

Modeling Population Decline of Endangered Species

Link to Git repo: <https://github.com/ST541-Fall2018/boydpe-project-populationdecline>

Peter Boyd

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Data and Implementation

- ▶ Data: any dataset containing columns titled “Year” and “Population”
- ▶ Function steps:
 - 1) Fits several different models
 - 2) Selects the best model by comparing AIC values
 - 3) Using fitted values from the best model, simulate many versions of new data
 - 4) Refit glm's, using original year values and simulated population
 - 5) Average fits, roughly estimate when population is zero
 - 6) Show graphically the fit of various models and the residual plot of best model
- ▶ `pop.decline(df = whale, ntimes = 100)`

Example for Whale data set

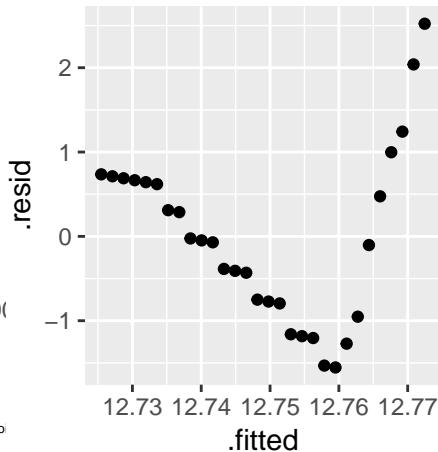
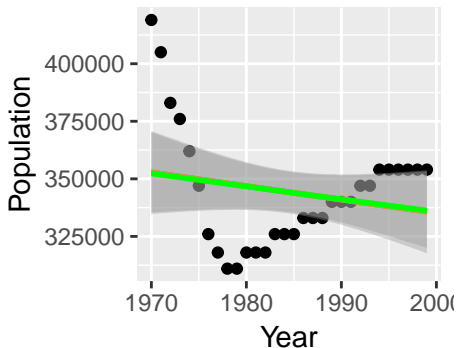
AIC for Each Model

Linear Model : 698.5794

Poisson : 53225.4

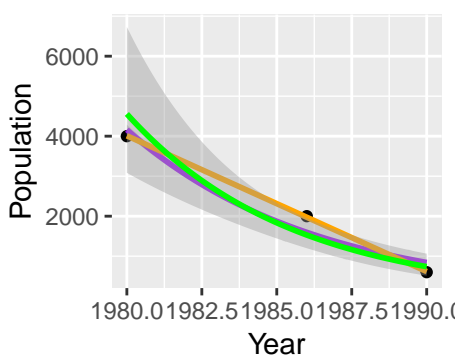
Negative Binomial : 697.0227

Predicted Extinction: 2114.55



Example for Addax data set

```
## AIC for Each Model  
## Linear Model : 32.09494  
## Poisson : 210.3932  
## Negative Binomial : 49.82695  
## Predicted Extinction: 1990.353
```



legend



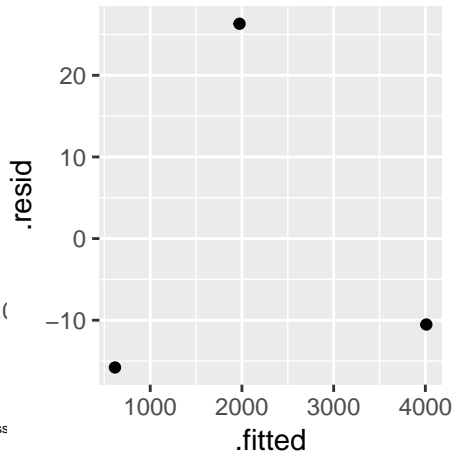
Linear



Neg.Bi



Poiss



Ideas for Future Work

- ▶ Could add complexity to model by considering a carrying capacity variable in the function
- ▶ Attempted to iteratively predict new values until population is extinct, but population kept converging to a nonzero count
- ▶ Questions?