# Insert title of project here

Web address for GitHub repository

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# 1 Rationale and Research Questions

## 1.1 Research Questions

1. (a) When consumers buy seafood, which species do they prefer? (b) Do they prefer wild or farmed fish?

2. (a) What qualities do consumers associate with wild vs. farmed seafood? (b) What qualities do they value in seafood?

3. Are seafood values predicted by demographic variables such as age or education level?

# 2 Dataset Information

## 2.1 Description of the Data

Our data were obtained from a social science survey conducted by a multi-university team of researchers, including the Murray lab at Duke University. The survey was conducted in the summer of 2020 via Qualtrics and targeted North Carolina residents from across the state.

The survey asked respondents a total of 37 questions. The question topics can be broken down into the following categories: eating habits for 8 types of seafood, what qualities respondents associate with seafood, attitudes about mariculture, attitudes about North Carolina seafood versus commercial fishing, respondents' involvement with seafood production, and demographic indicators. This study focuses on questions about eating habits, what qualities are associated with seafood, and demographic indicators.

Respondents answered each question by selecting one option from a menu of choices; the number of choices available depended on the question. The dataset contained responses from 1436 participants.

## 2.2 Data Wrangling

For each analysis, we created a new dataset containing only the relevant columns. For each category within the survey question, we then created a table with the frequency of each questions response. For example, one question asked respondents to rate how often they ate each of 8 types of seafood; respondents could choose from 7 responses for each seafood type. To wrangle this data, we created a dataframe for each type of seafood, for a total of 8 dataframes, each of which contained a column with the response choices and a column with the number of respondents that chose each response. Because the response choices were only represented by a number in the raw data, we renamed the response column with the meaning of each number for greater clarity. We repeated this process for the first two research questions (how often participants eat each type of seafood, whether participants prefer each type wild or farmed, whether participants associate each quality with wild or farmed seafood).

For the third research question, we created a dataframe with responses to a question about how important each of 11 qualities was when respondents were buying seafood. We then renamed the columns and removed rows with alternate responses to demographic variables, such as "prefer not to answer."

## 2.3 Data Structure: Consumer preferences

****Data from these responses are categorical, but the response choices could be situated along a linear scale, allowing us to analyze response means.

| Research Question | Survey Question | Response choices |
|---|---|---|
| 1a. When consumers buy seafood, which species do they prefer? | In the past year, how often did you eat the following type of seafood**? | 0 = Never, 1 = Once in the past year, 2 = A few times in the past year, 3 = Once a month, 4 = A few times every month, 5 = Once a week, 6 = More than once a week |
| 1b. Do consumers prefer wild or farmed fish? | Between wild-caught and farmed versions of the same seafood species**, which do you prefer to eat? | 1 = Strongly prefer wild-caught, 2 = Slightly prefer wild-caught, 3 = No preference, 4 = Slightly prefer farmed, 5 = Strongly prefer farmed, 6 = I don't know |
| 2a. What qualities do consumers associate with wild vs. farmed seafood? | How do you associate the following qualities*** with different types of seafood (farmed and wild-caught)? | 1 = More associated with wild-caught, 2 = Associated equally with wild-caught and farmed, 3 = More associated with farmed, 4 = Associated with neither wild-caught or farmed, 5 = I don't know |
| 2b. What qualities do consumers value in seafood? | When you are buying seafood, how important are the following qualities*** to you? | 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important |

** Seafood types: Tuna, Shrimp, Salmon, Flounder, Blue Crab, Clams, Mullet, Oysters (8)

*** Qualities: Healthy, Local, Safe, Tasty, Affordable, Sustainable, Fresh, Easy Access, Local Culture, Local Economies, Local Environment (11)

## 2.4 Data structure: Demographics

| Demographic Category | Response choices | Counts |
|---|---|---|
| Age | 1=19 or younger | 74 |
| . | 2=20-29 | 201 |
| . | 3=30-39 | 170 |
| . | 4=40-49 | 159 |
| . | 5=50-59 | 156 |
| . | 6=60-69 | 172 |
| . | 7=70 or older | 100 |
| . | 8=Prefer not to answer | 8 |
| Education level | 1=Less than high school | 35 |
| . | 2=High school graduate | 229 |
| . | 3=Some college | 302 |
| . | 4=2 year degree | 167 |
| . | 5=4 year degree | 382 |
| . | 6=Professional degree | 260 |
| . | 7=Doctorate | 49 |
| . | 8=Prefer not to answer | 12 |
| Political party | 1=Republican | 449 |
| . | 2=Democrat | 459 |
| . | 3=Independent | 384 |
| . | 4=Other | 28 |
| . | 5=Prefer not to answer | 116 |

# 3 Exploratory Analysis

[explanatory text]

freq.general mean = 4.76

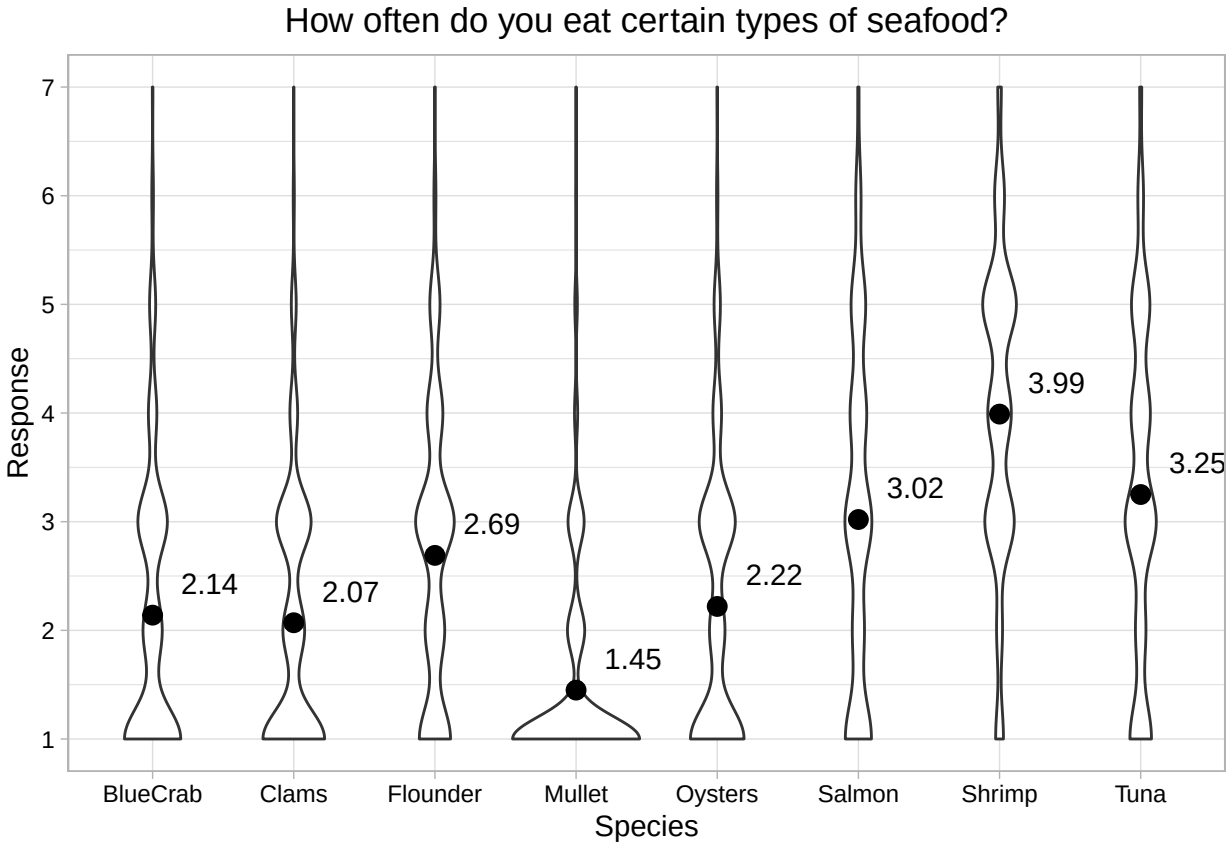
- frequency general?
- map of counties where respondents live?

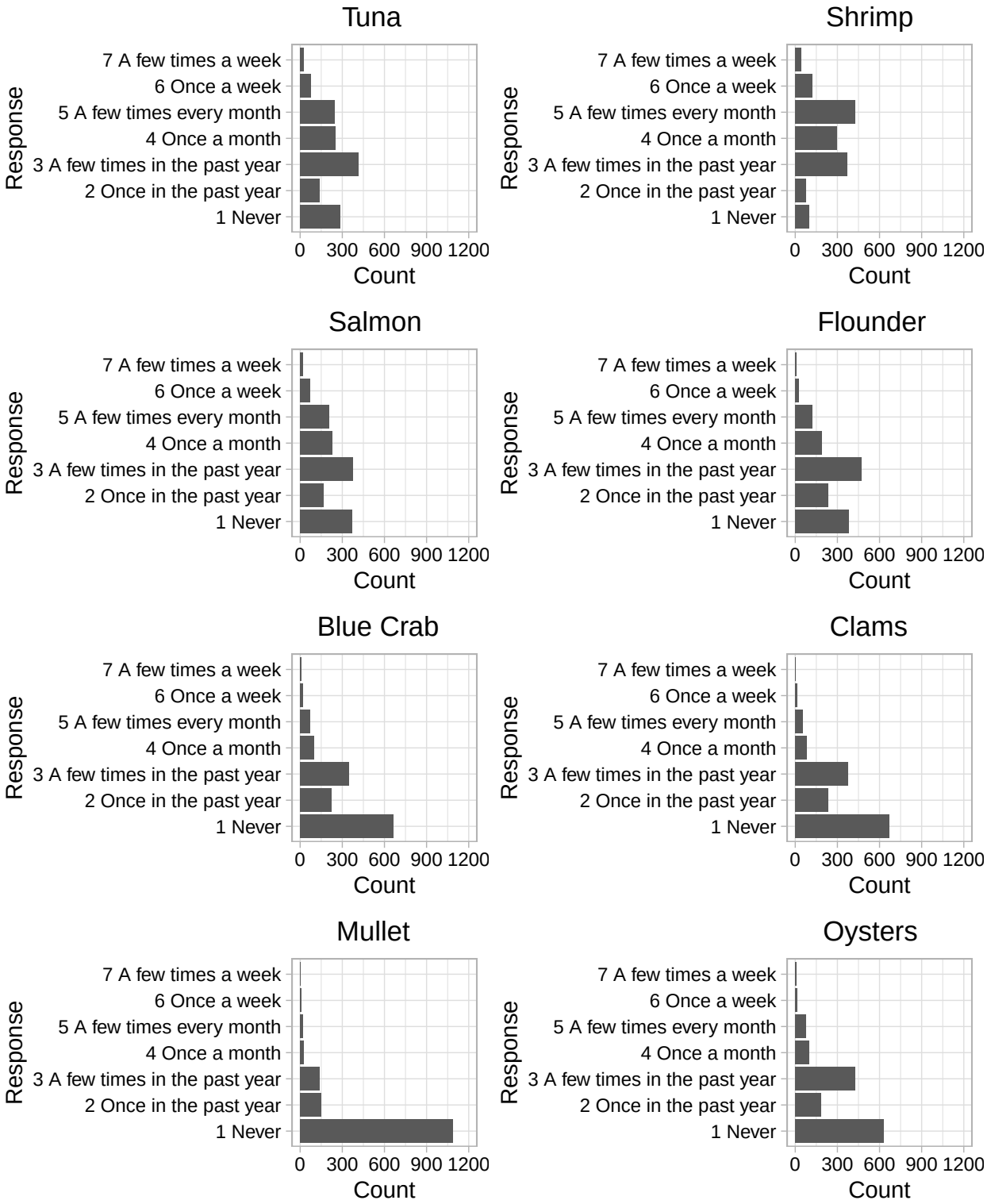
# 4 Analysis

## 4.1 Question 1a: When consumers buy seafood, which species do they prefer?

Table 3: Mean response: How often do you eat the following type of seafood?

| Species | Mean |
|---|---|
| Tuna | 3.25 |
| Shrimp | 3.99 |
| Salmon | 3.02 |
| Flounder | 2.69 |
| BlueCrab | 2.14 |
| Clams | 2.07 |
| Mullet | 1.45 |
| Oysters | 2.22 |

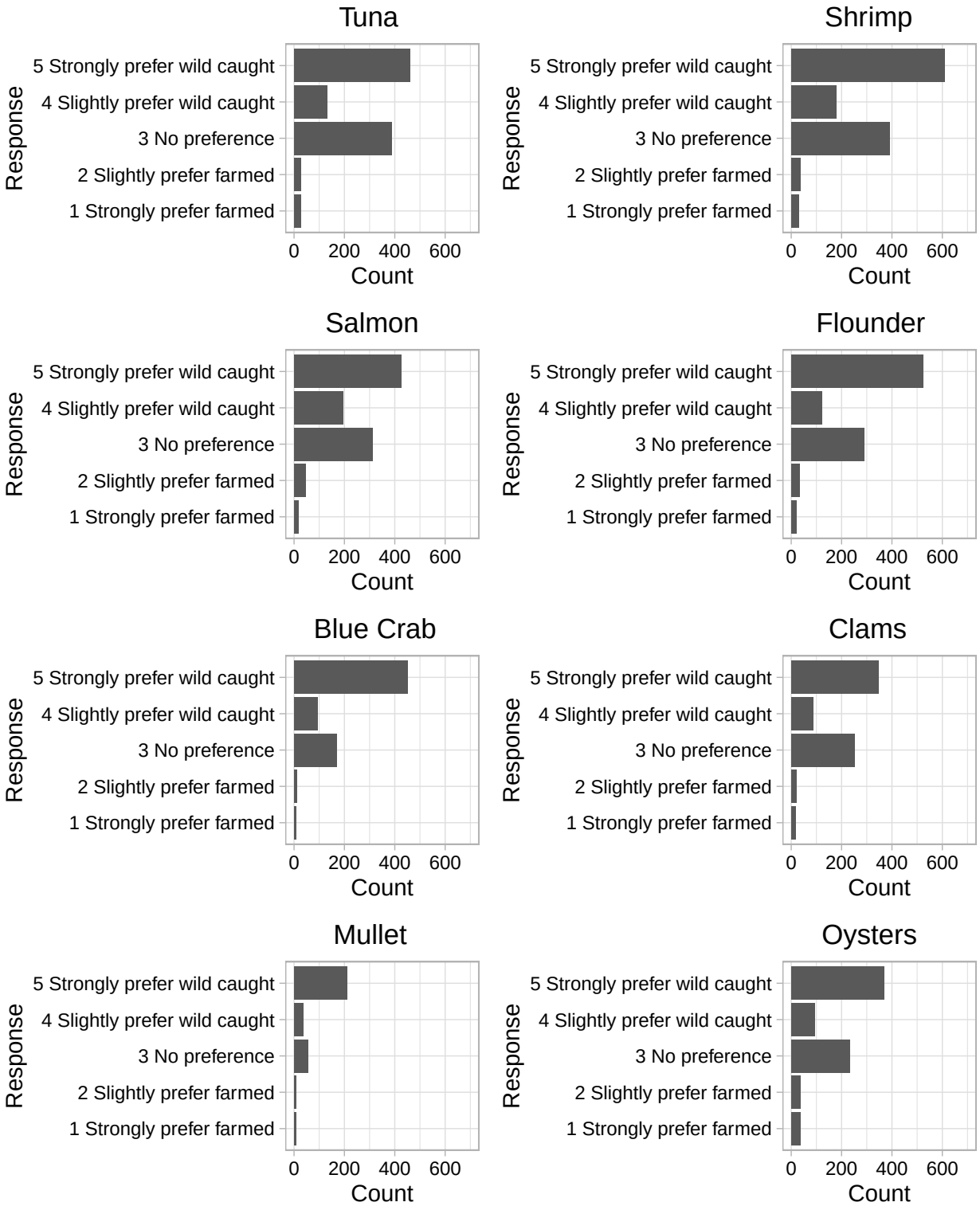





[explanation of frequency findings. also add fig.cap above]

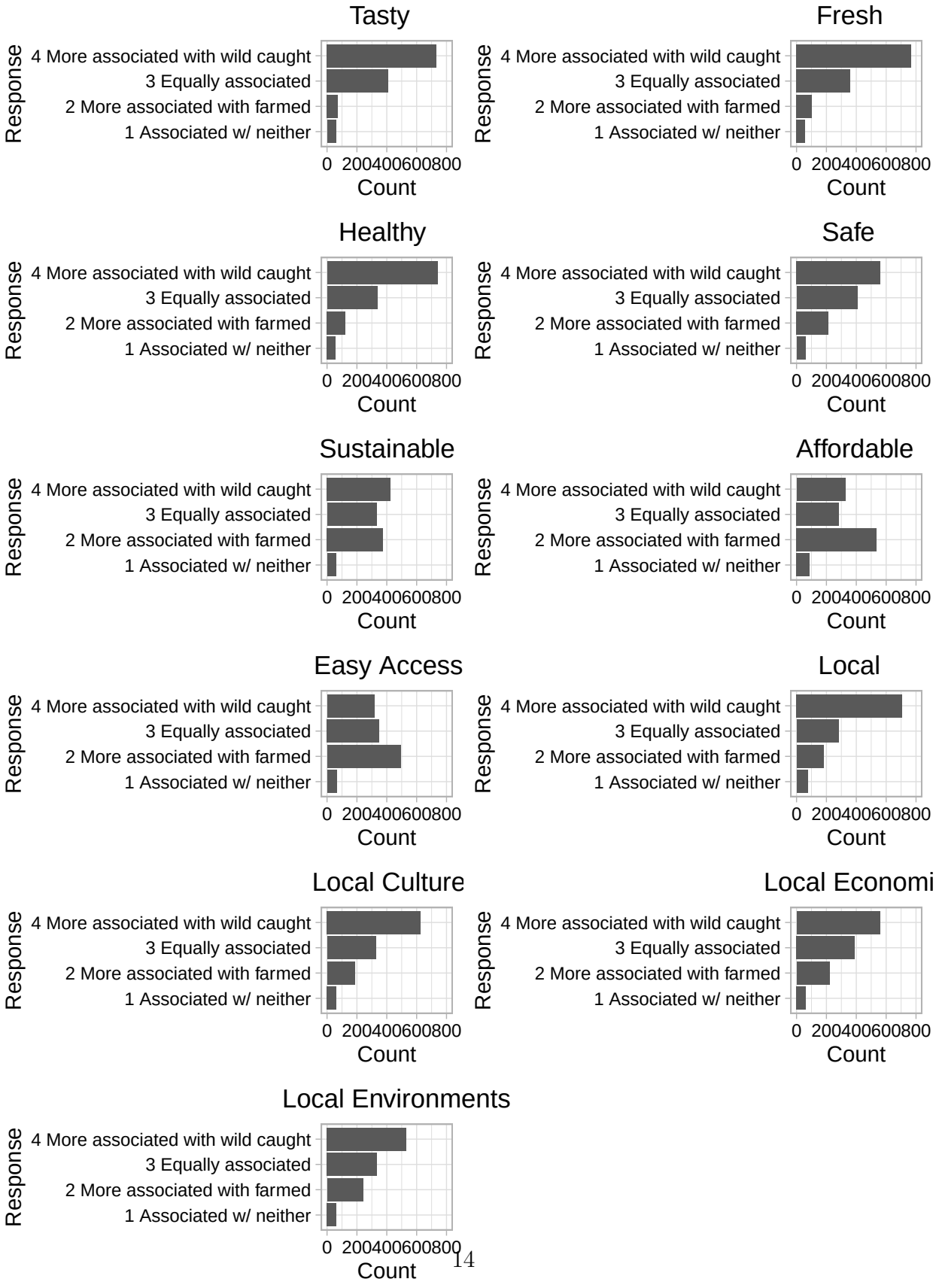
[explanation etc]

### 4.1.1 Question 1b: Do consumers prefer wild or farmed fish?



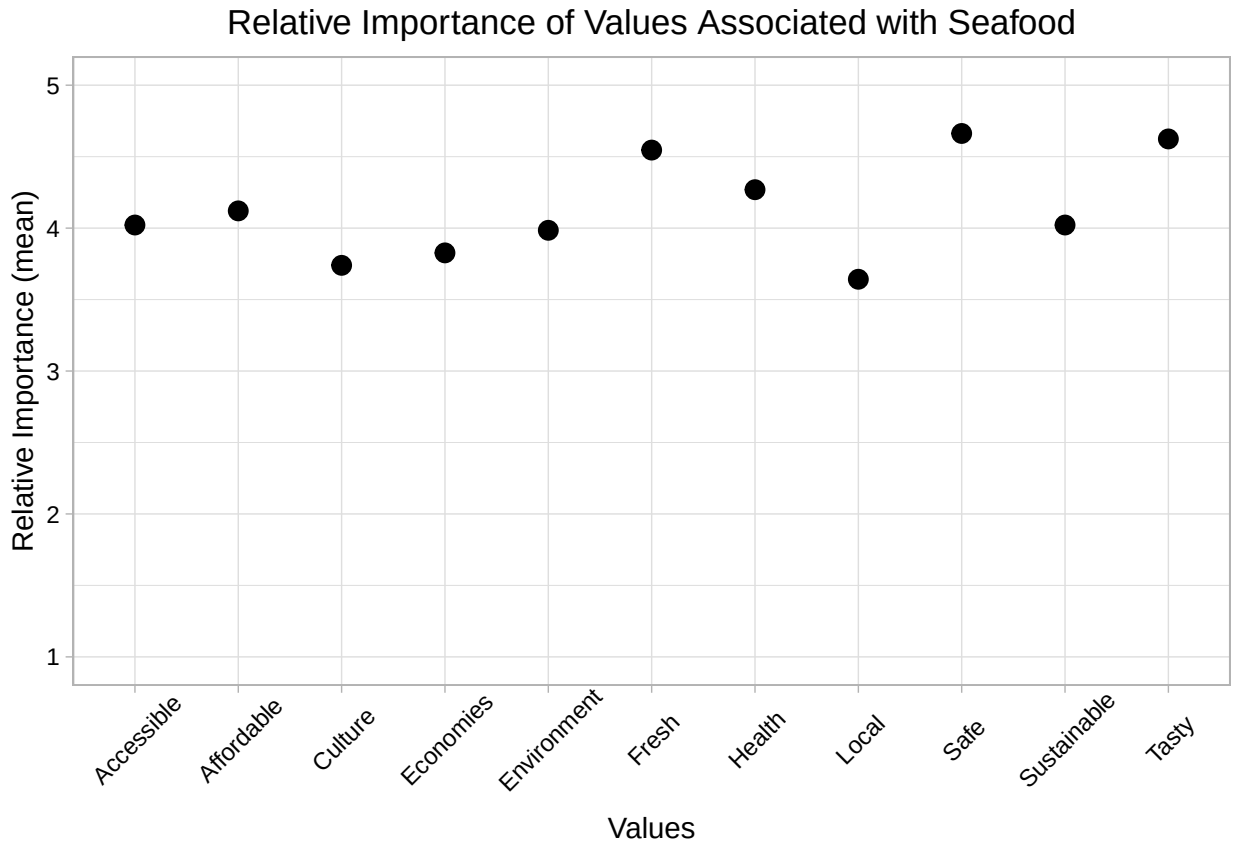

[explanation of findings. also add fig.cap above]

## 4.2 Question 2a: What qualities do consumers associate with seafood?



[explanation of findings. also add fig.cap above]

## 4.3 Question 2b: What qualities do consumers value in seafood?




## 4.4 Question 3: Are valued seafood qualities predicted by demographic variables such as age or education level?

Fresh tasty healthy local - qualities most associated with wild

```
##    1    2    3    4    5    6    7    8 NA's
##   74  201  170  159  156  172  100    8  396

##   1   2   3   4   5   6   7   8
##  35 229 302 167 382 260  49  12

##   1   2   3   4   5
## 449 459 384  28 116
```

```
##
## Call:
## lm(formula = Fresh ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6105 -0.5300  0.4151  0.4700  1.0000
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.00000    0.09923  40.311  < 2e-16 ***
## Age2         0.34826    0.11607   3.001  0.00276 **
## Age3         0.34118    0.11888   2.870  0.00419 **
## Age4         0.58491    0.12012   4.869 1.30e-06 ***
## Age5         0.55128    0.12049   4.575 5.33e-06 ***
## Age6         0.61047    0.11867   5.144 3.22e-07 ***
## Age7         0.53000    0.13089   4.049 5.53e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8536 on 1025 degrees of freedom
## Multiple R-squared:  0.03693,    Adjusted R-squared:  0.0313
## F-statistic: 6.551 on 6 and 1025 DF,  p-value: 8.386e-07

##
## Call:
## lm(formula = Fresh ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6808 -0.5331  0.4215  0.4669  0.9143
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.0857     0.1330  30.730  < 2e-16 ***
## Education2    0.3029     0.1428   2.122 0.034006 *
## Education3    0.4474     0.1404   3.186 0.001477 **
## Education4    0.4772     0.1462   3.263 0.001128 **
## Education5    0.4928     0.1389   3.548 0.000401 ***
## Education6    0.5951     0.1416   4.202 2.81e-05 ***
## Education7    0.5265     0.1741   3.025 0.002534 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7866 on 1417 degrees of freedom
```

```
## Multiple R-squared:  0.02069,    Adjusted R-squared:  0.01654
## F-statistic: 4.989 on 6 and 1417 DF,  p-value: 4.553e-05

##
## Call:
## lm(formula = Fresh ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6125 -0.5730  0.3875  0.4270  0.4270
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4.61247    0.03488 132.243   <2e-16 ***
## Political_Party2 -0.03949    0.04906  -0.805    0.421
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7391 on 906 degrees of freedom
## Multiple R-squared:  0.0007146,  Adjusted R-squared:  -0.0003883
## F-statistic: 0.6479 on 1 and 906 DF,  p-value: 0.4211

##
## Call:
## lm(formula = Local ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6164 -0.6163 -0.2289  0.7711  1.8649
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.13514    0.14044  22.324  < 2e-16 ***
## Age2         0.09372    0.16427   0.571  0.56845
## Age3         0.12957    0.16825   0.770  0.44142
## Age4         0.48122    0.17001   2.831  0.00474 **
## Age5         0.37769    0.17053   2.215  0.02699 *
## Age6         0.37068    0.16796   2.207  0.02753 *
## Age7         0.12486    0.18525   0.674  0.50045
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.208 on 1025 degrees of freedom
## Multiple R-squared:  0.01778,    Adjusted R-squared:  0.01203
## F-statistic: 3.093 on 6 and 1025 DF,  p-value: 0.005248
```

```
##
## Call:
## lm(formula = Local ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8846 -0.6911  0.3089  1.1154  1.5714
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.42857    0.20118  17.042   <2e-16 ***
## Education2   0.07361    0.21601   0.341   0.7333
## Education3   0.11447    0.21252   0.539   0.5902
## Education4   0.08041    0.22126   0.363   0.7163
## Education5   0.26253    0.21019   1.249   0.2119
## Education6   0.45604    0.21429   2.128   0.0335 *
## Education7   0.40816    0.26341   1.550   0.1215
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.19 on 1417 degrees of freedom
## Multiple R-squared:  0.01476,    Adjusted R-squared:  0.01059
## F-statistic: 3.537 on 6 and 1417 DF,  p-value: 0.001762


##
## Call:
## lm(formula = Local ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7734 -0.7734  0.2266  1.2266  1.3185
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       3.68151    0.05561  66.205   <2e-16 ***
## Political_Party2  0.09191    0.07821   1.175     0.24
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.178 on 906 degrees of freedom
## Multiple R-squared:  0.001522,   Adjusted R-squared:  0.0004197
## F-statistic: 1.381 on 1 and 906 DF,  p-value: 0.2403


##
```

```
## Call:
## lm(formula = Tasty ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6667 -0.4677  0.3430  0.4647  0.5676
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.43243    0.08570  51.722   <2e-16 ***
## Age2         0.03523    0.10024   0.351   0.7253
## Age3         0.10286    0.10267   1.002   0.3166
## Age4         0.19021    0.10374   1.834   0.0670 .
## Age5         0.23423    0.10406   2.251   0.0246 *
## Age6         0.22454    0.10249   2.191   0.0287 *
## Age7         0.24757    0.11304   2.190   0.0287 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7372 on 1025 degrees of freedom
## Multiple R-squared:  0.01409,    Adjusted R-squared:  0.008321
## F-statistic: 2.442 on 6 and 1025 DF,  p-value: 0.02383

##
## Call:
## lm(formula = Tasty ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6615 -0.6122  0.3403  0.3444  0.7143
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.2857     0.1145  37.426  < 2e-16 ***
## Education2    0.2645     0.1230   2.151  0.03162 *
## Education3    0.3699     0.1210   3.058  0.00227 **
## Education4    0.3490     0.1259   2.771  0.00566 **
## Education5    0.3740     0.1196   3.126  0.00181 **
## Education6    0.3758     0.1220   3.081  0.00210 **
## Education7    0.3265     0.1499   2.178  0.02958 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6775 on 1417 degrees of freedom
## Multiple R-squared:  0.009764,   Adjusted R-squared:  0.005571
```

```
## F-statistic: 2.329 on 6 and 1417 DF,  p-value: 0.03051

##
## Call:
## lm(formula = Tasty ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6904 -0.6275  0.3096  0.3725  0.3725
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        4.69042    0.02980 157.394   <2e-16 ***
## Political_Party2 -0.06297    0.04191  -1.502    0.133
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6315 on 906 degrees of freedom
## Multiple R-squared:  0.002485,   Adjusted R-squared:  0.001384
## F-statistic: 2.257 on 1 and 906 DF,  p-value: 0.1333

##
## Call:
## lm(formula = Health ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3372 -0.3372 -0.0882  0.7610  0.9865
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.01351    0.11050  36.321   <2e-16 ***
## Age2         0.14569    0.12925   1.127   0.2599
## Age3         0.07472    0.13239   0.564   0.5726
## Age4         0.22548    0.13377   1.686   0.0922 .
## Age5         0.27495    0.13418   2.049   0.0407 *
## Age6         0.32370    0.13215   2.449   0.0145 *
## Age7         0.24649    0.14576   1.691   0.0911 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9506 on 1025 degrees of freedom
## Multiple R-squared:  0.0107, Adjusted R-squared:  0.004912
## F-statistic: 1.848 on 6 and 1025 DF,  p-value: 0.0868
```

```
##
## Call:
## lm(formula = Health ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3500 -0.3477  0.6500  0.7120  1.2000
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   3.8000     0.1537  24.723  < 2e-16 ***
## Education2    0.3528     0.1650   2.138 0.032685 *
## Education3    0.5477     0.1624   3.373 0.000763 ***
## Education4    0.4335     0.1690   2.565 0.010431 *
## Education5    0.4880     0.1606   3.039 0.002421 **
## Education6    0.5500     0.1637   3.359 0.000802 ***
## Education7    0.4245     0.2012   2.109 0.035090 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9093 on 1417 degrees of freedom
## Multiple R-squared:  0.01248,    Adjusted R-squared:  0.008299
## F-statistic: 2.985 on 6 and 1417 DF,  p-value: 0.006693


##
## Call:
## lm(formula = Health ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3486 -0.3486  0.6514  0.6514  0.6882
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4.31180    0.03962  108.83   <2e-16 ***
## Political_Party2  0.03678    0.05573    0.66    0.509
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8395 on 906 degrees of freedom
## Multiple R-squared:  0.0004806,  Adjusted R-squared:  -0.0006226
## F-statistic: 0.4356 on 1 and 906 DF,  p-value: 0.5094
```

# 5 Summary and Conclusions

# 6 References

<add references here if relevant, otherwise delete this section>