OVERVIEW OF
REVEALED PREFERENCE MODELS

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Recreational Fisheries Data and Model Needs Workshop

7/26/2011
Overview of revealed preference models

• Purpose
  • Provide insights into recreational behavior and economic value of recreational trips and attributes of those trips

• Underlying economic theory
  • Utility maximization
  • Weak complementarity

• Assumptions
  • ‘Price’ reflects monetary and nonmonetary constraints on recreational participation
Data requirements of revealed preference models

- Fishing patterns of participants
  - E.g., number of angler days (for seasonal demand models) by site/mode/target species
- Characteristics of recreational alternatives (e.g., catch rates)
- Characteristics of recreational participants (e.g., boat ownership, income, other demographics)
- Non-participant data
Potential applications of revealed preference models

- Fishery management
- Project evaluation (e.g., Klamath dam removal)
- Natural resource damage assessment (e.g., Gulf oil spill)
- Ecosystem management (including non-fishery recreation)
Potential usage of revealed preference models for fishery management

• Regulatory analysis
  • Economic effects of management alternatives on recreational fishery
  • Analysis of rebuilding
  • ‘Front end’ behavioral assumptions underlying regional impact assessment of management alternatives

• SAFE reports
  • Provide context and interpretation of fishery trends

• General insights into angler behavior (helpful for management/monitoring)
  • E.g., effort shifts among fishing modes/target species/sites
How well do revealed model address management needs?

- Management needs differ by region
- Pacific Fishery Management Council
  - Non-recreational issues (e.g., ACLs, groundfish trawl catch shares, stock assessment/biological aspects of rebuilding) have had higher priority
  - States manage recreational fisheries, not feds
  - Current PFMC recreational priorities: accurate estimates of total fishing mortality (MRIP), pre-season projection and in-season monitoring of recreational groundfish and salmon fisheries – likely to be increasingly important in other regions due to ACLs
  - Pending: allocation as follow-up to ACLs
Example: salmon season length vs effort
(source: Michael O’Farrell, NMFS)
Addressing PFMC needs

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<tr>
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<th>PFMC projection models</th>
<th>Revealed preference models</th>
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<tr>
<td><strong>Focus</strong></td>
<td>Regs→Effort→Harvest</td>
<td>Econometric advances, behavioral insights</td>
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<td><strong>Data</strong></td>
<td>Aggregate data, time series, parsimonious, good values of predictors must be available pre-season</td>
<td>Micro data, cross sectional, post-season values sometimes used as proxies for pre-season values which are not known in advance</td>
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<td><strong>Criteria for ‘success’</strong></td>
<td>Accuracy of projections, timeliness</td>
<td>Utility theoretic, statistical significance of coefficients</td>
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<td><strong>Potential connection</strong></td>
<td>Behavioral insights from RP models may help to improve projections</td>
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Examples of use of revealed preference methods: Klamath dam removal

- Estimation of consumer surplus/angler day for ocean recreational salmon fishery
  - Zero truncated negative binomial
  - 2000 angler survey data (more recent surveys occurred during salmon closures)
  - Disparate estimates of consumer surplus ($99-$309), depending on assumptions regarding travel cost ($0.122 or $.491/mile), value of time (1/3 or 2/3 wage rate), and whether on-site expenses included or not.

- Benefits transfer
  - In-river salmon fishery: $34-$103/angler day
  - In-river steelhead fishery: $39-$203/angler day
  - Old studies (1980s, 1990s)
  - Broad range: heterogeneity of recreational experiences, ad hoc decisions by modeler
Methodological advances

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<tr>
<th>Model type</th>
<th>Description</th>
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| Extreme corner solution (RUM) | Deal with important (discrete) aspects of angler decision making (e.g., site, target species, mode choices)  
Link to seasonal demand made outside the model                                                                 |
| Corner solution      | Addresses seasonal demand  
Binding non-negativity constraints  
Allows consideration of nonparticipants                                                                 |
| Dynamic              | Seasonal demand in dynamic programming context                                                                                              |
Some aspects of revealed preference models that warrant additional research (short term)

• Need more studies relevant to NMFS-managed fisheries (available studies often outdated)
• Focus on aspects of model improvement that provide insights into angler behavior, even if not econometrically novel
• Survey prep: use focus groups/cognitive interviews to better address some of ad hoc decisions that go into model development (particularly decisions that influence consumer surplus estimates)
• Model automation? Maybe for simple models. Make sure that have economist oversight.
Some aspects of revealed preference models that warrant additional research (long term)

- Implicit price: opportunity cost of time, travel cost
- Defining choice set that is meaningful to anglers
- Qualities of recreational experience and aspects of regulations that influence angler behavior
- Multipurpose trips
- Multispecies catch
- Dynamic behavior: fishery entry/exit, expectation formation, adjustment of expectations to changes in fishery conditions
What are primary obstacles to using revealed preference models?

- **Data**
  - S&T funding available for periodic surveys
  - Survey design/pretesting/clearance/administration is time consuming and labor intensive

- **Skills required**
  - Specialized expertise needed for both data collection and analysis

- **Resources**
  - FTEs appear to be resource in shortest supply

- ** Appropriateness**
  - Serves some purposes but not always what management needs

- **Time requirements**
  - May be useful (depending on particular application) even if provided on different time scale than management cycle