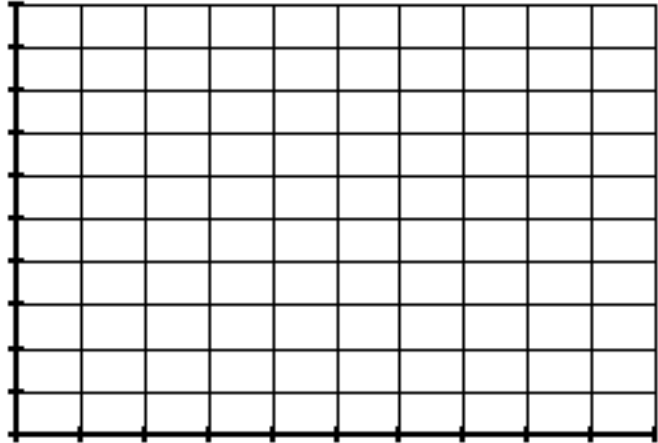
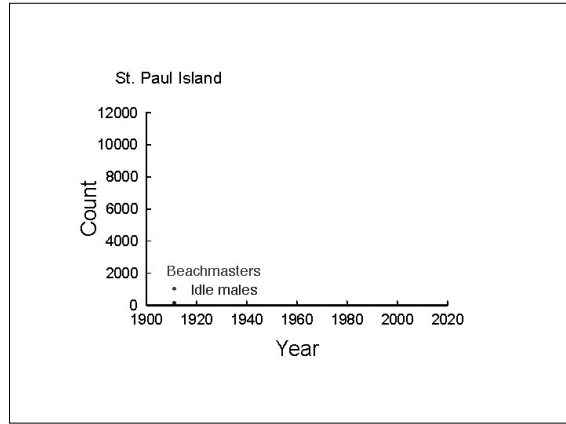
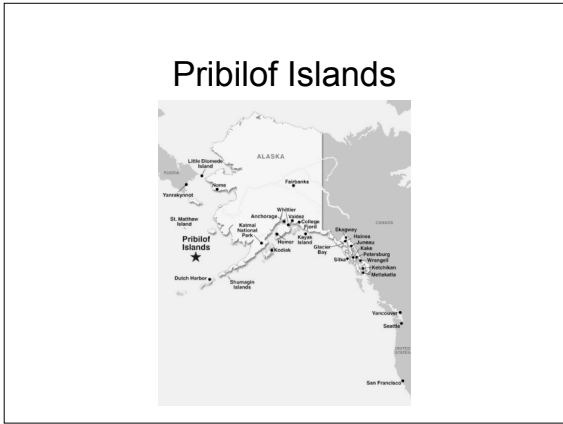


A Central Valley farmer stocked his farm pond with 1000 fathead minnows to raise as bait. Fatheads usually reproduce first as yearlings and regularly thereafter. The farmer recorded the number of fish each year for 10 years. He obtained the following data:

| <u>Year</u> | <u>Number of fish</u> |
|-------------|-----------------------|
| 0 | 1000 |
| 1 | 750 |
| 2 | 580 |
| 3 | 600 |
| 4 | 750 |
| 5 | 1200 |
| 6 | 1400 |
| 7 | 1460 |
| 8 | 1440 |
| 9 | 1450 |
| 10 | 1460 |

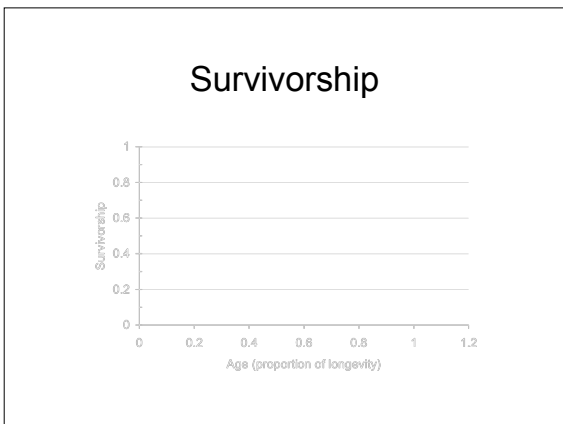


- Plot these data on a graph.
- Mark the area on the growth curve where the rate is greatest.
- Mark the point at which the farmer should begin fishing if he wants to maintain his population.
- Why did the population decline during the first two years?
- What was involved in slowing the population growth from the sixth year on?
- Is the fathead minnow a K-strategist or an r-strategist?



Problem: Harvest productivity declined

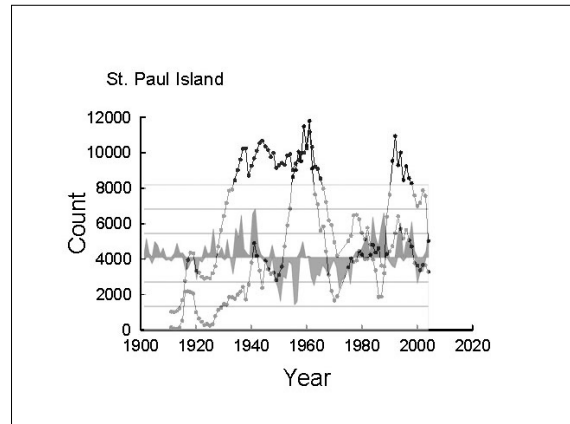
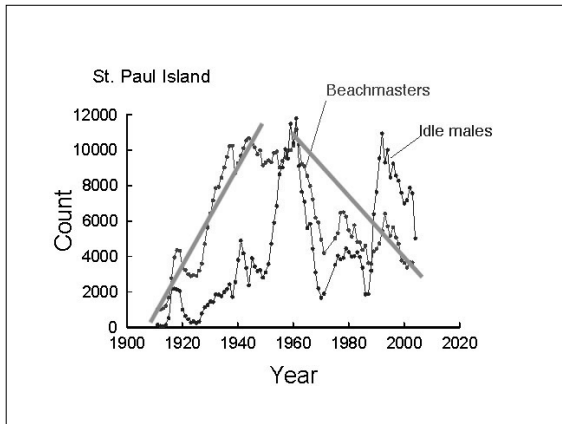
Action:



Population Change

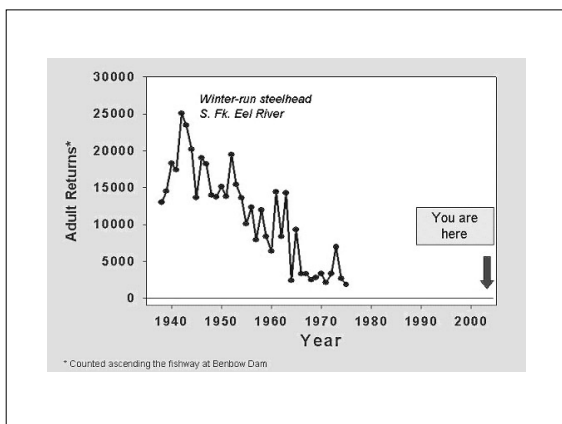
$$\frac{\Delta N}{\Delta T} = bN - mN$$

$$r = b - m$$



Interspecific Interactions

- ### Food chain
- Northern Fur Seal
 - Salmon
 - Small fish
 - Zooplankton
 - Algae



Factors

