Working Paper #14
Indicators of Status

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GARFO-MAFMC {Landings, Prices}
Industry for support of Summit (Manderson) and body weight samples
WP#14 Indicators of Status:


• Multivariate methods were used to explore post hoc classification of fishing year type using variables from Vessel Trip Reports, biological sampling of landings, and trawl surveys.

• Measures of fishing capacity on a per vessel (i.e., permit) basis may be a useful measure of fishery performance.

• Total fishing effort may be influenced by success earlier in the season. Complex in-season dynamics.
WP#14 Indicators of Status: Data & Methods

Variables suggested by fishermen shown in red

• Landings
• Effort \{Trips, Days Absent, Days Fishing\}
• LPUE \{Landings/Trip, Landings/DA, L/DF\}
• Standardized LPUE = \{L/T, L/DA, L/DF\} / \{respective means\}
• Capacity Ratio by Vessel= \ Landings/max\{observed LPUE by vessel\}
  • Can look at fishing success as fraction of vessels exceeding some fraction of its capacity
• Average Body Weight (g)
• Average Price
• NEFSC Bottom Trawl Survey
• Fishery Status \{Poor, Average, Good\}
WP#14: Results—Inter-relationships

- Longer trips reflect lower catch rates.
  \[ y = 893.46x^{1.46} \]
  \[ R^2 = 0.5567 \]

- Trips increase with higher success rates.
  \[ y = 93.155 \times 1.764^x \]
  \[ R^2 = 0.432 \]
WP#14 Indicators of Status: Results

Cluster Profile Plots

**Group 1:**

**Group 2:**

**Group 3:**
Indicators of Status: Results

- Regression Tree using 3 key variables.
- “Poor” $\Rightarrow$ Fraction of trips $>60\%$ capacity is less than 0.41
- “Good” $\Rightarrow$ Fraction of trips $>60\%$ Capacity is $>0.592$, AND price $>0.395$
- “Average” = everything else
- Proportion of variability explained by this model $= 0.582$
- Proportion of variance explained by “best model” $= 0.781$
Discriminant Analysis:
{Price, Ave Wt, Fraction of trips>60% capacity}

<table>
<thead>
<tr>
<th>Model Prediction</th>
<th>“True” State of Nature</th>
<th>Predicted Total</th>
<th>Percent Correct</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Good</td>
<td>Poor</td>
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