Science, Service, Stewardship

Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being

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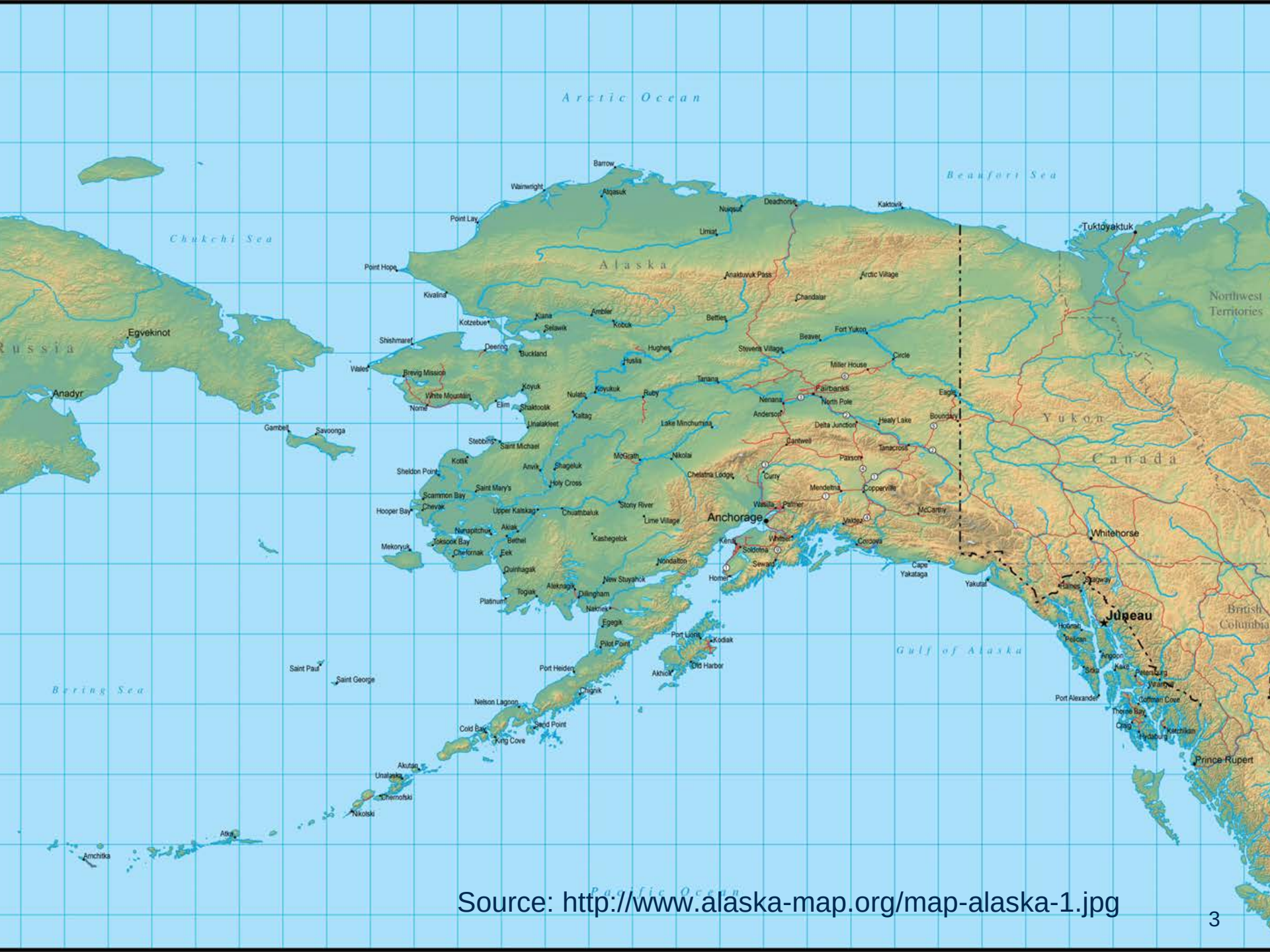
Overview

- Background information on the context of fishing communities in Alaska and U.S. Government (NOAA Fisheries) mandates
- Defining well-being, vulnerability, and resilience
- Applications of quantitative indicators
- Challenges



Source: http://www.alaska-map.org/map-alaska-1.jpg

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Demographics (Average 2005-2009)

- Total of 578 Communities throughout Alaska
- 393 Census Designated Places

Variable	N	Mean	Std. Dev.	Min	Max
Population	366	1,812	14,834	0	279,268
Age	313	34.59	10.73	10.2	63.2
Household Size	308	3.16	1.18	1.32	11.04
Household Income	303	$47,575	$20,836	$2,499	$115,417
Unemployment Rate	314	16.34%	14.99	0	69
Home Value	285	$140,769	$88,396	$18,800	$1,000,001
% Native Population	319	46.12%	39.80	0	100

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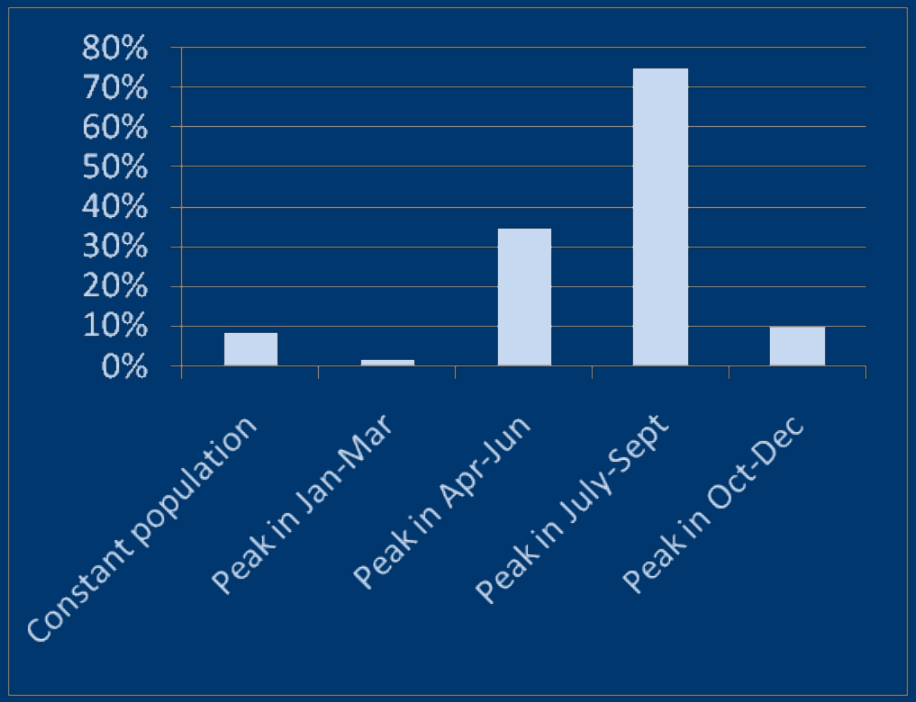
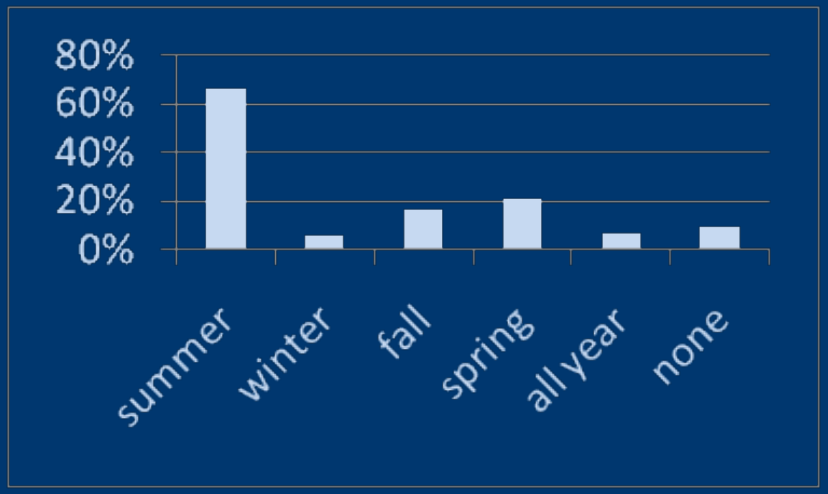
Overview: Alaska Population

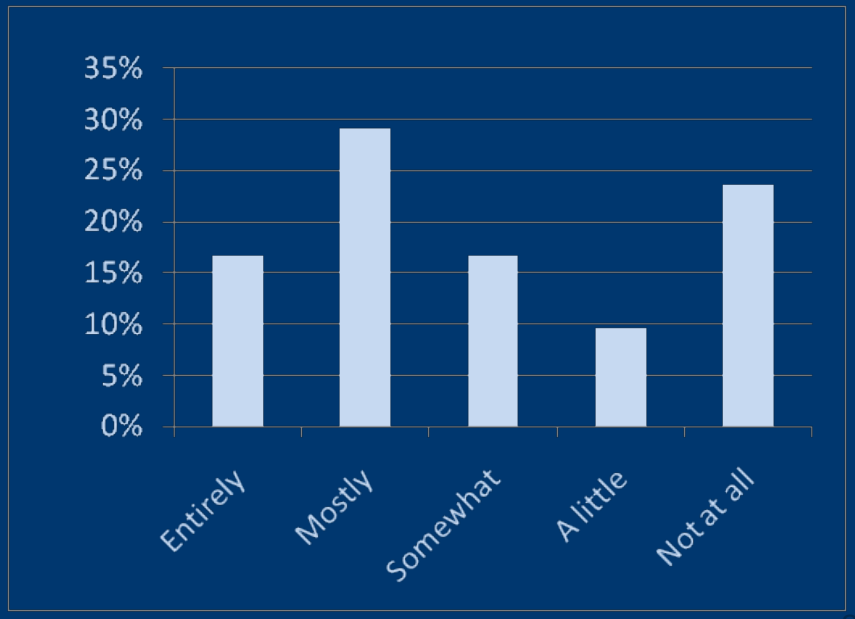
Annual population peak



Timing of seasonal residents



Degree population fluctuations due to fishing sector



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NOAA Fisheries activities relating to protecting fishing communities

- National Environmental Policy Act (NEPA), 1970
  - Beginning of social impact assessments (SIAs)
- Environmental Justice Initiative (Executive Order 12898), 1994
  - Achieving environmental protection for all communities (particularly minorities and low-income populations)
- Magnuson-Stevens Act - National Standard 8, 2006
  - "*Conservation and management measures shall, …take into account the importance of fishery resources to fishing communities … in order to (a)* ***provide for the sustained participation of such communities****, and (b)* ***to the extent practicable, minimize adverse economic impacts on such communities****."*

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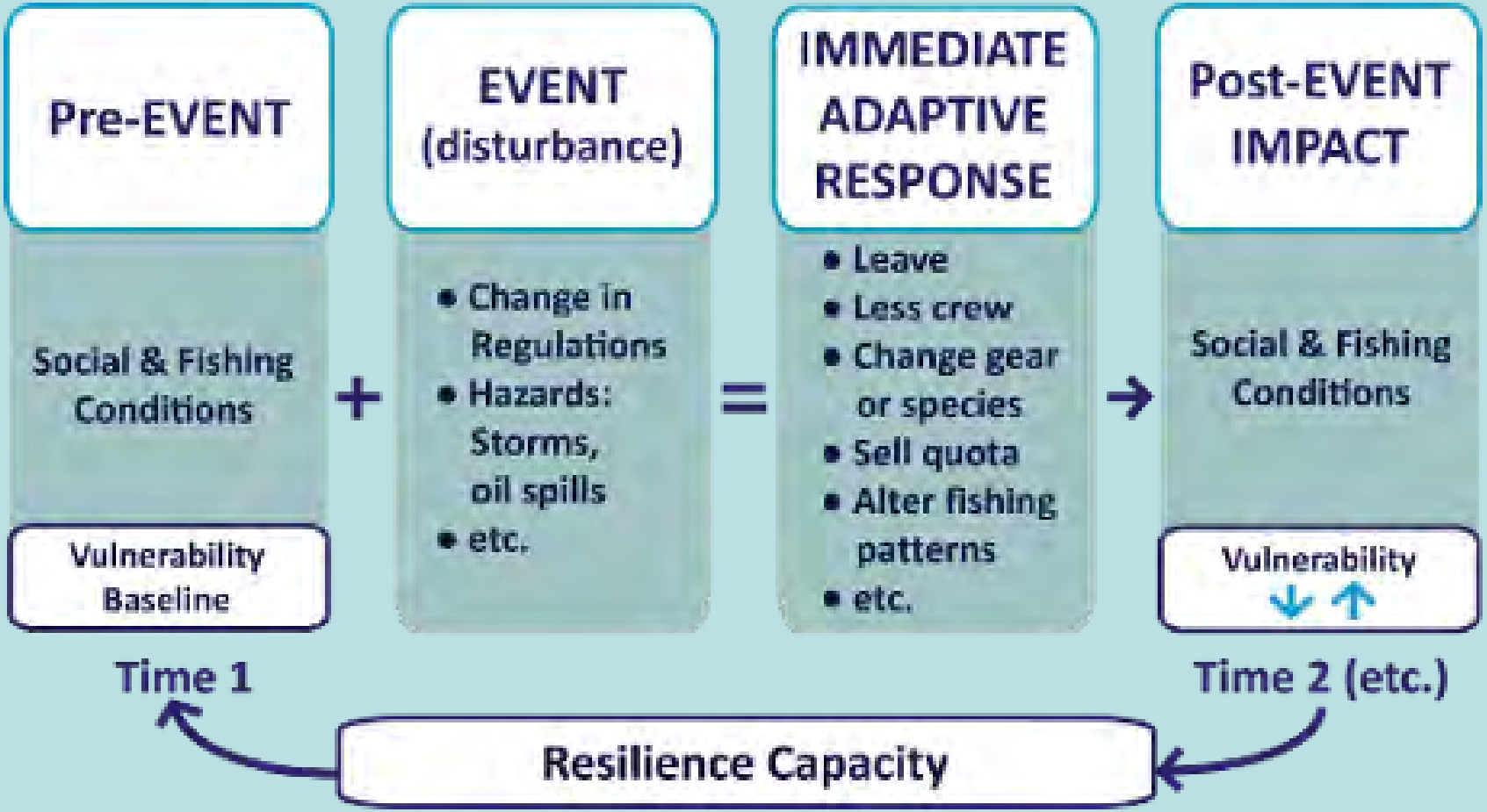
Community Social Indices: Project objectives

1. Determine key components of community well-being, vulnerability and resilience
2. Construct indices – Create objective measures of the social condition of communities to predict well-being, vulnerability and resilience
3. Use indices as reference points to understand how community vulnerability and resilience may change over time in response to changes in fisheries management regulations, ecosystem changes, and other external forces

Relationship between vulnerability and resilience



Source: http://www.st.nmfs.noaa.gov/humandimensions/social-indicators/vulnerability

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Relationship between vulnerability, resilience, and well-being

- Vulnerability is about the ***existing condition***
  - Easy to measure from existing data
- Resilience is about the ***response to change over time***
  - More difficult to measure until after an event occurs
- ***Need to track vulnerability over time to understand community resilience***

- We consider well-being to encompass both concepts of vulnerability and resilience, as well as other components.
  - Recognizing that that well-being is a multi-faceted concept, made up of objective, subjective and interrelational components (Coulthard et al. 2011).

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Social indicators of vulnerability and resiliency

- National and international focus on use of indicators to measure well-being in communities
- Cutter et al. (2003,2008) – National, based on county-level data
- Jacob and Jepson (2007) and Jacob et al (2010) - Gulf Coast fishing communities
- Colburn and Jepson (2013) – Northeast and Southeast fishing communities

- Effort within NOAA to create nationwide database of social indicators
  - Applicability: Fisheries management program performance (e.g., catch shares), predicting social impacts of proposed management programs (and doing social impact statements), vulnerability to climate change

Understanding Alaska Fishing Community Well-being

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Understanding Alaska Fishing Community Well-being

- 14 indices of community well-being in 2 categories:
  - Socioeconomic well-being indices (7)
  - Fishing involvement indices (7)
- 346 communities throughout Alaska
- Data from 2005-2009 from the U.S. Census Bureau's American Community Survey

From Himes-Cornell and Kasperski, 2015 "Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being", *Under Review*.

Socio-economic Well-Being Indicators

Personal Disruption	Labor Force Structure
% of residents that are unemployed	% of residents in the labor force
% of residents without a high school diploma	% of female residents in the labor force
% residents in poverty	% of residents that are self employed
% of females aged 15 and over that are separated	% of residents on social security
Population Composition	**Housing Disruption**
% of population that self identifies as white	% change in median mortgage cost (2000-2009)
% of households with a female head of household	% change in median home values (2000-2009)
% of population that is aged between 0 and 5 years old	% of households with mortgage costs that exceed 35% of their household income
% of residents that speak English less than well	
Poverty	**Housing Characteristics**
% of residents receiving cash public assistance	Median monthly rent
% Families in poverty	Median monthly mortgage cost
% of residents over age 65 in poverty	Median number of rooms in occupied units
% of residents under age 18 in poverty	% of housing units that lack indoor plumbing
Status of Schools	
Number of schools in a community	
Number of students in a community	

From Himes-Cornell and Kasperski, 2015 “Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being”, *Under Review*.

Fisheries Involvement Indicators

Commercial Processing	Recreational Fishing
Ex-vessel value of commercial catch landed in a community	Number of charter businesses located in a community
Pounds of commercial catch landed in a community	Number of sportfishing licenses
Number of processors located in a community	Number of sportfishing guide businesses
	Number of sportfishing guide licenses
Commercial Harvesting	**Subsistence Harvesting Involvement**
Ex-vessel value of commercial catch from vessels owned by residents	Percentage of households involved in any subsistence activities
Pounds of commercial catch from vessels owned by residents	Subsistence harvest in pounds
Number of CFEC permits held by residents	Subsistence harvest in pounds per capita
Number of vessels owned by residents	
Number of crew licenses held by residents	

From Himes-Cornell and Kasperski, 2015 “Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being”, *Under Review*.

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Methods

- Identify variables that represent the well-being concepts mentioned previously
- Conduct a principal components factor analysis
  - Achieve a single factor solution
- Create index scores from the factor loadings using the regression method

From Himes-Cornell and Kasperski, 2015 “Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being”, *Under Review*.

Data

- Fisheries data
  - — Commercial landings, permits, revenue, vessels, processors, quota share allocation (NOAA, ADFG)
  - — Recreational licenses, guides, charter businesses (NOAA, ADFG)
  - — Subsistence permits, halibut and salmon catch, marine mammal take (ADFG, USFWS, Alaska Beluga Whale Commission)

- Socioeconomic Data
  - — American Community Survey 2005-2009 (Census Bureau)
  - — 2000 and 2010 decennial census (Census Bureau)
  - —Alaska Local and Regional Information (ALARI) database

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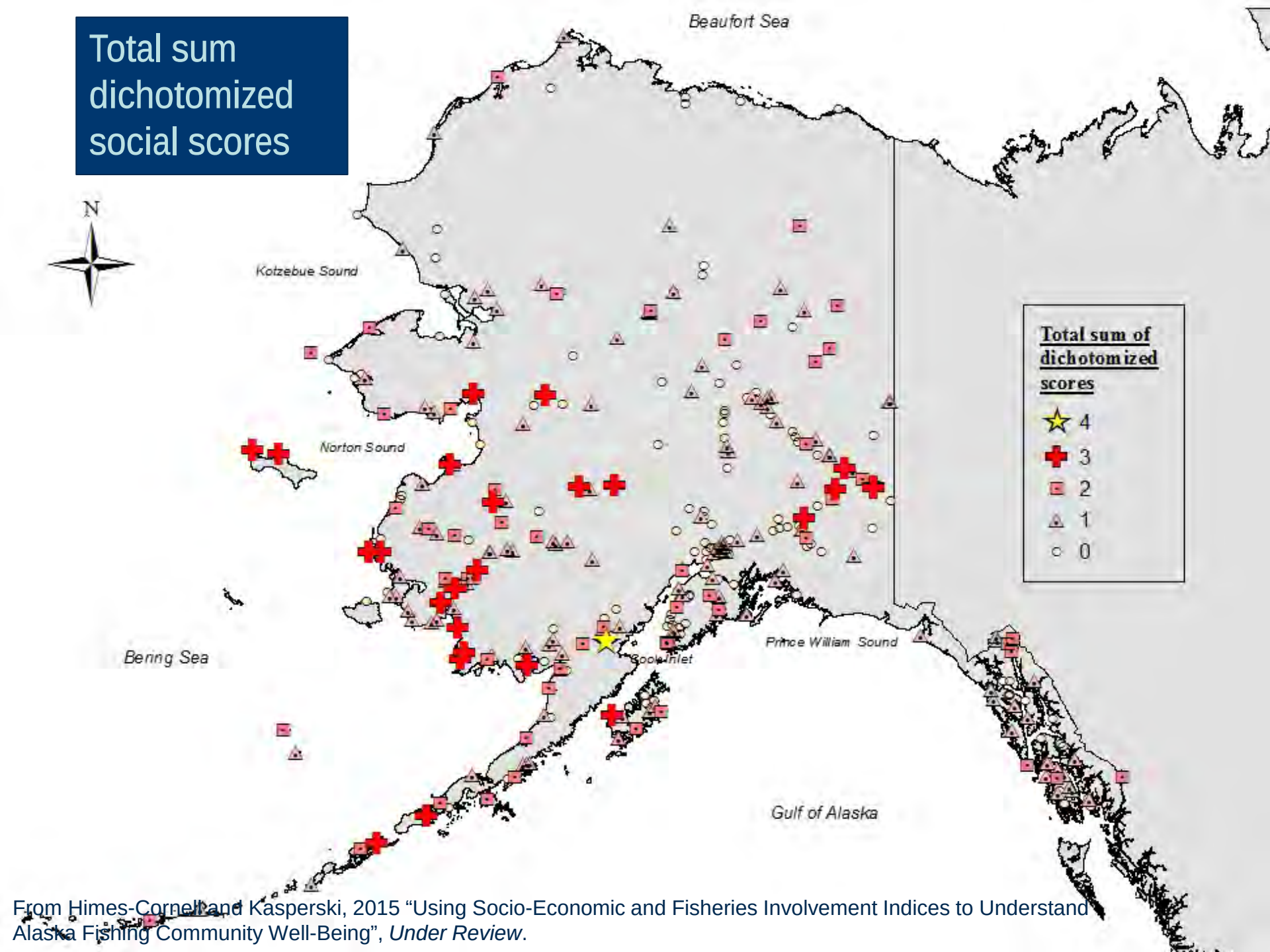
Overall community scores

- For each index (7 social; 7 fisheries):
  - Each community is given a score of 1 if they are +1 standard deviation above the mean index score and a 0 otherwise
- Dichotomized (0 or 1) score is then summed for each community
  - Across all socio-economic well-being indices
  - Across all fishing involvement indices

From Himes-Cornell and Kasperski, 2015 “Using Socio-Economic and Fisheries Involvement Indices to Understand Alaska Fishing Community Well-Being”, *Under Review*.

Community	Personal Disruption	Population Composition	Poverty	Labor Force Structure	Housing Characteristics	Housing Disruption	Status of Schools	Total Social Score
Kokhanok	1	1	1	0	0	1	0	4
Akutan	0	1	0	1	0	0	1	3
Anvik	1	0	1	0	0	0	1	3
Chevak	1	1	1	0	0	0	0	3
Clark's Point	1	0	1	0	0	0	1	3
False Pass	0	1	0	1	0	0	1	3
Gakona	0	0	0	1	0	1	1	3
Gambell	1	1	1	0	0	0	0	3
Goodnews Bay	1	1	0	0	0	1	0	3
Hooper Bay	1	1	1	0	0	0	0	3
Karluk	1	1	0	0	0	0	1	3
Koyuk	1	1	1	0	0	0	0	3
Koyukuk	1	1	0	0	0	0	1	3
Mentasta Lake	1	0	1	0	0	0	1	3
Napakiak	1	1	1	0	0	0	0	3
Nikolai	1	0	1	0	0	0	1	3
Northway	1	1	1	0	0	0	0	3
Northway Village	1	1	1	0	0	0	0	3
Platinum	1	0	1	0	0	0	1	3
Quinhagak	1	1	1	0	0	0	0	3
Savoonga	1	1	1	0	0	0	0	3
Stebbins	1	1	1	0	0	0	0	3
Takotna	1	1	0	0	0	0	1	3
Tanacross	1	0	0	1	0	0	1	3
Tuluksak	1	1	1	0	0	0	0	3
Tuntutuliak	1	1	1	0	0	0	0	3

Total sum dichotomized social scores



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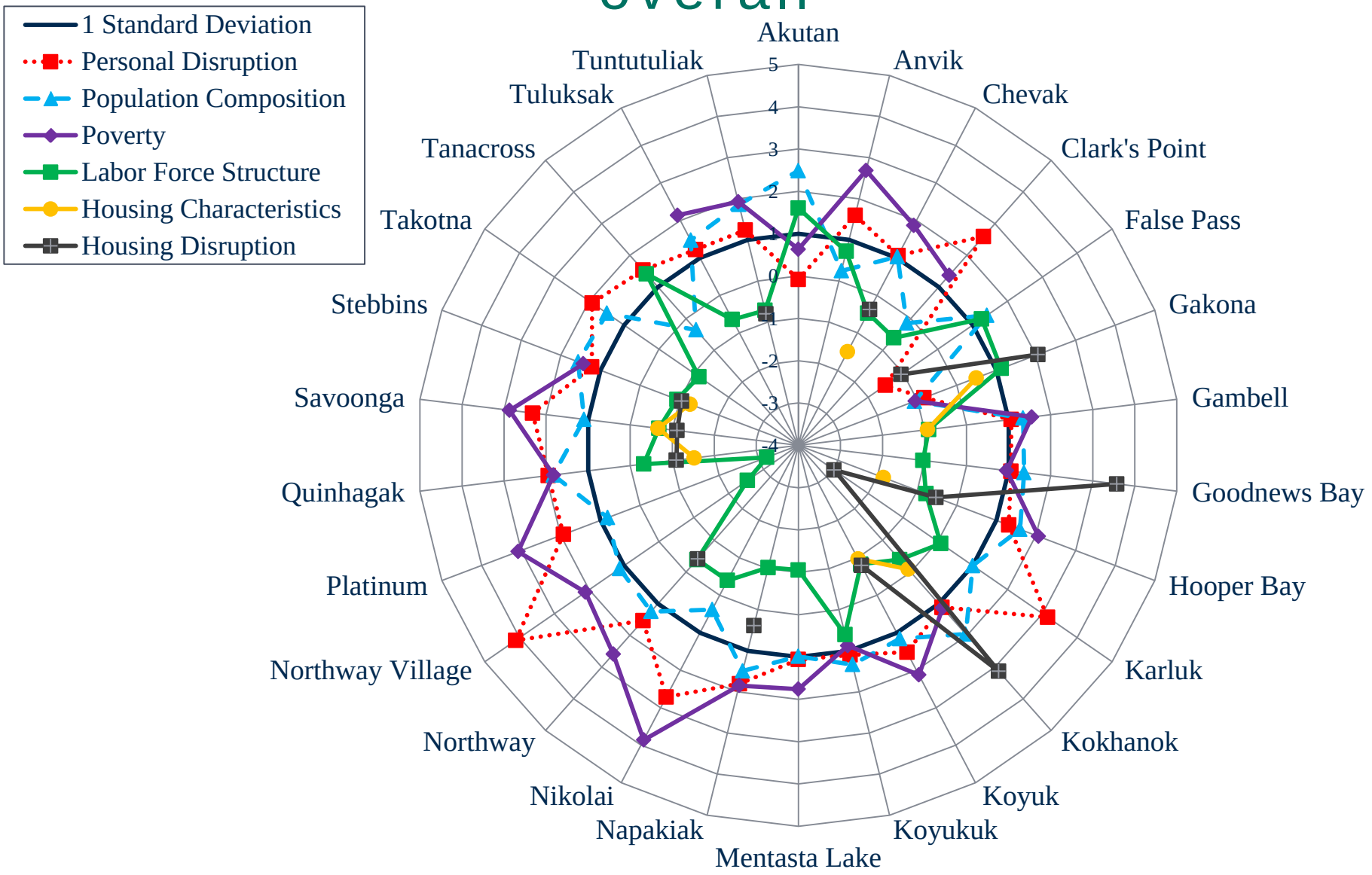
Social indices: Top 26 communities overall



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Fisheries indices

Community	Commercial Processing Engagement	Commercial Harvesting Engagement	Commercial Processing Reliance	Commercial Harvesting Reliance	Recreational Engagement	Recreational Reliance	Subsistence Harvesting Involvement	Total Fishery Score
Elfin Cove	0	1	1	1	1	1	0	5
Kasilof	0	1	0	1	1	1	1	5
Cordova	1	1	0	1	1	0	0	4
Craig	0	1	0	1	1	1	0	4
Dillingham	1	1	0	1	1	0	0	4
Egegik	1	1	1	1	0	0	0	4
Homer	1	1	0	1	1	0	0	4
Kodiak	1	1	0	1	1	0	0	4
Pelican	0	1	0	1	1	1	0	4
Petersburg	1	1	0	1	1	0	0	4
Port Alexander	0	1	0	1	1	1	0	4
Port Lions	0	1	0	1	1	1	0	4
Soldotna	0	1	0	0	1	1	1	4
Wrangell	1	1	0	1	1	0	0	4

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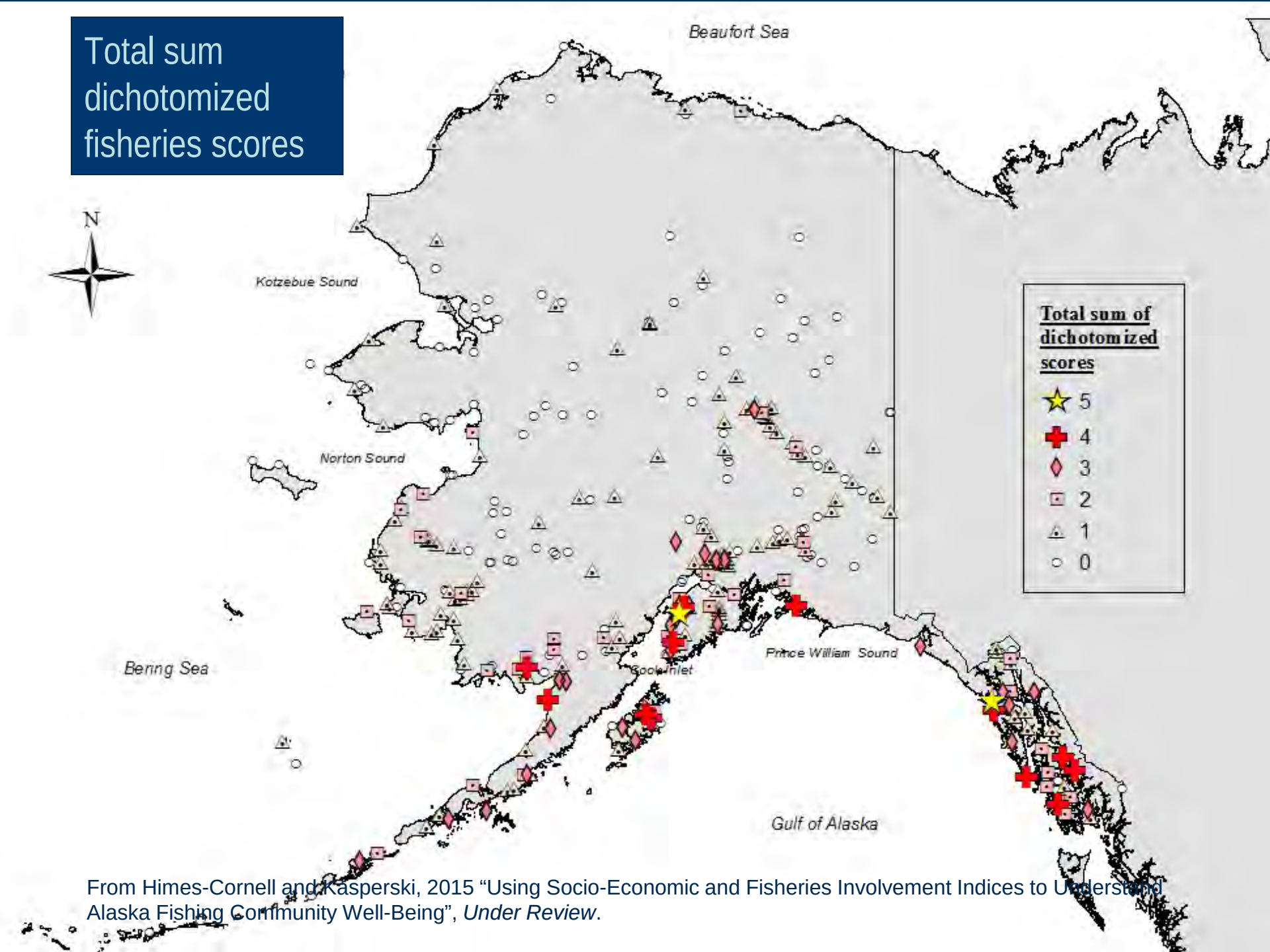

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Groundtruthing the Indices: Can we believe any of this?

- Develop a rapid assessment methodology to test the validity of the community well-being indices
- Compare in-person fieldwork assessments of well-being with quantitative social indicators of well-being described above

From Himes-Cornell, A., C. Maguire, S. Kasperski, K. Hoelting, and R. Pollnac. “Understanding vulnerability in Alaska fishing communities: A validation methodology for rapid assessment of well-being indices”, *Under Review*.

Predictive Accuracy of the indices

- One goal of indices = Predicting community vulnerability to inform decision-making
- Before making predictions, need confidence in indices
  - Ensure indices represent socio-economic realities of communities

- Lack of confidence = potential to make erroneous conclusions

Project goal:

- Test predictive accuracy of indices to identify which communities will be hardest hit by change (e.g., climate change, fisheries management)
- Understand future vulnerability by looking at the past: Crab rationalization (2005)

Predicting vulnerability to proposed management changes

- Catch share programs
  - Gulf of Alaska trawl fishery rationalization
  - BSAI crab rationalization
  - Halibut/Sablefish IFQ program
- Significant allocation changes
  - Halibut prohibited species catch (PSC)
- Proposed endangered species listings
  - Stellar Sea Lions

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Challenges in Measuring Vulnerability

- Uncooperative data
  - American Community Survey (ACS) data are based upon annual 5-year estimates
  - Not all variables, and indices, seem to be appropriate or available for all communities
- New data collections needed to say more about human dimensions of any one ecosystem being assessed (e.g., cultural ecosystem services and other non-market valuations)
- Communities are embedded in multiple socio-economic systems and ecosystems – many external factors to consider

Thank you!

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