



# Constructing a modeling tool for wolf status review in WA

December 2020 Update



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<sup>4</sup>United States Geological Survey

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

# A reminder of who we are...



- Lisanne Petracca
  - Postdoctoral Scientist
- 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
- Connect these demographic rates to a spatial, pack-level colonization process
- Develop simulation scenarios to account for wolf management strategies
- 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

# What is our 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*

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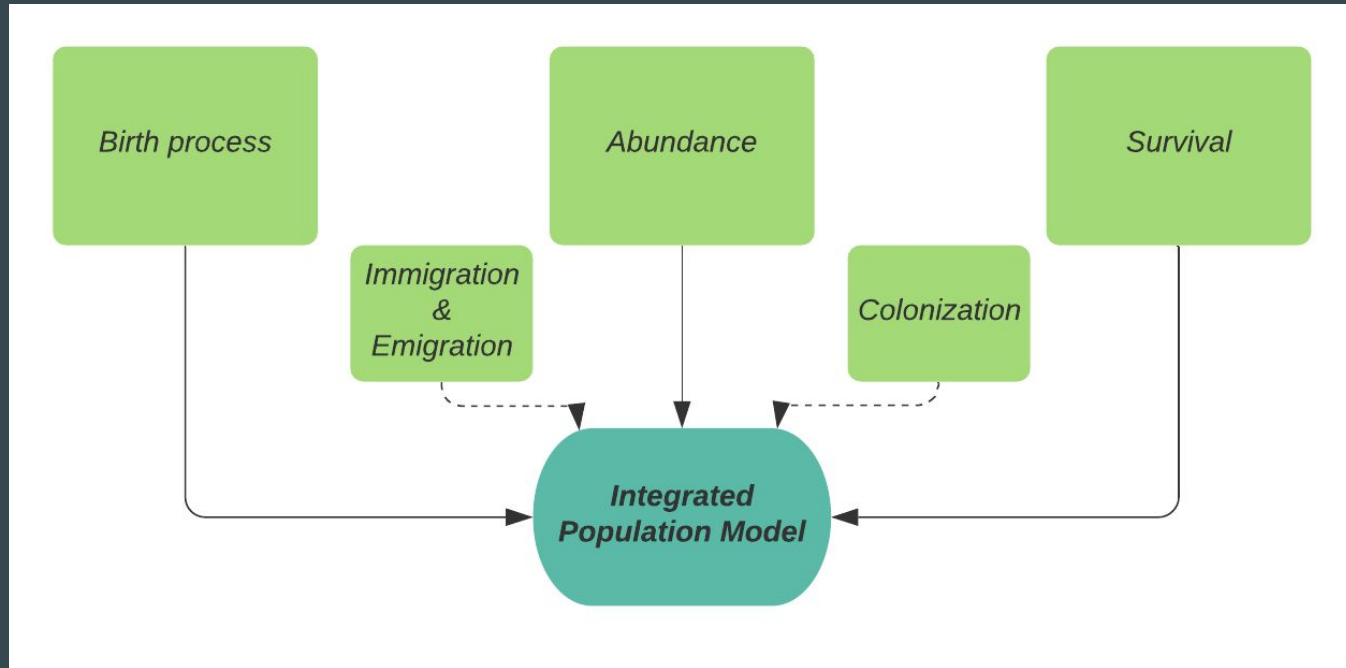
# A reminder of our statistical approach



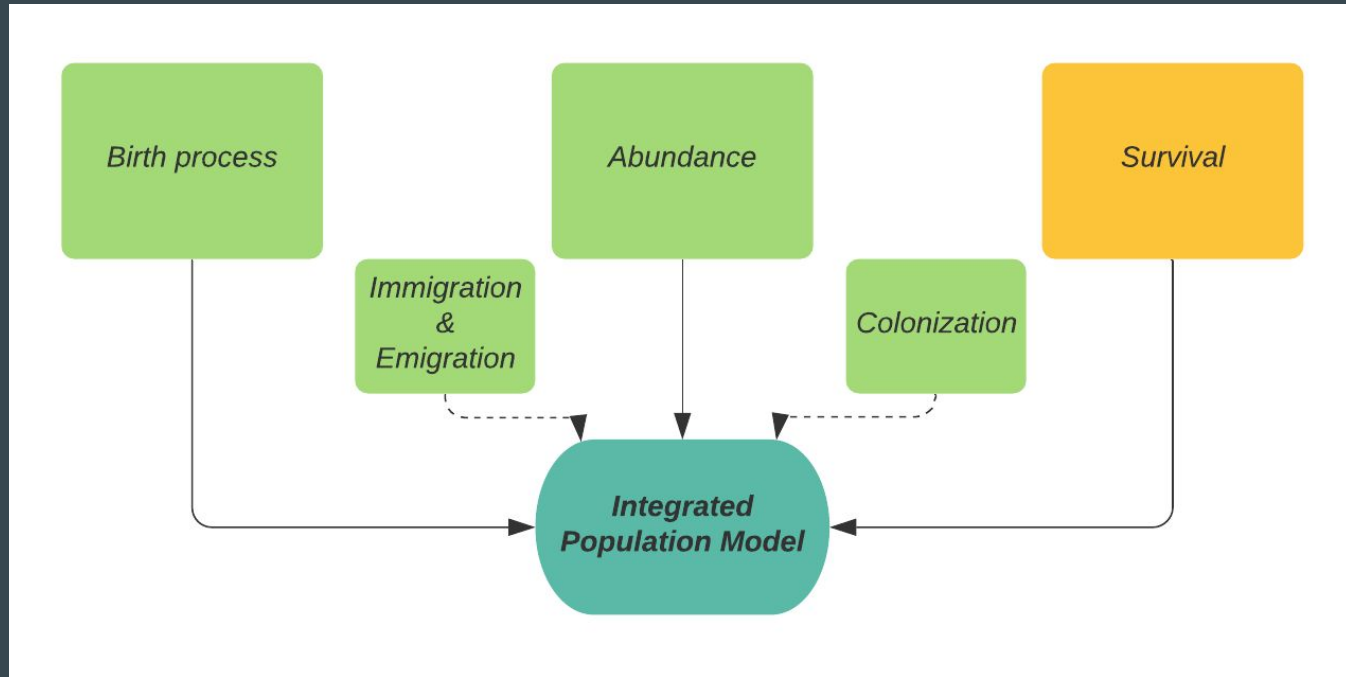
- Use of an *integrated population model*
  - Allows the use of multiple datasets in a single model framework
    - Increases precision & is a more efficient use of data than analyzing datasets independently
- By giving this model a spatial component, we can integrate dispersal behaviors and colonization of new areas
- Use of Bayesian framework allows for correct propagation of uncertainty in model parameters



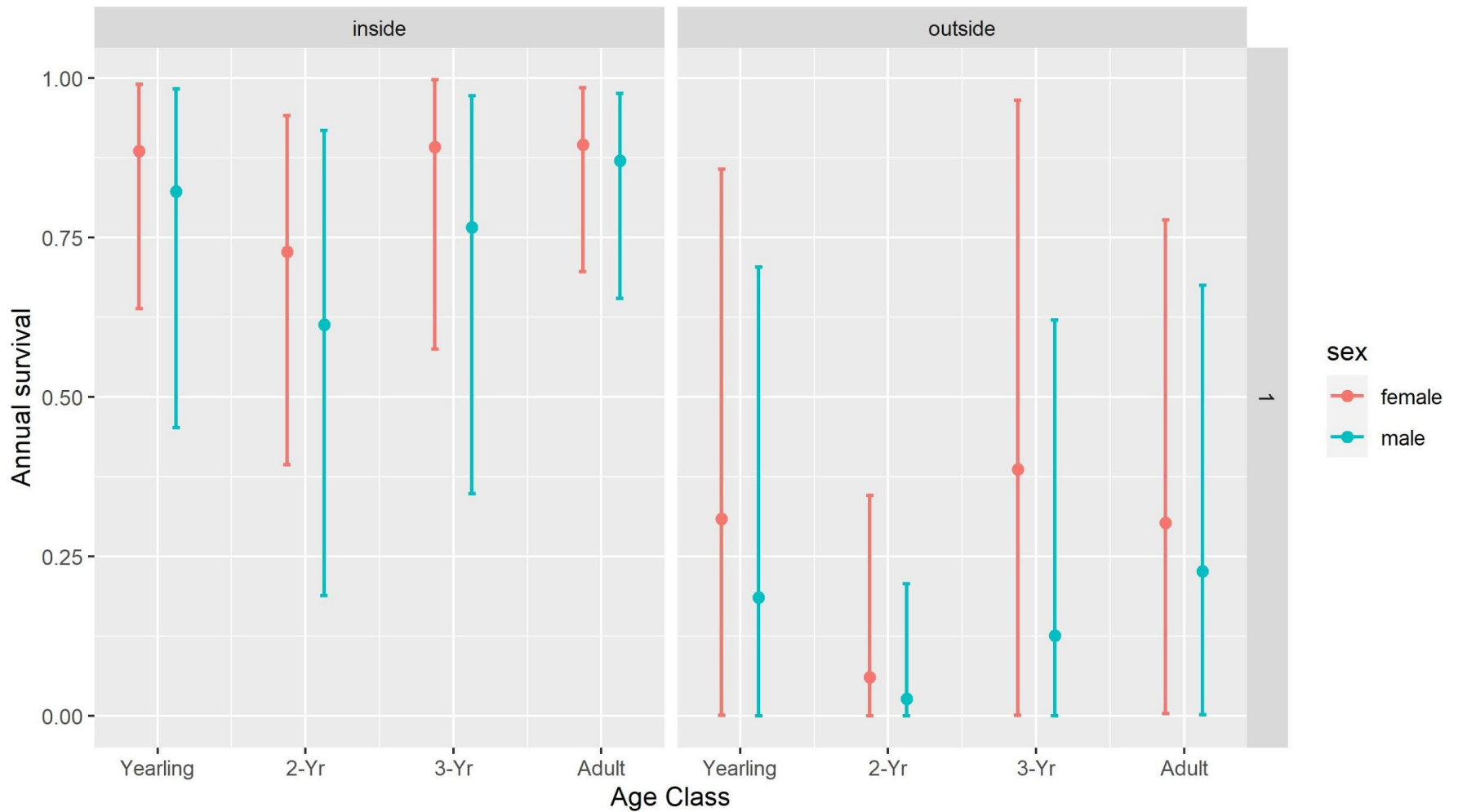
# What are the demographic model components?



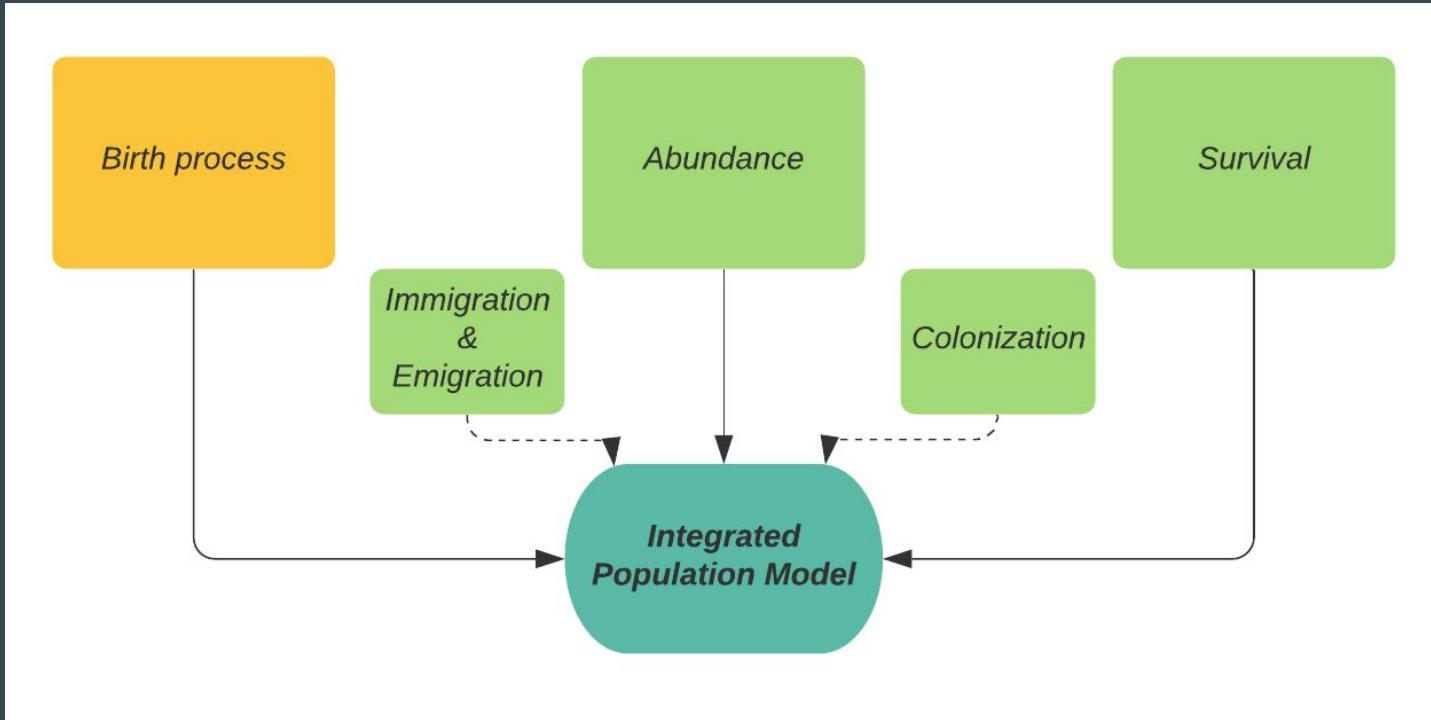
# Let's start with the survival component



**For the survival part of our model, we used GPS collar data from 76 wolves**



# Now let's move into the birth process



**There are two data sources  
we are interested in: pup  
counts (up to 2014) and  
200,000 images and videos  
from WDFW camera traps**

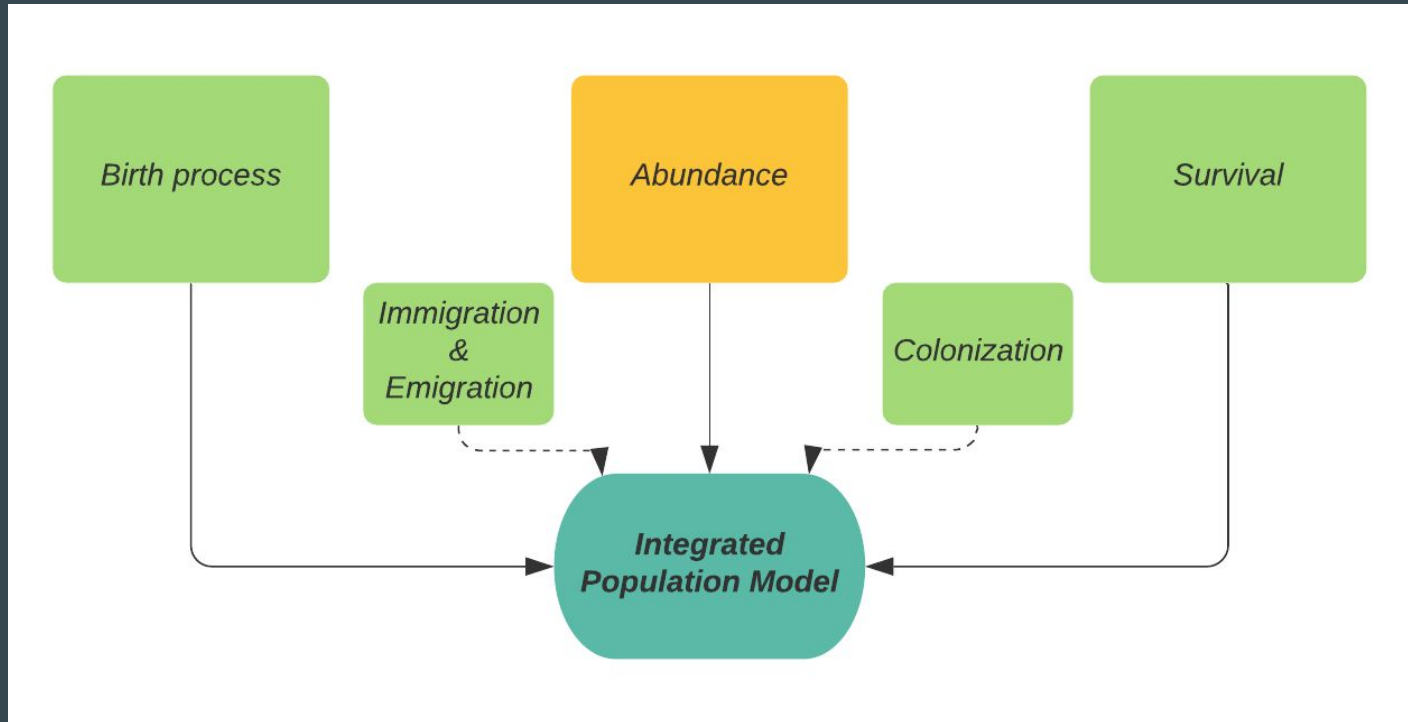
# How will all those images and videos be processed?

- We are currently hiring an undergraduate student to process these data using a program called Timelapse



Spokane Tribal Wildlife Program (Savanah Walker)

# Now let's move onto abundance





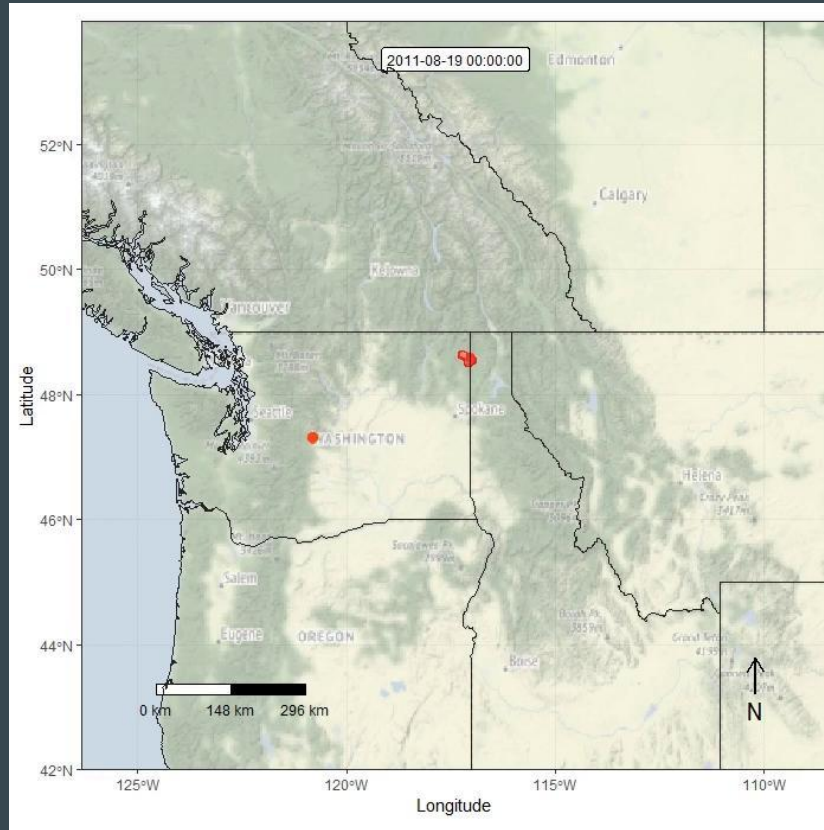
**For abundance, we will be  
using data from winter aerial  
surveys by WDFW  
(2008-2020)**

# How to Count A Wolf



Benjamin Drummond and Sara Joy Steele, "How to Count A Wolf"

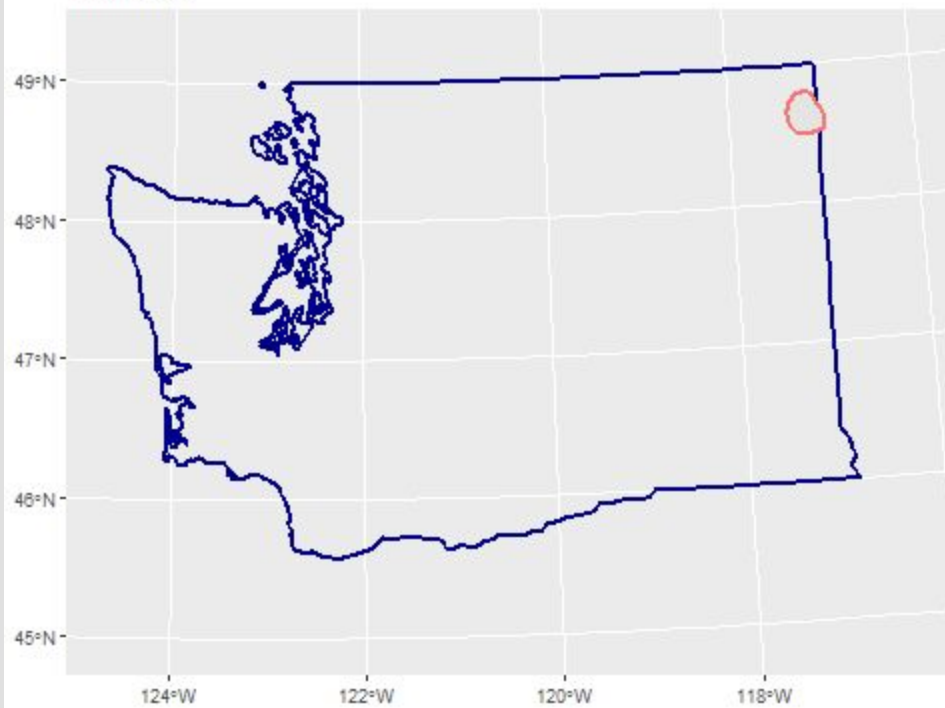
# Bringing it all together spatially...



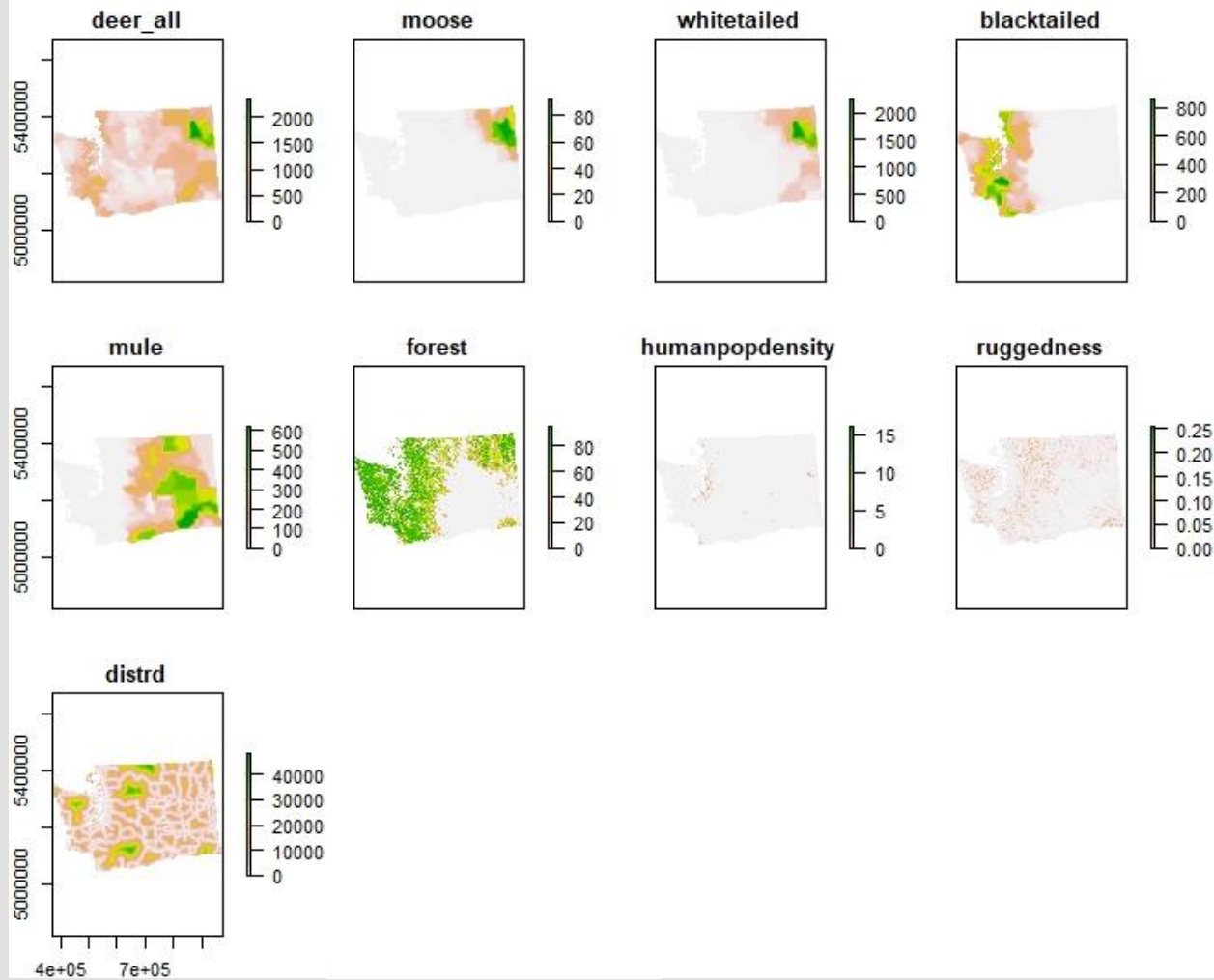
**Our current strategy is to create hypothetical pack territories across WA, and have them “colonized” based on habitat suitability and individual-based movements**

**What data will determine  
territory size? The GPS collar  
data**

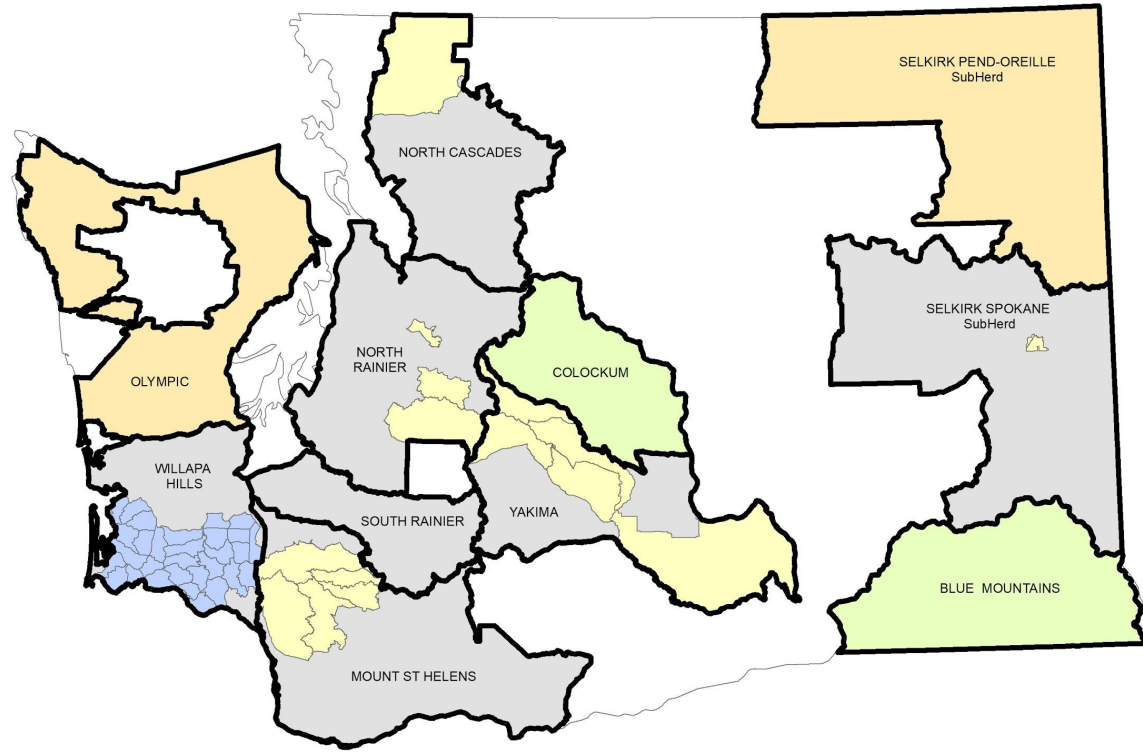
Year: 2009







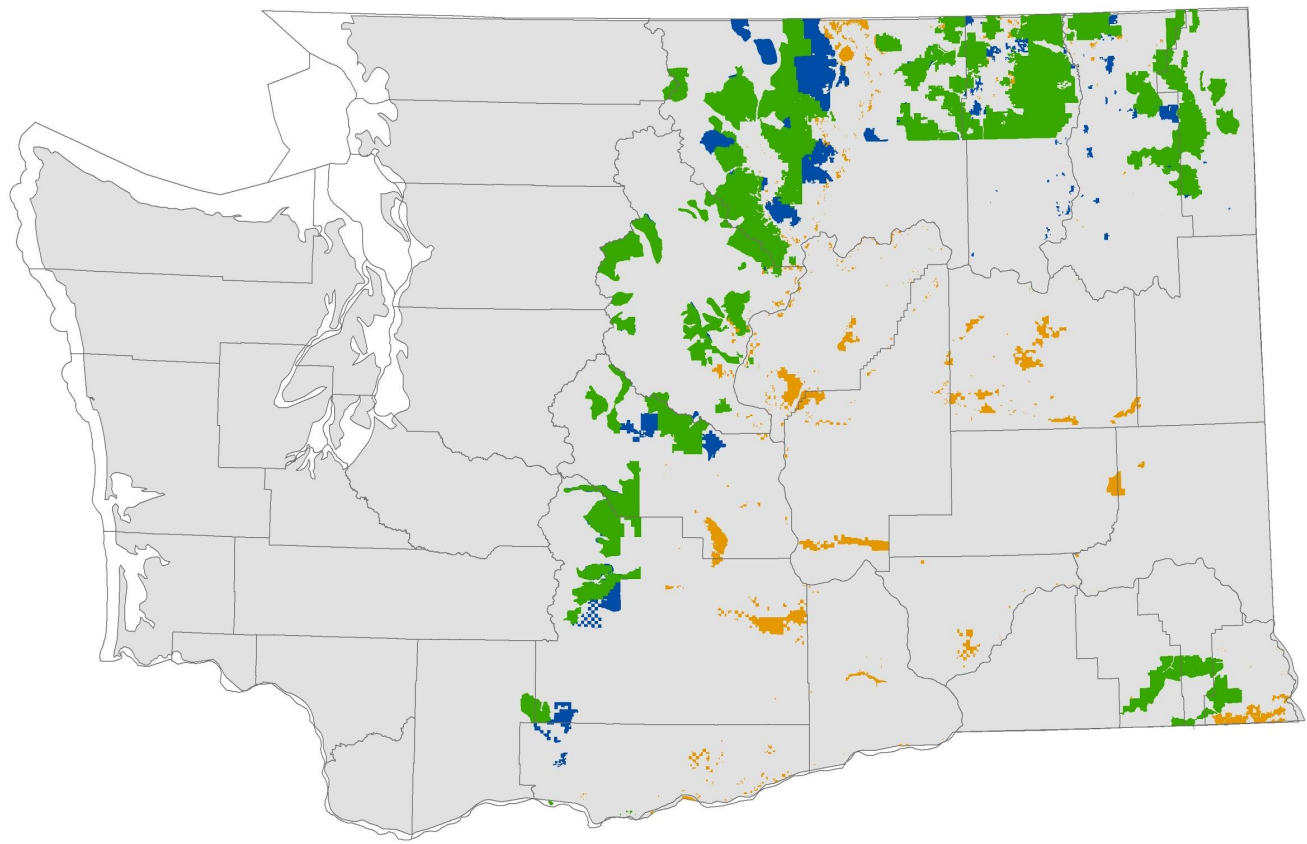
**And what data will determine  
habitat suitability? Possibly  
systematically-placed camera  
traps across WA**







-  WDFW estimates apply to whole herd
-  Only portion of herd range surveyed
-  Areas surveyed in alternate years
-  No WDFW estimates for these herds



BLM Allotments (online download)

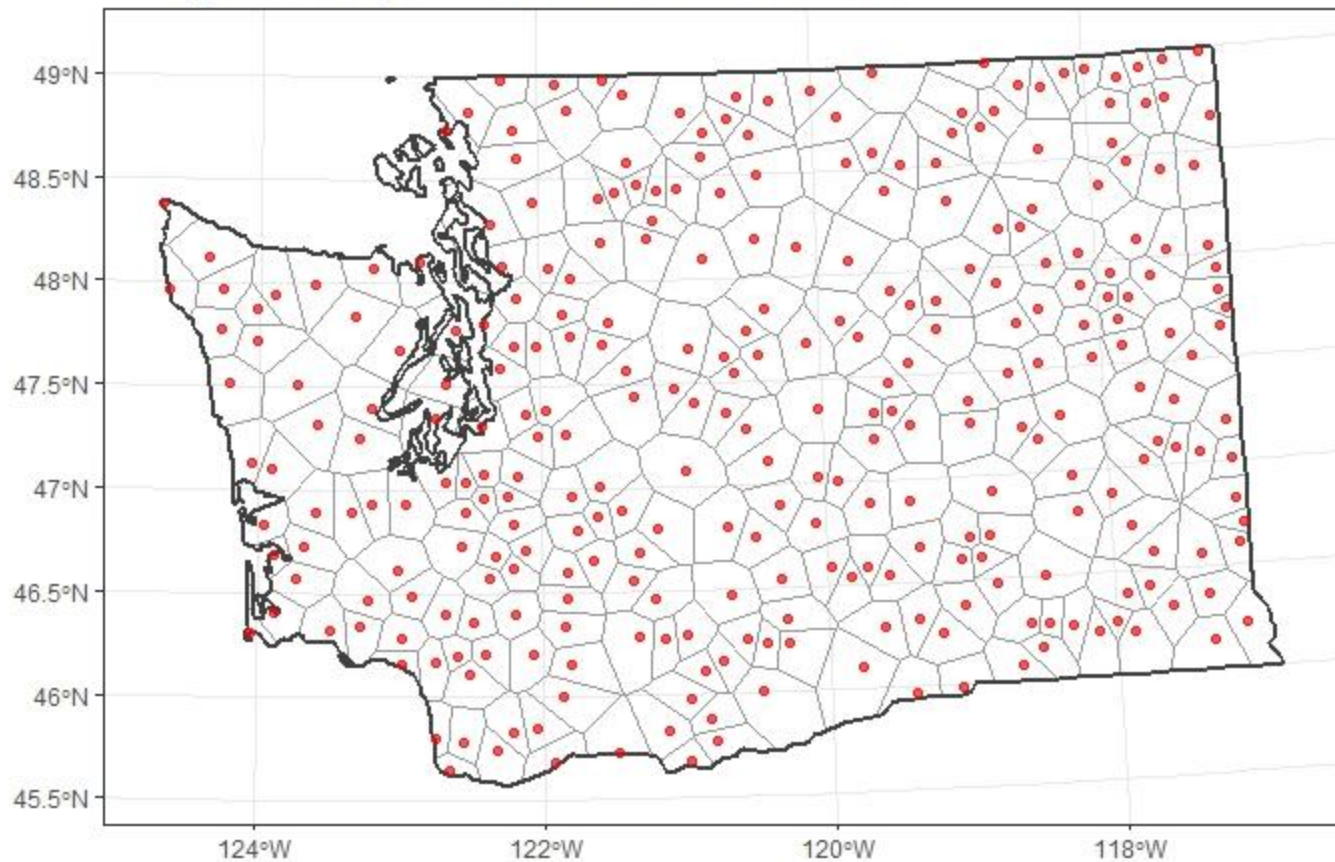


Allotments (as provided by WDFW)

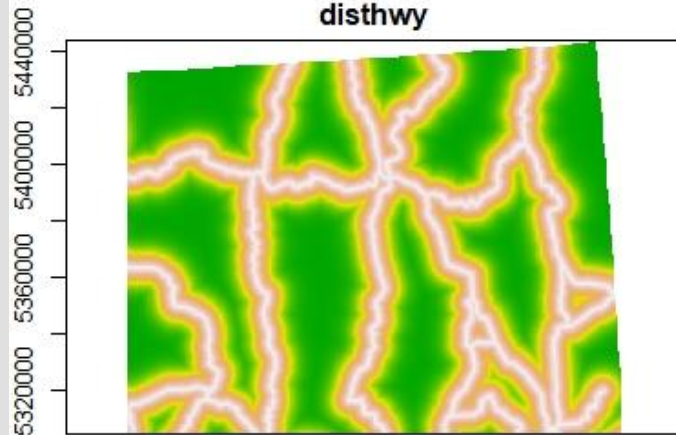


Allotments (as provided by Zoe Hanley)

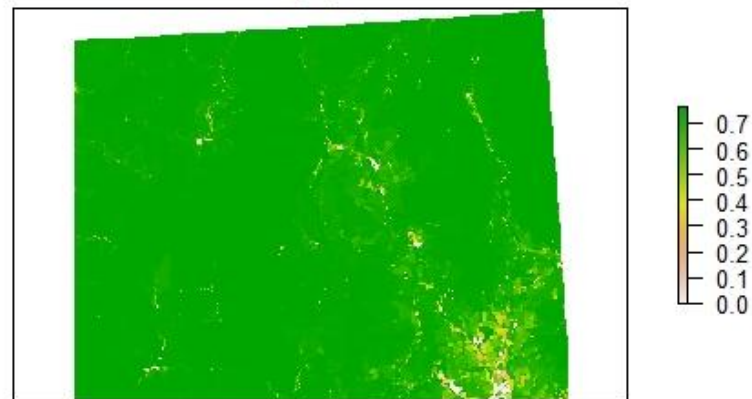
### 303 hypothetical pack territories across WA state



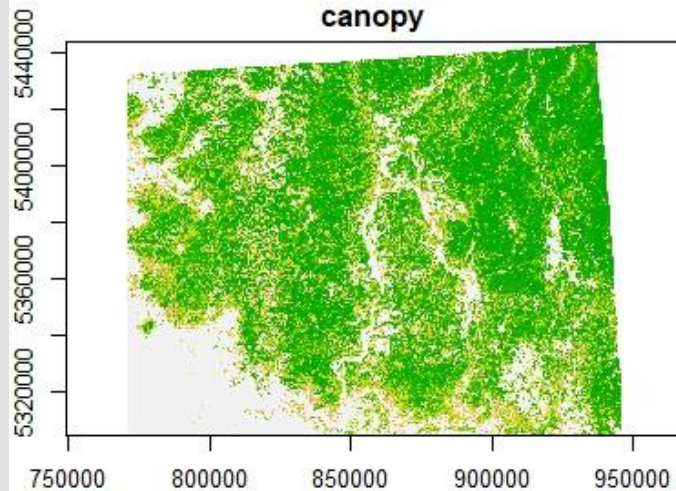
**disthwy**



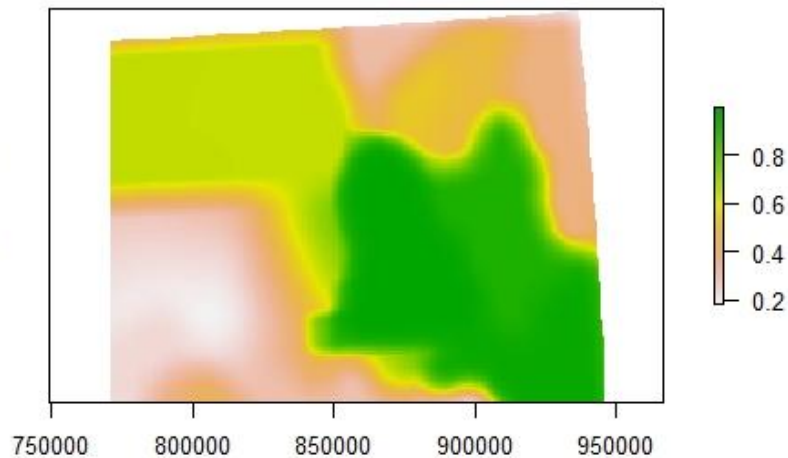
**pop**



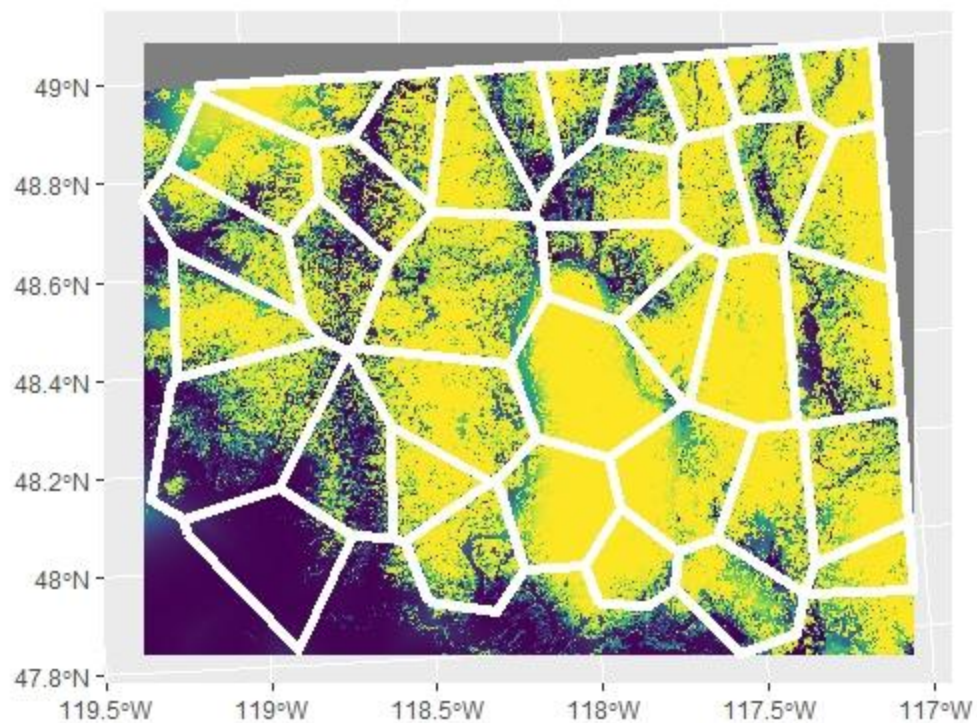
**canopy**



**deer**







Predicted wolf occupancy in NE Washington

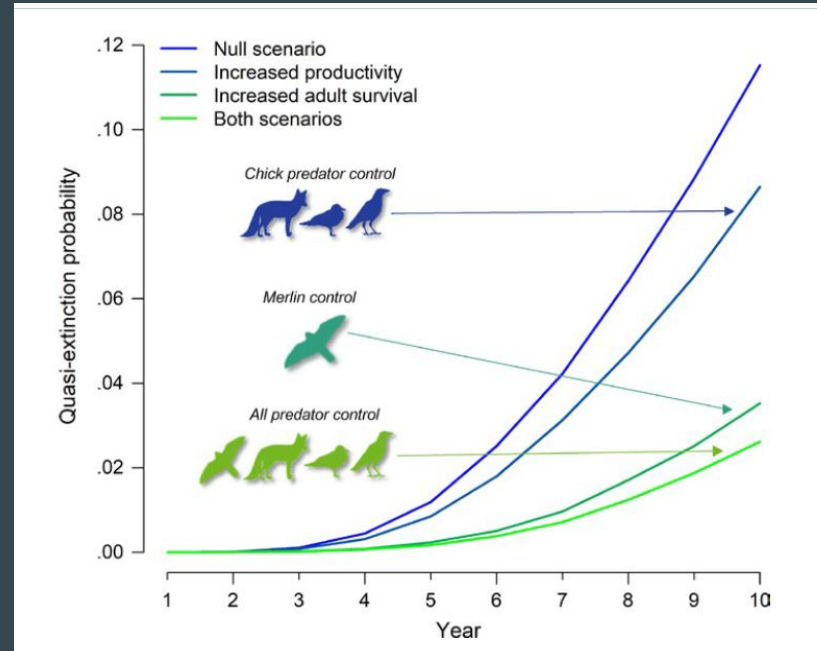
0.00 0.25 0.50 0.75

**But what about movement?  
The dispersal process  
represents our biggest current  
challenge**



# What do we still need to figure out?

- (1) The recruitment side of the demographics model (can the 200K images/videos help us?)
- (2) The spatial side of the model, particularly incorporating movement (our momentum is currently here)
- (3) Future scenarios (e.g., management of livestock depredation)

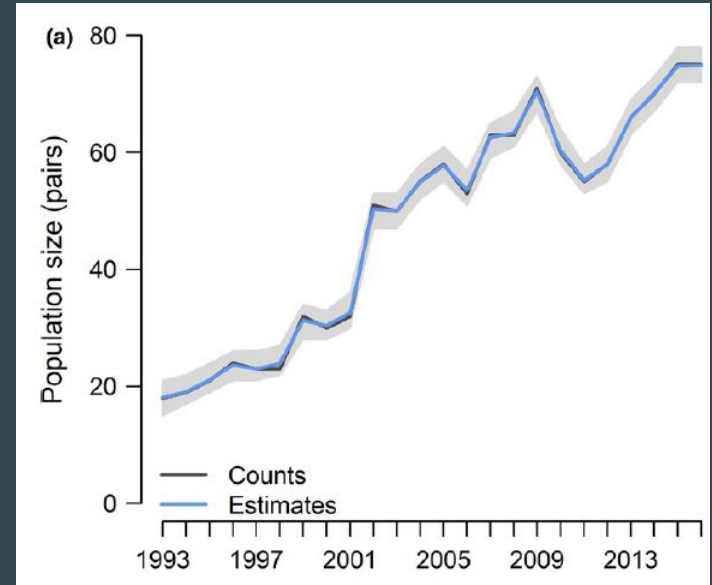


Example of management scenarios and predictions of quasi-extinction probability of a target species (Saunders et al. 2018)



# What will modeling results include?

- A model that captures the present population dynamics and space use of WA wolves while considering uncertainty
- 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.

