

# **GEO/OC 103 Spring Term 2009-10 Field Trip**

**to  
the Hatfield Marine Science Center  
and  
Seal Rock State Park**

**May 22, 2010**





PLEASE  
touch gently

Sea anemones  
are living  
animals.

Gentle fingers only  
on their tentacles  
or sides.





# Resonating pipes

Put your ear to the bottom of each pipe and compare the different sounds. Notice that the sounds vary with the length of the pipe.



The pipes are playing sound waves in the air. Each pipe resonates at one particular note.





EXIT

### Scientists searching for patterns

Scientists use the power of computers to find patterns in the data they collect. They use these patterns to make predictions about the future. This is how scientists search for patterns.

### ADD TO 12

Place the 7 different numbers so that the sum of three numbers in any straight line (vertical, horizontal, or diagonal) is 12.

### FOUR EQUATIONS

Place the numbers 1 through 9 so the three horizontal and one vertical equations are correct.

CUATRO ECUACIONES  
Coloca los números del 1 al 9 de manera que tres horizontales y una vertical estén correctas.

Coloca los siete números diferentes en el tablero de modo que la suma de los números en cualquier línea recta (vertical, horizontal o diagonal) sea 12.



### Scientists searching for patterns

Scientists search for patterns in the natural world. They look for regularities in the way things behave. For example, they might look for patterns in the way plants grow, or in the way animals move. They use these patterns to make predictions about the future. This is a key part of the scientific process.

FIRE EXIT

### ADD TO 12

Place the 7 different numbers so that the any three numbers in any straight line (vertical, horizontal, or diagonal) is 12.

*(Please don't leave the answer for the next person.)*

### FOUR

Place the num three horizo equations a





PLEASE touch gently

Gentle fingers only on their tentacles

Sea anemones are living animals.



























OREGON STATE

Searching for patterns  
in a complex world...

The pipes are picking up  
sound waves in the room.  
Each pipe responds to sounds  
of one particular pitch.

Sound waves have to travel  
further as the length of the  
pipe increases. As a result,  
longer pipes vibrate with  
low-pitched, low-frequency

sounds, and shorter pipes  
reinforce high-pitched high-  
frequency sounds.



PLEASE  
DO NOT  
touch the pipes



**PLEASE  
DO NOT**  
talk into pipes.  
  
For listening only.

# Resonating pipes



Put your ear to the bottom  
of each pipe and compare the  
different sounds. Notice that  
the sounds vary with the  
length of the pipe.

PSR











1) Why is super-sized neon spaghetti hanging from the ceiling and what is it used for?

1) Would an albatross really eat a cigarette lighter or a toothbrush? Why?

1) What do albatrosses and plastic bottles have in common?

### Creating Electricity from Anoxic Mud

Researcher Michael Fuel Cell (MFC) has discovered a way to generate electricity from anoxic mud. The mud is rich in organic matter and contains a high concentration of sulfate-reducing bacteria. These bacteria use sulfate as an electron acceptor and produce hydrogen sulfide as a byproduct. The hydrogen sulfide is then oxidized at the anode of the MFC, generating electricity. The electrons produced are used to reduce oxygen at the cathode, producing water. The overall reaction is:  $2H_2S + O_2 \rightarrow 2S + 2H_2O$ . The MFC can be used to power small electronic devices or to generate electricity for a small-scale power plant.

### Current Activities

Current activities include the use of MFCs in wastewater treatment, the production of hydrogen gas, and the generation of electricity from organic waste. MFCs are also being used in the development of bio-sensors and in the production of bio-fuels. The use of MFCs in wastewater treatment is particularly promising, as they can generate electricity while also treating the wastewater. The production of hydrogen gas from MFCs is another area of active research, as hydrogen is a clean and renewable energy source. The generation of electricity from organic waste is also a promising application of MFCs, as it can help reduce the amount of waste sent to landfills while also generating electricity.

### Microbial Fuel Cell

The Microbial Fuel Cell (MFC) is a device that generates electricity from organic matter. It consists of two electrodes, an anode and a cathode, separated by a proton exchange membrane. The anode is where the organic matter is oxidized, and the cathode is where the electrons are reduced. The overall reaction is:  $2H_2S + O_2 \rightarrow 2S + 2H_2O$ . The MFC can be used to power small electronic devices or to generate electricity for a small-scale power plant.

### North Pacific Albatrosses

North Pacific Albatrosses are a group of birds that are found in the North Pacific Ocean. They are known for their long, dark wings and their ability to fly long distances. There are several species of North Pacific Albatrosses, including the Laysan Albatross, the Black-footed Albatross, and the Brown Noddy. Each species has its own unique characteristics and behaviors. For example, the Laysan Albatross is known for its long, dark wings and its ability to fly long distances. The Black-footed Albatross is known for its black feet and its ability to fly long distances. The Brown Noddy is known for its brown feathers and its ability to fly long distances.

Would an albatross really eat a cigarette lighter or a toothbrush? Why?

Can you identify these different albatross species?

SE  
OT  
and  
k.  
You.



Many mollusks, like this scallop, have exchanged speed for protection while like the nudibranchs, octopuses kept their mobility

Many intertidal creatures have a spiny covering. These include the familiar sea stars and urchins.

sea squirts may look a bit like sponges but are actually more advanced and have a central nervous system

## Red flags and whistle blowers

Simply identifying all the species that live in an ecosystem can be a daunting task. For this reason, scientists often study species that play a major role in the ecosystem.



### Keystone species

are those whose role in an ecosystem is so important that major changes would result from their absence or elimination. The alligator in the southern swamps is a commonly cited example of a keystone species. In the intertidal, the sea star (*Pisaster*) is a keystone species.



### Umbrella species

are those which have such broad habitat and space requirements that protecting their habitat is assumed to provide protection for all of those species which share these habitats. Some biologists use grizzly bears as umbrella species for the mountains. In the less well-known marine environment, it is possible that some whale species may fit this role.



### Indicator species

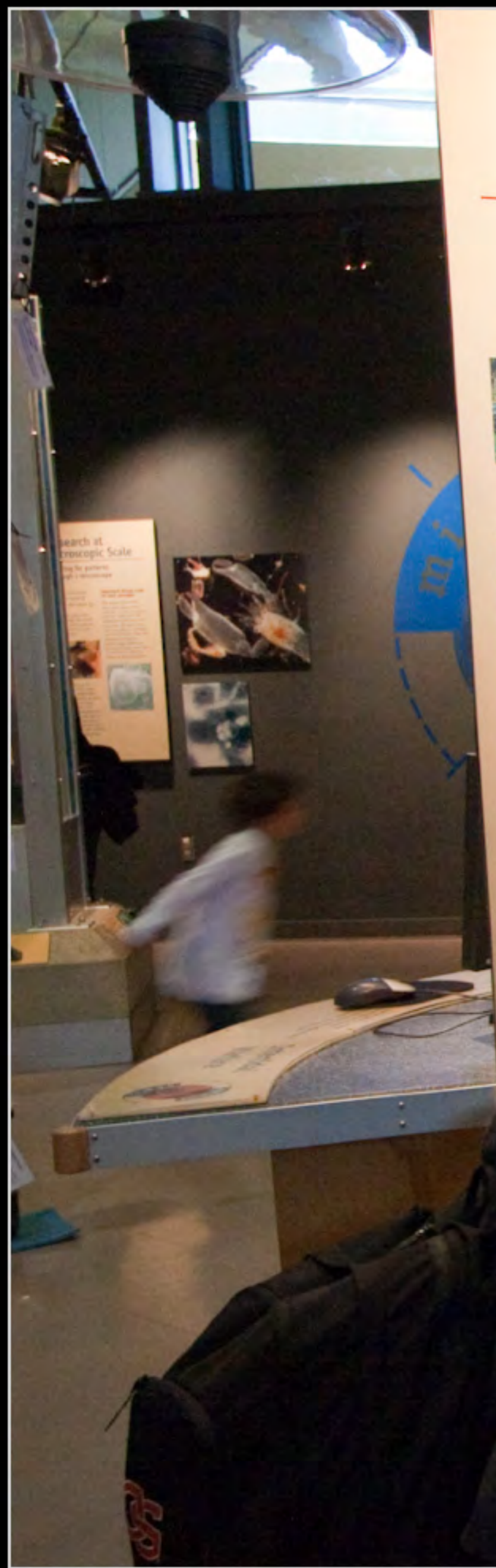
are those which serve as alarm bells for the rest of the community. Salmon are important indicator species for the health of our rivers and streams.

How Shore Aquarium  
The tide pools are home to a variety of marine life. Some of the most interesting organisms are the sea stars and sea anemones. These organisms are very sensitive to changes in water quality and can die if the water becomes too polluted. This is why it is important to keep the tide pools clean and free of debris.

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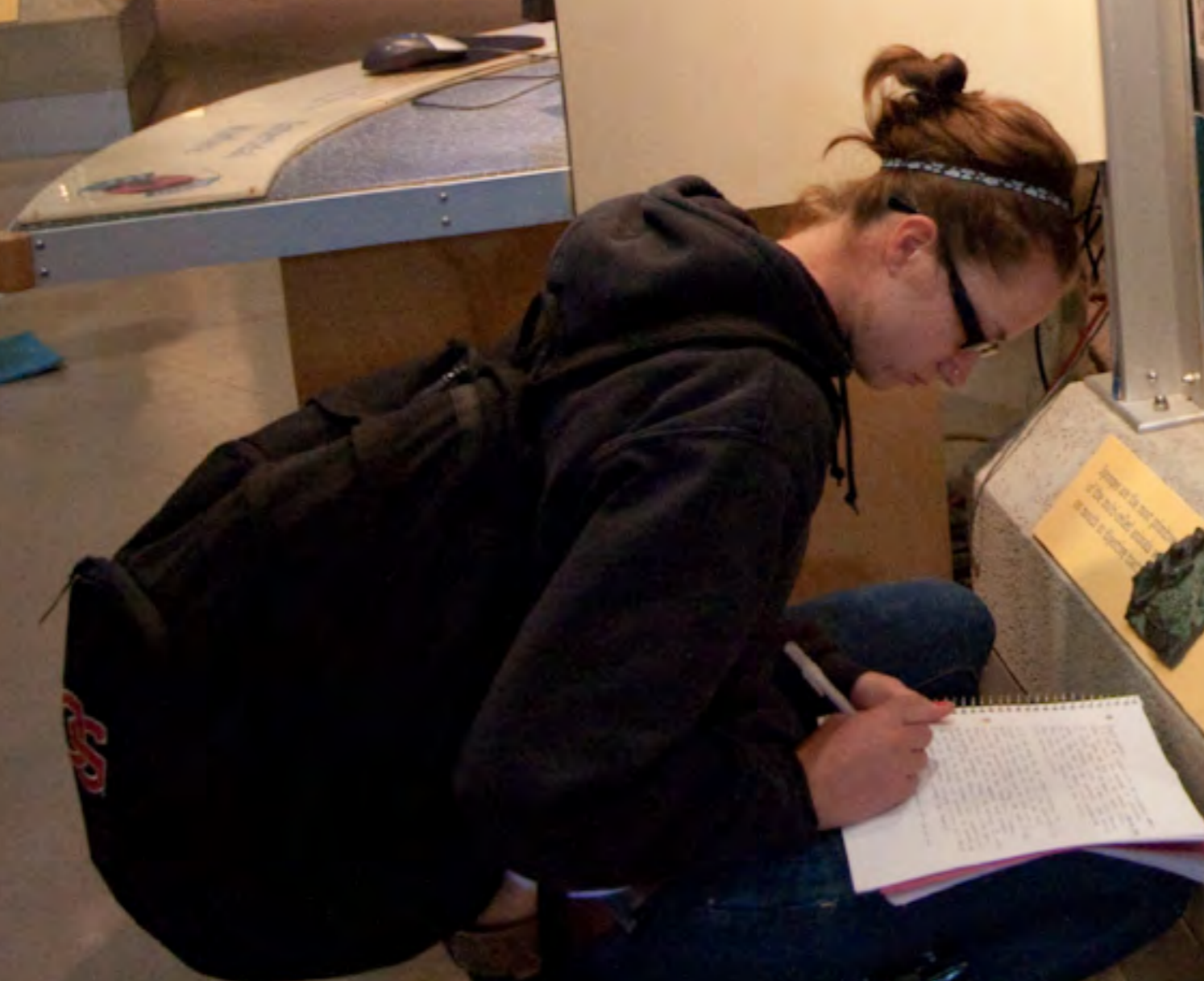
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# Rhythms OF OUR COASTAL WATERS

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no recorded intrusion  
states in native range  
states with invasive intrusion

Bahrain, Islands, Guam and South Africa as well as the Western United States.

PLEASE  
DO NOT TOUCH































## WELCOME TO OUR HOME

We are among the most diverse and productive places on the coast.

Please visit us, and enjoy our unique and wondrous habitat.

We can withstand the force of large waves, but we are easily damaged by human activities. Please:

• Walk carefully - avoid stepping on or crushing plants.

• Handle us gently - pulling and prying us from the rocks can damage our habitat.

• Please remove us from one place to another. Each of us is specialized to live in our habitat and we may not survive in another place.

• Please do not place rocks or shells in our habitat.

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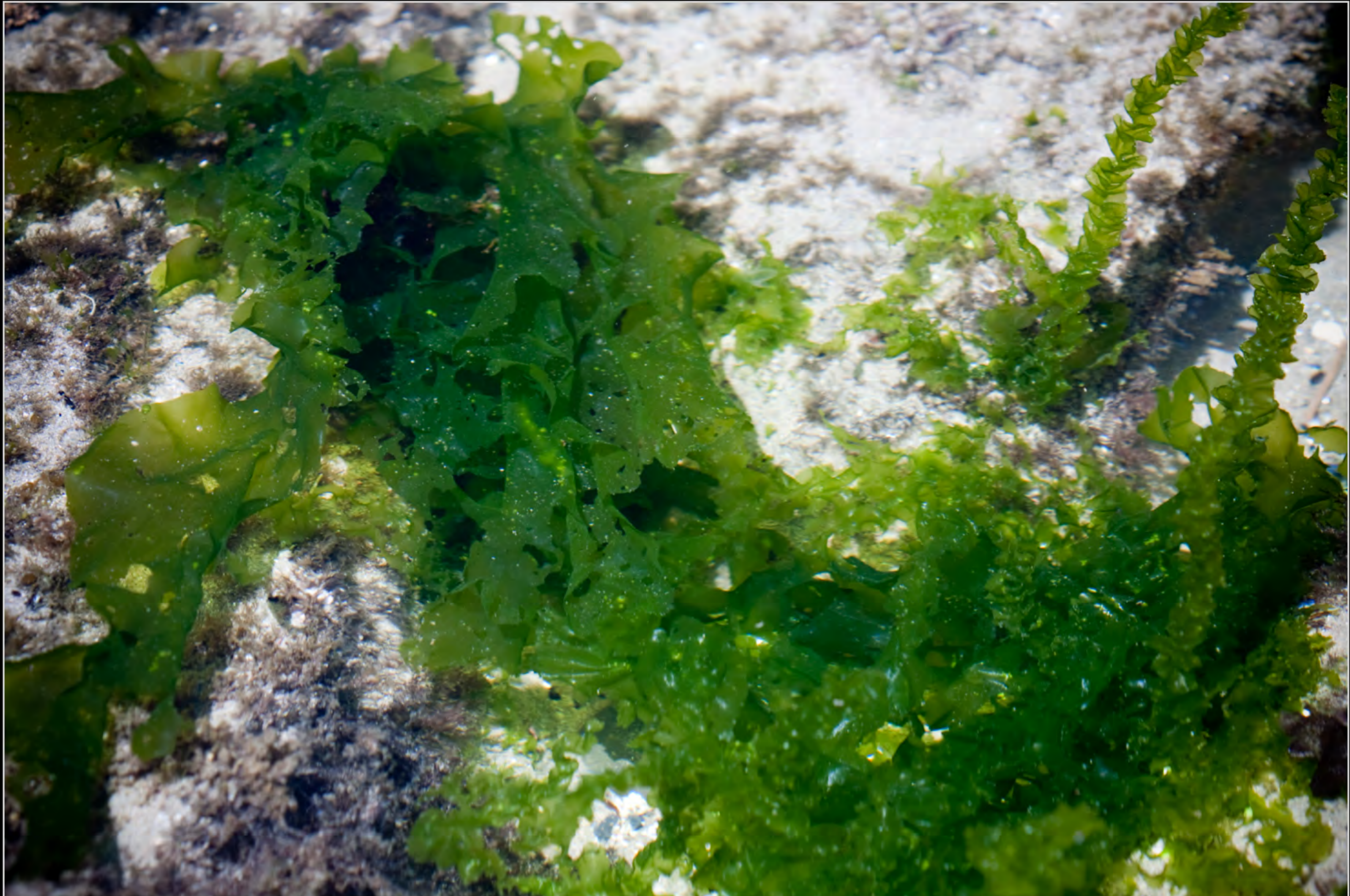






































**Photos By Tina Buescher**

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