THE BARTON SPRINGS SALAMANDER: A PROBLEM-SOLVING TEST

PART ONE

Attention students! Word of your work aboard the Space station Paloma has spread far and wide, but has also garnered interest close to home. I have received an email message from Mia Salerno of the U.S Fish & Wildlife Service and she would like me to forward it to you all.

Please read this email carefully. Ms. Salerno will ask you to formulate questions regarding the information still needed. To help you with this task, you may find filling out the below table a good start in pinpointing the information you still need.

Good luck on this very important task; the Barton Springs salamander is lucky to have you!

The Needs of the Salamander	**Lake LBJ**	**Balmorhea Springs**	**Blue Hole Creek**

EMAIL MESSAGE FROM MIA SALERNO

From: Mia Salerno, U.S Fish & Wildlife Service
To: Space Station Paloma Young Scientists

My name is Mia Salerno. I am a biologist studying the Barton Springs Salamander. As you may know, it is an endangered species. Data I have been collecting shows that the salamander is in danger of extinction because of water pollution and the many people who swim in the area where the salamanders live.

The Barton Springs salamander is an amphibian, and looks somewhat like a lizard. It has a long slender body about 2.5 inches long with gills on its neck for breathing in water. It has short legs and usually bends its body from side to side to give it as wide as possible a movement for its feet. These salamanders must live in deep water that moves quickly, and they like spring fed pools the best. Right now, they live only in pools fed by Barton Springs in Austin, Texas. The water temperature must be between 50F - 68F, and they cannot survive in water warmer than that. Salamanders tend to be shy, coming out at night to feed. They eat earthworms and brine shrimp. They need a rocky and sandy river bottom. Leaves and rotting debris can pollute the water, making it difficult for salamanders to survive. Salamander eggs usually hatch in November, March, and April.

Since the Barton Springs area is so small, we would like to try to introduce the salamander to a different location to see if it can survive there. We are considering the following three locations:

1. Lake LBJ: This lake is located about forty-five miles from Austin. Like Barton Springs, it is fed by springs from the Edwards Aquifer. It is a deep lake with fast moving currents, and is rich in aquatic life.
2. Balmorhea Springs: This large pool is located in west Texas and is known for its clean water. It is the home to many aquatic animals, including the brine shrimp eaten by the salamander.
3. Blue Hole Creek. This is an isolated creek in northwestern Texas seldom used by people. It is a swift flowing creek with a sandy bottom.

I heard that you have been working on a similar problem and I hoped you could help. I know you need more information before you can make your decision. Please email the questions you must have answered about these three locations to my assistant, Daniel Chen. He will gather as much information as he can and report back to you as soon as possible.

Thank you for your help.
Mia Salerno

EMAIL MESSAGE FROM DANIEL CHEN

From: Daniel Chen, U.S Fish & Wildlife Service
To: Space Station Paloma Young Scientists

Here is additional information about the three locations that we are considering for the salamander. I'm afraid I was not able to answer some of the questions you sent, but hopefully you have enough information here to make a decision.

Lake LBJ is located northwest of Austin, Texas, and was named after Lyndon B. Johnson, former president of the United States. It is a natural lake fed by underground springs. It is just over 21 miles long and has a maximum width of 10,800 feet. Tourists from all over Texas come here to take advantage of this beautiful lake. Water skiing and other sports are very popular here. The irregular shore line makes Lake LBJ attractive to boaters and fishermen. There is a rich variety of aquatic life, particularly bass, trout, and shrimp. The temperature of the lake ranges from 62° to 68° Fahrenheit. Lake LBJ is about 40 feet deep, and its bottom is covered with a variety of plant life. In the past, the lake suffered from pollution from Austin, though recent efforts have helped, and Lake LBJ is much cleaner than it was fifteen years ago. The most beautiful months for visiting the lake are March, April, May and June when the flowers are blooming.

Balmorhea Springs is located in west Texas at the foothills of the Davis Mountains. Water from the springs used to flow out into the desert, but during the Great Depression a huge L-shaped pool was dug. The water is exceptionally clean. It's clearer than the clearest Caribbean water and filled with aquatic life, including two endangered species. Turtles, frogs, crayfish, bass, and catfish are common. Balmorhea Springs is about 25 feet deep, and has a muddy, clay bottom. The slow moving water remains at a temperature around 72° Fahrenheit throughout the year. It is a popular swimming area, and the deepest areas are reserved for scuba divers interested in studying the aquatic life there. The marshland areas are ideal for bird watching.

Blue Hole Creek is located in northwestern Texas just south of the panhandle, about 50 miles from the Oklahoma border. It is far from any large towns. Because it is small and remote, it is rarely used for any water sports, even swimming. Blue Hole Creek is 16 feet deep at its deepest, and is much shallower in some places. The fast moving waters are fed by underground springs and are free of pollution. The water is kept cool by the shade of the trees that line its banks, and its temperature is generally between 60° and 65° Fahrenheit. The creek bottom is mostly sandy with small pebbles. Only small aquatic animals have been found in Blue Hole Creek, though the animals in the nearby woods depend on the creek as their source of water.