

Approaches to 'fishing community' in the context of groundfish and climate-generated shifts in the California Current

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- Survey qualitative and quantitative approaches to identifying and defining socioeconomic 'fishing communities' and 'fishing dependent/reliant' communities generally, and West Coast fishing communities in particular
- Offer a broad conceptual discussion of approaches to fishing communities
- Develop a defensible expansion of these conceptions specific to communities connected to the U.S. West Coast groundfish fishery
- Examine what various approaches to defining 'groundfish fishing communities,' on land, at sea and at varying scales, might mean for integration with species distribution and ecosystem dynamics modeling efforts in the context of climate-driven shifts in ocean conditions
- Center these definitions in terms of how they differ in their implications for the adaptive capacity of human communities and vulnerability to climate impacts

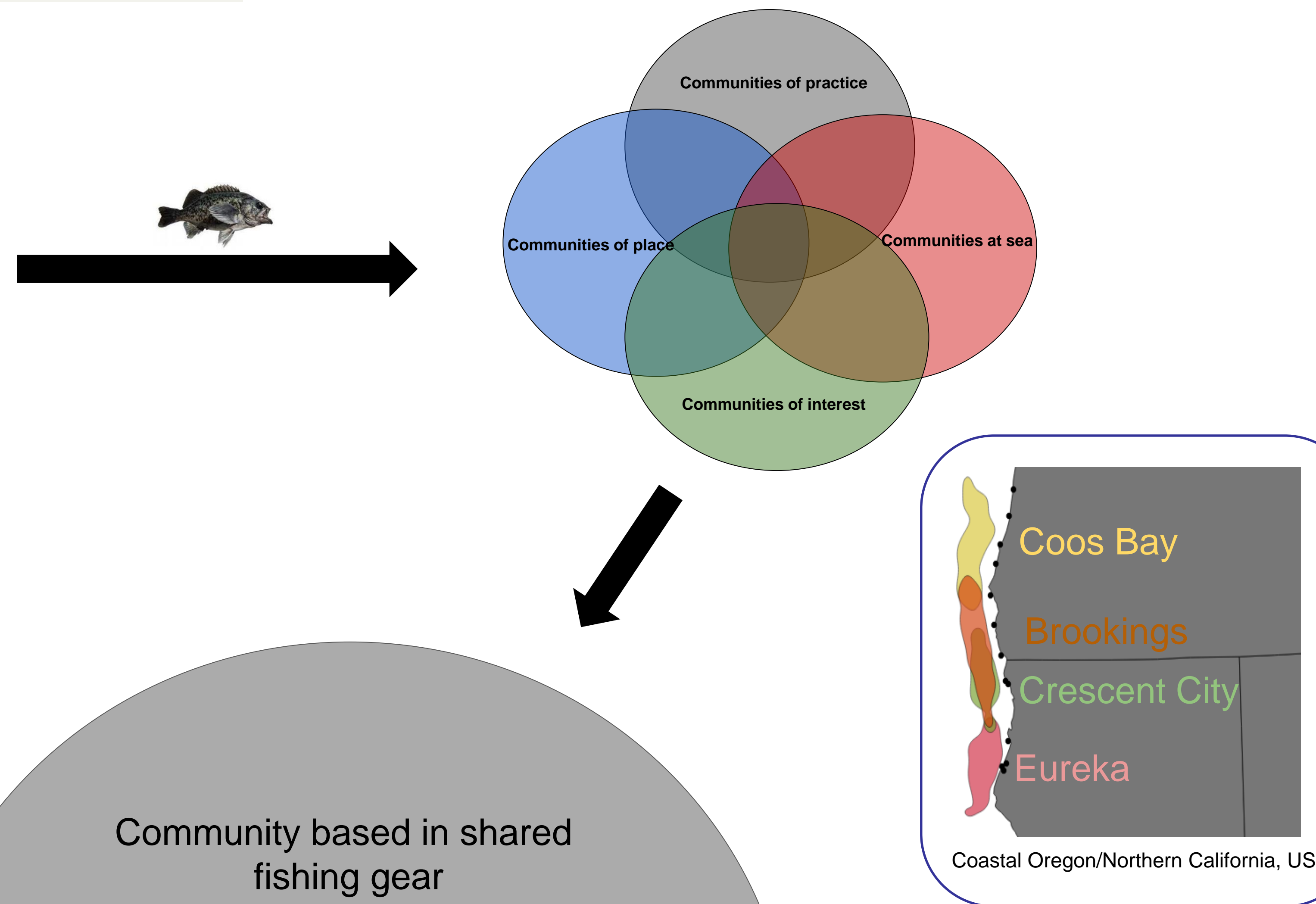
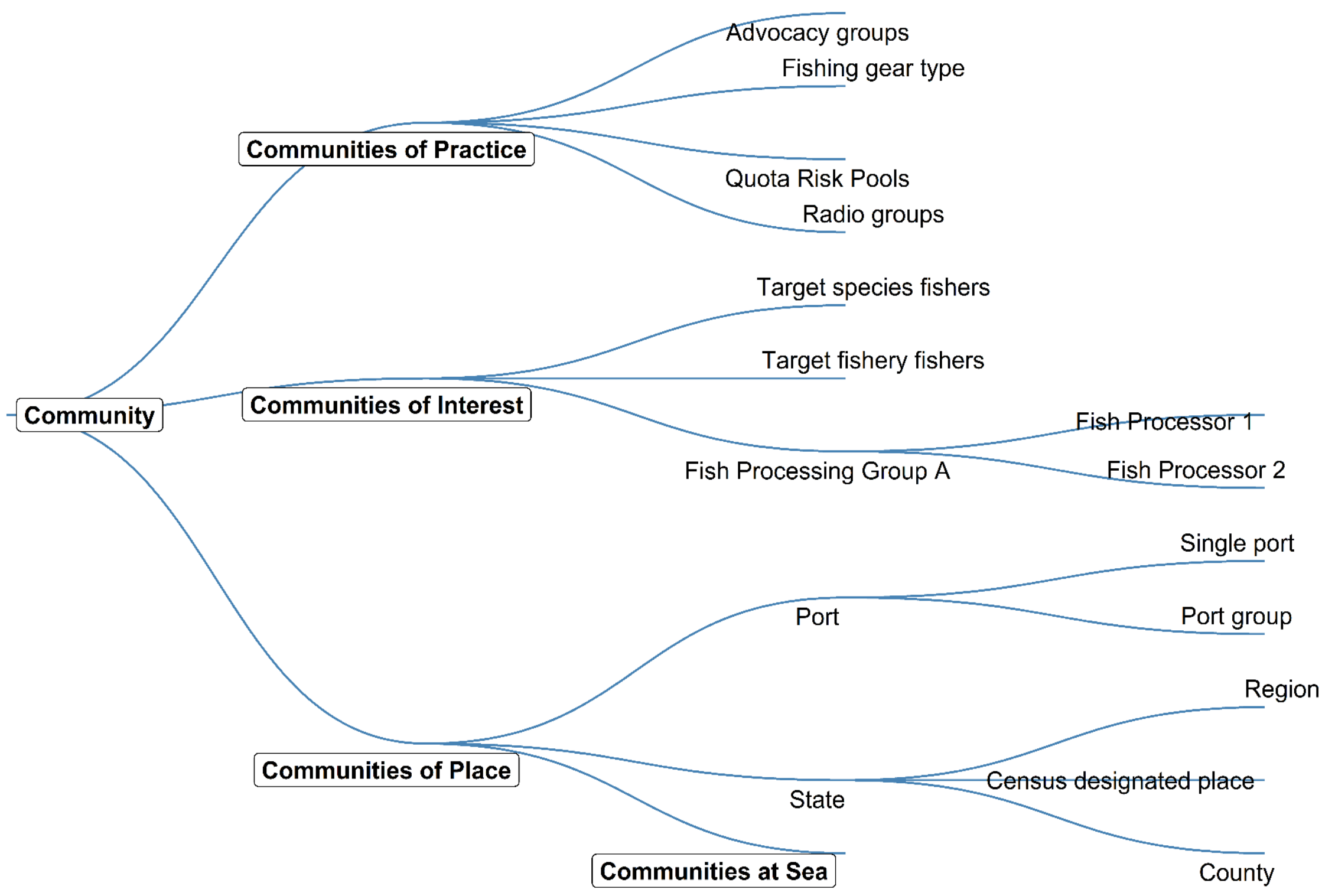
Objectives:

What makes for a fishing community? What is a groundfish fishing community?

Understanding the impacts of, and response to climate-driven shifts in groundfish species on human communities requires first defining and examining reasonable conceptions of fishing communities and, specifically, the subset of these communities tied to groundfish through commercial fishing. We examine human communities, in the context of the commercial groundfish fishery and climate change, according to **four major conceptual approaches**, with the recognition of the "community at sea" as a unique form of **community of place**.

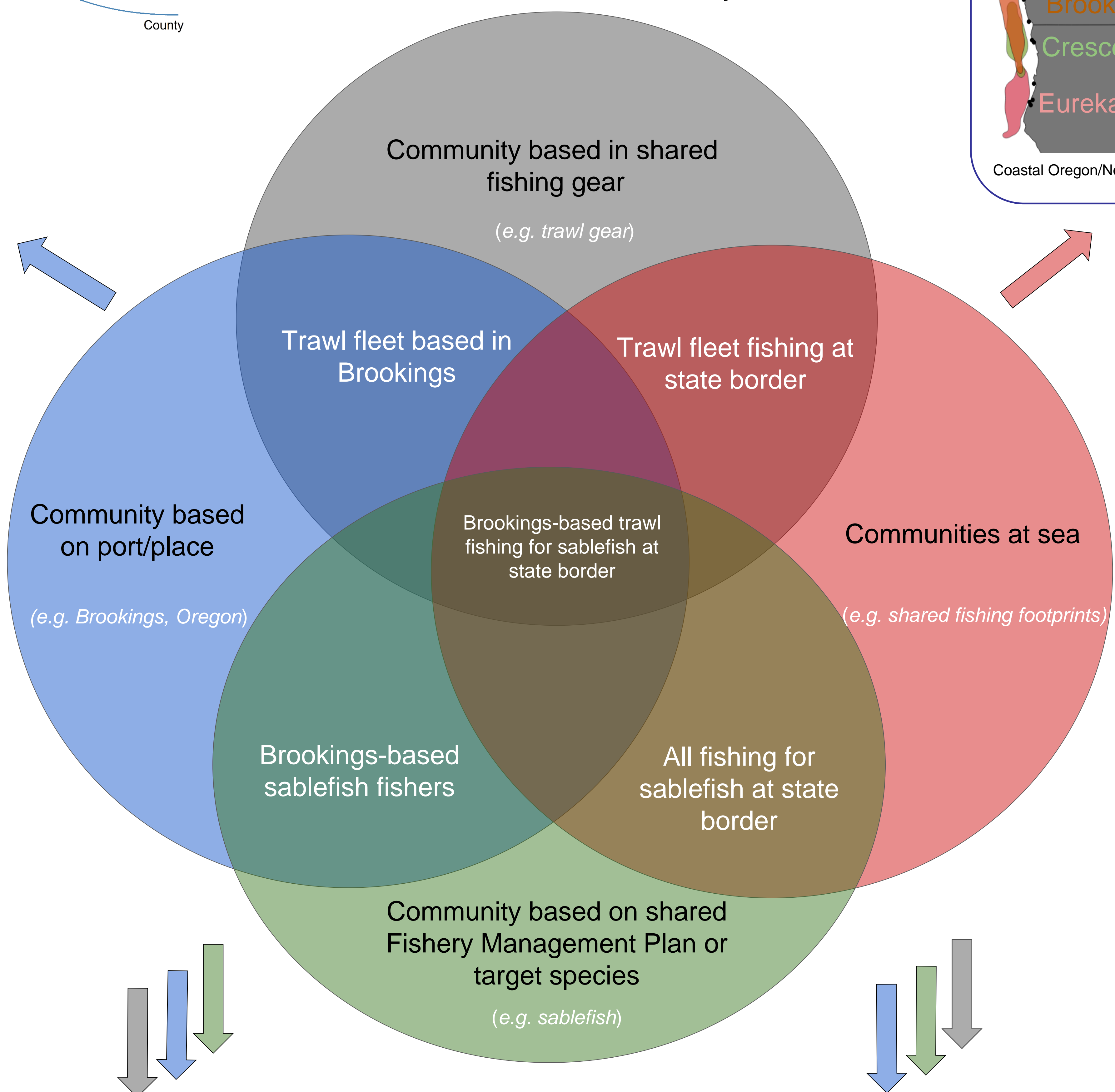
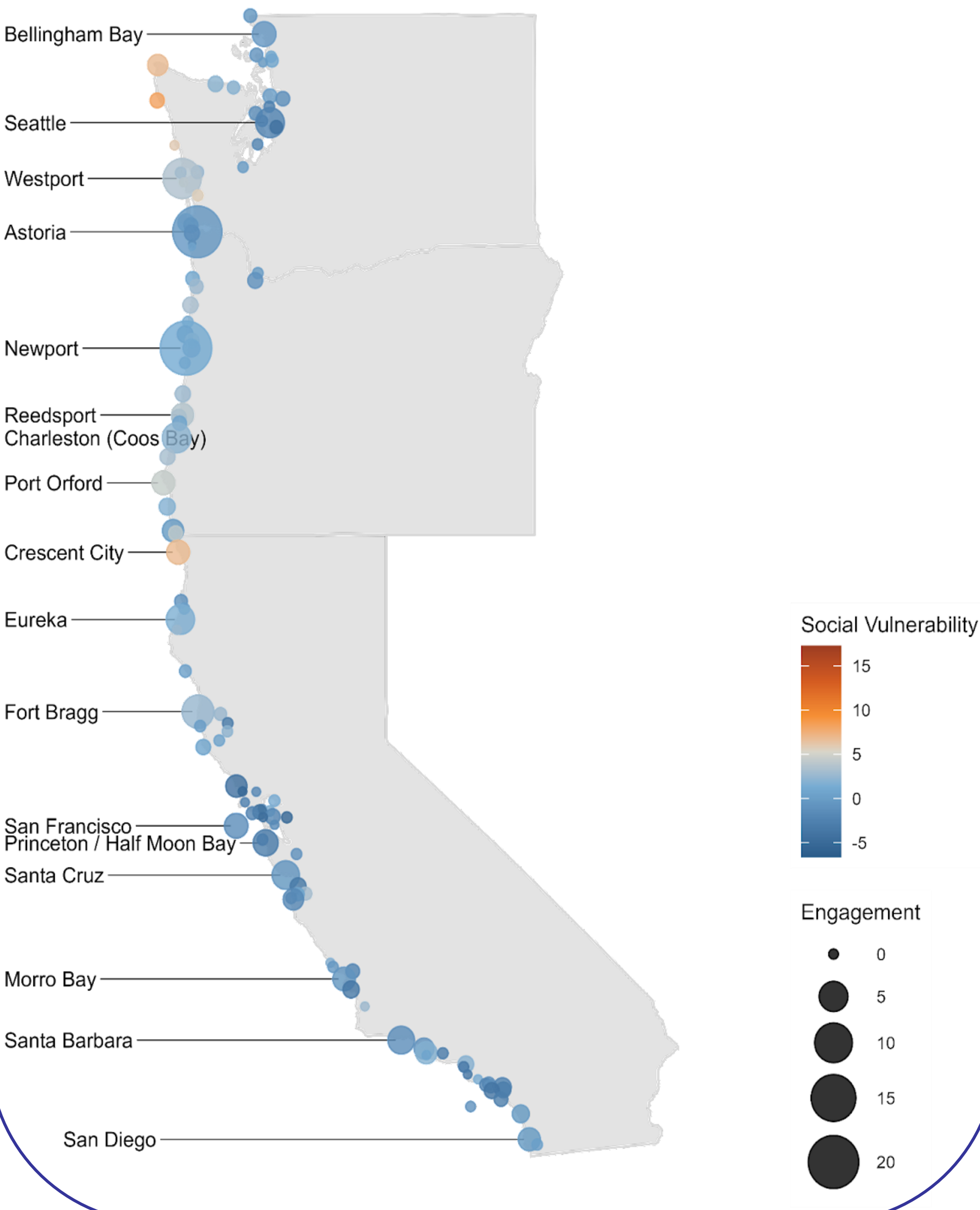
Overlapping conceptions of community

Within these separate conceptions of fishing community as applied to U.S. West Coast groundfish, there are important ways that these conceptions overlap, with communities of practice (grey) overlapping with communities of interest (green) as well as communities of place on land (blue) and, uniquely, communities of place at sea (red).



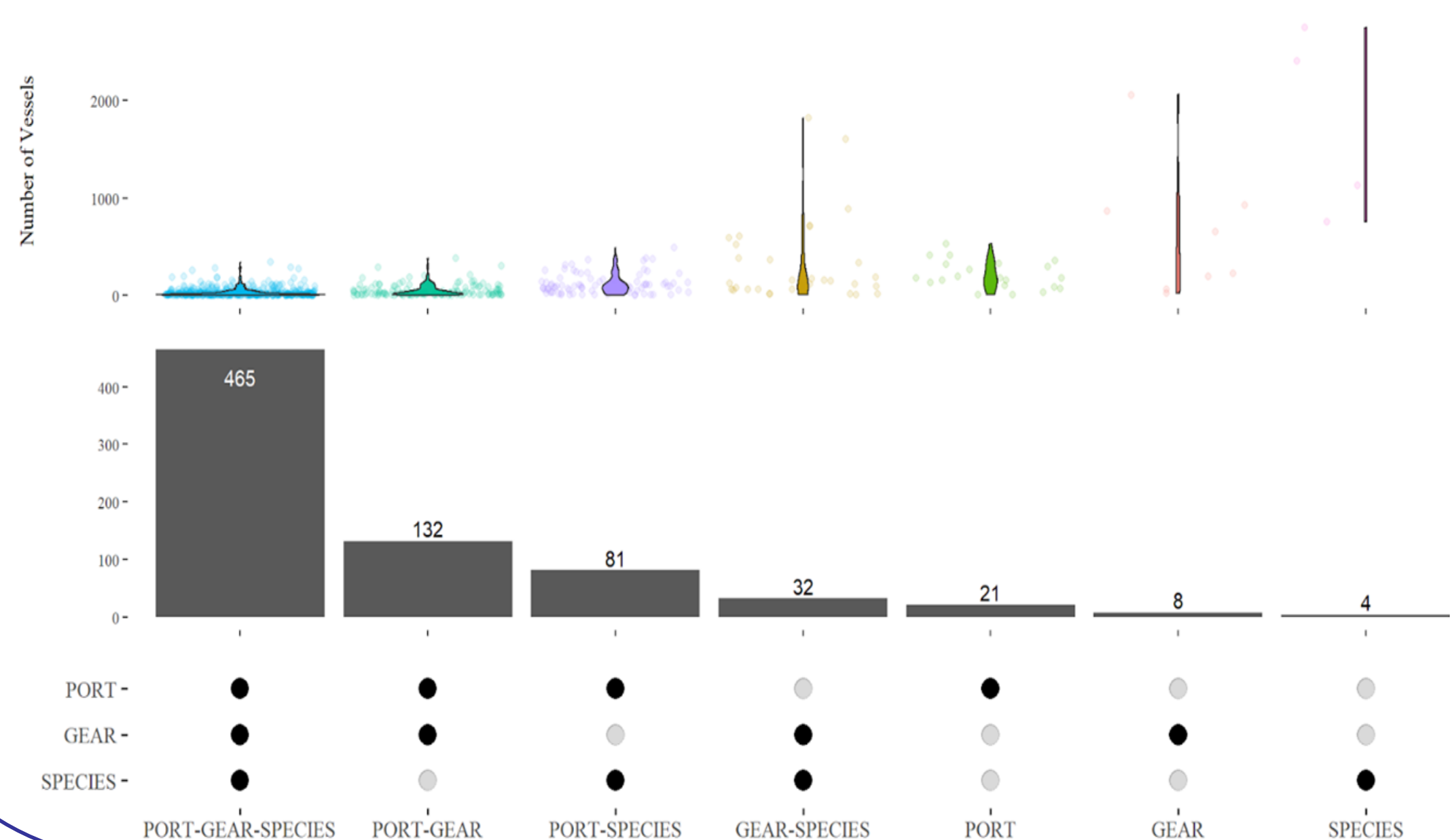
Groundfish communities of place and adaptive capacity

Using community social vulnerability index (CSVI) measures applied to U.S. Census designated places (CDPs) ^b, we map 'community of place' engagement with the groundfish fishery and community social vulnerability, as a proxy for adaptive capacity to climate-generated, exogenous shocks to the fishery.



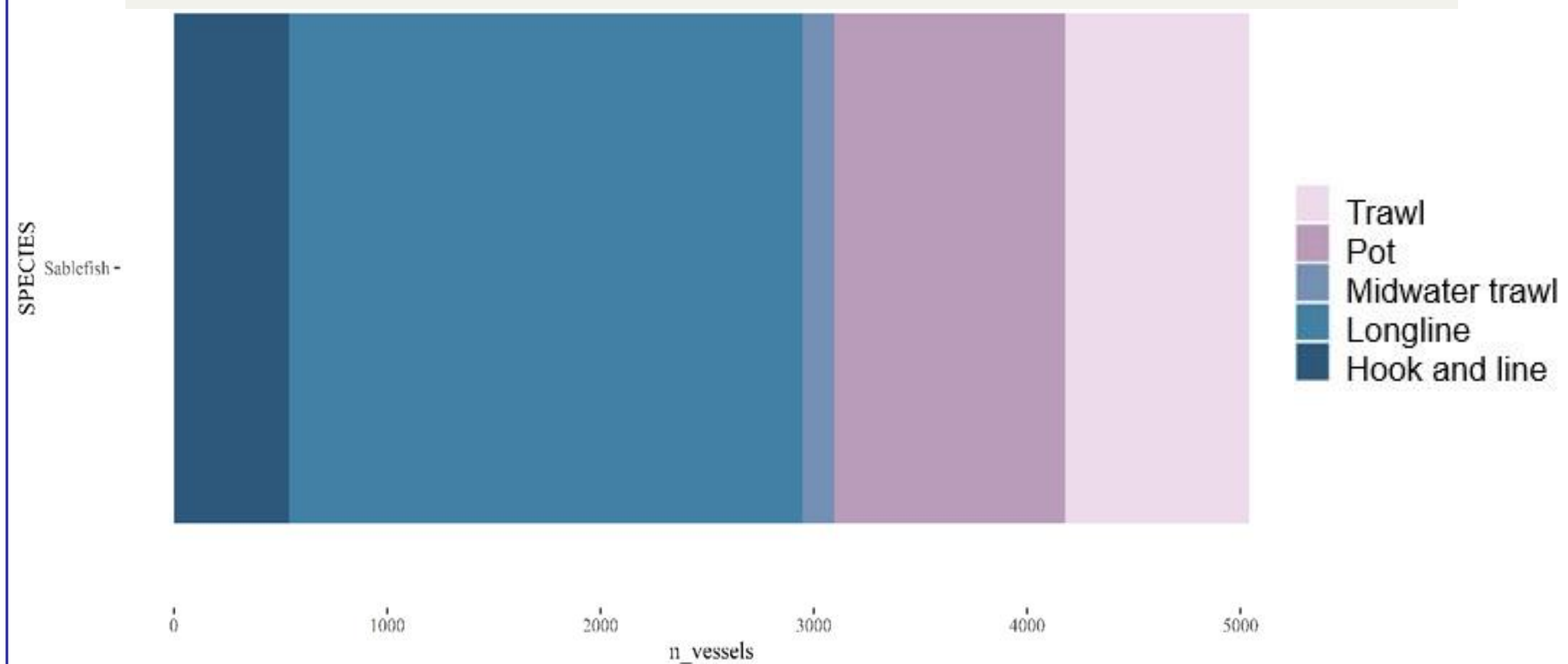
Operationalizing an overlapping approach to groundfish and human communities of practice, interest and place

On the far right, using data from the West Coast groundfish fishery, we divide groundfish fishers according to 4 broad target species categories. Across the top row, each dot then represents a possible community according to this conception, while the height of the line on the y axis line reflects the range of vessels per community and its width indicates frequency. With 4 broad categories of target species, there are 4 large distinct 'groundfish fishing communities' according to this *community of interest* conception, based on target species. Moving left, we may also divide communities by 8 broad gear types deployed (*communities of practice*) and 21 ports of landing (*communities of place*). Combining overlapping 'groundfish fishing community' conceptions based on gear types and species (8 x 4) results in 32 separate communities (e.g. all rockfish trawlers as a combined *community of practice* and *community of interest*). Combinations continue left to right such that, on the far left, there are 465 possible permutations of community based on combinations of gear used, target species, and port of landing.



Operationalizing overlapping communities of practice, interest and place: sablefish and climate

Approaches to groundfish fishing communities are salient in the context of sablefish, a commercially valuable groundfish species, and its potential climate-driven spatial distribution shifts. If, for example, the distribution of sablefish shifts northward in conjunction with climate changes in ocean conditions, then the combined *community of practice/community of interest* of hook and line sablefish fishers may feel impacts most acutely, even though this community represents a small number of vessels relative to several other *communities of practice* (far left, top figure below). This is because as *communities of place*, hook and line sablefish fishers tend to land in southerly ports (far left, map below). Hook and line gear is difficult to switch compared to other gear types, so the capacity to adapt to new target species using new gear may be limited and cumulative impacts of species distribution shifts become important. While distinct community conceptions may be appropriate to examining particular climate impacts on groundfish, we highlight here how the overlapping nature of these conceptions is also central in the context of sablefish and climate.



Conclusions

- Fishing community definitions key to impacts of climate-oriented changes in fisheries
- Place-level indices may inform management in terms of fishing community vulnerabilities to climate-generated shifts in groundfish, but vulnerability measures are incomplete as proxies for adaptive capacity
- When identifying potential climate-generated spatial shifts in groundfish species distributions, land-based conceptions of fishing community are insufficient
- Appropriate conceptual approach to community may depend on the climate-oriented impact and policy shift in question
- Defining 'groundfish fishing communities' in the context of climate-oriented shifts allows for a necessary critique of the primacy of place-based approaches to 'fishing community' in West Coast research and management

Future work

- Further survey data streams appropriate across the spectrum of community conceptions
- Narrow available data questions to those connected to spatial shifts in groundfish species (SDMs) and management futures amenable to Atlantis modeling
- Provide community conceptions to groundfish fisher key informants for feedback and *emic* groundtruthing of approaches to community

Data Sources
 Fishery revenue data obtained via fish ticket landings receipts for all commercial fishery landings on the U.S. West Coast, as collected by state management agencies. Revenue is aggregated to the level of port and social vulnerability measures are calculated from the American Community Survey (ACS).

References
^a St. Martin, Kevin and Madeline Hall-Abber. 2008. The missing layer: Geo-technologies, communities, and implications for marine spatial planning. *Marine Policy* 32(5): 775-786.
^b Coburn, Lisa L., Michael Japson, Amber Himes-Cornell, Stephen Kasperski, Karma Norman, Changhua Wang and Patricia M. Clay. 2017. Community Participation in U.S. Catch Share Programs. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-F/SPO-179, 136 p.

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