

## Ocean Odyssey Script

*Professor M:* Welcome! I'm so glad that we could get together to discuss our research. I think that we have all been doing some important work on the problems that impact marine life.

*Dr. N:* That's right. We all know that global climate changes are affecting marine life but man's impact is also altering it sometimes in harmful or destructive ways. For instance, overfishing of cod, sea urchins and other food sources has occurred.

*Professor Personguy:*

Off shore drilling and oil spills have also been a problem. In 1989 there was a gigantic oil spill in Prince William's Sound, Alaska. It killed billions of organisms both big and small in the water. Two billion dollars was spent to clean up the mess. I came up with an invention that may be difficult to make, but might be a better way to clean up the oil spills and keep the animals safe.

*Sergeant Elahw:* Oil spills are damaging to cetaceans such as whales. That's a big interest area of mine. Can you tell me how your invention works?

*Professor Personguy :* Here I have a big tube that we drop over the oil spill. There is a net that will filter out animals from the tube, and on the top, the tube is solid so that it will capture the oil. After the animals are filtered through, the net will become solid also, and the tube will squeeze together and compact the oil. Then it will have a giant chain connected to it and a helicopter will pull it out of the water.

*Professor M:* What an interesting idea! Let us tell you about the research we have been doing on dead zones.

*Sergeant Elahw:* What are dead zones?

*Dr. N:* A dead zone is a region of hypoxic water. It is when there is less than 2.2 milligrams of oxygen per liter. The first thing that starts it is actually too much of a good thing: nutrients that run off of farms. Then you get an algae bloom that is when there is over population of algae. Algae blooms don't let oxygen in the water. Decomposition that is occurring on the ocean floor requires oxygen. Animals use the last of the oxygen. The algae bloom doesn't let any light in so the plants die and can't produce oxygen.

*Professor Tinkerpot:* This is happening in the Gulf of Mexico where runoff from the Midwestern farming states is loading the Mississippi with nitrogen. That water is eventually flowing into the Gulf of Mexico where the dead zone has been studied for many years. Pollution from thousands of factories and power plants is also contributing to the problem.

*Professor M:* The longer term impacts of the dead zone are not completely known, but in the Gulf of Mexico, fish and shrimp ecosystems show signs stress. It is suspected to be responsible for:

Increased death rates of species

Acting as a barrier to migration

Increased jelly fish populations

Reducing suitable habitat

Increasing Predation

Altering food resources and food web abundances

Disrupting life cycles – like spawning and early life stages

*Sergeant Elahw:* How bad are these dead zones?

*Dr. N:* The dead zone in the Gulf of Mexico reached over 7,000 square miles during the 1990's. Flooding in the mid-west has contributed to an even larger dead zone some years. Adding to the problem is the difficulty to detect and measure dead zones since they are the same temperature as surrounding water. It is also difficult to predict where dead zones will travel since they are carried with currents and wind.

*Professor M:* When these oxygen-poor waters are forced inland by weather and tides, it drives all animal life before it. During jubilees, animals that don't leap into the baskets of people on the shore die in the water from suffocation.

*Sergeant Elahw:* This could be disastrous for whales also because the ecosystems near shore are important to food sources. Can these dead zones recover?

*Professor M:* Short-lived bottom communities have revived but most communities do not. Large, long-lived species like gastropods, bivalves, seastars, brittle stars, and sea anemones, once abundant in the Gulf of Mexico have vanished from that area because of the increased size of the dead zone.

*Professor Tinkerpot:* That is why it is important to act immediately and to use as many methods as we can to stop things from getting any worse. Most of these interventions will need government backing. For example, in Iowa, corn farmers are using large amounts of fertilizer at planting time because fertilizer is inexpensive. Much of the nitrogen is not used by the plant during growth and is being washed away into the streams and rivers.

*Professor Personguy:* It sounds like this problem isn't going to go away. People need corn and corn byproducts. Ethanol, a byproduct of corn, is being developed as an alternative fuel source.

*Professor Tinkerpot:* Yes. I've invented another way for farmers to use less fertilizer when they plant corn. As shown by my model, the corn seeds are dipped into a vat of liquid fertilizer, dried and packaged. A telescopic arm with a screened container holding the seeds would be dipped into the vat. When lifted out of the vat, the screen would

allow the excess fertilizer to drain off. Each corn seed would be coated with just the amount of fertilizer needed. The seeds are dumped onto a conveyor belt which carries the seeds through a dryer and on to be packaged.

*Professor M:* Dr. N and I have come up with a model that shows a similar way to decrease the effects of too much fertilizer. You can do this by coating each seed with a medium sized amount of fertilizer. You could spray each seed with a fertilizer spray from a big tank. In our model there is a tray that contains seed holders on a conveyor belt. Seed holders are the part of the model that holds corn seeds in little sockets. Tubes that hold corn seeds shoot out the seeds into the seed holders. When the tray is done being filled with seeds it moves on to where the seeds are sprayed with fertilizer. The conveyor then goes into a drying room. The excess fertilizer is dumped back into the tank so there is no waste

*Dr. N.:* By decreasing the nitrates used in agriculture, we'll reduce dead zones in the Gulf of Mexico and the Chesapeake Bay.

*Sergeant Elahw:* Maybe that would even help the whales. I have been doing research on why whales are beached. There is evidence that deadly military sonar and other underwater noises, like oil drills, cause the whales to surface too rapidly. As a result, they then suffer decompression sickness. As a solution, I have been working on a special project, "The Hydroid." Naval submarines would deploy the Hydroids into the ocean at the start of their drill.

*Professor Tinkerpot:* Can you tell us how this system works?

*Sergeant Elahw :* The naval submarines would deploy 50 or more hydroids which would locate the whales within the circumference of the sonar and guide them by gently pushing them to the outside. The hydroids use their feet to push the whales. When the whales reach the outer limit, then are feed enriched krill which is released by the hydroid so that the whales will stay out of the testing area. This will prevent the whales from rising to the surface too quickly and getting decompression sickness which is often the cause of beaching.

*Professor Personguy:* Wow, we have been busy. We've found solutions for whale health, oil spills, and decreasing dead zones.