Re-evaluation of stock structure for Bering Sea/Aleutian Islands northern rockfish

Paul Spencer
Alaska Fisheries Science Center
Background

• Information on high exploitation rates and targeted fishing presented to the BSAI Plan Team in September, 2015

• Plan Team requested a stock structure update for the September, 2016 meeting
Outline

• Stock structure analyses involving catch and survey data are updated
• Other stock structure analyses are summarized
• The extent of targeted fishing is examined in more detail
Summary of previous information

*Physical limitations to connectivity*

Deep passes in the Aleutian Islands may limit movement of northern rockfish

*Genetics*

An isolation by distance pattern of spatial structure has been observed. Estimates of lifetime dispersal distance are ~ 200 km (Gharrett et al. 2012).
Harvest and trends

Fishing mortality relative to target reference point

Ratio of BSAI-wide $F$ to $F_{abc}$ (estimated in 2014) from 2006 - 2015 ranged from 0.15 to 0.57.
Spatial concentration of harvest

$U_{F40\%}$ – the exploitation rate associated with fishing at F40% (affected by selectivity, numbers at age, maturity, and size at age)
Trends in survey biomass estimates
Growth

Generally, lower values of $K$ and $L_{inf}$ in the western AI compared to the central and eastern AI.
Estimated size at age

[Graph showing Estimated size at age for Year 2000 and Year 2012 with different species represented by different symbols and lines.]

NOAA FISHERIES
Age/size structure

Older fish in the western Aleutian Islands
Fishery and management activity

• At the 2015 Plan Team meeting, it was noted that targeted fishing was occurring in the eastern Aleutian Islands in 2015

• Directed fishing was allowed for a portion of each year since 2009

• Additional analyses indicates earlier targeting in other parts of the Aleutian Islands.
Definition of a “northern rockfish” targeted tow

• Based on fishery tows sampled by groundfish observers

• Two criteria:
  1) Rockfish have the highest catch of the species or species groups
  2) Northern rockfish have the highest catch among the rockfish
Number of northern rockfish tows

Increasing in the central AI from 2010-2012

Graph showing the number of northern rockfish tows from 2007 to 2016, with three lines representing different areas (WAI, CAI, EAI). The number of tows has increased significantly in the central AI from 2010 to 2012.
Average percent of haul catch weight composed on northern rockfish in targeted tows
Percent of yearly observed catch in targeted tows
Amount of northern rockfish catch in targeted hauls

<table>
<thead>
<tr>
<th>Area</th>
<th>Year</th>
<th>Hauls</th>
<th>Catch (t)</th>
<th>Mean Catch Per Haul (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAI</td>
<td>2011</td>
<td>38</td>
<td>735</td>
<td>19.34</td>
</tr>
<tr>
<td>CAI</td>
<td>2012</td>
<td>63</td>
<td>1090</td>
<td>17.30</td>
</tr>
<tr>
<td>CAI</td>
<td>2013</td>
<td>42</td>
<td>899</td>
<td>21.40</td>
</tr>
<tr>
<td>EAI</td>
<td>2014</td>
<td>19</td>
<td>521</td>
<td>27.44</td>
</tr>
<tr>
<td>EAI</td>
<td>2015</td>
<td>28</td>
<td>814</td>
<td>29.05</td>
</tr>
</tbody>
</table>
Why should we be concerned if the catch comes from targeted hauls?

- Because the interpretation of stock structure in 2012 was based on the understanding that northern rockfish would be a bycatch fishery.
- Directed fishing was allowed since 2009 in order to prevent regulatory discards, with the understanding that targeting or topping off would not occur.
- If we understood in 2012 that targeting was occurring, the ‘overage’ in 2015 in the EAI could have been more easily anticipated and prevented.
BSAI Plan Team conclusions, Sept 2012

• Evidence of stock structure
• Splitting the ABC would not reduce mortality
• Economic losses, increased regulatory discards, and management difficulty were considered
Conclusions

• Evidence for spatial stock structure remains
• Prevention of directed fishing minimizes any conservation concern, but at a cost of restricting harvest for which there may be economic interest
• A useful comparison may be BSAI POP and Atka mackerel, in which directed fisheries were allowed while also managing the spatial distribution of harvest.