Lab 4: Population Viability Analysis (PVA)

Agenda

1. PVA
2. Lab Exercise
3. For Next Week

1.

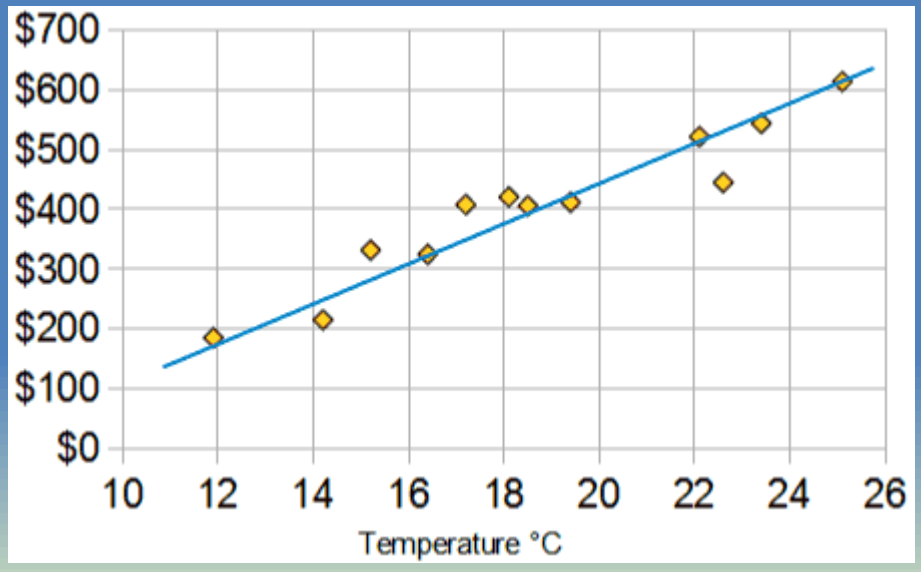
PVA

- Used to predict future of population
  - Involves many independent variables
    - Temperature
    - Survival rate
    - Reproductive rate
    - Time to maturity

1.

PVA

- We want to know two things
  - Risk of extinction
  - Expected range of variability



1.

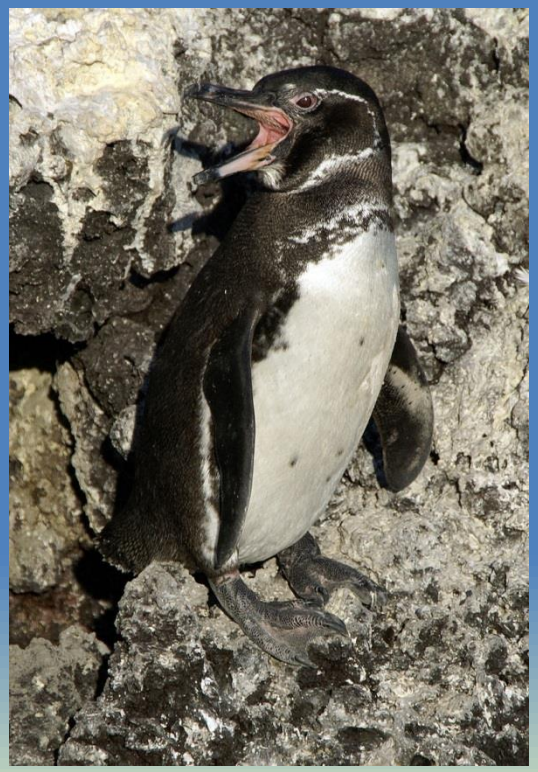
PVA

Steps in doing a PVA

1. Project population forward into future (e.g., 100 years)
2. Apply variables that influence population and run simulation (e.g., 100 times)
3. How many times out of 100 did the population go extinct?

Lab Exercise

- Galapagos penguin population
  - Normal year
    - Plenty of food
    - 18.8% (growth; 1.188)
  - El Niño year
    - Less food, more rainfall
    - -69.0% (decline; 0.31)



2.

Lab Exercise

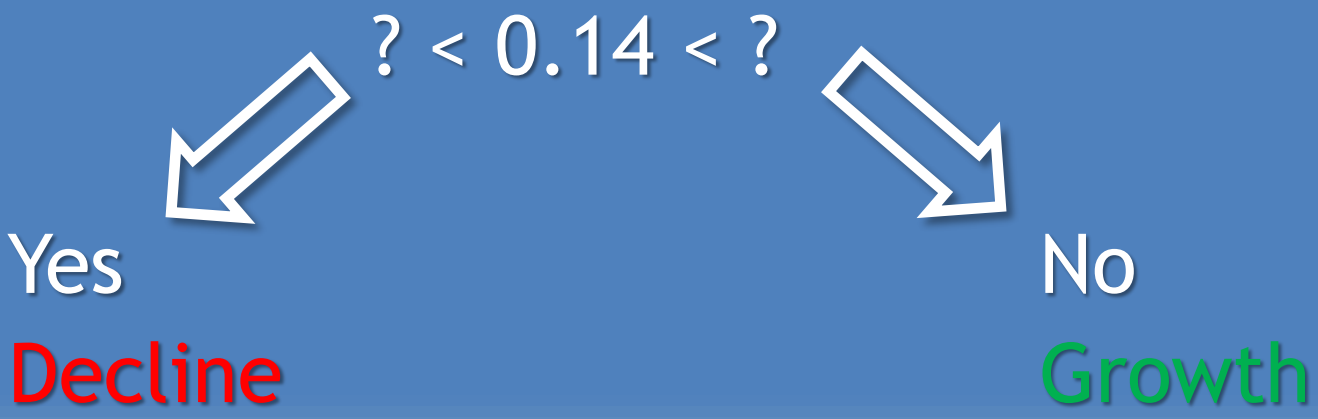
- Basic probability
  - Absolute certainty = 1/1 = 1.0
  - No chance = 0/1 = 0.0
- El Niño events occur every 7 years, so…

  Chance of El Niño = 1/7 = 0.14 = 14%

2.

Lab Exercise

- Select a random number between 0-1
- Is the chance of El Niño (0.14) greater than random?



2.

Class Activity

Use the following random numbers to determine the growth or decline of the population

Random Number	El Nino Probability	Population Growth Rate
0.25	0.14	?
0.89	0.14	?
0.16	0.14	?
0.10	0.14	?
0.07	0.14	?
0.34	0.14	?
0.05	0.14	?
0.02	0.14	?
0.87	0.14	?

Lab Exercise

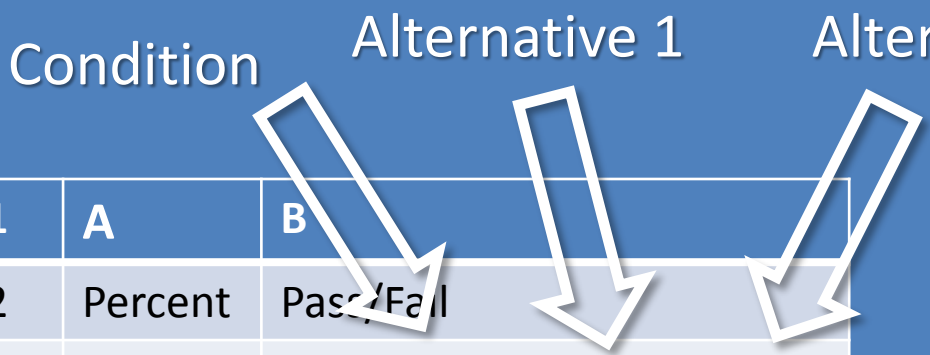
- Starting population of penguins = 500
- Lower limit = 10 (extinction)
- Upper limit (carrying capacity) = 2000

Lab Exercise

- Using Excel
  - IF function: allows you to determine an outcome from two or more possible alternatives

2.

"If the student's percent is greater than 69.99, then mark it as a pass. If not, then mark it as a fail."



1	A	B
2	Percent	Pass/Fail
3	78	=IF(A3>69.99, "pass", "fail")
4	88	
5	95	
6	65	
7	60	
8	45	
9	81	
10	70	
11	89	
12	94	

1. Open Excel
2. "Example" tab
3. Write equation to determine how many people passed

Lab Exercise

- Follow instructions for setting up data
  - Project population out 100 years
  - Examine three scenarios:
    1. El Niño frequency of 7 years
    2. El Niño frequency of 5 years
    3. El Niño frequency of 3 years

For Next Week

- Heading to Snyder Heritage Farm
- Submit via Blackboard
- PVA spreadsheet
- Answer questions 1 and 4 in lab manual (p. 72)