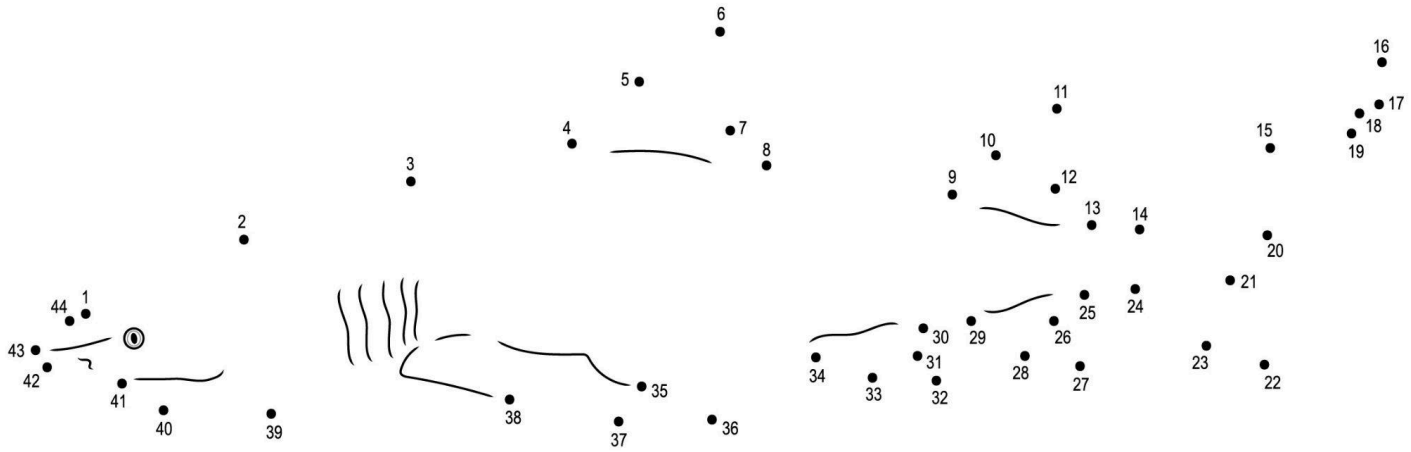
CONNECTING THE DOTS

A CONSERVATION ANALYSIS

Activity for Grades 4 & 5



Start at number 1 and connect the dots through number 44 (and then close the gap) to create a Lemon shark!

OBJECTIVES

Learn how scientists track lemon sharks around the Turks and Caicos Islands and why this matters.

Why Protect Sharks?
Sharks are top predators in the ocean. They help keep ecosystems balanced by feeding on sick and weak animals. When sharks are removed from the ocean, the balance of marine life can change, sometimes leading to unhealthy reefs and fish populations.

What Scientists Do:
- Use a variety of tags to track specific sharks and their locations
- Collect data on location, temperature, time, health, and biology
- Study migration, feeding, and breeding patterns
- Compare activity to human impacts (like tourism, fishing, construction, etc.)

Data Review:
Look closely at the maturity of the sharks and how often they are visiting certain areas. Are they new visitors or returning to the same location? If it's a "recap" (shark that has been previously tagged and recorded), is the shark growing at a steady rate? What might prevent sharks from returning to the same area? What might entice new sharks to visit? Are the areas they're visiting safe and full of enough biodiversity to sustain their population and promote population growth?

DEFINING TERMS

Habitats

Mangroves: Mangroves are salt-tolerant trees and shrubs that grow along tropical and subtropical coastlines, especially in areas where freshwater mixes with seawater, such as estuaries and tidal zones.

Seagrass Beds: Seagrass beds are underwater meadows of flowering plants that grow in shallow, salty, or brackish coastal waters. Unlike seaweed, sea grasses have true roots, stems, and leaves, and they anchor themselves in sandy or muddy bottoms.

Sand Flats: Sand flats are wide, flat areas of sandy seafloor that are usually found in shallow coastal waters, bays, or nearshore lagoons. They may be exposed at low tide and covered by water at high tide.

Reef Edges: Reef edges (*also referred to as a 'reef wall'*) are located at the outer margins of a coral reef where the reef meets the open ocean. Reef edges are the most exposed area of a reef with an abrupt drop-off into deeper water - prone to strong currents and sunlight.

Scientific Work-Up (Tagged Sharks)

Scientific work-up: When scientists tag sharks additional data is collected during the scientific work-up such as: measurements, identifying gender, health assessment, umbilical scar exam, plus a DNA sample. This can vary depending on the species, the size of the shark, and the questions scientists are trying to answer. The information from the work-up and results from the tagging reveals critical insight into the secret world of sharks whilst providing necessary data in order to enact impactful shark conservation.

Fort Length (FL): Measure from the nose to the end of the fork or "V" of the caudal fin (tail)

Total Length (TL): Measure from the nose to the top tip of the caudal fin (tail)

Pre-caudal Length (PCL): Measure from the nose to the beginning of the caudal fin (tail)

Girth: The girth measurement is acquired by wrapping a flexible tape measure around the shark - just behind the pectoral fins. Girth measurements can help scientists assess the health of the shark and get an estimate of the weight.

Recap: A "recap" is a shark that was tagged previously. A scientific work-up (gathering data) on a recap will determine if the shark is growing at a steady rate. Location data will also show if the recap is returning to the same habitat area.

Map Grid

X Axis: The x-axis is a horizontal number line. To simplify the activity included, our x-axis uses letters.

Y Axis: The x-axis is a vertical number line.

THINK LIKE A SCIENTIST

Read the information below and complete the activity.

Scientists have detected lemon sharks in the following key areas:

- Mangroves
- Seagrass beds
- Sandy Flats
- Reef Edges

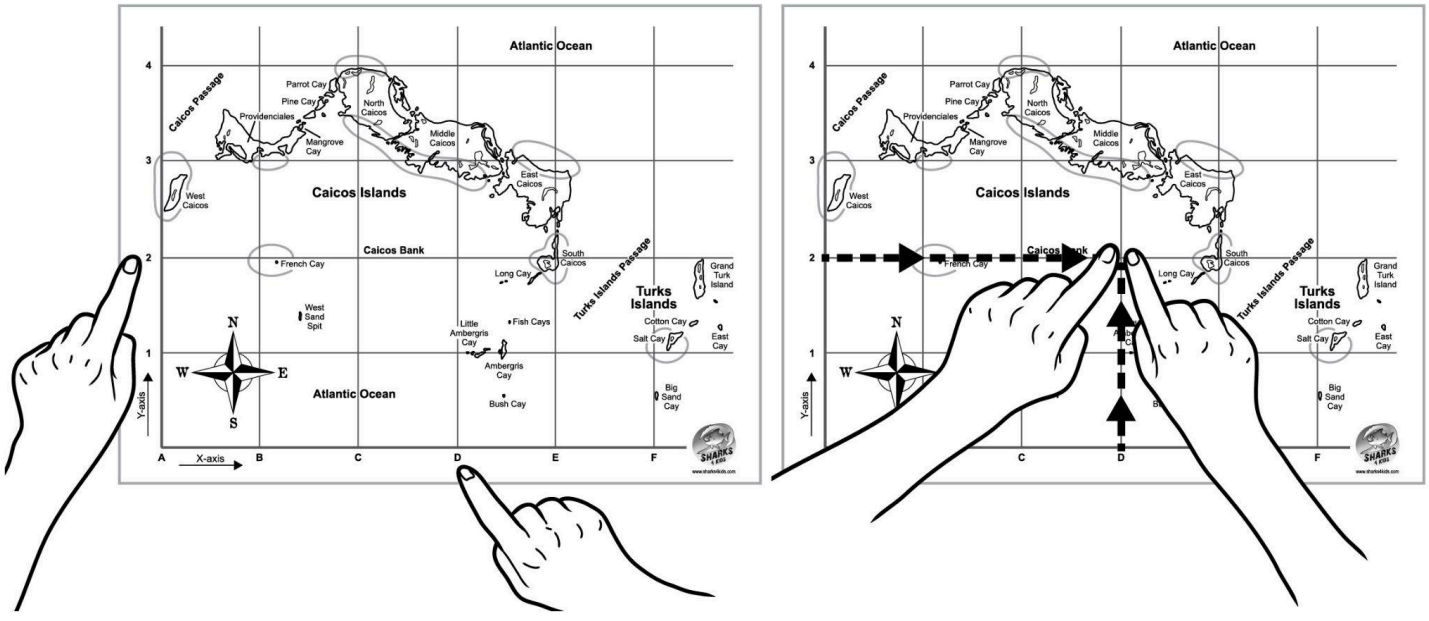
These are habitats where lemon sharks feed, grow, and hide from predators. When you learn where sharks spend most of their time, you can recommend protected areas, work with local communities on sustainable fishing, and warn against risky development projects that could harm the habitats and negatively impact the local communities.

Activity:

Refer to the diagrams below to learn how to locate x/y axis points around the Turks and Caicos Islands on the map. Using this method, you'll find specific habitats where lemon sharks have been found and tagged.

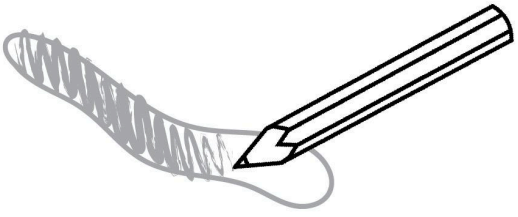
How to locate x,y points:

To find a point, you first go along the x-axis (horizontal), and then you go up the y-axis (vertical). A point is written as (x, y). Example: D,2 = Locate D on the x-axis and go up 2. Your x,y point is where the two lines meet.



Instructions:

Refer to the list of tagged sharks on the next page. Find the x/y axis point on the map of Turks and Caicos and mark it with a dot. Write the name of the habitat at that point (based on the hint) and shade the habitat area with your pencil. *Optional: You can shade the habitats with different colors, such as green for mangroves, or any color you choose!*



Tagged lemon sharks and where they were found:

Lemon shark 1 (LSl)
Habitat area (x/y axis point): **D3**
Hint: This shark was found among salt-tolerant trees and shrubs that grow along tropical and subtropical coastlines.
Notes: Female, juvenile, PCL 55 cm, FL 60.5 cm, TL 71.5 cm

Lemon Shark 2 (LS2)
Habitat area (x/y axis point): **E2**
Hint: This shark was found in a wide, flat area - usually found in shallow coastal waters, bays, or nearshore lagoons.
Notes: Female, juvenile, PCL 57.5 cm, FL 64 cm, TL 74.5 cm

Lemon Shark 3 (LS3)
Habitat area (x/y axis point): **A3**
Hint: This shark was found where the reef meets the open ocean.
Notes: Male, juvenile, PCL 60 cm, FL 65.5 cm, TL 77 cm

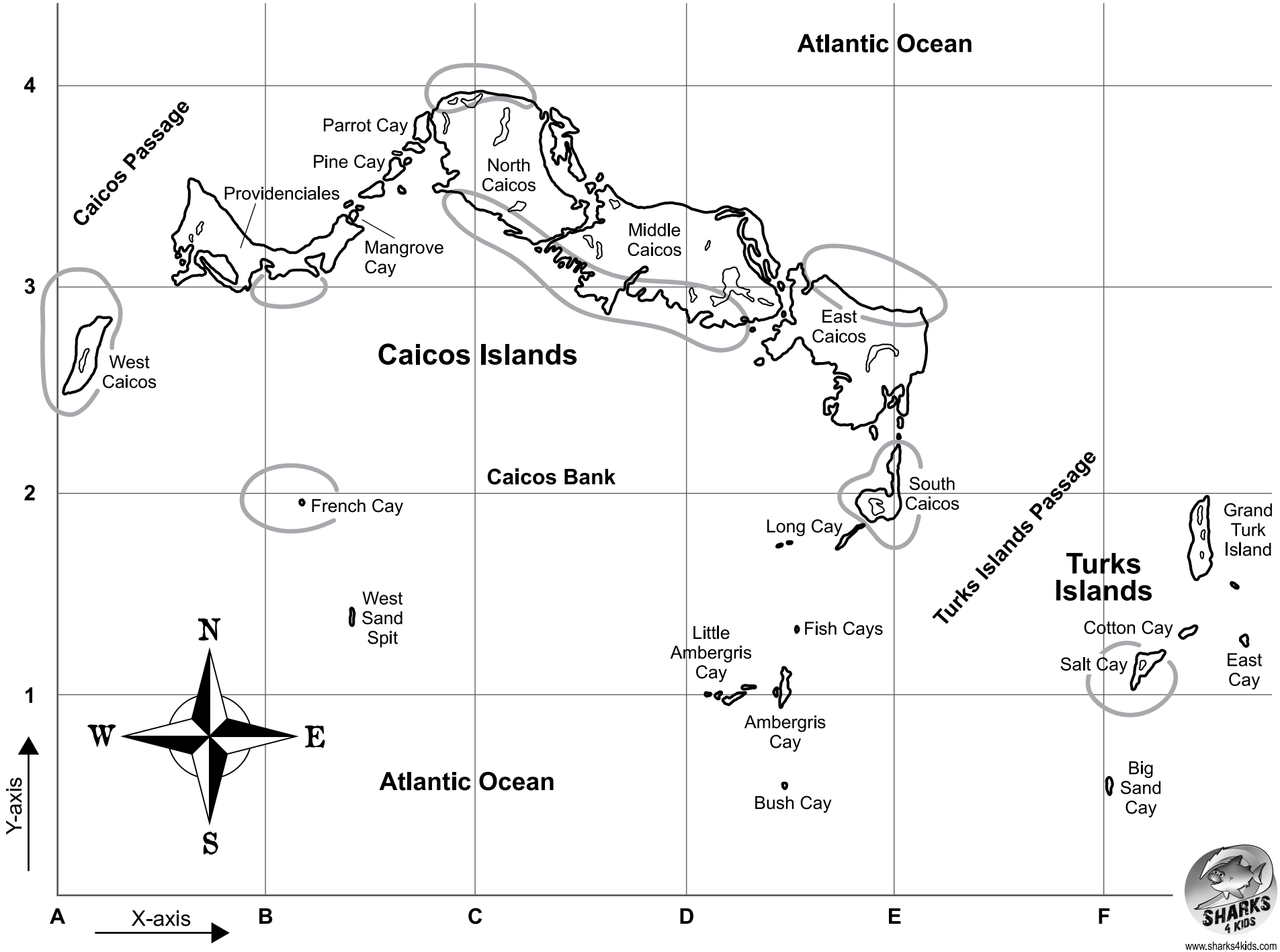
Lemon Shark 4 (LS4)
Habitat area (x/y axis point): **C4**
Hint: This shark was found among underwater flowering plants that grow in shallow, salty, or brackish coastal waters.
Notes: Female, juvenile, PCL 59 cm, FL 66 cm, TL 76.5 cm

Lemon Shark 5 (LS5)
Habitat area (x/y axis point): **B2**
Hint: This shark was found where the reef meets the open ocean.
Notes: Male, juvenile, PCL 47.5 cm, FL 51.5 cm, TL 61 cm

Lemon Shark 6 (LS6)
Habitat area (x/y axis point): **B3**
Hint: This shark was found in a wide, flat area - usually found in shallow coastal waters, bays, or nearshore lagoons.
Notes: Male, juvenile, PCL 61 cm, FL 67 cm, TL 77 cm

Lemon Shark 7 (LS7)
Habitat area (x/y axis point): **F1**
Hint: This shark was found among underwater flowering plants that grow in shallow, salty, or brackish coastal waters.
Notes: Female, juvenile, PCL 63.5 cm, FL 70 cm, TL 81.5 cm

Lemon Shark 8 (LS8)
Habitat area (x/y axis point): **E3**
Hint: This shark was found among salt-tolerant trees and shrubs that grow along tropical and subtropical coastlines.
Notes: Female, juvenile, PCL 70.5 cm, FL 79 cm, TL 91 cm


Atlantic Ocean
Caicos Passage
Parrot Cay
Pine Cay
Providenciales
Mangrove Cay
North Caicos
Middle Caicos
East Caicos
West Caicos
Caicos Islands
Caicos Bank
French Cay
South Caicos
Long Cay
Turks Islands Passage
Grand Turk Island
Turks Islands
West Sand Spit
Little Ambergris Cay
Fish Cays
Cotton Cay
Salt Cay
East Cay
Ambergris Cay
Bush Cay
Big Sand Cay
Atlantic Ocean
N
W
E
S
Y-axis
X-axis
A
B
C
D
E
F
1
2
3
4
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REFLECTION QUESTIONS

1. Why are sharks important to the ecosystem?

2. What kind of environments do lemon sharks like?

3. Why do scientists track the movements and locations of tagged sharks?

4. What data do scientists collect from tagged sharks?

5. Name two reasons why scientists care about lemon shark habitats.

6. How might this data help the local community and wildlife?

7. Which habitat appears most often near lemon shark sightings?

8. What could happen if these habitats are destroyed?

9. How does this map help us make real conservation decisions?

10. What surprised you the most about lemon sharks?

11. Do you think this kind of data collection helps the environment? Explain.

12. How can you help protect marine animals like sharks in your daily life?

WRITING PROMPTS

1a - Conservation in Action:

Imagine you're a conservationist advising a new resort company. They want to build on East Caicos, near coral reefs. Use what you learned to answer the corresponding questions below.

1b - Writing Prompts:

- Would you recommend East Caicos as a new resort building location? Why or why not?
- Why is scientific collaboration important? That is, why is it important for scientists and citizens to work together to understand this data and why it affects everyone and how we might work together?
- What environmental concerns might arise from building a resort near coral reefs on East Caicos?
- What steps could the resort take to minimize damage to the coral reefs and surrounding marine life?
- How could tourism be managed so that it supports both the local economy and reef conservation?
- How would you educate guests about the importance of preserving coral reefs during their stay?

2a - Conservation in Action:

Imagine you're a conservationist and the local community is complaining of fisheries in their area becoming depleted and many species have not been seen in the area for some time. Use what you learned to answer the corresponding questions below.

2b - Writing Prompts:

- What alternatives or solutions could protect sharks and still help the local economy?
- How could you use the data collected in this activity to communicate solutions to the local, state and federal governing agencies for lasting change/protection?
- What would happen if we saw lemon sharks leave this area?
- What possible causes could explain the depletion of fisheries and the disappearance of certain species in the area?
- How would you involve the local community in your conservation plan?
- What challenges or obstacles might you face while implementing your conservation measures, and how would you address them?