<table>
<tr><td>Time Frame: Sep-Dec</td><td>Unit Title: Ecosystem Interactions and Dynamics: Africa Storyline and Case Study</td><td>Course Name: Biology (CP and honors)</td></tr>
<tr><td colspan="3">Stage 1 - Desired Results</td></tr>
<tr><td rowspan="7">Established Goals
NGSS performance expectations (HS-LS)
LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
LS1-5: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
LS1-7: Use a model to illustrate that cellular respiration is a chemical</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

analyze food web relationships, energy transfer, genetic inheritance, evolution of traits, and conservation solutions for human activities in the Northwest Pacific ecosystem.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that….

Animals and plants interact within species and between species in many ways: to reproduce, to get energy, to grow and develop as organisms, and to survive. Animals and plants use the processes of cellular respiration and photosynthesis to get energy, as well as build and maintain the macromolecules (carbohydrates and proteins) they need to survive, and will participate in the global carbon cycle. Populations of animals and plants can also evolve in response to pressures such as environmental change, predation, or human activities. Humans can mitigate the impact of their activities on the environment.</td><td>ESSENTIAL QUESTIONS

Why do some animals live in groups?
How do animals and plants get the energy they need?
How do species live together and change over time?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…</td><td>Students will be skilled at…</td></tr>
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process whereby the bonds of food molecules and oxygen molecules are broken dn the bonds in new compounds are formed resulting in a net transfer of energy. LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. LS2-4: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the	- possible circumstances why animals may live in groups or live individually to survive and reproduce - how genetic traits are inherited through sexual reproduction, and how sexual reproduction introduces genetic variation - roles of macromolecules for organisms to get energy and perform living functions - essential elements (carbon, nitrogen) move in cycles through ecosystems, because matter is conserved, whereas energy flows in one direction - human activities have changed the survival and evolution of animal species - human activities and technologies can conserve species for the future - cultural and ecological reasons for preserving biodiversity - animal and plant species interact and depend on each other within an ecosystem - the different roles of producers and consumers and how they interact via photosynthesis and cellular respiration to get energy and to transfer carbon molecules.	8 science & engineering practices (NGSS) ● Asking questions and defining problems ● Developing and using models ● Planning and carrying out investigations ● Analyzing and interpreting data ● Using mathematics and computational thinking ● Constructing explanations and designing solutions ● Engaging in argument from evidence ● Obtaining, evaluating, and communicating information Evaluate the role of individual and group behavior on individual chances to survive and reproduce. Model how organisms on multiple trophic levels get food and energy in an ecosystem. Calculate the transfer of energy between trophic levels in an ecosystem. Demonstrate how carbon, hydrogen, and oxygen can be used to form different macromolecules (e.g. glucose, amino acids). Explain with evidence the uses of different macromolecules for the functions of body systems in living organisms. Model how organisms get energy from digesting food. Support an argument with evidence to distinguish cycling of matter (e.g. nitrogen) and flow of energy.

environment and biodiversity. LS2-8: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors LS4-3: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.		Use a model to illustrate how photosynthesis and cellular respiration transform energy through chemical reactions with carbon molecules. Demonstrate how DNA is passed from parents to offspring and how sexual reproduction can introduce genetic variation. Analyze DNA and geographical data to explain the distribution of organisms. Use mathematical representations (graphs, comparisons, numbers, etc.) to support and revise explanations of how biodiversity or a population of organisms varies or is changing. Construct an explanation based on evidence that the process of evolution by natural selection results from variation in a trait, inheritance of the trait, and differential survival and/or reproduction because of the trait. Explain with evidence how evolution by natural selection leads to adaptation of populations and that advantageous heritable traits (adaptations) will increase in a population relative to an organism without the trait. Design, evaluate, and/or refine a solution for mitigating (reducing the impacts of) human activities on the environment and biodiversity.

LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.		