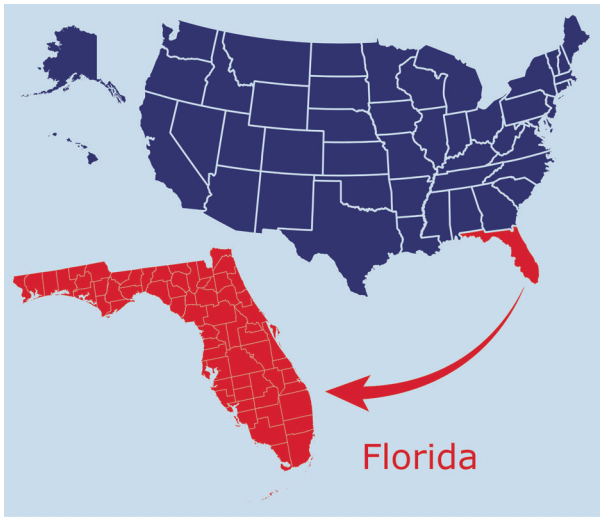
TOPIC: INTRODUCTION TO POPULATION ECOLOGY

◆ Recall: **Population Ecology**: examines population dynamics (how/why populations _____ over time).

- **Population**: all organisms of the _____ species living in the same area at the same time.
- Population _____ can be naturally or arbitrarily defined.

_____Boundaries

_____Boundaries



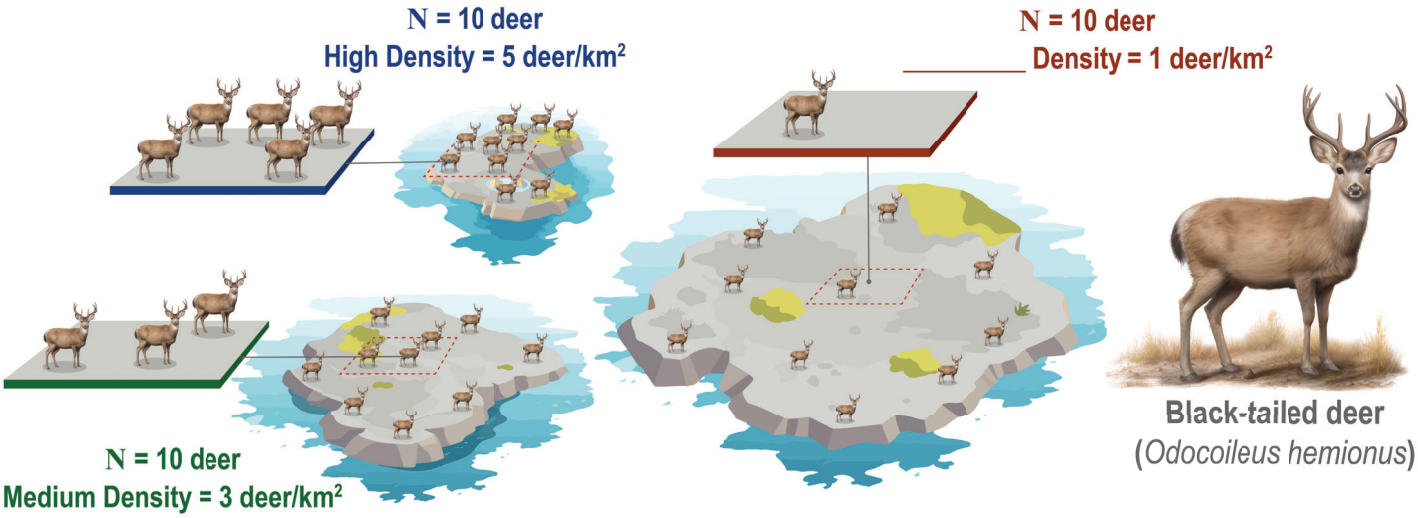
Population Size & Density

◆ **Population Size (_____):** total _____ of individual organisms in the population.

- Does _____ provide a standardized measure for comparisons.

◆ **Population Density:** population size **(N)** *within a defined unit of* _____ or volume.

- Provides a *standardized* measure for comparing populations in different regions.



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EXAMPLE

Forest-A is 10 square kilometers and has a wild boar population of 500. Forest-B is 50 square kilometers and has a wild boar population of 2,000. How do the population densities of wild boars in the two forests compare?

a) Forest-A has a higher population density.

b) Forest-B has a higher population density.

c) The population densities of the two foests re identical.

d) Not enough information is provided to make any conclusion.

PRACTICE

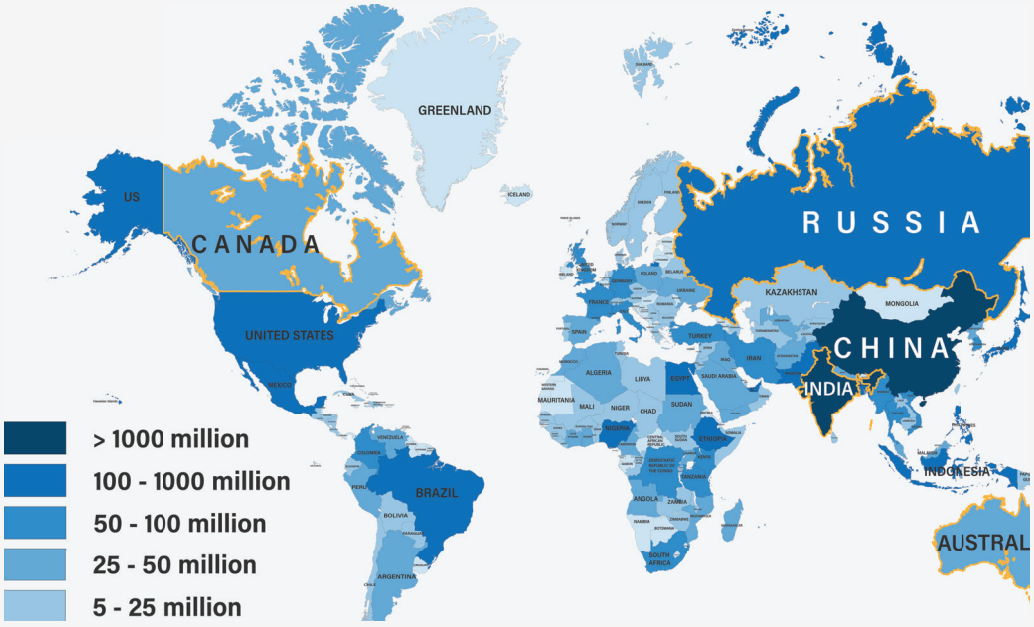
According to the diagram, which of the following countries has the greatest human population density?

a) Canada.

b) Russia.

c) Australia.

d) India.



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PRACTICE

Which of the following is an example of population density?

a) The population of humpback whales in the Atlantic Ocean.

b) The number of daisies per square meter in your backyard.

c) The number of chimpanzees in the San Diego Zoo enclosure.

d) The population of Arizona Bark Scorpions in the Sonoran Desert.

PRACTICE

To calculate the population density of people in Florida, you would need to know:

a) The population of Florida & the population of the whole USA.

b) The population of Florida & the total area of the whole of the USA.

c) The total area of Florida & the whole of the USA.

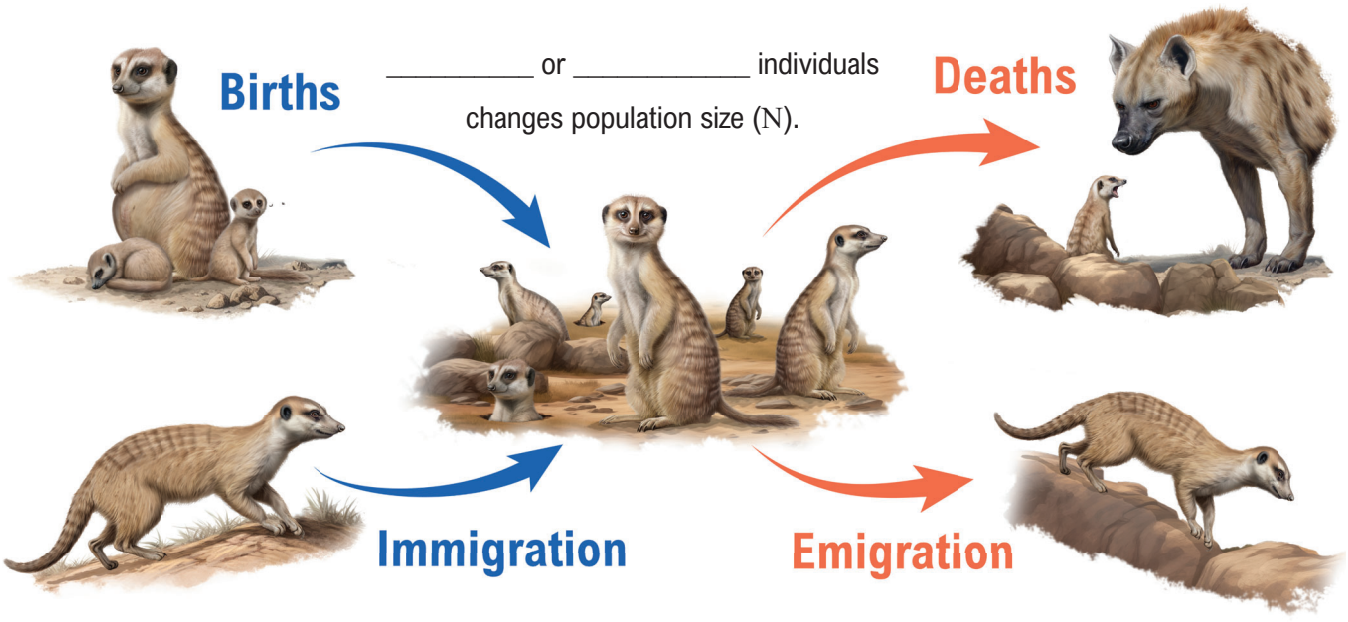
d) The population of Florida & the total area of Florida.

Factors Influencing Population Size (N)

◆ _____ factors directly impact population size (N):

◆ **Births:** number of _____ in a population.
◆ **Immigration:** movement of individuals _____ a population.
} _____ N

◆ **Deaths:** number of _____ in a population.
◆ **Emigration:** movement of individuals _____ a population.
} _____ N



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EXAMPLE

Which of the following equations accurately represents a change in population size over time?

a) Change in Population Size (ΔN) = Births + Immigrants + Deaths - Emigrants

b) Change in Population Size (ΔN) = Births + Immigrants - Deaths + Emigrants

c) Change in Population Size (ΔN) = Births + Immigrants - Deaths - Emigrants

d) Change in Population Size (ΔN) = Births - Immigrants - Deaths + Emigrants

PRACTICE

Suppose a population of rabbits in a forest has an initial population of 500. Over the course of one year, 200 new rabbits are born, and 150 rabbits die. Additionally, 20 rabbits emigrate out of the forest and 50 rabbits immigrate into the forest. What is the population size at the end of the year?

a) 500 rabbits.
b) 530 rabbits.
c) 580 rabbits.
d) 600 rabbits.

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PRACTICE

Which of the following factors directly impacts the population of rabbits in a meadow?

a) An increase in the amount of food available to the rabbits.

b) An increase in the number of foxes living in the area.

c) An increase in the number of rabbits being eaten by foxes.

d) All of the above.

PRACTICE

Which of the following statements is true?

a) Immigration & emigration only affect local populations, while birth & death affect local & global populations.

b) Birth & immigration always increase a population's size.

c) Death & emigration always decrease a population's size.

d) All of the above are true.

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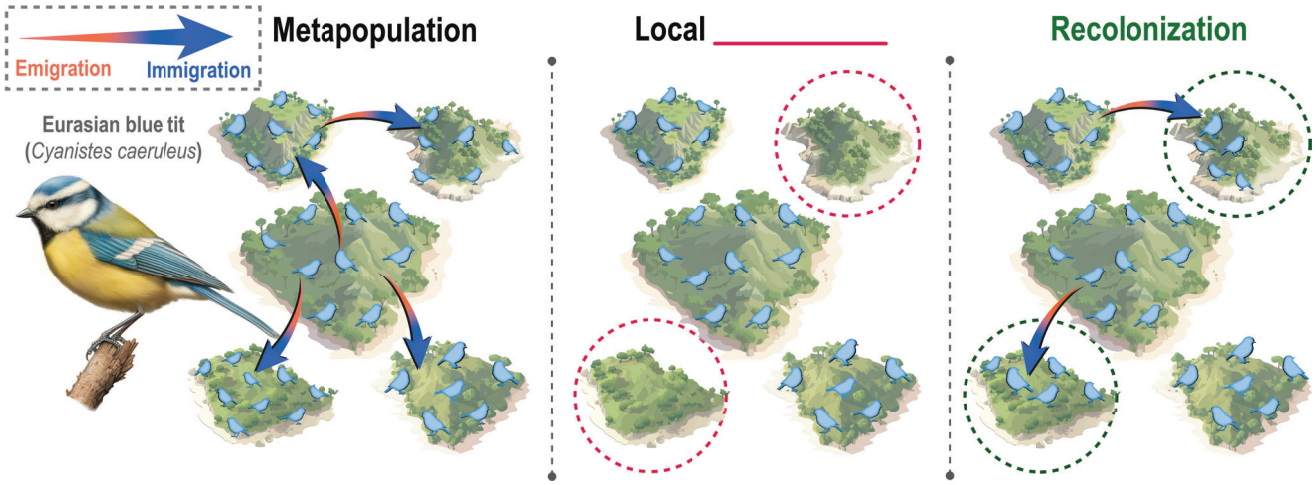
What is a Metapopulation?

- **Metapopulation:** a group of spatially separated local populations _____ by **emigration** & **immigration**.
  - Occurs when organisms inhabit patches of habitat within a mostly uninhabitable area.
  - If a local population goes extinct, the area may be **recolonized** by individuals from the metapopulation.



NOTE: Local populations are less stable but metapopulations tend to be _____ stable.

PRACTICE

Which of the following would NOT be considered a metapopulation?

a) Newt populations in different ponds within a large national park.

b) Butterfly populations in different meadows on an island.

c) The leopard populations in Sub-Saharan Africa and in south Asia.

d) All of the above are metapopulations.

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Population Dispersion Patterns

◆ Populations often exhibit characteristic patterns of _____.

- **Dispersion:** the degree of _____ between individuals in a population.

◆ Populations can exhibit ____ general patterns of dispersion:

1. Clumped

Individuals *aggregated* in _____

2. Uniform

Individuals _____ distanced from one another.

3. Random

_____ spacing between individuals.

EXAMPLE

Listed below are various plant & animal species. Mark each with either a C (clumped), U (uniform), or R (random) for the type of distribution that they are most likely to exhibit.

1. Red squirrels, who actively defend their individual territory _____.
2. Elephants, who live in herds _____.
3. Dandelions, whose seeds are dispersed by the wind _____.
4. Humans in the state of Alaska _____.
5. Lions, who live in prides for mating, social, & hunting purposes _____.
6. Oyster larvae, who can travel hundreds of miles powered only by sea currents _____.
7. Gray Sage plants, which release chemicals that inhibits the growth of plants around them _____.

PRACTICE

Which of the following species displays a uniform species dispersion pattern?

a) The human population living in the USA.

b) Wolves, who hunt & live in packs.

c) Redwood trees, which compete with each other for light.

d) Herrings, who swim together in schools to help avoid predation & increase feeding efficiency.