Golden Tilefish
Hook Selectivity Comparison from Two Longline Surveys

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Hypothesis: A dome shaped selectivity pattern exists in the fishery.
97% of Golden were in the core strata (3-5)
Hook Selectivity
150 hooks/station
1 Nautical Mile

- 2017 Pilot
  20% small - 60% medium – 20% Large

- 2020 survey
  50% small - 50% medium

8/0 small - 12/0 medium – 14/0 Large
Hook Selectivity
150 hooks/station
1 Nautical Mile
Catch Rates by Hook size

• 2017 Pilot
  59% small - 27% medium – 14% Large
  Small hooks caught 2.2 times more fish (#s) than medium hooks.
  Small hooks caught 4.2 times more fish (#s) than large hooks.

• 2020 survey
  70% small - 30% medium
  Small hooks caught 2.4 times more fish (#s) than medium hooks.
2017 Tilefish Longline Pilot Survey

Large differences in catch rates among hook sizes

Length Distribution by hook size

- Small (8/0)
- Medium (12/0)
- Large (14/0)

20% small - 60% medium – 20% Large
2017 Tilefish Longline Pilot Survey

Proportions by hook size

Length Distribution by hook size

- **small (8/0)**
- **Medium (12/0)**
- **Large (14/0)**

Frequency (Proportion by hook size)

Length (cm)
Large differences in catch rates between hook sizes

Length Distribution by hook size

50% small - 50% medium

Small (8/0) vs Medium (12/0)

Age3 vs Age4

Age7-ish
Small shift in the proportion at length but there is a large difference in Q between the hook sizes.
Landings at length

Survey Length Distribution

Length Distribution by hook size

Variable Y-axis
Frequency (000s)

Length (cm)

2015
2016
2017
2018
2019
2020

Model predicted age-4 (2013 yc)

age-7 (2013 yc)

2017
2020
<table>
<thead>
<tr>
<th>depth strata</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meters</td>
<td>82.3-98.6</td>
<td>98.8-252.2</td>
<td>252.4-303.6</td>
</tr>
<tr>
<td>sample size</td>
<td>12</td>
<td>588</td>
<td>17</td>
</tr>
<tr>
<td>0-55 cm</td>
<td>100%</td>
<td>95%</td>
<td>59%</td>
</tr>
<tr>
<td>56-max cm</td>
<td>0%</td>
<td>5%</td>
<td>41%</td>
</tr>
</tbody>
</table>

**2017 Pilot survey**

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</tr>
<tr>
<td>sample size</td>
<td>2</td>
<td>937</td>
<td>22</td>
</tr>
<tr>
<td>0-55 cm</td>
<td>100%</td>
<td>86%</td>
<td>55%</td>
</tr>
<tr>
<td>56-max cm</td>
<td>0%</td>
<td>14%</td>
<td>45%</td>
</tr>
</tbody>
</table>

**Legend**

- Green circles indicate different fish species ranges.
Catch rates and sample size are much lower outside of the main 3 tilefish fishing ground strata (3-3, 4-3, 5-3).

Size distribution suggests a slight shift to larger fish with greater depth and outside of the core fishing grounds.

<table>
<thead>
<tr>
<th>2017 Pilot survey (limited to depth strata 3-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>core strata (3-5)</td>
</tr>
<tr>
<td>sample size</td>
</tr>
<tr>
<td>0-55 cm</td>
</tr>
<tr>
<td>56-max cm</td>
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</table>
Conclusions

• Results of the hook size selectivity comparison and to a lesser extent the spatial & depth refuge effects are consistent with a dome shaped selectivity pattern.
• The degree of doming (descending right side) remains more elusive since a flat topped selectivity assumption may not be justified in the survey.

Survey Design Question

Longer-term, perhaps a survey designed with 2 hook sizes (smalls and mediums) could inform fishery selectivity through the modeling of the survey with separate estimates of Q and dome shaped selectivity for each hook size? Cost-benefit trade-off?
What is the optimal fishery independent tilefish longline survey for the Buck? What are the trade-offs?
If we assume 300k is available for a survey in a two year period. Example: 150k annual survey or 300k every two years or 600k every 6 years.

• Pre-recruit index annually (limited spatial extent core, only small hooks to increase Q with less stations, better information on age 3 and 4 relative to commercial fishery, frequent assessments).

• Every two years (limited spatial extent core, two hook sizes, less useful as a pre-recruit index, perhaps better information to inform selectivity in the assessment, estimate Q and selectivity by hook size, less frequent assessment-about 3 years).

• Every 6 years (spatially extent outside of core, two hook sizes, not useful as a pre-recruit index, could perhaps inform selectivity, could inform general longer-term stock range expansion and contraction, could provide better information on blueline, could help support a longer term constant ABC decision).