Seven Reefs and a Heat Wave Lab

Name _____

Date _____

Period _____

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Do Now Two coral reefs sit in the same warm ocean. One is full of fish and colorful coral. The other is white, and most of its coral is dead. 2 minutes, before you open the lab

A. What is your first idea about why the second reef is dying?

☐ Warmer water ☐ Fishing and people ☐ Not sure yet

B. How could a scientist find out if warmer water is hurting a reef? Write one thing they could measure.

_____

☐ I can use real reef data to find a pattern and pick a fair comparison.

☐ I can explain how a scientist like Enric Sala studies a warming ocean.

☐ I can plan a measurement to test how climate affects a local ecosystem.

Part 1. Survey the reefs (Tab 1)

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Pick card **A**. Click every ring that sits on living coral, then press **Check my count**. Do all seven cards. Copy from **Your survey**, and look at the graph.

1. Record each reef.

Card	Heat weeks	Fishing? (yes or no)	Coral points (of 25)	Coral cover (points × 4)
A				
B				
C				
D				
E				
F				
G				

2. Do the hottest reefs have the least coral? ☐ yes ☐ no The three hottest reefs are _____, _____ and _____. Their coral cover: _____.

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 3 to 5.

3. A diver's photo has 25 survey points. 9 land on living coral. Coral cover = _____%. Why do you multiply by 4?

4. What do **heat weeks** measure, and what tool measures them? At about how many do corals start to bleach?

5. The two reefs with the least coral are _____ and _____. Read their cards. What do they have in common that the other five do not?

Part 2. A fair comparison (Tab 2)

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Do Steps 1, 2 and 3 in the side panel. In Step 2, compare **C and E**, then **C and A**.

6. The reefs where people fish: _____

7. What is different about each pair?

Pair	Heat weeks	Fishing	What is different?	A fair test of heat?
C and E				☐ yes ☐ no
C and A				☐ yes ☐ no

8. Open the strips. From 1997 to 2005, coral at Kingman (C): ☐ fell ☐ stayed about the same At Tabuaeran (B) and Kiritimati (E): ☐ fell ☐ stayed about the same

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 9 to 11.

9. Explain **coral bleaching** in three steps: what happens to the water, to the algae, and to the coral.

10. Heat waves hit all seven reefs. Which reefs lost the most coral, and why? Use the word **resilience** .

11. A classmate compares C and E and says, "E has less coral, so heat kills coral." Is that a fair conclusion? Explain, and name a better pair.

Part 3. Sixty years in a coral (Tab 3)

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Move along the core. Mark every bright stress band until you have found all 10. Copy from **Bands you found**.

12. The Jarvis Island record, 1960 to 2016.

Question	Answer
How many heat waves bleached the reef?	
How many were severe (over 30%)?	
Biggest before 2015: years and %	
2015-16: % bleached, % that died	

13. Was 2015-16 the first big bleaching at Jarvis? Use two numbers from Q12.

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 14 to 16.

14. Claim: "One record-hot summer proves the climate has changed." ☐ true ☐ false Climate is the usual pattern over about _____ years. Explain using **weather** and **climate** .

15. How did the scientists know 2015-16 was bigger than any heat wave before it? Why did they need many years of data, not one?

Wrap it up: plan it like Enric Sala

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16. Pick one Buffalo question.

☐ Is Lake Erie freezing less? ☐ Are Delaware Park's leaves coming out earlier?

☐ Are brook trout losing cold streams?

What will you measure?	
Where? (two places to compare)	
How often, and for how many years?	
What pattern would mean "yes"?	

NYSSLS: HS-ESS2-7 (Earth's systems and life change together), touching HS-ESS2-5. Environmental Science, Chapter 6, Explorers at Work: Saving the Last Wild Places in the Ocean (pp. 158–159). Tags: SEP = Science and Engineering Practice, CCC = Crosscutting Concept. Data: Sandin, Sala and others (2008); Barkley, Cohen and others (2018).