Adult Salmon Diet Program

ES 482/582 Data Project (UVic)
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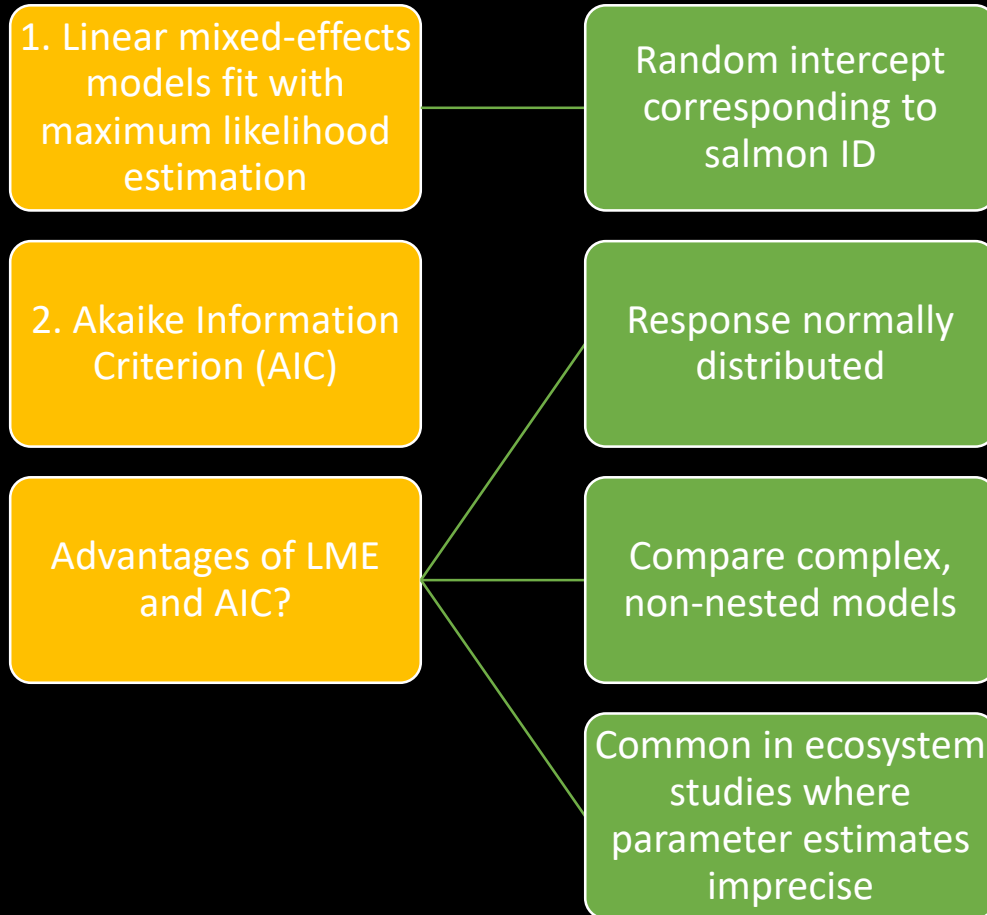
Juanes Lab

How does Chinook size, catch location and time of year in the Salish Sea affect the size of herring prey consumed by Chinook salmon?

Response vs. Explanatory Variable	Hypotheses
Herring size vs. salmon length	positive, linear
Herring size vs. collection day of year	positive, linear
Herring size vs. longitude	negative, linear nonlinear

Interactions

Salmon length : latitude

Salmon length : longitude

Salmon length : collection day of year

Description of Data

Data collection	Herring otoliths Recreationally-caught salmon catch data
Response variable	Otolith width (mm) ~ proxy for herring size
Explanatory variables	Collection day in 2018 Salmon length (cm) Latitude Longitude

Statistical Methods

1. Linear mixed-effects models fit with maximum likelihood estimation — Random intercept corresponding to salmon ID

2. Akaike Information Criterion (AIC)

Advantages of LME and AIC?
- Response normally distributed
- Compare complex, non-nested models
- Common in ecosystem studies where parameter estimates imprecise

AIC results

Model 11 <- oto.width ~ day of year + longitude + salmon length + random effect (salmon ID)

Model 6 <- oto.width ~ day of year + longitude + random effect (salmon ID)
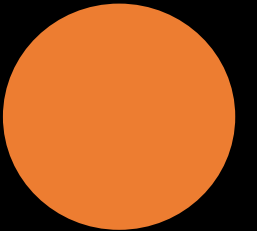
Coefficients plot

- Model 11
- Model 6

Results

✓ Longitude

✓ Collection Day of Year

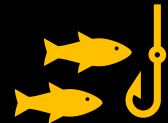| Response vs. Explanatory Variable	Hypotheses	Results
Herring size vs. salmon length	positive, linear	positive, linear
Herring size vs. collection day of year	positive, linear	negative, linear
Herring size vs. longitude	negative, linear nonlinear	negative, linear

Model vs. data

Limitations

Longitude – reflects spatial size distribution of herring in Salish Sea

Solution: model capture location as a categorical variable

Day of Year – reflects two or more herring age classes

Solution : model age classes separately

Salmon length – few salmon below <62cm

Solution : model with and without fish < 62cm

Discussion

The importance longitude and day of year for explaining variation in herring size may reflect:

1. High herring abundance observed along east coast Vancouver Island

2. High abundance of large herring near Hornby/Denman Island during spring spawning

3. Small, young-of-the-year juvenile herring in June diets

Salmon length?

Not important predictor but…

Increasing prey size with increasing predator size is consistent with other studies

Checklist

- PDF file
- 10 slides max
- 2 slides of plots min
- Complete sentences