Creating Public Voice with a Spatial, Science-based Opinion Survey

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Today’s Objectives

- Explain Sportsman’s Values Mapping
  - Partners and Origins
  - Arizona’s Experience

- Survey Design

- Results, Products, and Applications

- Where to From Here?
Value Mapping

Origin and History
Theodore Roosevelt
Conservation Partnership
TRCP Vision and Mission

- Guarantee all Americans a quality place to hunt and fish...
  - Strengthen Federal game and fish laws, policies, & funding
  - Build consensus
  - Unify and amplify the voice of sportsmen
Purpose of Sportsmen Values Mapping

To provide new information to help guide other land uses in balance with the needs of wildlife and sportsmen...

Represent ALL hunters/anglers

- Balance existing habitat/biological data with sociological data from hunters and anglers
- Give decision-makers a tool to identify the hunting and fishing opportunities sportsmen most want maintained.
SVM in Montana, Wyoming, & Idaho

- Workshops using paper maps and crayons
- Results digitized & analyzed to produce paper maps
  - MT – 43 sportsmen’s groups in 32 communities
  - WY – 20 community and group workshops
  - ID – in progress—20+/- communities
Wyoming Sportsmen Values Priority Areas

- High value areas identified by 20 different communities of sportsmen in Wyoming
- Blue = lowest, Purple = highest, Tan = no data
Value Mapping
DESIGNING & CONDUCTING THE SURVEY
Storyboard the Workflow

1. User Enters Workshop
2. User Receives Survey Sheet with ID Number
3. User Chooses a Tablet / Laptop
4. User Selects a Species / Species Group
5. User Zooms into Desired Location on Map (assistance available)

6. User moves to next entry location
7. User saves entry
8. On completion, dialog opens and user provides ID #, motivations
9. User draws desired area on map
10. User selects line or polygon drawing tool

11. On completion of all entries, user fills out survey
12. User turns in survey
13. STOP
Mockups and Prototypes

- Design schema for each species / species group feature layer
- Create editing templates to serve as mockup survey collection
- Use domains/subtypes to increase collection efficiency/ease
Best Design Practices – Use & Inclusivity

• Design to engage users / easy to use / intuitive
• Represent the voice of all hunters / anglers
• Experiment with online survey technology
• How can we encourage participation?

...and ensure a positive experience...
Best Design Practices – Survey Logistics

- Postcards for ease and cost of delivery
- Invitation, credentials & instructions on card
- Highly engaging user help and support
- Outsourced prep & mailing
- Three survey periods, one month apart
Survey Targets and Constraints

- Arizona resident license holders
  - Hunting license
  - Fishing license
  - Combination hunting and fishing license
- Ages 18 – 65
  - Sensitivity to contact of minors
  - Sensitivity to families of deceased license holders
- 7500 license holders contacted
  - Certified random selection
  - Source: customer databased of > 100,000 hunt/fish/combo resident license holders
Survey - Service Guidelines

• Engage customers (24 hour answers)
• Applications issues resolved immediately
• Final mailing - TRCP included incentives:
  - Kimber Rifle
  - Patagonia Fisherman’s Backpack
Survey Period Design

• Three mailings, about 1 month apart
  - September 14, 2015
  - October 12, 2015
  - November 16, 2015
• Resent to non-respondents
• Survey open continuously
• Closed on December 6, 2015
Survey Design - Publicity

- Passive publicity to soften any perceived impacts based on not being chosen
- TRCP, AZGFD and partner portals/websites
- Word of mouth
- Post survey publicity and announcements via TRCP & AZGFD websites and portals, Linked-in, AZ Wildlife Views
Survey Results

ANALYSIS AND INTERPRETATION

Arizona's Most-valued Hunting and Fishing Locations v1.0

What is Sportsmen's Value Mapping (SVM)?
- Survey of 1200 randomly selected Arizona landowners
- 1200 respondents mapped their most valuable hunting and fishing spots
- Participants told which species they want to protect in these areas

Why is SVM Mapping Information important?
- Helps prioritize areas to ensure hunting and fishing access
- Provides valuable data to be used by conservation and recreation efforts
- Protects hunting and fishing interest in Arizona wildlife management

How does this site work?
- Species tabs ranked by N of survey responses...for example, elk received the most responses and bucks #1
- Data controls species (e.g., deer)
- Red/Orange areas = most highly valued
- Yellow areas = moderately highly valued
- Green areas = less highly valued
- Click to show # of harvestable areas with highly valued selected area
- Explain to landowners why hunting and fishing are important areas

More Information about the SVM survey...
See why protecting public access to lands needs your voice...
## Survey Results - Data Distribution

<table>
<thead>
<tr>
<th>Species/Species Group</th>
<th>Respondents</th>
<th>Z- Score</th>
<th>%</th>
<th>CUMULATIVE</th>
<th>CUMULATIVE %</th>
<th>QUARTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elk</td>
<td>724</td>
<td>2.658450085</td>
<td>19.73%</td>
<td>724</td>
<td>19.73%</td>
<td>1</td>
</tr>
<tr>
<td>Mule Deer</td>
<td>497</td>
<td>1.399476157</td>
<td>13.54%</td>
<td>1221</td>
<td>33.27%</td>
<td>1-2</td>
</tr>
<tr>
<td>White-tailed Deer</td>
<td>354</td>
<td>0.606378044</td>
<td>9.65%</td>
<td>1575</td>
<td>42.92%</td>
<td>2</td>
</tr>
<tr>
<td>Javelina</td>
<td>291</td>
<td>0.256971183</td>
<td>7.93%</td>
<td>1866</td>
<td>50.84%</td>
<td>2-3</td>
</tr>
<tr>
<td>Turkey</td>
<td>283</td>
<td>0.212602058</td>
<td>7.71%</td>
<td>2149</td>
<td>58.56%</td>
<td>3</td>
</tr>
<tr>
<td>Coldwater Fish (trout, grayling)</td>
<td>267</td>
<td>0.123863808</td>
<td>7.28%</td>
<td>2416</td>
<td>65.83%</td>
<td>3</td>
</tr>
<tr>
<td>Quail</td>
<td>252</td>
<td>0.040671698</td>
<td>6.87%</td>
<td>2668</td>
<td>72.70%</td>
<td>3</td>
</tr>
<tr>
<td>Dove</td>
<td>216</td>
<td>-0.158989365</td>
<td>5.89%</td>
<td>2884</td>
<td>78.58%</td>
<td>3-4</td>
</tr>
<tr>
<td>Warmwater Fish (amur, bass, bluegill, buffalo, carp, catfish, chub, crappie, mullet, perch, pike, sucker, sunfish, tilapia, walleye)</td>
<td>214</td>
<td>-0.170081647</td>
<td>5.83%</td>
<td>3098</td>
<td>84.41%</td>
<td>4</td>
</tr>
<tr>
<td>Predators</td>
<td>167</td>
<td>-0.430750257</td>
<td>4.55%</td>
<td>3265</td>
<td>88.96%</td>
<td>4</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>126</td>
<td>-0.658142024</td>
<td>3.43%</td>
<td>3391</td>
<td>92.40%</td>
<td>4</td>
</tr>
<tr>
<td>Squirrel</td>
<td>99</td>
<td>-0.807887821</td>
<td>2.70%</td>
<td>3490</td>
<td>95.10%</td>
<td>4</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>71</td>
<td>-0.96317976</td>
<td>1.93%</td>
<td>3561</td>
<td>97.03%</td>
<td>4</td>
</tr>
<tr>
<td>Other Small Game</td>
<td>56</td>
<td>-1.046371869</td>
<td>1.53%</td>
<td>3617</td>
<td>98.56%</td>
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</tr>
<tr>
<td>Bighorn Sheep</td>
<td>53</td>
<td>-1.063010291</td>
<td>1.44%</td>
<td>3670</td>
<td>100.00%</td>
<td>4</td>
</tr>
</tbody>
</table>
### Survey Results - Sample Sizes

1125 total independent respondents

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<th>Number of Polygons</th>
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<td>167</td>
<td>257</td>
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Survey Spatial Results - Value
The Good • The Bad • The Ugly
Analytical Approach - Data Cleanup

• Analyses would be summarized for each of the 15 species \ species groups

• Developed a “shard index” to identify artifacts for potential removal
  – “shard” = long, elongated polygon fragment usually associated with mistakes in drawing
  – clean up mistakes in drawing polygons
  – deleted shards and areas far outside of Arizona
Analytical Approach - Value Index

• Smaller, carefully drawn areas provide a better indicator of a specific, highly valued area

• Slight positive weighting to smaller, more carefully drawn areas

• VALUE = $1 / \sqrt{\text{AREA}}$
  – unitless index of value
  – Index value calculated and assigned to each of the individually drawn polygon, and analyzed by species/species group
Analytical Approach - Value Index

- $VALUE = 1 / \sqrt{AREA}$

In the area of overlap of the two polygons, the aggregate value is 0.3162 + 0.03162, or 0.3479.

Areas with larger aggregate values are “more valued” than areas with smaller aggregate values.
Analytical Approach – ArcGIS

• polygons were intersected, and value indexes were summed across all overlapping polygons

• color classifications show lower values in green to highest values in red (9 quantiles)
Analysis Results

- **VALUE** results
  - What areas are considered the most highly valued?
  - What is the other spatial context for highly valued areas?

- **MOTIVATIONS** results
  - Why are these areas valued?
  - What are the most important motivations?
VALUE Results
PRELIMINARY USES & APPLICATIONS
What **ARE** the Value Results?

- A snapshot in time of how hunters & anglers value lands and waters
- Integrates value and motivation information across participant age, experience and all other factors (e.g. aesthetics, success, etc.)
- Limited to AZ Residents, and is subject to the same numerical pressures (e.g. most license holders live in urban areas)
What ARE the Value Results?

- REPRESENTATIVE
- STRUCTURED
- REPEATABLE
- Science-based
- Index of popularity

Not necessarily a predictor of:
- usage pressure at any given time
- hunter success in taking game
- wildlife population size or density
## Analytical Approach – Sample Size

- total # of independent polygons contributed
- total # of respondents contributing ≥ 1 polygon

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Arizona’s Most-valued Hunting and Fishing Locations v1.0 Storymap

- Tabbed, Map Series SM Template
- Create and publish tile packages (create in Pro/ArcMap)
- Interactive map for each species
  - State boundary “shaded”
  - Species value layer + supplemental layer (fish)
- Tribal lands mask
- Esri Topo Basemap
- Background, methods, credits, & Copyright info
- Autorun option
Robbin’s Butte Habitat Improvements

Are hunter values near these areas sufficiently high to justify investments in habitat improvements?
National Forest Travel Management

Will proposed campsite closures impact hunter access / inhibit the Department’s game management authority?
Four Forests Restoration Initiative

Will proposed restoration activities benefit wildlife in areas that our constituents value?
Forging Conservation Alliances

Where do hunting/angling and non-consumptive birding interests align to promote conservation alliances to conserve habitats of shared value?
Transportation Impacts Analysis

Which transportation corridor option impacts valued lands the least?
Other SVM Uses in Arizona

- Balance other land uses with the needs of fish, wildlife and sportsmen.
- Identify areas needing stronger conservation efforts, or expansion of hunting and angling opportunities.
- Identify key high-use areas warranting special conservation strategies, because of their value to sportsmen.
- Improve hunter/angler retention by providing voice and high quality experiences.
MOTIVATIONS Results

PRELIMINARY USES & APPLICATIONS
Survey Results - Hunting Motivations

1 - Good Chance of Harvesting Game
2 - Traditional Place to Hunt
3 - Close to Home
4 - Less Crowded
5 - Aesthetics are Pleasing
6 - Easy to Hunt
7 - Chance to Harvest Exceptional Animals
8 - Recommended by a Friend
9 - Access More Restricted
10 - Easy to be Drawn
Survey Results - Fishing Motivations

1 - Traditional Area
2 - Easy to Fish
3 - Close to Home
4 - Aesthetics are Pleasing
5 - Less Crowded
6 - Chance to Catch Large Fish
7 - Access More Restricted
8 - Friend Recommendation
Motivations - Summary

- Chance to harvest (seeing game?) dominated motivations
- Distance from home and tradition were strong motivations
- Crowding and aesthetics ranked moderately among motivations
Motivations - Summary

- For some species, draw odds were a motivation
- For sheep and pronghorn, draw odds and quality animals drove motivations
- Tradition, success, distance from home and aesthetics were strong motivators for anglers
Alternative Summary

- Agreed to preserve sensitive information
- Reduce Boundary effects
- Improve consistency of application
- Enhance ease of interpretation
Hexagon Binning Example

• 115,572 hexagons, approximately 1 mi$^2$ each, comprise the statewide “hex binning fabric”

• Arizona = 113,600 mi$^2$

• Just as some hexagons overlap the edges of 11M, so do a number of hexagons overlap the state boundary with Mexico, CA, UT, CO, NV, and NM
Hexbin by Species - Approach

- Individual values in the underlying value map are “sorted” into their bins and “counted”

- Resulting value of that “count” now becomes the value of each hexagon (next slide)
Hexbin by Species – Elk Result

- Resulting hexbin for Elk for Unit 11M
- Values easily seen for each bin
- 1 value per bin
- “Identify” tool on each bin allows us to see the numerical representation of the value
Hexbin Summary Across All Species

• combine hexbin value for each bin across all species

• mean or other metric would be calculated

• “identify” window shows contributions of each species to the overall value of the hexagon

Aggregating values from bins within project polygons is a simple way to quantify the potential impacts of those projects upon areas
Hexbin Summary

- Standardized on national HEXBIN geography
- Comparable with other AZGFD hexbin data
- Comparable with other multi-state GIS data
- SVM is the only hexbin dataset representing public opinion from AZGFD customer base
Future SVM Activity

- Apply to nonconsumptive, "wildlife watcher" public(s)
- Offer as a "Software as a Service" (SAAS) product
- Periodic resurveys to ensure data currency and examine trends
Header for Demo Slide

Supporting Text