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Analysis of Environmental Data
Week 12 Reading Questions
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Worked with Juliana Berube

Q1: In the context of a dataset (real or made up), describe the inherent conflict between using a complicated model that minimizes the unexplained variation and using a simple model that is easy to communicate.

When communicating science, clarity is extremely important, especially when the target audience is not scientifically trained. For example, for my thesis project, I am creating a model using RSFs to describe the relationship between food/resource availability and selection for black bears. The more covariates I use in the model, the less variation there will be. However, if MassWildlife want to use this model as an example to the public why they are making management decisions, it must be simplified so that the residents of Massachusetts can understand and interpret it for themselves.

Q2: Which of the following predictor variables had slope coefficients that were significantly different from zero at a 95% confidence level? Select the correct answer(s)

- **water**
- **nitrogen**
- ~~phosphorus~~
- ~~None~~

Q3: Using the information in the model coefficient table above, calculate the expected biomass for a plant given: 0 mL water per week, 0 mg nitrogen per week, 0 mg phosphorus per week. Explain how you made the calculation.

-1.7 + (0*0.043) + (0*0.043) + (0*-0.027) = **-1.7**

Intercept + $B_{water}x_{water}$ + $B_{nitrogen}x_{nitrogen}$ + $B_{phosphorus}x_{phosphorus}$
Intercept = -1.7 (base case)
B_{water} = 0
x_{water} = 0.043
$B_{nitrogen}$ = 0
$x_{nitrogen}$ = 0.043
$B_{phosphorus}$ = 0
$x_{phosphorus}$ = -0.027

Q4: Using the information in the model coefficient table above, what is the expected biomass for a plant given: 10 mL water per week, 30 mg nitrogen per week, 20 mg phosphorus per week. Explain how you made the calculation.

-1.7 + (10*0.043) + (30*0.192) + (20*-0.027) = **3.95**

Intercept + $B_{water}x_{water} + B_{nitrogen}x_{nitrogen} + B_{phosphorus}x_{phosphorus}$
Intercept = -1.7 (base case)
B_{water} = 10
x_{water} = 0.043
$B_{nitrogen}$ = 30
$x_{nitrogen}$ = 0.043
$B_{phosphorus}$ = 20
$x_{phosphorus}$ = -0.027

Q5: Describe the key difference between a simple linear regression and a 1-way analysis of variance.
Regression is used to find a relationship between variables to help make predictions, while ANOVA is used to take unrelated groups to see if they have a common mean.

Q6: Identify the deterministic component(s) of the model equation.
$\boldsymbol{\alpha + \beta}$**, the regression coefficients**

Q7: Identify the stochastic component(s) of the model equation.
$\boldsymbol{\epsilon}$ **, the error component**