

Fish as Fertilizer: The Impacts of Salmon on Coastal Ecosystems

Directions:

READ each part carefully – you may take notes and draw the graphs but DO NOT write on the packet. Answer the following questions for each part. You will be doing a scientific write-up for each part. Please write answers in complete sentences/paragraphs.

General Background: (this section is to be done as a group, but each member needs to have it written down in their own words)

Discuss, and answer the following:

- What are the important nutrients in ecosystems? Why?
- What drives the nutrients through ecosystems? (hint: think about biotic interactions and ecological pyramids)
- Describe the idea of a “nutrient conveyor belt” carrying marine nutrients to freshwater and terrestrial ecosystems
- Define: marine, freshwater, terrestrial and riparian ecosystems

Pacific Salmon Life Cycle: (this section is to be done as a group, but each member needs to have it written down in their own words)

Explain and DIAGRAM (with labels) the general life cycle of the Pacific Salmon that spawn in northwestern North America. Explain how after spawning, the adult salmon die- depositing biomass into the river and how this contributes to huge ocean-derived organic material being transported upstream into freshwater and the surrounding riparian ecosystems.

Stable Isotope Analysis: (this section is to be done as a group, but each member needs to have it written down in their own words)

Explain how scientists can find out how much MDN’s actually get deposited by using stable isotopes. Define isotopes. Point form is fine.

Part 1, 2A, 2B, 2C, 3, 4: (these sections are to be done as a group, but each member needs to have it written down in their own words)

Student Assessment: (this section is to be done completely individually)

Below are several suggestions for demonstrating overall understanding of the case study. The diagram quiz essentially asks students to construct a concept map of the whole case. The essay quizzes asks students to form an argument, and then support it using at least 3 separate, concrete examples. Choose one.

Option #1: Short essay quiz

Many salmon stocks in the Pacific Northwest have declined greatly since the mid-1800s. What effects might this decline have on both stream and riparian ecosystems? Try to incorporate as many of the ecosystem components and effects that you learned about from the figures in the case as you can.

Option #2: Short essay quiz

Some researchers call Pacific salmon “keystone species” in coastal ecosystems. A keystone species is one that has a disproportionate and widespread impact within its ecosystem or community. Based on what you learned in this case study, do you think salmon are keystone species? Support your answer with evidence from the research studies you examined.

Option #3: Diagram quiz

Make as complete a diagram as you can of the movement of nutrients from the ocean into components of the stream and riparian ecosystem. Label each component in your diagram. Between components, write a phrase or sentence that clearly describes the relationship or connection between the components.