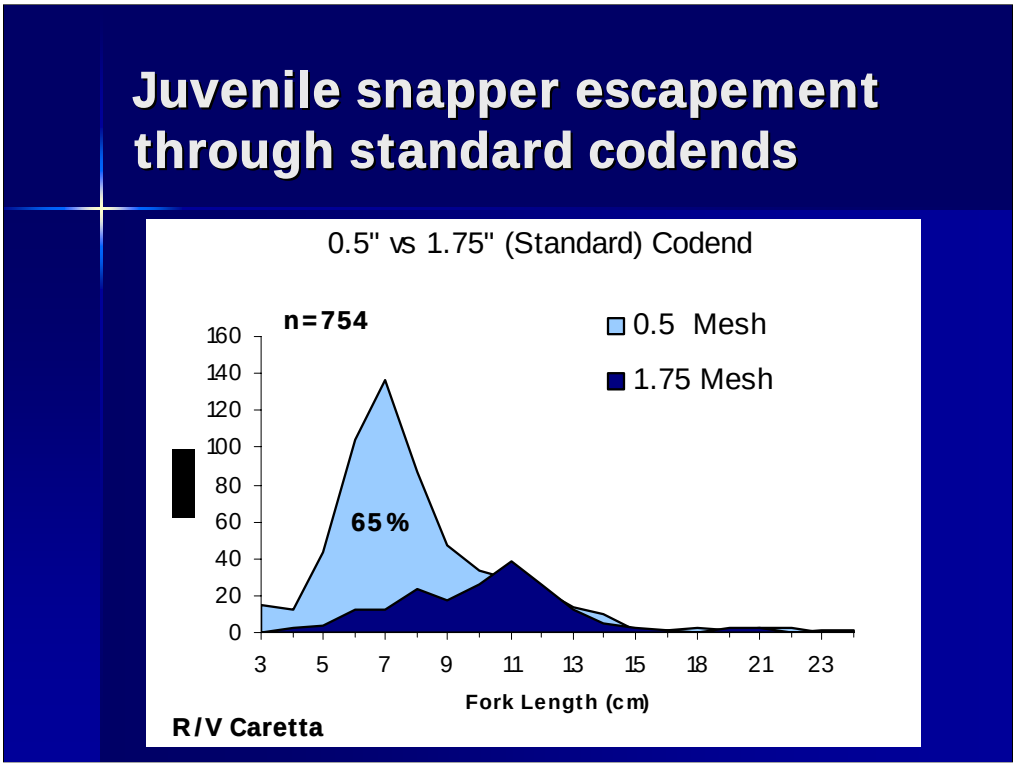
# Current Research

Codend Selectivity

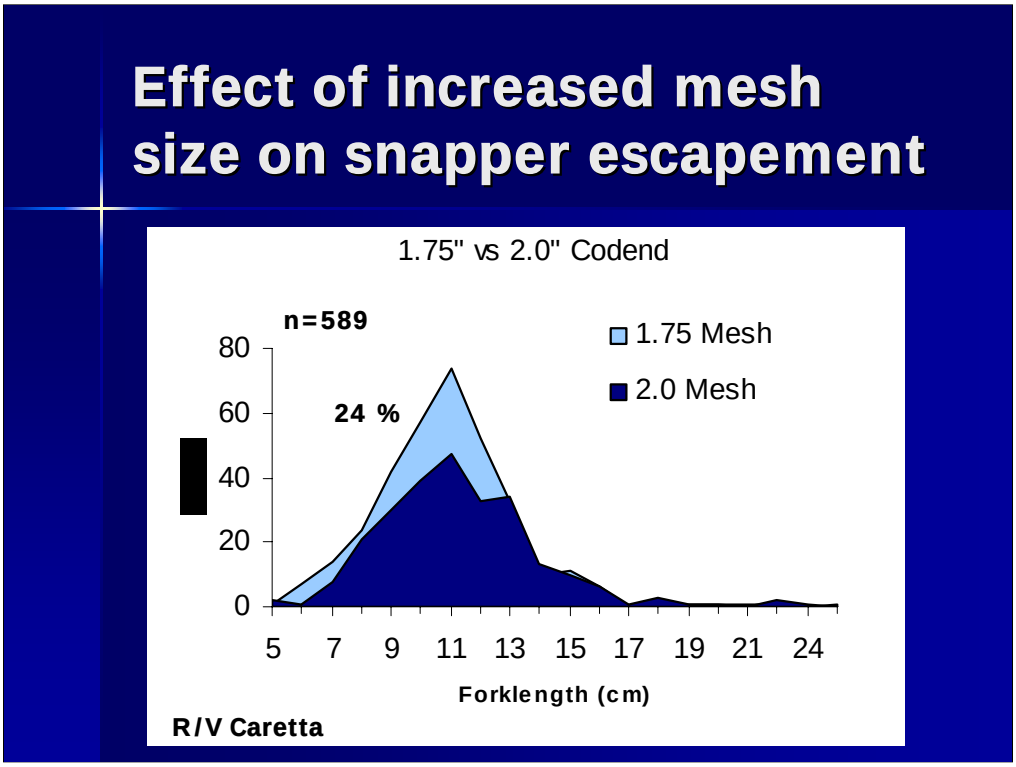
Large Mesh Panels




Due to the fact that age zero snapper are weak swimmers, current BRD technology is relatively ineffective in excluding this size class of fish.

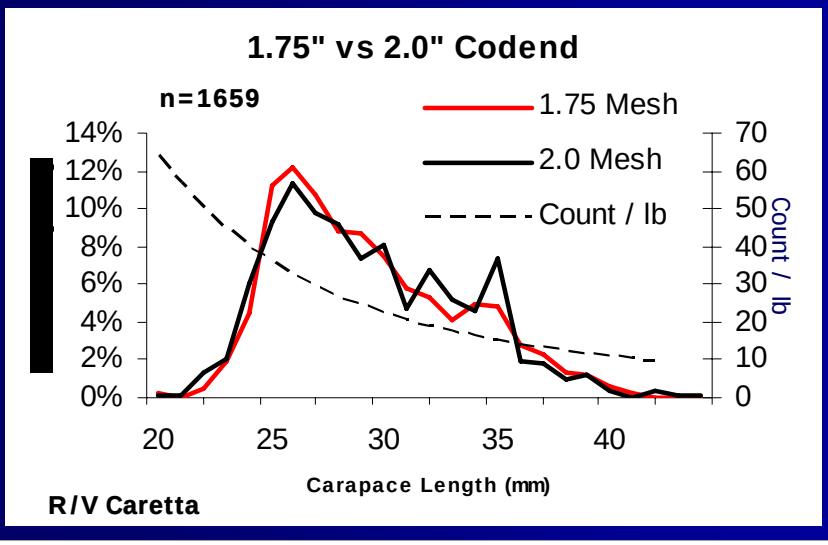



In order to evaluate the ability of zero year class snapper to escape through the meshes of codends, a conventional codend, constructed of 1.75-inch (44-mm) diamond mesh nylon was tested against a 0.5-inch (12.7 mm) fine mesh codend in a paired comparison. In this experiment, conducted July - September, an estimated 65% of the snapper entering a standard 1.75-inch mesh codend are able to escape through the meshes, avoiding capture.

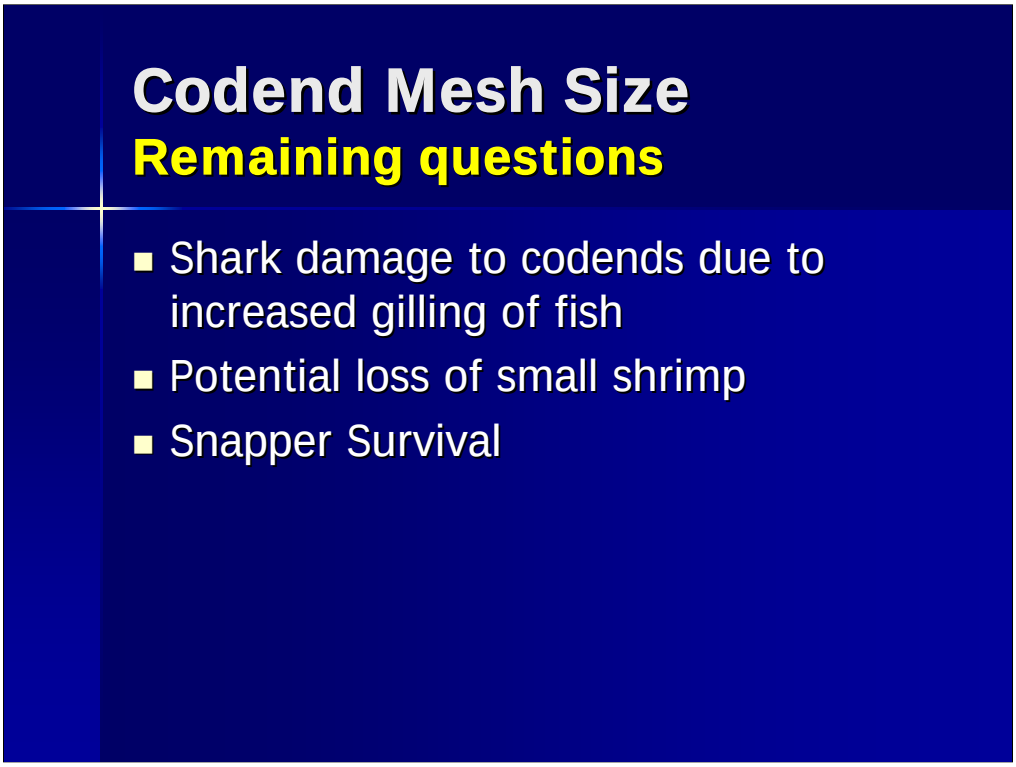



Based on the previous results, the 1.75-inch (44-mm) mesh codend was tested against a 2.0-inch (51-mm) codend of the same design. As compared to the 1.75-inch codend, the larger mesh codend significantly reduced juvenile snapper capture by 24%. Zero year class snapper were reduced by 38%. A statistical analysis indicates the length distributions in the two codends are significantly different.

# Effect of increased mesh size on brown shrimp




The length distributions in the 1.75-inch (44-mm) and 2.0-inch (51-mm) codends shows that the most abundant size brown shrimp caught during the study were 26-mm carapace length, which correspond to a 32 count/lb head-on shrimp. Statistical analysis failed to detect a difference between the two distributions.




The potential impact of increasing codend mesh size is still unclear. Anecdotal information indicates that increasing mesh size may have an adverse consequence resulting from an increase in shark damage to codends due to increased fish gilling. Research needs to be conducted on a larger size range of shrimp in order to asses the potential loss associated with increasing mesh size. Also, research needs be conducted to quantify the post escapement survival rate of snapper after passing through the codend meshes.

# Large Mesh Panels

A growing number of fishers in the Northern Gulf of Mexico are using large mesh panels installed in the codends in a variety of configurations in order to further reduce finfish bycatch.  The photo is from a vessel fishing out of Morgan City, LA.

# Square Mesh Panels

Harvesting Systems is currently evaluating square mesh panels (SMPs) sewn into the top of the codend as a means to reduce finfish bycatch. SMPs are used extensively in Europe and Australia and have shown the potential to augment the reduction being achieved with current BRD designs.

# Future Research

- Prototype BRD Designs
- Codend Selectivity
  - Snapper Escapement
  - Shrimp Retention
- Square Mesh Panels
- Snapper Survival Study
  - Unaccounted Mortality

Shrimp trawl bycatch reduction research planned by the NOAA, Harvesting Systems and Engineering Division in 2007 include the development and testing of NOAA and Industry prototype BRD designs. Research on codend selectivity will be expanded to cover a larger range of shrimp sizes as well as investigating codend construction materials such as polyethylene and Sapphire webbing.


Base on a similar study by the Fisheries Research Services in Aberdeen, Scotland, NOAA researchers are planning to conduct a red snapper survival study utilizing a specialized codend cover to collect snapper which have escaped through the meshes of a codend. After capture, snapper will be held in cages for a period of time in order to estimate the post escapement mortality.