

# Exploring Marine Transportation

## Ports and Estuaries

Designed by: Jason Rubinstein, Abe Gelb, Dakota Goldinger

### Synopsis

Our activity is designed to educate informal audiences about the effects marine transportation and the development of ports has on the diamondback terrapin in an estuarine ecosystem. Our activity will consist of a model our participants can interact with.

### Concepts addressed

- How estuary's must change to accommodate a port
- How these accommodations affect the life of a diamondback terrapin
- Instill the effect marine transportation has on marine life and marine ecosystems
- Depict how terrapins interact with both their natural estuarine environment and a developed (disrupted) estuarine environment.

### Misconceptions

There is no connection between marine transportation and marine life (not true: the construction of ports, bulkheads, and docks impact marine life)

### Ocean Literacy Principles

- The ocean and humans are inextricably interconnected.
- The ocean supports a great diversity of life and ecosystems.

### Vocabulary

Estuary, Estuarine, Channel, No Wake Zone, Habitat Destruction, Dredging, Pollution, Industrialization, Development, and Reproduction.

### Guiding Questions

1. Where do you see boats on bodies of water?
2. What do you think an estuary is?
3. How do people interact with this environment?
4. How can we make this environment capable of transporting people?
5. What kind of vessels do you need to transport people in this water?
6. How can we make these boats capable of traveling through a shallow estuary?
7. Where does this sand go?
8. Where do turtles (diamondback terrapins) lay their eggs?
9. How might this process affect these turtles?
10. Where are these boats going to go?
11. How does the building of docks/dredging affect the ecosystem of Terrapins?
12. What can we do to protect the Terrapin?
13. How does the size of boats affect dredging?
14. How might we protect the Terrapin while accommodating the needs of people?
15. Other than Terrapins, how might boats affect other marine animals in the ocean?



## Materials

- Large Plastic tub
- Sand found in an estuary
- Turtle (Diamondback Terrapin)
- Styrofoam
- Popsicle sticks
- Toy Boat and Buoys
- Props

## Set up

Place the large plastic tub on a low table so that students can easily see over the sides.. The model will consist of sand, water, popsicle sticks that make up docks, boats, and various other props. The sand and docks are moveable.

## Activity Description

Using the guided questions, we will introduce what an estuary is to our audience, what a diamond terrapin is, and where it lays its eggs. We will keep our explanations concise as to not delve to deeply into the biology of Terrapins or the nature of estuaries.

Then we will have our participants interact with our model. We will ask our participants if they can help us transport some goods across our estuary. We will give them a boat and ask them if they can help us bring this boat across, at which point the boat will be too big to travel over the water (it will get stuck in the sand). Then, we will ask them how they can solve this problem, which should result in them dredging the water.

After this, they will have to place the sand somewhere. We will follow up by pointing out that the turtle will now have no where to nest. At this step, the participant has several options. He or she can either still put the sand in the turtles nesting grounds, or pick a smaller boat to travel across the

water, or maybe even find a different place to put the sand that allows the boat to travel across the estuary and for the turtle to lay its eggs.

Another aspect for the students to explore we can do involves the docks. We can start by asking the students “where will these boats go in order to transport goods?” We will guide them to understanding that docks are important for boats to transport goods. We will have them place docks in our model so the boats can transport the goods. This however may also disrupt the turtles nesting grounds. We will pose this problem to our participants and see what they do about it. They could decide not to transport the goods, they could also put docks in some areas but not others, as to allow some places for the turtles to nest and some areas for the boats to take their goods, or they could put docks throughout the model. Regardless of what they choose, we will explain to them the repercussions. Ultimately, our goal is to stress the point that marine transportation in estuaries harm terrapin populations and by reducing dredging and the construction of ports, we can reduce this impact. We will encourage creativity from our learners and allow them to use the materials however they like. If they stray too far away from accomplishing the activity, we will bring them back to focus using guided questions (listed above) and perhaps defining more concepts. Upon finishing our lesson with the models, we will proceed to our conclusion questions that will also complete the learning cycle and allow our students to internalize and reflect on what they learned (see the last several questions from our list). As I said before, we will also have some pictures showing how dredging has impacted current ecosystems on our planet.



*This activity was developed by students in the Spring 2010 Communicating Ocean Science for Informal Audiences (COSIA) class at Rutgers University.*