2021 Unit 03: Populations

Content Area: **Science**
Course(s): **Advanced Placement Environmental Science**
Time Period: **October**
Length: **13 periods**
Status: **Published**

Enduring Understandings:

- Human populations change in reaction to a variety of factors, including social and cultural factors.
- Populations change over time in reaction to a variety of factors.

Essential Questions:

- How do changes in habitats influence changes in species over time?s a place for a long time?
- How is educational opportunity for women connected to human population changes?

Lesson Titles:

- Age Structure Diagrams
- Carrying Capacity
- Demographic Transition
- Generalist and Specialist Species
- Human Population Dynamics
- K-Selected r-Selected Species
- Population Growth and Resource Availability
- Survivorship Curves
- Total Fertility Rate

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative

	analysis in print or digital text, to analyze information presented via different mediums.
LA.RH.9-10.8	Assess the extent to which the reasoning and evidence in a text support the author's claims.
LA.RH.9-10.9	Compare and contrast treatments of the same topic, or of various perspectives, in several primary and secondary sources; analyze how they relate in terms of themes and significant historical concepts.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
LA.WHST.9-10.1.A	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
LA.WHST.9-10.1.B	Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
LA.WHST.9-10.1.C	Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
LA.WHST.9-10.1.D	Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.
LA.WHST.9-10.1.E	Provide a concluding paragraph or section that supports the argument presented.
	Random processes can be described mathematically by using a probability model: a list or description of the possible outcomes (the sample space), each of which is assigned a probability. In situations such as flipping a coin, rolling a number cube, or drawing a card, it might be reasonable to assume various outcomes are equally likely. In a probability model, sample points represent outcomes and combine to make up events; probabilities of events can be computed by applying the Addition and Multiplication Rules. Interpreting these probabilities relies on an understanding of independence and conditional probability, which can be approached through the analysis of two-way tables.
	Randomization has two important uses in drawing statistical conclusions. First, collecting data from a random sample of a population makes it possible to draw valid conclusions about the whole population, taking variability into account. Second, randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. The conditions under which data are collected are important in drawing conclusions from the data; in critically reviewing uses of statistics in public media and other reports, it is important to consider the study design, how the data were gathered, and the analyses employed as well as the data summaries and the conclusions drawn.
	Connections to Functions and Modeling.
	Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Error Analysis Have students perform per capita ecological footprint calculations using dimensional analysis to compare developed vs. developing countries. Have them compare answers with a partner to determine errors in their calculations. Then ask them to explain the concept of per capita resources consumption as compared to the size of the population.
- Idea Spinner Create a spinner with four quadrants labeled “Predict,” “Explain,” “Summarize,” and “Evaluate.” After new material is presented, spin the spinner and ask students to answer a question based on the location of the spinner. For example, after providing students with demographic data and characteristics that describe different phases of the demographic transition, ask students to predict what would happen if there were a change in one of the variables that affects a demographic transition.
- Think-Pair-Share Ask students to respond to the following prompt: Which reproductive strategy is more prone to creating an invasive species, and which is more prone to creating an endangered species? Have them develop a claim and support it with evidence (e.g., characteristics of species). After writing for two to three minutes, they can pair with a nearby partner to share responses. Select one group to share their response with the class. The class can add additional information or challenge a response.

Modifications

Benchmark Assessments

Skills-based assessment

Reading response

Writing prompt

Lab practical

Formative Assessment:

- Anticipatory Set
- Apply appropriate mathematical relationships to solve a problem, with work shown (e.g., dimensional

analysis)

- Closure
- Explain patterns and trends in data to draw conclusions.
- Warm-Up

Summative Assessment:

- Alternate Assessment
- Marking Period 1 Assessment
- Unit 3 Populations Benchmark

Alternative Assessments

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Reflective pieces

Concept maps

Case-based scenarios

Portfolios

Resources & Materials:

- AP Environmental College Board Site
- Carolina Biological Lab Kits
- Cengage Site
- Exploring Environmental Science for AP® Updated