



Clip Activity: Modeling a False Spring

How can climate change cause population extinctions?

Practice this math exercise in your science journal.

In this clip, Dr. Parmesan describes how one population she observed was wiped out because of a repeated extreme event, in this case, a snowstorm.

- Imagine a population of 1000 butterflies. In “Year 1” a snowstorm kills 90% of the population. How many are left?
- In “Year 2” a second snowstorm occurs in early spring, killing off 90% of your new population (the population at the end of Year 1). How many butterflies are left now?
- In “Year 3,” (sorry butterflies), *another* snowstorm occurs. 90% of the population (from year 2) is killed. How many butterflies are left? Is it possible for this population to survive?
- What about this scenario is natural? What, if anything, about this scenario is unnatural?

Bonus! The previous activity was a simplified model: here is a more complex math problem. Imagine that half of a 100-butterfly population is female and half is male and that females and males are equally likely to die in a snowstorm.

- After one snowstorm, calculate the number of female butterflies left if 90% die off. If you end up with a number that involves a fraction, remember: half a butterfly is, logically, a dead butterfly. How many females do you have?
- At the end of the summer all of the existing adults die. Imagine that each female lays 20 eggs and that 50% of them will survive to become adults the next year. How many butterflies will you have at the start of year 2? (Assume 1/2 of the eggs will become females and half will become males.)
- Assuming all conditions above: if a snowstorm occurs every year, killing 90% of adults before the eggs are laid, how many years will it take for the population to die out?
- If no more spring snowstorms occur and only 20% of the adult butterfly population dies each year, how long will it take for the population to reach 100 again?