# **LAB 8 – SOLVE THE MYSTERY OF THE DYING CRABS**

# Name: Section number \_\_\_\_\_\_\_\_\_\_\_\_\_

Complete the lab and use this form as your answer sheet. Type answers in the Text boxes which will expand as you type in them.

# Lab 8.1 – What trends or patterns can you observe in dissolved oxygen levels in the ocean at this location?

## Interpretation questions

1. Most organisms need a DO concentration of 2 mg/L or above to be able to live. Below this concentration, we consider conditions to be “hypoxic,” and if DO falls to approximately 0 mg/L, conditions are “anoxic.” Click the “Draw 2 mg/L Threshold Line” box beneath the graph to bring up a line that marks 2 mg/L, the threshold for hypoxic conditions. Characterize conditions on the seafloor over the weeks that these data were collected. Was hypoxia common, rare, or non-existent during this time?

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1. How many longer-term (longer than a few hours) hypoxic events happened during the interval covered by these data?

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1. Choose one of the hypoxic events in June. Roughly how long, in days, did DO remain below the hypoxia threshold?

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## Application questions

1. What are some ways ocean water becomes oxygenated? Would these processes operate in the same way in all parts of the ocean? What are some differences you might see with depth?

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1. Based on depth and temperature, make a hypothesis about which depths of the ocean would be well-oxygenated and which depths would not be.

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1. The following figure shows us DO along a transect across the Oregon shelf by Endurance Glider #384, near our study area. The colors represent levels of dissolved oxygen. Do these real-word data support your hypotheses in the previous questions?

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# Lab 8.2 – How do DO levels correlate to seawater temperatures?

## Interpretation questions

1. How many periods of prolonged low temperatures (more than a few hours) do you see in this data?

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1. Compare the two interactive graphs. What do you notice about the trends in temperature and DO?

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1. Does DO change at the same pace (rapid or slow) as the seawater temperature?

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1. Describe the typical "textbook" relationship between temperature and dissolved oxygen. If you had a beaker of water and you heated it up, as the temperature went up would the dissolved oxygen level in the water increase or decrease?

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1. Does the pattern shown in the graphs fit the relationship you described in the previous question? Explain why or why not.

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## Application questions

1. In a general way, where in the ocean do you expect colder water to occur, and where in the ocean do you expect warmer water?

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1. The following figure shows us seawater temperature along a transect across the shelf by Endurance Glider #384, near our study area. The colors represent different temperatures. The seawater temperature data we are examining was collected in approximately 25m of water. According to this profile, what is the expected approximate temperature of seawater off the Oregon coast at 25m?

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1. According to the figure above, at what approximate depths would we usually find water at the temperature range we see in our minimum temperatures for our 25m study site?

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1. Formulate a hypothesis as to why the seawater is changing temperature and dissolved oxygen content in the pattern observed here. What other sorts of data might be needed to test your hypothesis?

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# Lab 8.3 – Can wind direction data help us synthesize our observations from Activity 1 and 2?

## Interpretation Questions

1. Do you see any correlation between wind direction and dissolved oxygen? If so, characterize the relationship.

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1. Do you see any correlation between wind direction and temperature? If so, characterize the relationship.

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1. Summarize what happened with all three variables over the course of the study interval in a general sort of way. When one variable changed, how did the other variables change? Were the changes predictable?

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1. What mechanism can you think of that could cause the wind direction to influence both DO and T simultaneously?

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1. Now synthesize what you have learned from the datasets over the three activities:
   1. What killed the crabs and what was the sequence of events that caused it to happen?

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* 1. Can we use our understanding of this scenario to help predict when this crab-killing sequence of events might happen in the future in this area? What types of conditions would you need to look out for?

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## Assessment questions

1. Think of other commercially important species that might be affected by similar events. List two species (or types of organisms) affected and describe why and how you think they would be affected by low dissolved oxygen

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## Reflection

1. In the wake of anoxic events, should humans enact regulations to help marine populations recover?

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