

# Study on catch retention using a larger TED and opening in the summer flounder trawl fishery

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Dan Salerno & Steve Eayrs, GMRI  
Captain James Lund & crew, Richard Hoff, F/V Nordic Viking

# Outline

- Project Goal
- TED design
- Methods
- Results
- Problems
- Conclusion



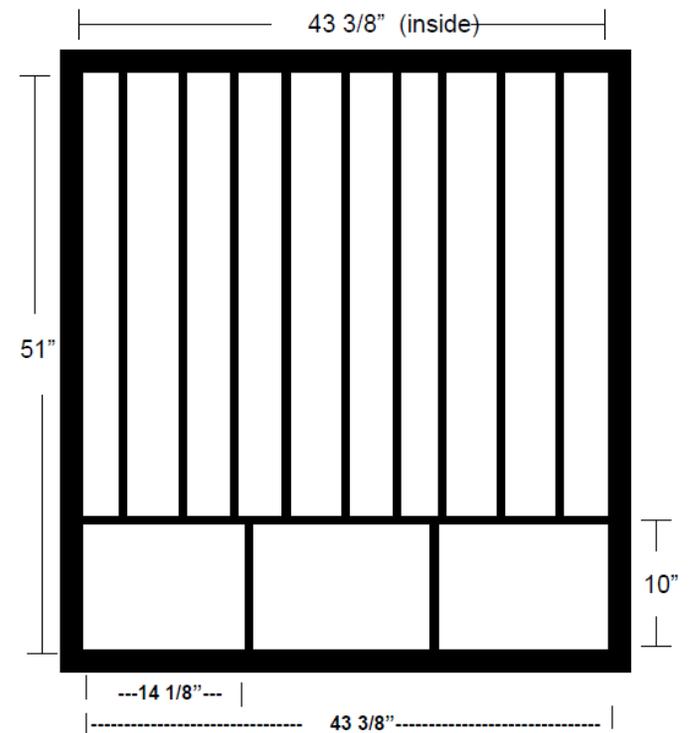
# Goal

- To evaluate the effect of a larger NMFS TED (LF-TED) on catches of summer flounder (fluke) and other species



# TED design

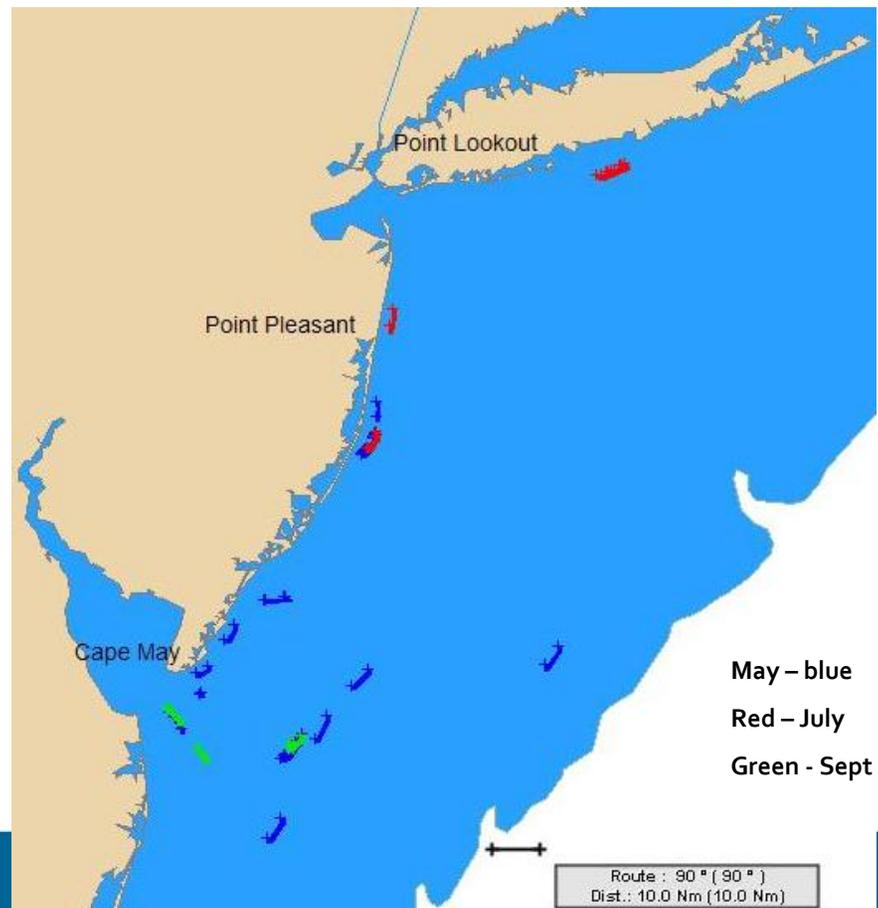
- 25% wider than SF-TED in 2007
- Other dimensions were equal
- Top opening configuration
- Escape opening width = grid width
- Grid angle =  $55^\circ$
- 100 mesh circ. x 33 mesh deep extension
- 3.5" mesh size
- 2 x 8" plastic floats/side



Flat bars 3/8"x1.5" (all inside bars)  
Round bars 1.6" O.D. (outer frame)  
Bottom Windows = 10"h x 14 1/8" w  
Bar spacing (top) = 4"  
Frame – inside width measurement – 43 3/8"  
Frame – inside height measurement = 51"

# Methods

- 40 alternate paired tows (80 total) over 16 days
- May (23 pairs) July (8 pairs) September (9 pairs)
- Cape May – Long Island
- Av depth = 13.7 ftm
- Av tow duration = 77 mins
- Av diff between pairs = 1.7 mins
- Av vessel speed = 3.1 kts
- Av diff between pairs = 0.01 kts
- Catches standardized to 1 hour



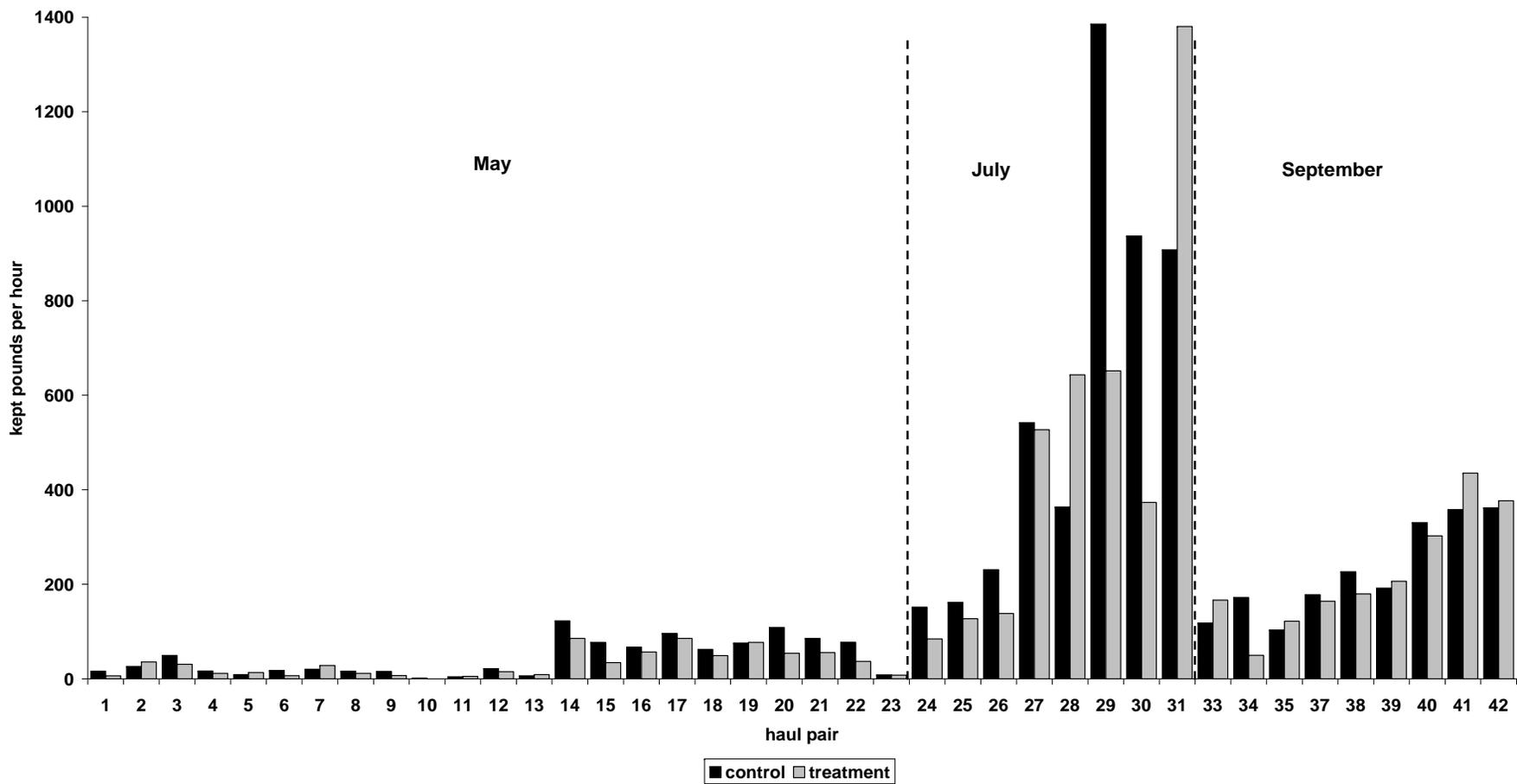
## Results – summary

- 31.5% ↓ in catch of all species in TED net
- 13.4% ↓ in total catch of fluke in TED net

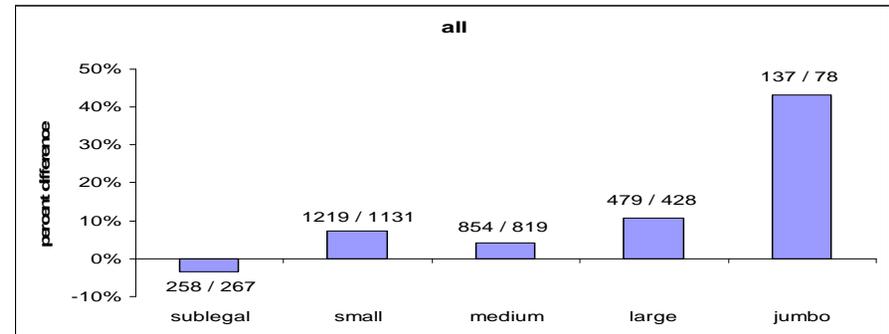
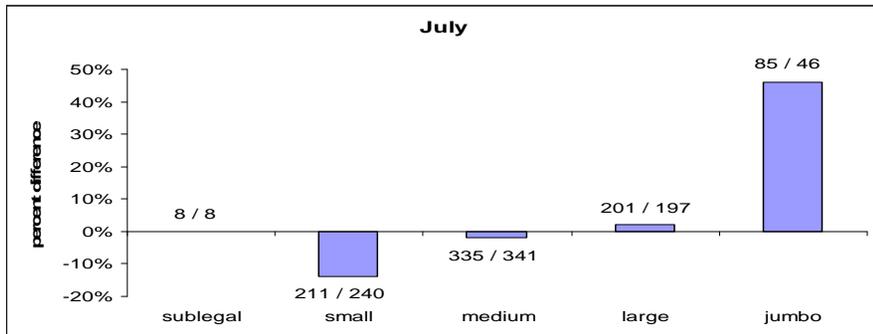
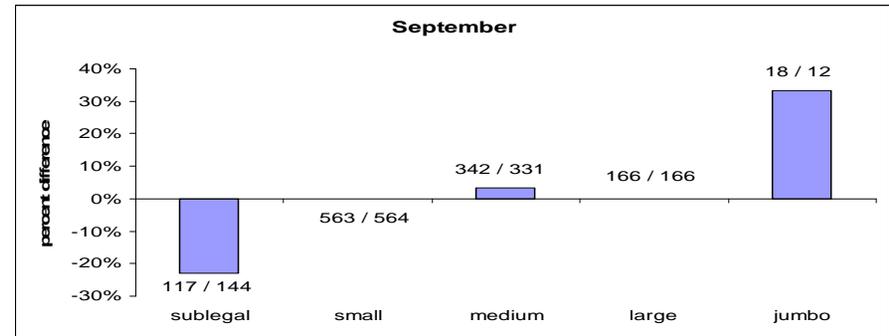
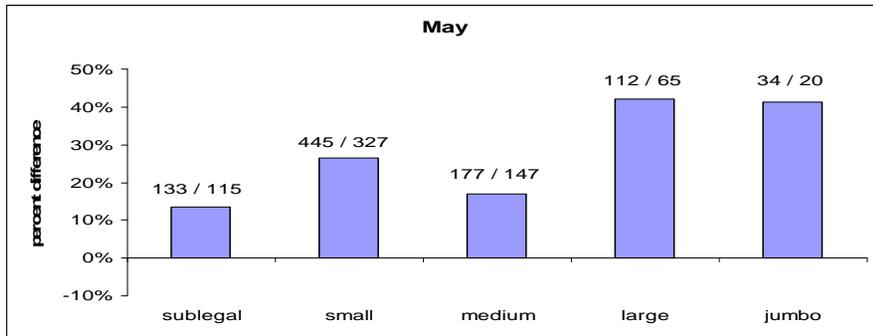
Table 5. Standardized catch comparison and one-tailed, paired t-test results for bycatch and commercially important species and groups in the Mid-Atlantic trawl fishery. *n* = number of paired tows with species occurrence; negative sign indicates treatment catch > control catch; Power value indicates the result of power analysis.

| Species/group                   | Control (lbs/hr) | Treatment (lbs/hr) | Reduction (%) | <i>p</i> -value | Power |
|---------------------------------|------------------|--------------------|---------------|-----------------|-------|
| bycatch, all ( <i>n</i> = 40)   | 59121.4          | 39071.5            | 33.9          | < 0.001 *       | 0.997 |
| skates, all ( <i>n</i> = 40)    | 42859.5          | 31927.3            | 25.5          | 0.002 *         | 0.990 |
| horseshoe crab ( <i>n</i> = 24) | 5391.5           | 1144.6             | 78.8          | < 0.001 *       | 0.407 |
| spiny dogfish ( <i>n</i> = 22)  | 3897.8           | 2230.3             | 42.8          | 0.006 *         | 0.875 |
| smooth dogfish ( <i>n</i> = 33) | 3372.5           | 1566.2             | 53.6          | 0.007 *         | 0.992 |

# Results - Kept fluke catches by testing period



# Results - Fluke catch (#control/#treatment) by size



sub-legal (<14"), small (14-16"), medium (16-18"), large (18-22"), jumbo (>22")

## Results - Fluke catch (weight) by testing period

Table 2. Average catch rate of legal-sized summer flounder in pounds per hour per tow by major category.  $n$  = number of paired tows; a negative reduction indicates treatment catch > control catch; Power indicates the result of power analysis.

| Category  | Control (SD)    | Treatment +/- SD | Reduction (%) | Power |
|---|-----------------|------------------|---------------|-------|
| Total flounder ( $n = 40$ )                     | 193.0 +/- 289.8 | 166.3 +/- 263.4  | 13.9          | 0.374 |
| May ( $n = 23$ )                                | 43.5 +/- 37.8   | 31.4 +/- 27.0    | 27.8 *        | 0.977 |
| July ( $n = 8$ )                                | 585.0 +/- 449.1 | 490.7 +/- 427.2  | 16.1          | 0.258 |
| September ( $n = 9$ )                           | 226.6 +/- 99.9  | 222.5 +/- 124.6  | 1.8           | 0.140 |
| Control > 100 lbs/hr of summer fl. ( $n = 19$ ) | 365.8 +/- 347.7 | 319.4 +/- 320.2  | 12.7          | 0.308 |
| Control < 100 lbs/hr of summer fl. ( $n = 21$ ) | 36.7 +/- 31.6   | 27.8 +/- 24.8    | 24.3 *        | 0.937 |

*Significant result in May due to low catches &/or high(est) bycatch volume*

# Results - Fluke catch (weight) by testing period

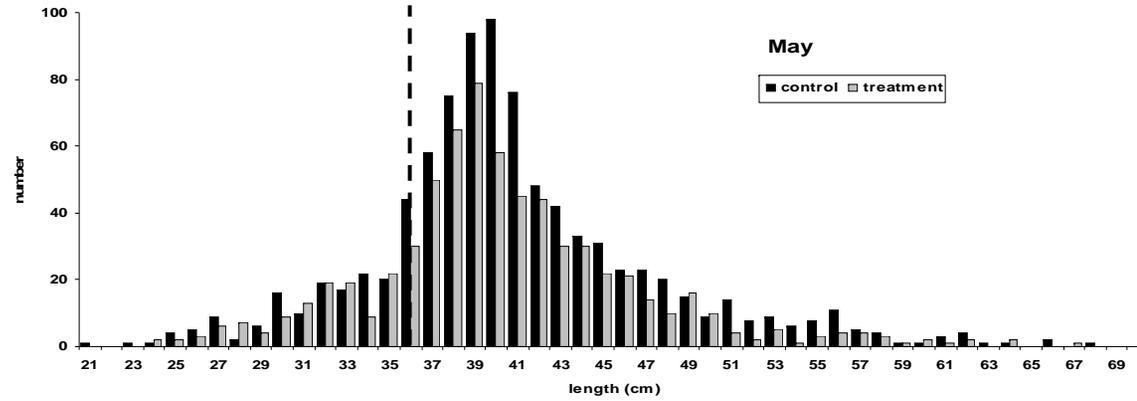
Table 2. Average catch rate of legal-sized summer flounder in pounds per hour per tow by major category. *n* = number of paired tows; a negative reduction indicates treatment catch > control catch; Power indicates the result of power analysis.

| Category  | Control (SD)    | Treatment +/- SD | Reduction (%) | Power |
|---|-----------------|------------------|---------------|-------|
| Control > 250 lbs of dogfish ( <i>n</i> = 17)     | 45.3 +/- 38.5   | 31.5 +/- 26.9    | 30.4 *        | 0.969 |
| Control < 250 lbs of dogfish ( <i>n</i> = 23)     | 302.2 +/- 344.2 | 265.9 +/- 313.2  | 12.0          | 0.295 |
| Control > 1000 lbs of skates ( <i>n</i> = 27)     | 228.4 +/- 336.4 | 189.4 +/- 303.6  | 17.0          | 0.371 |
| Control < 1000 lbs of skates ( <i>n</i> = 13)     | 120.5 +/- 140.7 | 119.7 +/- 154.0  | 0.7           | 0.111 |
| Control total bycatch > 2000 lbs ( <i>n</i> = 15) | 225.2 +/- 388.6 | 188.1 +/- 366.0  | 16.5          | 0.248 |
| Control total bycatch < 2000 lbs ( <i>n</i> = 25) | 173.7 +/- 217.7 | 153.2 +/- 184.8  | 11.8          | 0.303 |

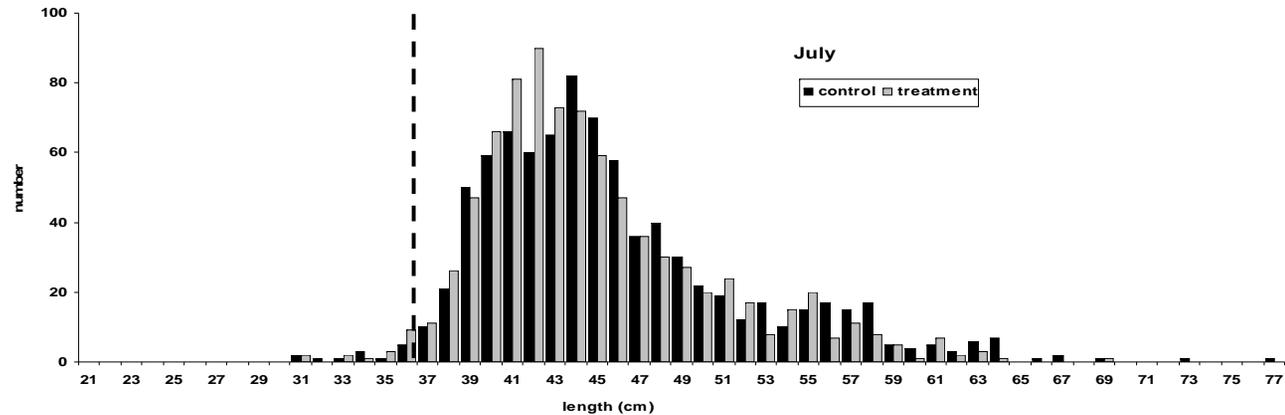
\* significant at  $\alpha = 0.05$

# Results – Fluke length-frequency by testing period

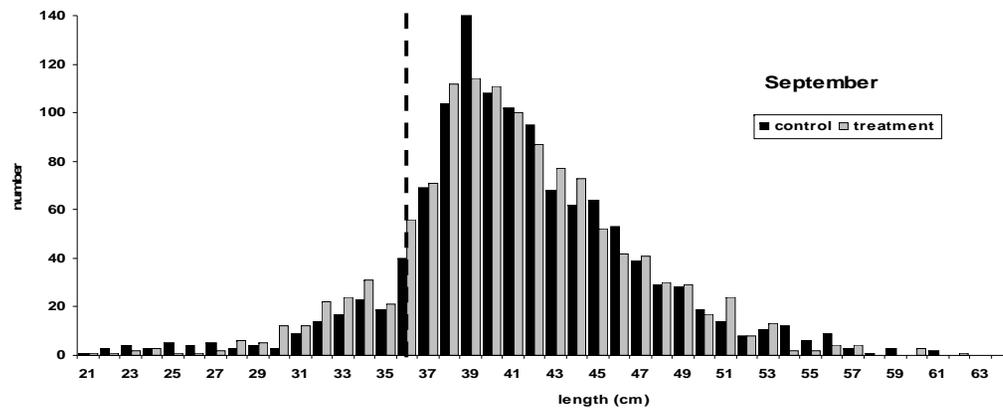
Av length (May)  
C: 40.8 cm +/- 6.6  
T: 40.2 cm +/- 6.2 ns



Av length (July)  
C: 45.8 cm +/- 6.3  
T: 44.8 cm +/- 5.6\*



Av length (Sept)  
C: 41.3 cm +/- 5.6  
T: 40.9 cm +/- 5.4 ns



## Comparison with SF-TED (Lawson et al. 2007)

Table 8. Comparison of summer flounder catch reductions between the LF-TED and the SF-TED using catch categories adapted from Lawson et al. (2007). *n* = number of paired tows satisfying the requirements of each catch category.

| Catch category   | LF-TED<br>reduction (%) | <i>n</i> | SF-TED<br>reduction (%) | <i>n</i> |
|--|-------------------------|----------|-------------------------|----------|
| All tows   | 13.4                    | 40       | 35 *                    | 37       |
| Total weight of summer<br>flounder > 50 kg for at least<br>one tow | 13.2                    | 24       | 35 *                    | 18       |
| Total weight of summer<br>flounder < 50 kg in each net             | 18.0 *                  | 16       | 37 *                    | 19       |
| Dogfish weight > 100 kg<br>for at least one tow                    | 27.2 *                  | 20       | 39 *                    | 20       |
| Dogfish weight < 100 kg<br>in each net                             | 11.7                    | 20       | 14 *                    | 17       |
| Skate/ray weight >500 kg<br>for at least one tow                   | 17.4                    | 26       | 39 *                    | 23       |
| Skate/ray weight < 500 kg<br>in each net                           | - 1.8                   | 14       | 29 *                    | 14       |
| Total catch weight > 900 kg<br>for at least one tow                | 16.7                    | 21       | 42 *                    | 21       |
| Total catch weight < 900 kg<br>in each net                         | 5.6                     | 19       | 16 *                    | 16       |

\* significant at  $\alpha = 0.05$

## Problems encountered

- partial grid clogging by skates on haulback
- chaffing of extension meshes on bottom of TED
- inability to wrap extension/codend around net drum
- complicated and time consuming codend retrieval
- TED destruction
- failure of welds in grid



## Problems encountered

- complicated and time consuming codend retrieval
- TED destruction
- failure of welds in grid



# Conclusion

- High variability between tows & months hampered analysis
- Fluke loss remains too high
- Encouraging bycatch reduction
- Further refinement required
  - Catch loss
  - TED strength
  - Handling in poor weather
- LF-TED a move in the right direction
- Camera gear to observe TED incl. efficacy of escape opening
- Perhaps long-term commercial testing program required with subsidy???



# Escape cover too tight???

