**Supporting information**

*Description of bootstrap analysis*

A bootstrap analysis was conducted to evaluate confidence in the overall vulnerability classification. The distribution of tallies for each sensitivity attribute and exposure factor was sampled with replacement to compute a new overall vulnerability classification, with this procedure repeated 1000 times to produce a distribution across the overall vulnerability classifications. A certainty score was computed as the percentage of bootstrap vulnerability rankings which were identical to the original vulnerability ranking.

*Evaluation of influence of sensitivity attributes and exposure factors*

To evaluate the influence of each sensitivity attribute and exposure factor, the scoring rubric was applied after removing each attribute and factor from the analysis, and the number of stocks for which the vulnerability score was changed was recorded.

*Description of distribution analysis*

The potential for stocks to change their distribution was assessed by examining the scores of the sensitivity attributes Adult Mobility, Early Life Stage Dispersal, Habitat Specificity, and Sensitivity to Temperature, following the methodology used in Hare et al. (2016). Stocks that are habitat generalists and sensitive to temperature, and with high levels of mobility and dispersal, were considered as having increased potential for changing their distribution. The attribute scores for Adult Mobility, Early Life Stage Dispersal, and Habitat Specificity were adjusted by reversing the axis such that a high numerical score indicted less sensitivity, and the same logic rule for the overall vulnerability evaluation was applied.

*Description of directional analysis*

The vulnerability rankings could indicate either beneficial or adverse effects on a stock, as an increase in the mean of an environmental factor could have the same *Z* score as a decrease in the mean. The scorers evaluated whether climate change would affect stocks in a positive, neutral, or negative direction. For each stock, scorers distributed four tallies across these three bins and an average score was computed for each stock by assigning the numerical values of 1, 0, and -1 to the categories of positive, neutral, and negative, respectively. The category for each stock was obtained by dividing the distance from -1 to 1 equally among the three categories; for example, average scores less than -1/3 were categorized as negative, whereas average scores greater than 1/3 were categorized as positive.

References

Hare, J. A., Morrison, W. E., Nelson, M. W., Stachura, M. M., Teeters, E. J., Griffis, R. B., . . . Griswold, C. A. (2016). A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. *PLoS One, 11*(2), e0146756. doi:10.1371/journal.pone.0146756

Table S1. Data quality categories for sensitivity attributes, environmental projections of physical or biological variables, and stock spatial distributions.



Table S2. The logic rule of assigning sensitivity and exposure categories, and an alternative rubric that centers the thresholds for the high, moderate, and low categories.



Table S3. The distribution of sensitivity attributes and exposure factors across ranking categories, and the percentage of sensitivity attributes and exposure factors with data quality ≥ 2,

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sensitivity Attributes | | | | |  | Exposure Factors | | | | |
| Stock | Low | Moderate | High | Very High | Percent Data Quality >2 |  | Low | Moderate | High | Very High | Percent Data Quality >2 |
| Giant Pacific octopus | 11 | 1 | 0 | 0 | 50 |  | 21 | 0 | 0 | 1 | 64 |
| Magistrate armhook squid | 11 | 1 | 0 | 0 | 42 |  | 17 | 0 | 0 | 1 | 56 |
| Smoothskin octopus | 10 | 1 | 1 | 0 | 17 |  | 11 | 0 | 0 | 1 | 33 |
| Plain sculpin | 11 | 1 | 0 | 0 | 17 |  | 17 | 0 | 0 | 1 | 56 |
| Bristol Bay red king crab | 6 | 2 | 2 | 2 | 100 |  | 17 | 0 | 0 | 1 | 56 |
| Norton Sound red king crab | 5 | 3 | 2 | 2 | 83 |  | 17 | 0 | 0 | 1 | 56 |
| Snow crab | 6 | 1 | 3 | 2 | 100 |  | 17 | 0 | 0 | 1 | 56 |
| Tanner crab | 9 | 0 | 1 | 2 | 92 |  | 16 | 1 | 0 | 1 | 56 |
| Alaska skate | 9 | 2 | 0 | 1 | 75 |  | 11 | 0 | 0 | 1 | 33 |
| Commander skate | 9 | 2 | 0 | 1 | 42 |  | 11 | 0 | 0 | 1 | 33 |
| Pacific sleeper shark | 10 | 1 | 0 | 1 | 42 |  | 15 | 0 | 0 | 1 | 50 |
| Salmon shark | 11 | 0 | 0 | 1 | 75 |  | 16 | 1 | 0 | 1 | 56 |
| Alaska plaice | 9 | 1 | 0 | 2 | 92 |  | 17 | 0 | 0 | 1 | 56 |
| Arrowtooth flounder | 11 | 0 | 1 | 0 | 92 |  | 17 | 0 | 0 | 1 | 56 |
| Flathead sole | 9 | 1 | 1 | 1 | 92 |  | 16 | 1 | 0 | 1 | 56 |
| Greenland turbot | 8 | 3 | 1 | 0 | 75 |  | 17 | 0 | 0 | 1 | 56 |
| Kamchatka flounder | 10 | 1 | 1 | 0 | 50 |  | 16 | 1 | 0 | 1 | 56 |
| Northern rock sole | 9 | 1 | 2 | 0 | 92 |  | 17 | 0 | 0 | 1 | 56 |
| Pacific halibut | 9 | 2 | 0 | 1 | 100 |  | 17 | 0 | 0 | 1 | 56 |
| Starry flounder | 10 | 0 | 2 | 0 | 42 |  | 21 | 0 | 0 | 1 | 64 |
| Yellowfin sole | 10 | 0 | 2 | 0 | 92 |  | 17 | 0 | 0 | 1 | 56 |
| Capelin | 8 | 3 | 1 | 0 | 58 |  | 21 | 0 | 0 | 1 | 64 |
| Pacific herring | 6 | 3 | 1 | 2 | 92 |  | 21 | 0 | 0 | 1 | 64 |
| Eastern Bering Sea Pacific cod | 11 | 1 | 0 | 0 | 83 |  | 17 | 0 | 0 | 1 | 56 |
| Eastern Bering Sea pollock | 11 | 1 | 0 | 0 | 83 |  | 17 | 0 | 0 | 1 | 56 |
| Giant grenadier | 11 | 1 | 0 | 0 | 8 |  | 10 | 1 | 0 | 1 | 33 |
| Sablefish | 10 | 2 | 0 | 0 | 50 |  | 15 | 2 | 0 | 1 | 56 |
| Pacific ocean perch | 8 | 1 | 1 | 2 | 75 |  | 15 | 2 | 0 | 1 | 56 |
| Rougheye rockfish | 8 | 1 | 1 | 2 | 75 |  | 15 | 2 | 0 | 1 | 56 |
| Shortraker rockfish | 8 | 1 | 1 | 2 | 58 |  | 15 | 2 | 0 | 1 | 56 |
| Shortspine thornyhead | 9 | 1 | 1 | 1 | 33 |  | 15 | 2 | 0 | 1 | 56 |
| Chinook salmon | 5 | 3 | 2 | 2 | 83 |  | 21 | 0 | 0 | 1 | 64 |
| Chum salmon | 7 | 1 | 2 | 2 | 92 |  | 21 | 0 | 0 | 1 | 64 |
| Coho salmon | 7 | 1 | 2 | 2 | 75 |  | 21 | 0 | 0 | 1 | 64 |
| Pink salmon | 8 | 0 | 2 | 2 | 75 |  | 21 | 0 | 0 | 1 | 64 |
| Sockeye salmon | 7 | 0 | 3 | 2 | 75 |  | 21 | 0 | 0 | 1 | 64 |