**Summary of analysis for NWFSC Symposium 2016**

**Methods**

Motivated by the 2015 HAB, our primary goal was to evaluate the influence of a closure of the Dungeness crab (POT\_1) fishery on other nodes in the coastwide fisheries participation network. To accomplish this task, we had to identify the most important fisheries on the US west coast, develop a method for parameterizing the interactions between fisheries in the coastwide network, and simulate a closure of the crab fishery.

We chose to focus on the fisheries accounting for 90% of all revenues generated during the period 2009-2013 (PacFIN cite). To address for the fact that the Dungeness crab fishery spans December-January, we calculated annual revenues based on each year beginning November 1 and ending on October 31. This analysis resulted in ten nodes in the coastwide participation network (Table 1).

Table 1. Fisheries accounting for 90% of all revenues on the US west coast, 2009-2013.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| metier.2010 | Real name | dollars | pounds | percent.rev | percent.pounds |
| POT\_1 | Dungies | 644829706.1 | 262647868 | 35.00248371 | 8.122747762 |
| NET\_1 | Squid | 313911191.7 | 1201321754 | 52.04213196 | 45.27528078 |
| TLS\_2 |  | 166680071 | 126842092 | 61.0898176 | 49.19804752 |
| TWL\_1 |  | 120247798 | 220403547 | 67.61707829 | 56.01433135 |
| TWS\_1 |  | 115685826.2 | 273878130 | 73.89670717 | 64.48439047 |
| HKL\_1 |  | 81620487.64 | 28221136 | 78.32720993 | 65.35716804 |
| TLS\_1 |  | 65605816.53 | 12674015 | 81.88840834 | 65.74912945 |
| NET\_2 |  | 63219887.73 | 727446731 | 85.32009436 | 88.24642345 |
| POT\_2 |  | 56549434.97 | 4184517 | 88.38969655 | 88.37583541 |
| MSC\_1 |  | 39840290.05 | 60310472 | 90.55229714 | 90.24101999 |

We chose to consider the strength of interactions between fisheries in the coastwide participation network in two ways. We determined the Spearman rank correlation between (i) revenues and (ii) trips among each pair of fisheries, and used the sign and strength of each correlation as a proxy for the pairwise, undirected (symmetrical in both directions) interaction strength (or edge weight). In economic terms, nodes with positive (negative) links are complements (substitutes). Inferring positive (negative) interactions in the networks developed based on revenues can be justified if greater revenues from one fishery facilitated greater (lesser) revenue from another, a third exogenous variable (e.g., environmental or market conditions) linked the revenues of the fisheries, or other reasons. Inferring negative (positive) interactions in the networks developed based on trips can be justified if decisions to target one fishery reduce (increase) opportunities to target another (e.g., if both fisheries occur in the same season, but target stocks occur in different habitats and/or require different gears).

We simulated the dynamics of the coastwide network following the neural network methods detailed by Hobbs et al. (2002) and Ozesmi and Ozesmi (2004).