



**To:** Assistant Wildlife Biologists  
**From:** Robert Mesta/United States Fish and Wildlife Service  
**Subject:** Setting intermediate goals

I am currently working on a recovery plan for a bald eagle population in the Northwest. I need your help in developing the best plan.

This plan is based on increasing the *productivity* of the population.

(*Productivity* is the ratio of the number of eagles that are born and leave the nest each season, divided by the number of nests in an area. For example, if you have 8 nests, and in one year there are 6 baby eagles born which survive long enough to leave the nest and fly on their own, the productivity for that year is  $6/8$ , or 0.75 in decimal form.)

We have decided to set the following long-range goal: increase productivity from 0.9 to 1.5 over the next 5 years. We are more likely to reach our 5-year goal if we set annual targets as well, so we need to determine what those annual targets will be.

There are several ways to approach this problem. Your answers to the following questions will help me choose an option.

1. Suppose that productivity increased by the same amount each year. Draw a graph that shows what the productivity would be after one year, two years, three years, four years, and five years.
2. Suppose that productivity increased by the same percentage each year. First, please work out what would happen if the percentage increased at a rate of 110% each year.
  - a) Productivity at end of year 1 = 110% of 0.9 =
  - b) Productivity at end of year 2 = 110% of productivity at end of year 1 =
  - c) Productivity at end of year 3 = 110% of productivity at end of year 2 =
  - d) Productivity at end of year 4 = 110% of productivity at end of year 3 =
  - e) Productivity at end of year 5 = 110% of productivity at end of year 4 =
3. An increase of 110% each year does not achieve our goal of 1.5 by the end of the fifth year. What annual percentage increase would reach that goal? Make a graph based on your calculations.
4. Compare the graphs you made for questions 1 and 3.
5. Realistically, productivity will probably increase most in the first few years right after we introduce the recovery plan. In later years, increases in productivity will be smaller and may even level off. Draw a graph of productivity over five years that shows that type of situation.