ECOL 4000/6000 – Population & Community Ecology
Exam 1 – Topics

1. Population growth and decline

- Open vs. closed populations
- The fundamental equation of population ecology
- Per capita rates
- Estimating rates of growth and decline
- Predicting changes in population size
- Discrete vs. continuous time models

2. Density dependence

- State variables vs. parameters
- Density dependence
- Intrinsic rate of increase and carrying capacity
- Stability
- Resilience
- Allee effect
- Using graphical methods to demonstrate stability

3. Complex dynamics

- Cycles
- Overcompensation
- Bifurcation
- Aperiodic dynamics

4. Why do populations go extinct?

- Stochastic and deterministic models
- Demographic and environmental stochasticity
- Gillespie's direct method
- Population viability analysis

5. Age structure

- Static and cohort life tables (basic manipulation, filling in missing values)
- Survivorship curves
- Gross vs. net reproductive growth
- Transient dynamics and the stable age distribution
- Projection matrices
- Reproductive value
- Age- vs. stage-structure

6. Metapopulations

- Patch occupancy
- Two-patch dynamics
- Levins metapopulation model
- Mainland-island metapopulation model
- Metapopulation meltdown