Education and Research: Testing Hypotheses

Runoff and Occurrence of Mud Snails

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Summary

Using visual data of estuarine shorelines from unoccupied aircraft around mainland areas in Carteret County, compare occurrence of mud snails (*Illynassa obsoleta*) and obvious areas of point source runoff. Mud snails are sensitive to tri-butyl tin, a byproduct of road traffic and runoff and over time populations can disappear in areas where they should be abundant.

Key Concepts

- Bio.2.2.1 Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment.
- Affects of runnoff, a human influenced problem on native fauna.
- NGSS_checklist Earth mud snails.pdf

Objectives

Include clear, measurable statements of what students will be able to do, such as:

- Research and learn about the native mud snail *Illynassa obsoleta.* If you have access to go to the edge of the sound or saltmarsh, mud snails can be seen year round.
- Read the research paper that gives evidence of chemicals in our environment affecting organisms https://www.researchgate.net/publication/10820547_The_Biocide_Tributyltin_Reduces_the_Accumulation_of_Testosterone_as_Fatty_Acid_Esters_in_the_Mud_Snail_Ilyanassa_obsoleta
- Use recent shoreline data to observe and determine areas where mud snails are obviously present and where they are not. Cross-reference these findings with where known/obvious outfalls, runoff inputs are located.
- Use graphing skills to show correlations between findings.
- Present findings and draw preliminary conclusions based on data and propose solutions.

Materials

- Paper on toxicity in mud snails from tri-butyl tin that over time leads to mortality.

  https://www.researchgate.net/publication/10820547_The_Biocide_Tributyltin_Reduces_the_Accumulation_of_Testosterone_as_Fatty_Acid_Esters_in_the_Mud_Snail_Ilyanassa_obsoleta
- Visual data of estuarine shorelines from unoccupied aircraft around mainland areas in Carteret County from the lab: marineuas.net

Procedure

- Research and learn about the native mud snail *Illynassa obsoleta.* If you have access to go to the edge of the sound or saltmarsh, mud snails can be seen year round.
- Read the research paper that gives evidence of chemicals in our environment affecting organisms https://www.researchgate.net/publication/10820547_The_Biocide_Tributyltin_Reduces_the_Accumulation_of_Testosterone_as_Fatty_Acid_Esters_in_the_Mud_Snail_Ilyanassa_obsoleta
- It might be practical for the teacher to lead/facilitate a discussion about these findings; Some questions to include in the discussion might include:
    - Does this only affect the mud snail?
    - What happens to the population over time? (they live approx. 8-10 years) if the pollution no longer affects them OR if it stays around
    - How are other organisms in the area affected?
    - How large an area does this potentially affect?
    - What are the implications for human health?
- Use recent shoreline data to observe and determine areas where mudsnails are obviously present and where they are not. Cross reference these findings with where known/obvious outfalls, runoff inputs are located.
- Have students organize findings in a graphical organizer
- Present findings and draw preliminary conclusions based on data and propose solutions

Assessment

- **Performance**—what will students do during the lesson to demonstrate understanding?
    - Students will show that they have identified areas on the images where they see mud snails and where they do not
    - They will show where there are obvious or known runoff deposition areas.
    - They will show any correlations between these 2 observations
- **Product**—a graph to show correlations between observations and a final presentation (this could be a class discussion sharing data, observations and drawing conclusions)
- Assessment should be directly related to the lesson objectives
- ***Assessment rubrics that you would use in the classroom are also helpful***

Additional Resources

https://gsa.confex.com/gsa/2011NE/finalprogram/abstract_184202.htm