AFSC Recreational Fishing Economics Program

Dan Lew and Brian Garber-Yonts

July 17-20, 2017
Outline

• Background
  • Alaska saltwater sport fisheries
  • Pacific halibut regulatory context
  • Program motivation and goals
  • Research program environment

• Understanding marine charter businesses and anglers
  • Data collections
  • Baseline economic and other policy-relevant information
  • Additional research

• Looking ahead
Alaska saltwater sport fisheries

- Reputation as high quality fishing destination

- Pacific halibut primary federally-managed species
  - International Pacific Halibut Commission (stock assessment, ACLs)
  - NPFMC (sectoral allocations)
  - NMFS (scientific analysis, implementation, and enforcement)
  - State of Alaska/ADF&G (recreational fishing regulations and enforcement)

- Important state-managed species
  - Pacific salmon (esp. chinook and coho)
  - Rockfish
  - Lingcod
  - Sablefish (black cod)
Alaska saltwater sport harvest by species (# fish)

Data from http://www.adfg.alaska.gov/sf/sportfishingsurvey/
Primary Alaska saltwater sport fishing regions

- IPHC Areas 2C (Southeast) and 3A (Southcentral)
Pacific halibut: A changing regulatory landscape

- Responses to declining stocks in IPHC areas 2C and 3A

- Pre-2007: Bag limits same for guided (charter boat) and unguided (shore, private boat) anglers

- 2007 onward: Differential bag limits and imposition of size limits in guided/charter fishing trips first in 2C and recently in 3A; other restrictions
Pacific halibut: A changing regulatory landscape (cont.)

- 2011: Charter limited entry
  - Charter halibut permits (CHPs)

- 2014: Pacific Halibut Catch Sharing Plan (CSP) began
  - Formalized allocation process
  - Annual review of charter-specific regulations
  - Introduced guided angler fish (GAF) program
Pacific halibut sport harvest, 2003-2015 (# fish)
Pacific halibut commercial and research harvest, 2003-2015 (lbs.)
Program goals

• Collect data on saltwater sport fishing participants

• Develop policy-relevant information
  • Measuring recreational fishing demand and values
  • Evaluate effects of policy changes and allocation decisions
  • Additional research to improve methods/models
NMFS Alaska Region Recreational Fisheries Implementation Plan

Specific objectives/strategies:

• “Continue to provide services that promote management objectives associated with the recreational Pacific halibut fisheries, including the collection of economic information and disseminating that information to the Council audience”

• “Support socio-economic research on recreational fisheries”

• “Conduct socio-economic projects and analyses that help inform Council management decisions relevant to Pacific halibut management and the Pacific halibut Catch Sharing Plan”
Research environment

- Data and funding challenges
  - Data collection under Marine Recreational Information Program (MRIP)
  - Ad hoc funding
  - Only voluntary surveys
  - Administrative/policy hurdles

Source: http://www.st.nmfs.noaa.gov/recreational-fisheries/Surveys/coverage
Research environment (cont.)

- Primary recreational fisheries participants
  - Anglers
    - Guided/unguided
    - Resident/non-resident
  - Charter businesses
    - CHP holders

Source: NMFS Photo Archive
## Recreational fishing economic data collections

### Anglers

#### Alaska Saltwater Sport Fishing Survey

**Popular Alaska Saltwater Sport Fish**

<table>
<thead>
<tr>
<th>Pacific Habitat</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>King Salmon (Chinook)</strong></td>
<td>Available throughout the season</td>
<td>Average weight is approximately 25 pounds (ranges from 15 to over 35 pounds)</td>
</tr>
<tr>
<td></td>
<td>2006 daily catch limit was 1 to 3; in some areas, the daily limit was 2 for Alaska residents and 1 for non-residents</td>
<td></td>
</tr>
</tbody>
</table>

**Silver-Salmon (Coho)**

- Available throughout the season
- Average weight is approximately 15 pounds (ranges from 7 to over 15 pounds)
- 2006 daily catch limit for all non-King salmon was a combined total of 5 to 10 in most areas

**Other Salmon**

- Red (Sockeye), Pink (Humpy), and Chum (Dog) salmon are available at different times throughout the summer months
- They are sometimes caught, but are rarely targeted by sport anglers in SALTWATER off Alaska
- 2006 daily catch limit for all non-King salmon was a combined total of 5 to 10 in most areas

**Other Species**

- Includes lingcod and rockfish
- 2006 daily catch limit for lingcod was 2 in most areas
- 2006 daily catch limit for rockfish was 5 to 10 in most areas

Photo credit: Alaska Department of Fish and Game - Sport Fish Division

Sponsored by NOAA Fisheries (National Marine Fisheries Service)

Your participation in this survey is voluntary. All responses are confidential.

OMB Control # 0648-0535
Expiration Date 02/28/2009

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### Charter businesses

#### Alaska Saltwater Sport Fishing Charter Business Survey

**2015 Season**

Photo credit: R. Yamada

This survey is funded by the National Oceanic and Atmospheric Administration, a U.S. government agency charged with making decisions about habitat management.
Charter Business Survey

Collaboration with charter industry
- Survey development
- Member participation

Comprehensive cost & earnings
- Employment & wages
- Revenue: Charter trips (type, length), services, permits
- Costs: trip/operating, overhead, capitalized
- Client profiles & sources
- Business/household characteristics

<table>
<thead>
<tr>
<th>Year</th>
<th>Population/ Sample Size</th>
<th>Sample Rate</th>
<th>Unit Responses</th>
<th>Survey Response Rate</th>
<th>Online (% of n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>650</td>
<td>1.0</td>
<td>174</td>
<td>28%</td>
<td>33%</td>
</tr>
<tr>
<td>2012</td>
<td>592</td>
<td>1.0</td>
<td>141</td>
<td>24%</td>
<td>30%</td>
</tr>
<tr>
<td>2013</td>
<td>572</td>
<td>1.0</td>
<td>125</td>
<td>22%</td>
<td>50%</td>
</tr>
<tr>
<td>2015</td>
<td>561/421</td>
<td>0.75</td>
<td>84</td>
<td>21%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Administration
- Pacific States Marine Fisheries Commission
- Mail and EDR Web portal

Non-response adjustment
- Non-respondent survey
- Ancillary data
Survey population: Charter businesses

Data collected

- **Alaska Saltwater Sport Fishing Charter Business Survey**: Costs, earnings, and employment
- **Alaska Charter Halibut Permit Holder Survey**: CSP, GAF leasing, and potential program changes
Economic conditions in the charter business sector

- Generated estimates of costs, earnings, and employment for 2011-2013

![Graph showing percent full-time positions for the 2011-2013 charter business population.]

![Bar chart showing mean revenues and costs for 2011, 2012, and 2013.]

**Figure 36.** Estimated percent of full-time positions for the 2011-2013 charter business population.

**Perspectives**

Weighting and Imputation for Missing Data in a Cost and Earnings Fishery Survey

Economic conditions in the charter business sector (cont.)

Ongoing and planned research

- Currently analyzing 2015 data
- Exploring models that explain participation (exit-stay) behavior of charter businesses
- Plans to estimate economic contribution of charter sector with economic impact models
Survey population: Charter businesses

Data collected

• **Alaska Saltwater Sport Fishing Charter Business Survey**: Costs, earnings, and employment

• **Alaska Charter Halibut Permit Holder Survey**: CSP, GAF leasing, and potential program changes
Charter halibut permit holders survey

- Mail survey in 2015 to 565 charter halibut permit (CHP) holders (entire population)
- 48% response rate
- Collected data on variety of topics related to CSP, GAF, and Catch Accountability Through Compensated Halibut (CATCH) proposal
  - Recent CATCH adoption
  - Funding mechanism unclear
Attitudes toward the Halibut Charter Sharing Plan

**Table 3. -- How positively or negatively do you view the CSP as a whole? (Question A1).**

<table>
<thead>
<tr>
<th></th>
<th>2C</th>
<th></th>
<th>3A</th>
<th></th>
<th>All areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>% resp</td>
<td>% item</td>
<td>Count</td>
<td>% resp</td>
<td>% item</td>
</tr>
<tr>
<td>Very positively</td>
<td>5</td>
<td>4.17</td>
<td>4.2</td>
<td>4</td>
<td>2.65</td>
<td>2.7</td>
</tr>
<tr>
<td>Somewhat positively</td>
<td>15</td>
<td>12.5</td>
<td>12.61</td>
<td>10</td>
<td>6.82</td>
<td>6.76</td>
</tr>
<tr>
<td>Neither positively</td>
<td>13</td>
<td>10.83</td>
<td>10.92</td>
<td>14</td>
<td>9.27</td>
<td>9.46</td>
</tr>
<tr>
<td>nor negatively</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat negatively</td>
<td>29</td>
<td>24.17</td>
<td>24.37</td>
<td>34</td>
<td>22.52</td>
<td>22.97</td>
</tr>
<tr>
<td>Very negatively</td>
<td>57</td>
<td>47.5</td>
<td>47.9</td>
<td>86</td>
<td>56.95</td>
<td>58.11</td>
</tr>
<tr>
<td>Blank</td>
<td>1</td>
<td>0.83</td>
<td>-</td>
<td>3</td>
<td>1.99</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>99.17</td>
<td>100</td>
<td>148</td>
<td>98.01</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 4. -- How positively or negatively do you view the GAF component of the Catch Sharing Plan? (Question A2).**

<table>
<thead>
<tr>
<th></th>
<th>2C</th>
<th></th>
<th>3A</th>
<th></th>
<th>All areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>% resp</td>
<td>% item</td>
<td>Count</td>
<td>% resp</td>
<td>% item</td>
</tr>
<tr>
<td>Very positively</td>
<td>6</td>
<td>5</td>
<td>5.04</td>
<td>6</td>
<td>3.97</td>
<td>4.03</td>
</tr>
<tr>
<td>Somewhat positively</td>
<td>18</td>
<td>15</td>
<td>15.13</td>
<td>13</td>
<td>8.61</td>
<td>8.72</td>
</tr>
<tr>
<td>Neither positively</td>
<td>16</td>
<td>13.33</td>
<td>13.45</td>
<td>12</td>
<td>7.95</td>
<td>8.05</td>
</tr>
<tr>
<td>nor negatively</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very negatively</td>
<td>63</td>
<td>52.5</td>
<td>52.94</td>
<td>93</td>
<td>61.59</td>
<td>62.42</td>
</tr>
<tr>
<td>Blank</td>
<td>1</td>
<td>0.83</td>
<td>-</td>
<td>2</td>
<td>1.32</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>99.17</td>
<td>100</td>
<td>149</td>
<td>98.68</td>
<td>100</td>
</tr>
</tbody>
</table>

- Majority of respondents did not believe changes to GAF leasing program would be helpful (~60%)
- But few indicated they participated in the program (~7% overall in 2014)
Attitudes toward the CATCH proposal

- Survey asked questions about general support, effectiveness, and funding mechanisms
  - Low support for CATCH proposal (though ~30% not at all familiar with it)
  - Belief that it will not be effective (~47%)
  - Little support for funding mechanisms that involve the charter sector funding it with CHP fee or charter halibut tax (harvest tax) (<15% at least somewhat supportive)
  - More support for funding through a halibut stamp program (>60% at least somewhat supportive)

| Table 41. -- How supportive, if at all, are you of the CATCH Project? (Question F3). |
|---------------------------------|-------|-------|-------|-------|-------|-------|
|                                 | 2C    |       | 3A    |       | All areas |       |
|                                 | Count | % resp| % item| Count | % resp| % item| Count | % resp| % item|
| Not at all supportive           | 40    | 33.33 | 40.00 | 66    | 43.71 | 50.38 | 106   | 39.11 | 45.89 |
| A little supportive             | 17    | 14.17 | 17.00 | 18    | 11.92 | 13.74 | 35    | 12.92 | 15.15 |
| Very supportive                | 7     | 5.83  | 7.00  | 5     | 3.31  | 3.82  | 12    | 4.43  | 5.19  |
| Extremely supportive           | 22    | 18.33 | 22.00 | 17    | 11.26 | 12.98 | 39    | 14.39 | 16.88 |
| Blank                          | 20    | 16.67 | -     | 20    | 13.25 | -     | 40    | 14.76 | |
| Total                          | 100   | 83.33 | 100   | 131   | 86.75 | 100   | 231   | 85.24 | 100   |
Additional research on Halibut CSP and its effects

In short:
• Reviewed tradable permit programs with similar characteristics to the GAF leasing program

In short:
• Examined GAF leasing market activity
• Evidence of benefits for self-leasers and those with certain types of quota holdings
• Low levels of GAF leasing relative to commercial IFQ leases
Survey population: Anglers

Survey development and testing

- Numerous focus groups and cognitive interviews
- Small formal pretest done
- Input from fishery managers

Administered using modified Dillman Tailored Design Method approach

- 5 contacts plus incentive

Administered in 2007, 2012, and 2017 (fielding now)

- Modifications made in 2012 and 2017
- Response rates ranged from 50-57% across years
Survey population: Anglers

Survey versions
- Non-resident anglers
- Southeast Alaska resident anglers
- Other Alaska resident anglers

Data collected
- Revealed preference (RP) data
  - Season-level fishing information
  - Detailed trip-level information
  - Trip expenditure-level information
- Stated preference (SP) data
  - Choice experiment questions
Example of SP choice experiment question

Figure 3. Example of SC version choice experiment question. Note: The survey uses the common names for Chinook and coho salmon used by anglers in Alaska, king and silver salmon, respectively.

D4 Choice A, Choice B, and Choice C are described in the columns below. Below the columns indicate which of these three choices you like best and which you like second best.

<table>
<thead>
<tr>
<th>Type of boat</th>
<th>Choice A</th>
<th>Choice B</th>
<th>Choice C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Charter boat</td>
<td>Private boat</td>
<td>Do something else in Southcentral Alaska other than saltwater boat fishing</td>
</tr>
<tr>
<td></td>
<td>2 days</td>
<td>2 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Halibut</td>
<td>Halibut</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 per day (6 total)</td>
<td>3 per day (6 total)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 fish any size; 2 fish no larger than 18 lbs</td>
<td>No size restriction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silver salmon</td>
<td>Silver salmon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 per day (12 total)</td>
<td>6 per day (12 total)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1,400</td>
<td>$1,000</td>
<td></td>
</tr>
</tbody>
</table>

Which do you like best? Check one box.

Which do you like second best? Check one box.
Recreational fishing trip SP-based values

- Saltwater fishing trip values for different types of trips and anglers
  - Single-species and combination trips
  - Marginal values for changes in regulations

**Article**

Economic Values for Saltwater Sport Fishing in Alaska: A Stated Preference Analysis

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Department of Agricultural and Resource Economics, University of California Davis, One Shields Avenue, Davis, California 95616, USA
Additional SP research

• Explored differences in expected fishing trip values resulting from bag limits restricting harvest
• Model allows for calculating the marginal expected value of fish that depends upon the expected catch versus the bag limit restriction
• Estimate SP model that allows for estimation of WTP for “catch and keep” and “catch and release” trips

Fisheries Research 157 (2014) 124–135

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Is a fish in hand worth two in the sea? Evidence from a stated preference study

Daniel K. Lew a,b,*, Douglas M. Larson c,d,1
Recreational fishing trip RP-based values

• Model of fishing site choice over the season that accounts for targeting behavior
• Pacific halibut harvest variables not statistically significant
• Trip- and season-level fishing values and marginal values associated with catch/harvest rate changes

A Repeated Mixed Logit Approach to Valuing a Local Sport Fishery: The Case of Southeast Alaska Salmon

Daniel K. Lew and Douglas M. Larson
Improving RP Models

In short:
- Examined issues related to treatment of time costs in recreational demand models
- Proposed a simple extension of commonly-used fraction of wage rate approach to account for time costs

In short:
- Examined sensitivity of recreation demand model to different sources of catch/harvest rate information
- Model accounted for multiple sources of site-specific variables
Combining RP and SP data

Preliminary investigation into the gains from combining the RP and SP data

• Draws on strengths of each data type
  - RP data: cost
  - SP data: policy variables

• Compares numerous econometric models
  - Statistical gains
  - RP and SP WTP differences mitigated

• Highlights challenges in combining datasets
Measuring economic impacts related to Alaska saltwater recreational fishing

- Develop economic impact models for Alaska economy
- Estimate impacts on jobs and output from changes in regulations
- Accounting for model and data induced stochasticity/variation (generating confidence bounds)
Looking ahead: Challenges and opportunities

• Lots to do…

• Administrative/internal
  • Funding
  • Paperwork Reduction Act
  • Staff, collaborations

• Communication/managing relations
  • Diverse stakeholders and fishery participants
  • Sharing results
  • Continuing data collections
    • Survey fatigue/skepticism

• Post-implementation analyses
Looking ahead: Challenges and opportunities (cont.)

- **Methodological**
  - Combining data sources and improving recreational fishing demand and economic impact models
  - Potential of integrated policy models
    - IEA models

- **Allocation/sectoral issues**
  - Unblurring the lines between subsistence, personal use, and sport fishing
  - More research on GAF leasing market, effects from RQE introduction, effects from regulatory changes on charter and non-charter entities
Questions?