

Sarah Cottrill
Science Teacher Fellow
Nashoba Brooks School

Spoken Adaptation of The Log of the Sea of Cortez

Middle School Level

Major Question: How do the abiotic and biotic factors of aquatic environments create unique marine biomes and animal adaptations?

Learning Goal: Understand how a marine biologist works scientifically and apply knowledge to their own sea “journey”

Structure:

Steinbeck

Each class will begin with a reading from Steinbeck’s *Log of the Sea of Cortez*. The readings should be supported with a discussion of vocabulary (highlighted in blue) and as many visuals as possible. Post-reading, students will be asked to respond to questions in their own sea logs.

Marine Research

For their research project, students will be assigned one part of the ocean (open ocean, deep zone, or neritic zone). They will do an initial observation of their environment using live feeds from Explore (explore.org) and list the abiotic factors of their environment. They may also brainstorm any questions about anything they see.

Their next task will be to research their environment online and discover at least 5 prominent organisms that live in their environment. With this background knowledge, they will create 4 interview questions to “ask” an organism of their choice. (It should be an organism easily identifiable and present in their live feed.) These questions will be answered during a second observation period where they watch their environment for at least 25 minutes.

At the conclusion of the project, students may summarize their findings and research in an assessment of your choosing. Some possible ideas are a written report of the abiotic and biotic factors in their environment or a presentation to share with their classmates.

Each segment of class will be referred to by its number as listed below. *Initial observation should take place prior to reading, allowing students to select an environment of their choosing.

- 1) Initial Observation: brainstorm environment questions and identify factors
- 2) Background research on organisms
- 3) Specify 4 observable “interview” questions for organism
- 4) Record observations of organism
- 5) Write summary of research and observations

Assessment: Students will create their own sea log, which will record the answers to post-reading questions and their own observations of their environment. Teacher may choose final assessment structure.

*Note on adaptation: This narrative has been adapted for Grade 5 scientists and readers. Wherever possible, Steinbeck's original text is kept whole and intact. In some areas, only small modifications are necessary for comprehension but occasionally, lengthy chapters needed to be condensed and summarized. Any alteration is shown in [brackets]. In this case, I have tried to maintain Steinbeck's writing style but of course, the story is an adaptation and will highlight themes relevant to this unit.

The Log of Sea of Cortez by John Steinbeck and Ed Ricketts

Day 1: Introduction to a journey as a marine biologist. Crew: Steinbeck, Ricketts, Carol (biologists), Tony (Captain), Tex (engineer), Sparky and Tiny (crew)

Students should record:

- Name of their boat
- List 4 crewmates who will be traveling with them

Starting the Journey “How does one organize an **expedition**: what equipment is taken, what **sources** read; what are the little dangers and the large ones? No one has ever written this. The information is not available... [in this written **log** of our journey, we tell the story of our scientific exploration of the Sea of Cortez]... The Sea of Cortez, or the Gulf of California, is a long, narrow, highly dangerous body of water. It is subjected to sudden and vicious storms of great intensity... [But it is also a beautiful home for more than 5,000 marine **organisms**. Our ship, *The Western Flyer*, will sail along the coastline and our crew will collect **specimens** from its many shores. We hope to better understand this unique marine ecosystem].” (5-6)

Leaving Port “We had planned to sail about ten o’clock on March 11, but so many people came to see us off and the **leave-taking** was so pleasant that it was afternoon before we could think of going. The moment or hour of leave-taking is one of the pleasantest times in human experience, for it has in it a warm sadness without loss. People who don’t ordinarily like you very well are overcome with affection at leave-taking. We said good-by again and again and still could not bring ourselves to cast off the lines and start the engines... [It was only at Capt. Tony’s insistence that we started the motor and said our final good-byes]; the lines were cast off. [*The Western Flyer*] backed and turned and wove [its] way out among the boats of the fishing **fleet**... We stood on the top of the **deckhouse** and watched the town of Pacific Grove slip by and dark pine-covered hills roll back on themselves as though they moved, not we.” (24-25)

*Post-reading Question: Imagine that you are taking a journey to your aquatic biome. What would you take on a 6-week expedition? What scientific tools would you need to study your environment? Remember to list clothes and food as well.

Day 2

- **Technicalities of getting a permit** “[Before we could begin our collection, we had to receive a **permit** from the Mexican government, stating our purpose and permission to collect. We anchored *The Western Flyer* in a small **lagoon** along the US border to Mexico.] We were impatient for the officials, and.. we did not have to wait long... About noon they trooped to the beach, scattering the pigs and Mexican vultures which browsed happily there. They filled the rowboat until the **gunwales** just missed dipping [into the water], and majestically they came alongside [the ship]. We conducted the **ceremony of**

clearing with some dignity, for if we spoke to them in very bad Spanish, they in turn honored us with very bad English. They cleared us [to continue our journey], drank coffee.. And finally left... Much as we had enjoyed them, we were impatient, for the tide was dropping and the exposed rocks looked very rich with animal life.” (48)

- **Collecting methods** “Our collecting ends were different from those ordinarily [used]... At the present time, collecting is done by [scientists] who specialize in one or more groups. Thus, one man interested in **hydroids** will move out on a reef, and if his interest is sharp enough, he will not even see other life forms about him.... Collecting a large number of animals presents an entirely different aspect and makes one see an entirely different picture... We saw dominant species and changing sizes, groups which thrive and those which recede under varying conditions. In a way, ours is the older method, somewhat like that of Darwin on the *Beagle*. He was called a “**naturalist**”. He wanted to see everything, rocks and **flora and fauna**; marine and terrestrial... [And had to do so slowly]. This is the proper pace for a naturalist... We must have time to think and to look and to consider.” (51)

*Post-reading Question: Why is it important for naturalists to go slowly? What sorts of organisms will you look for in your environment? (Remember to look for plants and microorganisms!)

Research Project: Background on organisms in environment (2-A)

Day 3

- **Nights on the Boat** [On the sea, our days became rhythmic with the rising and setting of the sun. Each morning, we arose to gulls crying overhead and fish flickering in the shallow waters. We drank several cups of coffee and then loaded into our small boat, and cruised out to the tidepools. We would collect all day in the sun and as the afternoon waned, we would return to the boat, exhausted. As the sun set over the flat horizon, stars would begin to light the night sky and the crew would retire to their bunks.]

“Nights at anchor in the Gulf are quiet and strange. The water is smooth, almost solid, and the dew is so heavy that the decks are soaked. The little waves rasp on the shell beaches with a hissing sound, and all about in the darkness the fishes jump and splash. Sometimes a great ray leaps clear and falls back on the water with a sharp [splash]. And again, a school of tiny fishes whisper along the surface, each one, as it breaks clear, making the tiniest whisking sound. And there is no feeling, no smell, no vibration of people in the gulf... In many places of anchorage there were utterly no sounds associated with man.” (75)

*Post-reading Question: What do you think it’s like to be out in the wilderness without any people around? Describe what you might hear or see. Think about your life- have you ever been out all alone in the wilderness?

Research: Background on organisms (2-B)

Day 4

- **Food Web** “The bay was swarming with small fish, apparently come to eat the shrimps. Now and then a school of six- to ten-inch fish would drive at the little fish with such speed and in such numbers that they made the sharp hissing we had heard, while farther off some kind of great fish leaped and splashed heavily... The water seemed almost solid with tiny fish, one and one-half to two inches long. Sparky went to the galley and put the biggest frying pan on the fire and poured olive oil into it. When the pan was very hot he began catching the tiny fish with the dipnets, a hundred or so in each net. We passed the nets through the galley window and Sparky dumped them into the frying pan. In a short time these tiny fish were crisp and brown. We drained, salted, and ate them without any cleaning at all and they were delicious.” (198)

*Post-reading Question: What kind of food webs are present in your environment? Draw 2 of them. (You may need to go back and observe your aquarium.)

Research: Background on organisms (2-C)

Day 5

- **Running into difficulties** “[The] Hansen Sea-Cow [was a motor attached to our little skiff]: a dazzling little piece of machinery, all aluminum paint and touched here and there with spots of red. The Sea-Cow was built to sell, to dazzle the eyes, to splutter its way into the unwary heart... It was intended [to] push us ashore and back, drive our boat into estuaries and along the borders of little coves... [However, the Hansen Sea-Cow was] a mean, irritable, contemptible, vengeful, mischievous, hateful living thing... We observed the following traits in it and we were able to check them again and again. [What follows is a list of the terrible traits of the Hansen Sea Cow]:
 1. Incredibly lazy, the Sea-Cow loved to ride on the back of a boat, trailing its propeller daintily in the water while we rowed.
 2. It required the same amount of gasoline whether it ran or not, apparently being able to absorb this fluid through its body walls... It always had to be filled at the beginning of every trip.
 3. It had apparently some clairvoyant powers, and was able to read our minds, particularly when they were inflamed with emotion. Thus, on every occasion when we were driven to the point of destroying it, it started and ran with a great noise and excitement. This served the double purpose of saving its life and of resurrecting in our minds a false confidence in it...
 4. It completely refused to run: (a) when the waves were high, (b) when the wind blew, (c) at night, early morning, and evening, (d) in rain, dew, or

fog, (e) when the distance to be covered was more than two hundred yards” (18-20)

*Post-reading Question: Think of challenges that you and your crew may face on the water and create a creative story about the incident. Did one of your tools malfunction? Did you have trouble finding or catching an organism? Try to incorporate the humor that Steinbeck uses to describe the Hansen Sea-Cow.

Day 6

- **Mirages on the Ocean** “As we moved up the Gulf, [a [mirage](#)] began to distort the land... [An ocean mirage is an optical illusion caused by shimmering water and bright sun. The shore] suddenly splits off and becomes an island; and then the water seems to stretch inward and pinch [the island] to a mushroom-shaped cliff, and finally... [frees] it from the earth entirely so that [an island] hangs in the air over the water.

Even a short distance offshore [on the ocean] one cannot tell what the land really looks like... One remembers the old stories of invisible kingdoms where princes lived with ladies and dragons for company... [The land seems that mysterious.]

Tony grew restive when the mirage was working, for here right and wrong fought before his very eyes, and how could one tell which was error? It is very well to say, “The land is here and what blots it out is a curious illusion caused by light and air and moisture,” but if one is steering a boat, he must sail by what he sees and if air and light and moisture- three realities... combine to create a lie, what is a realistic man to believe? Tony did not like the mirage at all.” (67-68)

- **Ways to Collect Data** “There are three ways of seeing animals: dead and preserved; in their own habitats for the short time of a low tide; and for long periods in an aquarium. The ideal is all three. It is only after long observation that one comes to know the animal at all. In his natural place one can see the normal life, but in an aquarium it is possible to create abnormal conditions and to note the animal’s adaptability or lack of it.” (156)

*Post-reading Question: Brainstorm 4 interview questions for your organism. Think about behaviors or traits that you can see in your aquarium.

Research: Share questions and improve/focus. Try out questions on a different organism as a class example (3)

Day 7

- **Observations of unknown** “About noon we arrived at Puerto Escondido, the Hidden harbor, a place of magic... The little outer bay was our first collecting station, a shallow warm cove with a mud bottom and edged with small boulders, smooth and unencrusted with algae. On the bottom we could see long snake-like animals, gray with black

markings, with purplish-orange.... heads like chrysanthemums. They were about three feet long and new to us. Wading in rubber boots, we captured some of them and they proved to be giant **synaptids**. They were strange and frightening to handle, for they stuck to anything they touched, not with slime but as though they were coated with innumerable suction-cells. On being taken from the water they collapsed to skin, for their bodily shape is maintained by the current of water which they draw through themselves. When lifted out, this water escapes and they hang as limp as unfilled sausage skins. Since they were new and fascinating to us, we took many specimens, maneuvering them gently to the surface and then sliding them into submerged wooden collecting buckets to prevent them from dropping their water. On the bottom they crawled about their flower-heads moving gently, while the current of water passing through their bodies drew food into the stomachs.” (129-130)

*Research: Focused 30 minutes observation to answer interview questions (4)

Day 8

- **Pirate Ship** “The tide began to flow rapidly and the winds came up and we went back to the *Western Flyer*. When we were on board we saw a ship entering the harbor, a big green sailing **schooner** with her sails furled, coming in under power. She did not come to approach us, but came to anchorage about as far from us as she could. She was one of those incredible Mexican Gulf craft; it is impossible to say how they float at all and, once floating, how they navigate. The seams are sprung, the paint blistered away, ironwork rusted to lace, decks warped and sagging, and, it is said, so dirty and bebugged that if the cockroaches were not fed, or were in any way frustrated or insulted, they would mutiny and take the ship [into cockroach control]... Once the anchor of this schooner was down there was no further sign of life on her and there was no sign of life from the buildings ashore either.... [In the evening], the schooner did not even put up a riding light, but lay completely dark [and mysterious] on the water.” (183)

*Research: Final assessment work time (5-A)

Day 9+10

*Work on Final project (5-B+C)

Day 11

- **Dark and Mysterious** “In mid-afternoon we came to anchorage at Amortajada Bay on the southwest tip of San Jose Island. A small dark islet had caught our attention as we came in. For although the day was bright this islet, called Cayo on the map, looked black and mysterious. We had a feeling that something strange and dark had happened there

or that it was the ruined work of men's hands. Cayo is only a quarter of a mile long and a hundred yards wide. Its northern end is a spur and its southern end a flat plateau about forty feet high. Even in the distance it had a quality which we call "burned". One knows there will be few animals on a "burned" coast; that animals will not like it, will not be successful there..." (106) "Collecting on the rocks we found, as we knew we would, a sparse and unhappy fauna. The animals were very small. *Heliaster*, the sun-star of which there were a few, was small and pale in color. There were anemones, a few sea-cucumbers, and a few sea-rabbits." (108)

*Post-reading Discussion: A recent expedition went to collect at Cayo and found it to be one of the most abundant ecosystems. Why do you think that might be the case?

- **Human effects on Ecology** "As we ascended the Gulf it became more sparsely inhabited; there were fewer of the little heat-struck *rancherías*, fewer canoes of fishing Indians. Above Santa Rosalia very few trading boats travel. One would be really cut off up here. And yet here and there on the beaches we found evidences of large parties of fishermen. On one beach there were fifteen or twenty large sea turtle shells and the charcoal of a bonfire where the meat had been cooked or smoked. In this same place we found also a small iron harpoon which had been lost, probably the most valued possession of the man who had lost it." (171)

*Post-reading Question: *The Western Flyer* sailed in 1950. Already 50 years ago, the crew found traces of humans way out in the wilderness and it affected the organisms that lived there. What effects can humans have on ecology? How do they change and impact an environment by living or hunting in an area?

Day 12

- Ending Journey

"The *Western Flyer* hunched into the great waves toward Cedros Island, the wind blew off the tops of the whitecaps, and the big **guy wire**, from bow to mast, took up its vibration like the low pipe on a tremendous organ. It sounded its deep note into the wind." (224)

"What was the shape and size and color and tone of this little expedition? We slipped into a new frame and grew to be a part of it, related in some subtle way to the reefs and beaches, related to the little animals, to the stirring waters and the warm brackish lagoons... Our fingers turned over the stones and we saw life that was like our life." (223)

*Post-reading: Reflect on your experience. What did you learn about being a scientist? Do you think it's easy or hard? What is one environment that you would like to explore next and why?

Project: Share final reports