

**HS-ESS3-3** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

**Clarification Statement:** Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural efficiency, levels of conservation, and urban planning.

**Assessment Boundary:** Assessment for computational simulations is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.

Four Excel spreadsheets are provided with data so that students can run spreadsheet calculations and create graphs within Excel. An article on weather and alligator nests counts is also provided. Links to all supporting documents are available here: <http://www.louisianafur.com/phenomena.html>

1. RanchingTable.xls
2. AlligatorNestSurvey.xls
3. FarmAlligatorDataBlank.xls
4. WildAlligatorDataBlank.xlsx
5. CSG Newsletter Sept 2006\_drought article\_pg19\_22.pdf

Below are a few ideas on how these spreadsheets can be utilized. There is a lot of data available, and there are many possibilities of how this data can be used to answer questions about the alligator management program and its impact.

- 1) Biologist at the Louisiana Wildlife and Fisheries use alligator nests surveys to monitor the stability of the wild alligator population.
  1. Use the AlligatorNestSurvey.xlsx to create a chart showing alligator nest populations over time.
  2. What has the trend for alligator nests counts been since 1970?
  3. Read the following article on droughts and alligator populations on pages 19-22. (CSG Newsletter Sept 2006\_drought article\_pg19\_22.pdf) Which preceding weather events caused the drought in 2006 to be particularly damaging?
  4. Were there weather events in Louisiana that precede or correlate to other dips in nests counts?
  5. Students may discuss the impact that more frequent storms and erratic weather patterns may have on Louisiana's natural resources.
- 2) Have students explore the data in (AlligatorNestSurvey.xlsx) and (RanchingTable.xls).
  1. Ask students what questions this data could help answer.
  2. Is there a correlation between nest counts, eggs collected, and alligators returned to the wild?
  3. How does this data reflect on the sustainability of the alligator management program?
  4. Have students read the sections titled, "Setting the Harvest Quota" and "Monitoring the System," (<http://www.louisianaalligators.com/alligator-management-program.html>) for further insight into this topic.
- 3) The Louisiana Alligator Management Program is self-funded. Alligator tag fees support alligator research, species monitoring, and habitat monitoring. Students can evaluate the funds generated by

alligator harvests that go back into managing alligators by tallying the total tag fees. Note that from 1972 to 1987 the fee was paid per farmer, not per tag. From 1987 forward the fee was paid per tag (per skin sold). For example in 1972, three farms sold skins and each farm paid a \$5.00 fee for a total of \$15 in fees. In 2001, 180,391 skins were sold, and a \$4 tag fee had to be paid for each skin. In 2001, the farming industry generated \$721,564 in tag fees, which are used by the Louisiana Department of Wildlife and Fisheries to manage the alligator program.

1. Use FarmAlligatorDataBlank.xls to run spreadsheet calculations.
  2. Take it a step further by creating a chart in Excel to show the trend over time.
  3. Take it even further and add the total tag fees generated by the farming industry (FarmAlligatorDataBlank.xls) with the tag fees generated by the wild hunts (WildAlligatorDataBlank.xls) and create a combined graph.
  4. Do these funds seem stable?
  5. Does a self-sustaining system work? How do you know? (Look back at AlligatorNestSurvey.xlsx)
- 4) How does the alligator industry help sustain the human population? What are the uses of alligators? Meat? Leather? What about the economic impact?
1. Students can evaluate the financial impact and sustainability of the alligator management program on the alligator farming communities by calculating the value of the alligator harvest.
    - a) Use FarmAlligatorDataBlank.xls to run spreadsheet calculations.
    - b) Take it a step further by creating a chart in Excel to show the trend over time.
  2. Students can evaluate the financial impact to Louisiana related to the wild harvest program.
    - a) Use WildAlligatorDataBlank.xls to run spreadsheet calculations.
    - b) Take it a step further by creating a chart in Excel to show the trend over time.