The Great Bay Area Bug Off!

Lesson Plan and Teacher Instructions

Lesson Goals
Student will understand the mosquito life cycle and thus, know how, when, and where it breeds. Students will learn the meaning of “vector” and how mosquitoes act as vectors for a number of diseases. Students will learn about the more common vector borne diseases found in California and will know of the risks and prevention techniques used to protect themselves and their families from these diseases. Students will engage in outreach by designing and developing a Public Service Announcement to inform and educate their community.

2013 NGSS Standards

LS2.A: Interdependent Relationships in Ecosystem
- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience
- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2),(HS-LS2-6)
- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

ETS1.B: Developing Possible Solutions
- When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary to HS-LS2-7)

Optional Lesson Extension

This lesson has students generating a PSA in the form of a poster or video presentation. These PSAs should be of high enough quality to be posted online, viewed in a public forum, or even used by local businesses to educate the public. Up to teacher’s discretions, extra credit can be offered for public posting or for displaying (with permission) by a local merchant.

Kit Contents
- Flash drive containing
Lecture
Master vocabulary list
Lesson plan and teacher instructions
Student instructions (handout)
Demo instructions

- For demonstration
  - 35 white-lined Dixie cups
  - Three eye droppers (or pipettes with bulb-end)
  - Red food coloring

- Miscellaneous
  - Poster showing mosquito life cycle
  - Poster on vector-borne diseases

Unit Plan
Preparation for Day 1 of unit:
1. Preview lecture and ensure links are current and active.
2. Make copies of vocabulary list, student instructions and rubric.
3. Write vocabulary words on the white board or on sheets that can be posted around the room.
4. Review project instructions, demonstration instructions, and materials.
5. Determine project teams.

Day 1 of unit:
1. Hand out vocabulary list for inclusion in binders. Instruct students to complete definitions during lecture. (Note: some vocabulary definitions can be completed while students are researching their subjects.) Teacher may choose to collect words and definitions for grading/scoring.
2. Post vocabulary list (or magnetic strips) in classroom.
3. Present all/part of lecture.

Day 2 of unit:
1. Complete lecture, if needed.
2. Demonstration – how diseases are transmitted via vectors.
3. Introduce project and handout instructions.
   a. Show PSA example, produced by CDC: https://www.youtube.com/watch?v=oo-lpp1Cx5g
4. Assign teams.
5. Homework (individual): Students are to observe their home/surrounding environment, identify possible breeding grounds for mosquitoes, identify conditions whereby mosquitoes could enter homes and bite people.

Day 3 of unit:
1. Students meet in teams for the first time (in document containing student instructions, this is “Day 1”).
2. Teams assign team members a research focus.
3. Each person on the team is to research their focus area, take notes, and complete their own “Research Form.” Research can be done during class time and for homework. Focus areas include:
   - West Nile Virus – General Information
• Mosquito Life Cycle and mosquito environment
• Vector Borne Diseases
• West Nile Virus – Prevention methods
• California’s drought and its effect on West Nile Virus

Day 4 of unit:
1. Team meeting Day 2: Students share their learnings from their research and brainstorm their PSA. Plan should be completed by the end of the period on this day.

Day 5 of unit:
1. Team meeting Day 3: Students spend the period making their poster or producing their video.

Day 6 of the unit:
1. Team meeting Day 4: Students continue work on their PSA. Final project should be completed by the end of the period.

Day 7 of the unit:
1. Team presents their PSA to the class.

Resources Provided to Students

<table>
<thead>
<tr>
<th>West Nile Virus</th>
<th>Centers for Disease Control and Prevention: <a href="http://www.cdc.gov/westnile/">http://www.cdc.gov/westnile/</a> FAQs, Statistics and Data, Prevention tips, Disease Information</th>
</tr>
</thead>
</table>

Rubric

Student Name: ________________________________

<table>
<thead>
<tr>
<th>Category</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Points</th>
</tr>
</thead>
</table>

SAN MATEO COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

Protecting public health since 1916
<table>
<thead>
<tr>
<th>Followed Guidelines</th>
<th>This PSA includes all required elements as well as additional information. Format for Audio/Visual 1-2 minutes in length. File is playable for presentation. Poster layout well done on one poster paper.</th>
<th>All required elements are included in the PSA.</th>
<th>All but ONE of the required elements are included in the PSA.</th>
<th>Several required elements are missing. Format guidelines were not followed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>Notes indicate research was done thoroughly and multiple sources were used, not just the single resource provided in the instructions</td>
<td>Notes indicate research was done. Single resource was used and notes from that source are complete.</td>
<td>Notes are present but are incomplete.</td>
<td>Minimal notes. (if notes are missing, score = 0)</td>
</tr>
<tr>
<td>Content of PSA</td>
<td>Excellent presentation of message. All facts and details are accurate and correct.</td>
<td>Good presentation of message. Most facts and details are accurate and correct.</td>
<td>Missing major point, meaning somewhat unclear. Some facts and details are missing or incorrect.</td>
<td>Missing major points, meaning unclear. Facts and details are incorrect.</td>
</tr>
<tr>
<td>Originality/ Creativity</td>
<td>The PSA is exceptionally creative and “grabs” the audience’s attention and uses original ideas.</td>
<td>The PSA is mostly creative. The PSA reflects student creativity and the use of some original ideas.</td>
<td>The PSA is somewhat creative. The PSA reflects some creativity, but it lacks originality.</td>
<td>The PSA has no creativity. The PSA reflects a lack of creativity and originality</td>
</tr>
<tr>
<td>Technical Production</td>
<td>The recording is clear and loud enough to be heard. Background sounds and effects blend with the PSA’s message. A high degree of technical skill is evident in the production of this PSA. The technical effects are very powerful and add to the impact of the PSA. If poster: poster is developed well. It is legible, colorful, and shows skill in its development. The poster’s appearance adds to its usefulness and</td>
<td>The recording is clear and loud enough to be heard. Background sounds and effects usually blend with the PSA’s message. Technical skill is evident in this PSA and adds to the quality of the announcement. If poster: poster is developed well. It is legible, message is clear but poster’s appearance can be improved to add to its effectiveness. More care/time could have been taken.</td>
<td>Most of the recording is clear and loud enough to be heard. Background sounds and effects sometimes distract with the PSA’s message. Some technical skill is evident in the creation of this PSA, but it adds little to the effectiveness of the announcement. If poster: poster’s message is less effective due to lack of clarity, content, or care taken when developing the poster. Poster may be missing information</td>
<td>The recording is unclear and/or not loud enough to be heard. Background sounds and effects absent or distract from the PSA’s message. Very little technical skill is evident in the production of this PSA. If poster: Poster is poorly developed and/or message is not clear. Poster will not be effective – its message is unclear and/or without effectiveness.</td>
</tr>
</tbody>
</table>

SAN MATEO COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

Protecting public health since 1916
| Message Effectiveness | The combination of creativity, technical skill, and audience appeal are very effective in delivering a strong message about the selected topic. | The combination of creativity, technical skill, and audience appeal deliver a clear message about the selected topic. | The intent of the PSA is understood, but it has little motivational value. | The message is not clear in the PSA. |