Read me for SES vulnerability analysis 012616

We will consider the effects of a crab fishery closure for the coastwide network. The following ports have a sufficient number of vessels to repeat this analysis at a smaller spatial scale:

+ Astoria

+ Newport

+ Coos Bay

+ Port Orford

+ Westport

+ Morro Bay

+ San Francisco

+ Eureka

+ Fort Bragg

We will also analyze the structural properties of undirected fisheries participation networks, characterized 2 ways.

1. Networks where the edge weights are based on the number of vessels participating in both nodes. with that kind of network, you could estimate interaction strengths as: proportion of vessels that do i and j relative to total number that do i or j.
2. Networks where the edge weights are based on correlations between métiers in revenue/landings/trips. correlations between metiers based on year, strategy (maybe year, vessel size)

***Correlations between top 10 metiers***

*Which correlation matrix is the most sensible one to use if we are interested in simulating expected changes in participation given a shock to one fishery?*

I think trips make the most sense for thinking about decisions made by fishermen: if trips are negatively correlated, it suggests that a decision to fish for X comes at a cost of targeting Y, whereas if trips are positively correlated, it suggests that a decision to fish for X improves the chances of deciding to target Y (or a third unmeasured variable positively influences chances of conducting trips for X and Y). So let’s focus on trips for parameterizing the networks, and later re-do the analyses using revenue/landings to see if it changes things much.

Results below refer to correlations between top 10 metiers, each vessel-year is used as a replicate. Needs to be redone where year is considered a covariate?

Here are the few discrepancies, which fall into 3 categories (i. negative corr for trips but positive for revenue/pounds (speaks to tradeoff, an enabling correlation), ii. weak for trips but strong for revenue/pounds (env or market signal? Or 2 large fisheries by pounds), iii. strong for pounds but weak for revenue/trips):

* (iii) correlation between salmon and urchins only strong for pounds
* (i) shrimp sole correlation strongly negative for trips only. Targeting different patches?
* (i) crab-sardine sign change for trips, which show negative correlation. Vessels have to re-gear?
* (ii) crabs-sablefish weak for trips, strong for revenues/pounds. Perhaps fishermen catch both with the same gear?
* (i) crab-shrimp sign change for trips, which show negative correlation. Vessels have to re-gear?

I like that we detect:

- a (+0.3) correlation between crab and sablefish revenues (similar for pounds, but ~0 for trips)

- a (+0.37) correlation between crab and albacore revenues

- a (-0.33) correlation between lobster and urchin revenues

- a (-0.24) correlation between shrimp and albacore revenues

- a (-0.53) correlation between shrimp and dover sole trips (~0 for revenues and pounds)

- a (-0.34) correlation between crab and sardine trips (correlations weak for revenues, pounds)

I'm surprised at the:

- a (+0.62) correlation between lobster and chinook revenues (+0.55 for pounds)

- a (-0.43) correlation between crab and urchin revenues

- a (-0.55) correlation between urchin and chinook pounds (much weaker for revenues and trips)

- a (-0.22) correlation between lobster and sablefish trips (correlation is ballpark similar for revenue, pounds)

I'm agnostic about:

- a (-0.23) correlation between dover sole and albacore revenues

- a (+0.22) correlation between dover sole and crab revenues

- a (+0.23) correlation between shrimp and crab revenues [note, that the correlation between trips for these fisheries is (-0.31))

***Top 10 metiers***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| metier.2010 | Major species | dollars | pounds | percent.rev | percent.pounds |
| POT\_1 | Dungeness crab | 644829706.1 | 262647868 | 35.00248371 | 8.122747762 |
| NET\_1 | Market squid | 313911191.7 | 1201321754 | 52.04213196 | 45.27528078 |
| TLS\_2 | Albacore | 166680071 | 126842092 | 61.0898176 | 49.19804752 |
| TWL\_1 | Dover sole | 120247798 | 220403547 | 67.61707829 | 56.01433135 |
| TWS\_1 | Pink shrimp | 115685826.2 | 273878130 | 73.89670717 | 64.48439047 |
| HKL\_1 | Sablefish | 81620487.64 | 28221136 | 78.32720993 | 65.35716804 |
| TLS\_1 | Chinook salmon | 65605816.53 | 12674015 | 81.88840834 | 65.74912945 |
| NET\_2 | Pacific sardine | 63219887.73 | 727446731 | 85.32009436 | 88.24642345 |
| POT\_2 | CA spiny lobster | 56549434.97 | 4184517 | 88.38969655 | 88.37583541 |
| MSC\_1 | Red sea urchin | 39840290.05 | 60310472 | 90.55229714 | 90.24101999 |