This project was evaluated using the point scale of 0-1-2-3. The project was evaluated based on the visible information in the project photograph; some more information may have been on the additional sheets.

A. Title
Title: The effect of zebra mussels on phytoplankton.
Score: 3 – *The title correctly states the independent variable or the dependent variable and is NOT worded as a question.*
Comments: This title states both an independent variable (zebra mussels) and the dependent variable (phytoplankton).

B. Question
Question: How will zebra mussels affect phytoplankton?
Score: 3 – *The question states the independent variable and the dependent variable, and is testable.*
Comments: This question correctly states the independent and dependent variable. In addition, the dependent variable is testable. However, it could have been better worded as "What is the effect of zebra mussels on phytoplankton?"

C. Hypothesis
Hypothesis: If the population of zebra mussels increases, then the population of phytoplankton will increase because zebra mussels affect the turbidity since they are filter feeders, so the more zebra mussels, the clearer the water will be and the more sunlight phytoplankton will get. Also, zebra mussels eat small zooplankton which will eat phytoplankton so the population of phytoplankton will increase as more and more zooplankton get eaten by zebra mussels.
Score: 3 – *The hypothesis (1) predicts the effect that changing the independent variable will have on the dependent variable, AND (2) explains the reason for the prediction using scientific concepts ("because…").*
Comments: The hypothesis makes a predication and very nicely explains two lines of reasoning that would support their prediction!

D. Background Research (found throughout the project especially within the hypothesis and discussion/conclusion sections)
Score: 2 – *Background research is accurate, containing SOME relevant, well-chosen facts, definitions, concrete details, quotations, scientific concepts, or other information and examples that (1) provide information on the IV & DV AND (2) attempts to support the "because" portion of the hypothesis OR (3) attempts to support the "scientific reasoning" of the discussion/conclusion.*
Comments: There were some good facts presented about both zebra mussels and phytoplankton, but the bullet list format did not do the best job of connecting the elements of the background research. It is unclear why some parts are included, like the definitions of "ecology" and "ecosystem". If these words were used in sentences that connected them to the question about zebra mussels and phytoplankton, perhaps it would be clear why they were included.

E. Investigation Design (ID)
Score: 3 – *All 5 components of the investigation's design (or ID) are stated correctly and explicitly, AND only one independent variable (or IV) is allowed to change at a time, AND there are multiple trials.*
Comments: Very nicely done, using the special Secondary Research Investigation Design Diagram.

F. Procedure

Score: 2 – *The Procedure accurately and completely satisfies two or three of the above. (The procedure is (1) a step-by-step description of how the investigation was done AND (2) uses precise language and scientific vocabulary to describe both the sequence of actions taken and materials used AND (3) is sufficiently detailed to enable the reader to replicate the investigation AND (4) is consistent with the Investigation Design Diagram (IDD) and is an appropriate test of the hypothesis.)*

Comments: Procedures in secondary research projects are challenging. It is good that the investigator has a two part procedure and tries to explain what the scientists did as well as what the students did to explore the data. This is tricky stuff. It would have been good to see a little bit more specific detail like in "Procedure #1", what the students did. It would have been good to include the link to the website where they accessed the data and to note which graph or graphs they produced. On the split bar graph, the students should explain which split date they used and why. The procedure should have been a little more specific around the question, in this case the zebra mussels vs. phytoplankton. In "Procedure #2", what the scientists did, it would have been good to include information on how the scientists gathered the data bout the two variables they are investigating, the zebra mussels and the phytoplankton. The phytoplankton is actually a measurement of the chlorophyll in the water, so the students should have explained a little bit more about why they used chlorophyll to measure phytoplankton.

G. Data/Results

Score: 2 – *Most parts of the data graphs and tables are present, complete and accurate. Data analysis is attempted but may not be accurate.*

Comments: The students did not include titles for the graph and the table. The table and graph are relevant and the analysis statements include reference to the numbers from the graph and the data table. The analysis statement about the data in the table is a bit more complete. The statement about the graph could use one more piece about the July 1, 1992 to October 20, 2012 average and hot that compares to the earlier data.

Ha. Discussion/Conclusion: Scientific Explanation

Score: 3 – *A scientific explanation consisting of a statement that (1) makes an overall claim addressing the original investigation question AND (2) supports the claim with evidence and relevant, accurate data from the investigation AND (3) contains relevant scientific concepts AND (4) uses words, phrases, and clauses that clarify and connect the relationship between the claim, evidence and science concepts AND (5) demonstrates an understanding of the topic.)*

Comments: This section is great! Congratulations for looking at your data and seeing that it did not support your initial thinking, and then considered other explanations for how the zebra mussels interacted with the phytoplankton! This is a great example of an "ah ha" moment.

Hb. Discussion/Conclusion: Reflection

Score: 2 – *Two or three parts of the Reflections are complete and accurate.*

Comments: The investigation did state that the data did not support their hypothesis. That was good. The students included the temperature influence here, which was confusing since where was no data presented about temperature and its connection to the phytoplankton. The "Next Steps" could be a little clearer; it was unclear what the question of the next investigation might be and therefore how this data might relate to the next investigation.

I. Literature Cited

Score: 2 – *Most parts of the Literature Cited are complete and accurate. Bibliography is present, but references are not cited in the text of the investigation.*

Comments: The title for each page says "Geography4Kids". This appears to be an error as that seems to be a very different website. There are many specific links to web pages for pages cited in the body of the text, especially in the hypothesis, background research, and in the conclusion. It would have been nice to have one or two other sources of information besides the AMNH references just to show that the information provided by AMNH did not contradict other resources, especially around the two variables, zebra mussels and phytoplankton.

Project Section	Score (0-3)	Weight	Weighted Score
A. Title	3	x 1	= 3
B. Question	3	x 1	= 3
C. Hypothesis	3	x 2	= 6
D. Background Research	2	x 2	= 4
E. Investigation Design (ID)	3	x 2	= 6
F. Procedure	2	x 2	= 4
G. Data/Results	2	x 3	= 6
Ha. Discussion/Conclusion: Scientific Explanation	3	x 2	= 6
Hb. Discussion/Conclusion: Reflections	2	x 1	= 2
I. Literature Cited	2	x 2	= 4
		Total weighted score	= 44 (54 max)
	Final Score (%) =	**=Total weighted score/54 x 100**	**= 81%**