Constructing a modeling tool for wolf status review in WA

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Our goal is to use rigorous quantitative science to assess progress towards wolf recovery goals in Washington

Who will help us achieve project goals?

- Lisanne Petracca
  - Postdoctoral Scientist - started June 1
- Ben Maletzke
  - WDFW Wolf Specialist
- Sarah Converse
  - Unit Leader, USGS Washington Cooperative Fish and Wildlife Research Unit
  - Associate Professor, UW
- Beth Gardner
  - Associate Professor, UW

What do we hope to achieve?

- Estimate demographic rates for wolves in Washington
  - Survival, recruitment, dispersal
- Develop simulation scenarios to account for future effects of wolf management
- Use current conditions and simulated scenarios to assess progress toward recovery goals

Sarah Bassing

A reminder of recovery goals from 2011 plan

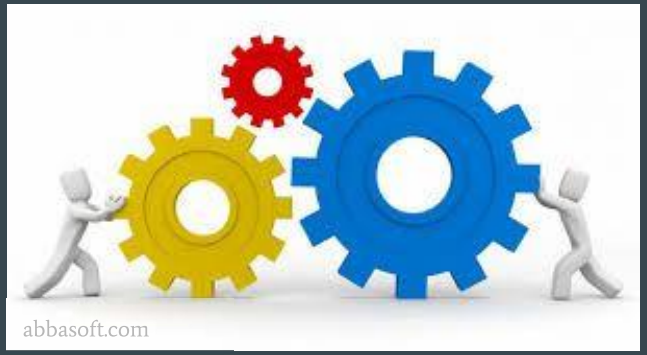
- Delisting: at least 4 breeding pairs in each Recovery Region + 3 additional breeding pairs anywhere in state for 3 consecutive years

- Alternatively, at least 4 breeding pairs in each Recovery Region + 6 additional breeding pairs anywhere in state *for a single year*

- Less rigorous criteria for downlisting to state threatened or state sensitive
  - Threatened: 2 BP per region for 3 consecutive years
  - Sensitive: 4 BP per region for 3 consecutive years

One of the most important parts of our modeling process is properly quantifying uncertainty with respect to meeting recovery goals

What is the general statistical approach?



- Use of a *spatial integrated population model*
  - Allows the use of multiple datasets in a single model framework
    - Increases precision & is a more efficient use of data than analyzing datasets independently
- The spatial component allows for spatially explicit modeling (e.g. movement behaviors) and allows for spatial predictions
- Use of Bayesian framework allows for correct propagation of uncertainty in model parameters

What Washington data are available for the model?

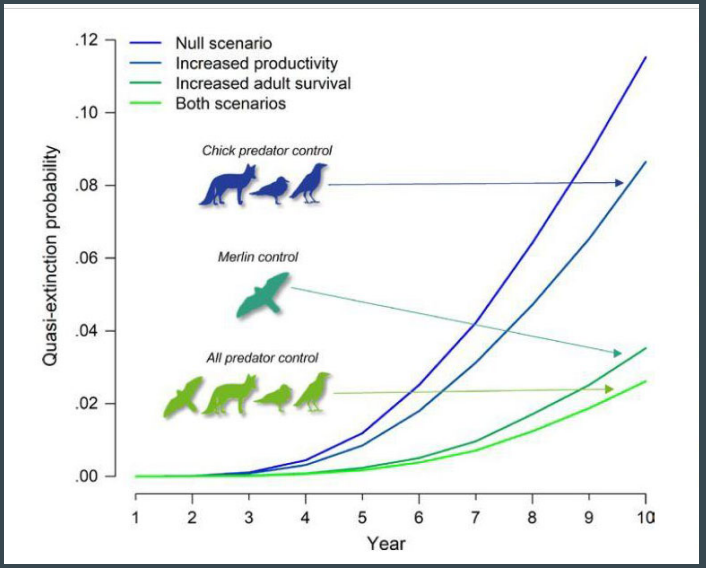
- GPS and VHF collar data from ~130 wolf captures (2008-2020)
- ~100 mortality records (2008-2020)
- ~350 records of collared individuals relocated during winter aerial surveys (2008-2020)
- Annual minimum pack counts from aerial surveys (2008-2020; pup counts thru 2015)

What do we still need to figure out?

(1) The ideal model structure for estimating survival, recruitment, and abundance processes given the data at hand

(2) How to best incorporate the spatial component (e.g., spatial extent of population, process of establishing new packs)

(3) Future scenarios (e.g., management of livestock depredation)



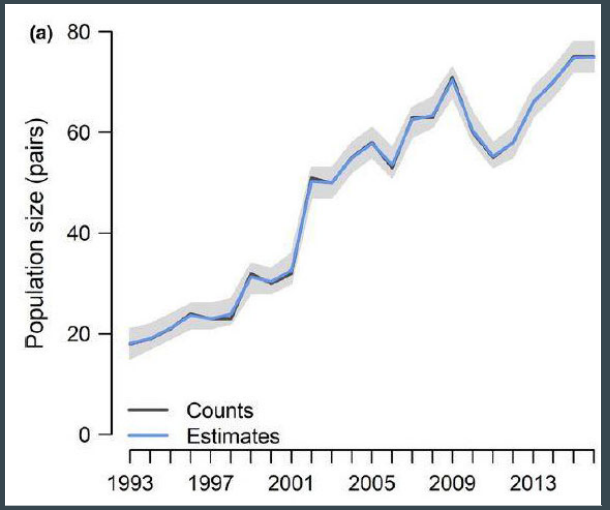
Example of management scenarios and predictions of quasi-extinction probability of a target species (Saunders et al. 2018)

What is the project timeline?

- June to September 2020
  - *Project scoping and data compilation*
- September 2020 - January 2021
  - *Model development*
- February to March 2021
  - *Scenario dev't and implementation*
- April to July 2021
  - *Draft report complete, revision w/ WDFW*
- August 2021
  - *Submission of final report and model code*

What will modeling results include?

- For future time points:
  - Probability of meeting downlisting and delisting criteria
  - Predicted abundance and distribution
  - Probability of extinction
- Expected time to meet downlisting and delisting criteria
- Measures of uncertainty around each of these quantities



Example of estimated population size from an IPM, in this case for the Great Lakes piping plover (Saunders et al. 2018)

Management judgment will be needed

- Are the criteria still appropriate given predicted probability of extinction and expected future abundance?
- Are modeled management scenarios realistic?
- Are assumptions made in the modeling exercise supported?

Thank you. We welcome your questions.

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