Stability, cycles, and chaos

- **Deterministic chaos** pattern of population change where the population fluctuates erratically over time with no apparent repeated pattern. It arises because the population grows so fast that it tends to overshoot *K*, a process known as **overcompensation**. Once above *K* the net recruitment is negative and population declines rapidly. For some populations with lower rates of increase, the pattern of fluctuation will be **cyclical** rather than deterministic chaos, but the underlying cause is still overcompensation.
- Slight changes in starting conditions under deterministic chaos lead to different population dynamics over time

Intraspecific Competition

- Occurs when individuals of the same species utilize common resources that are in short supply, or if the resources are not in short supply, when the organisms seeking the resource harm one another in the process
- Exploitation when individuals use a resource so that less of it is available to others. This includes both removal of a resource (consumption use of food e.g.) or occupation or resource (pre-emptive use as in nesting sites)
- Interference competition direct interaction of individuals by usin behavior: e.g. exclusion of some individuals through territories, displacement of upporting by dominants
- Direct measures of food shortage measuring food supplies
- Indirect measures hpdy condition
- Interaction frood, predators, dis ale
 - Can be synergistic in eractions with predation and disease
 - Animals may later behavior when food becomes difficult to find in safe areas and animals search increasingly in areas where they are at risk of predation (Lima and Dill 1990, McNamara and Houston 1987) (predator-sensitive foraging) and such behavior can result in increased predation well before starvation takes effect (Sinclair and Arcese 1995)
 - Disease can also interact synergistically with food as pathological effects suddenly become apparent at certain stages of undernutrition (Ch 11) (wood bison switch from high-density, food-regulated state to low-density predator-regulated when diseases (TB, brucellosis) affect the population (Rettie and Messier 2004)