Modeling With a Recursive Equation Key

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Suppose we are in charge of a brim population of a local lake. This population of brim increases itself by 15% each year. We assume 500 are caught each year. Currently there are 1800 brim in the lake.

1. Write a difference/recursive equation for the lake brim population.

$$x_{n+1} = 1.15x_n - 500$$
$$x_0 = 1800$$

2. Determine how many brim will be in the lake after 3 years.

$x_1 = 1.15x_0 - 500 = 1.15(1800) - 500 = 1570$

Years	Brim
Initial	1800
1	1570
2	1306
3	1002

3. As time goes on, will the population die out, increase, or go to a limiting stable ?

The population will die out ($x < 1$). More fish are being taken out of the population by fishing than are being born each year. In particular, there are 270 Brim born during year 1, but 500 removed by fishing resulting in a net decrease in population size through the first year and that continues each year.

4. If we wanted the brim population to remain at 1800, how many fish would we allow to be caught each year?
From above we note that 270 Brim are born during the first year. In order to keep the population size the same we would need to allow 270 Brim to be caught.

$$1800 = 1.15 * 1800 - x$$
$$270 = x$$