By Jessica Schmidt

ALASKAN EASTERN BERING SEA SNOW CRAB GEOSPATIAL ABUNDANCE ANALYSIS (NOAA)

Researcher Introduction

- **Jessica Schmidt – MSDA Candidate, WGU**
  - Current Data Analyst at University of Utah - Analytics and Institutional Reporting
    - Professional experience in institutional research, cancer clinical research, tax research, human resource management, event management, policy-making and analysis, government, security, and education
  - Bachelor's degrees in Economics and Political Science – International Relations focus
  - Previously studied Mechanical (Aerospace) Engineering and Pre-Med Honors Biology – hence interest in biological analysis

Snow Crab Geospatial Abundance

Image Source: New Scientist

- Snow crab fisheries have a set quota and limited time to fish
- Understanding snow crab geospatial abundance would aid fisheries
- Which variables affect the catch per unit effort?
  - Snow crab gender, year of haul, bottom depth, surface temperature, bottom temperature, latitude, longitude

Data Analysis Process

- A Multiple Linear Regression (MLR) was used for this analysis

- NOAA Data was cleaned for analysis by detecting and treating duplicates, missingness, outliers, and re-expression of categorical variables

- NOAA Data was prepared for analysis via normalization

- Initial model was treated for multicollinearity and refined via backward-stepwise elimination method to reach final polished model

Findings

1. Snow crab abundance is **decreasing** year-over-year
2. **Deeper bottom depths** will result in **lower yield**
3. **Higher latitudes** will result in **higher yield**
4. There are **more female crab** than male crab

Discussion of Limitations

- The data for this analysis was from 1975-2018, and therefore does not include 2019-present

- Multiple Linear Regression is most effective with many independent variables (15+ is best), whereas this dataset offered 7

- R-squared of final model is low, but results can be accepted given statistical significance of variables (5% industry standard)

Proposed Course of Action

- Given the findings, I propose the following for snow crab fisheries:
  - Expect lower catch per unit effort year-over-year
  - Expect more female than male crab
  - Fish at shallower depths to maximize yield
  - Fish at higher latitudes to maximize yield

Image Source: Whidbey

Expected Benefits

Image Source: National Fisherman

- "In 2022 alone, commercial landings of Alaskan Snow Crab totaled 5.5 million pounds and were valued at $24.5M." (NOAA)

- The results of this analysis can aid the $24.5M industry by informing fisheries on the most ideal conditions to fish to maximize catch per unit effort

- There is a set harvest limit every year - the faster fisheries can harvest the crab the better, and higher catch per unit effort will expediate the process

NOAA Dataset: https://www.kaggle.com/datasets/mattop/snowcrab

New Scientist Image: https://www.newscientist.com/article/2398608-warm-seas-blamed-for-the-disappearance-of-10-billion-snow-crabs/

Britannica Bering Sea Image: https://www.britannica.com/place/Bering-Sea

Whidbey Image: https://www.whidbeynewstimes.com/news/catch-the-deadliest-catch/

National Fisherman Image: https://www.nationalfisherman.com/alaska/bering-sea-snow-crab-still-on-hold

NOAA: https://www.fisheries.noaa.gov/species/alaska-snow-crab#:~:text=Generally%20harvested%20from%20January%20to,%2C%20but%20available%20year%2Dround

Sources