

WLF 419 - Waterfowl and Wetlands Ecology and Management
Lecture 10 – Annual Cycle of Waterfowl/Population Dynamics
Next Time – Breeding Probability and Breeding Propensity

Review of Population Dynamics

- *Population* – group of organisms that occupy a particular area at a particular time
- *Population Dynamics* – the study of processes affecting population abundance through the annual cycle

Models to describe the dynamics of populations are seemingly simple:

$$N_{t+1} = N_t + \#B + \#I - \#D - \#E$$

- However, we cannot enumerate factors that affect population dynamics and many covariates may influence any parameter. For example, survival probability may be related to habitat conditions, weather events, age, sex, past breeding effort, and size of the animal. We must also recognize that there is uncertainty associated with estimates because we sample populations.
- We can never model truth because it is too complex. Even if we could model truth, the model would be too complex to provide useful information to aid in conservation or management decisions. Therefore, we must model population dynamics using models that are by definition simplifications or abstraction of reality. What is a useful model:
 - Parameterized with valid estimates
 - Recognize and embrace uncertainty
 - Simple enough to be interpretable
 - Complex enough to be realistic

How do we characterize population dynamics?

- Lambda (λ) – finite rate of population change
 - If $\lambda = 1.0$ – population is stable
 - If $\lambda < 1.0$ – population is decreasing
 - If $\lambda > 1.0$ – population is increasing
 - At what rate is change occurring?
- How do I estimate λ ?
- Change in abundance

$$I = \frac{N_{t+1}}{N_t}$$

- Age or Stage Structured Population Change
 - Matrix Modeling

F_0	F_1	F_2	F_3	$N_0(t)$	$N_0(t+1)$
S_0	0	0	0	$N_1(t)$	$N_1(t+1)$
0	S_1	0	0	$N_2(t)$	$N_2(t+1)$
0	0	S_2	S_3	$N_{3+}(t)$	$N_{3+}(t+1)$
A		*		N(t)	=
					N(t+1)

- Difficult to parameterize
- Information about the contribution of individual demographic parameters
- Could include immigration or emigration
- Assumptions
- Capture/Recapture
 - Reverse capture histories for λ
 - Estimation of individual demographic parameters

Waterfowl Capture and Marking

Capture

- Bait
 - Rocket Net
 - Funnel Trap
 - Species that feed on seeds
- Decoy
 - Decoy traps
 - Mist Nets
 - Anatinae
- Nest
 - Weller trap
 - Purse trap
 - Dip Net
 - Hoop
 - All species
 - Cavity nesting species
- Drive trapping
 - Helicopter, Boat, Foot
 - Anserini

Marking

- Leg bands
 - All Species
 - U.S Fish and Wildlife Service leg bands



- Aluminum and Monel
- 1-800-327-BAND

- Plasticine filled leg bands
 - Terminal Recovery or recapture
- Web (fingerling) tags

- Visible markers
 - Nasal Saddles and discs
 - Anatinae



- Neckbands
 - Anserini and Cygnini



- Tarsal Tags
 - Anserini, Cygnini, and Mergini



- Nape tags

- Radio transmitter
 - Implants
 - Harness
 - Suture
 - Sub-cutaneous
 - Glue
 - On neckbands
- Dying
 - Temporary tags
 - Pycric Acid

Annual Events for Waterfowl



