

Periphyton Lab

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Algae, Springs Ecosystem

Summary:

The periphyton study will familiarize students with the macro and micro algae common to springs and introduce them to the factors that influence algal growth. Students will observe and measure macro algae at locations near the Wakulla Springs waterfront. Students will then collect samples of the common varieties and will examine and compare the abundance and variety of algae by observing the slides under a microscope.

Objective(s):

After completing the field lab, students will be able to:

1. Collect and Identify common groups of algae
2. Explain the benefits and hazards of algae

Ecosystem(s): Rivers/Springs

Equipment:

- | | | |
|--|---|---------------------------------|
| • Periphytometers (optional) | • Dip nets or rakes | • Pupil Cam & Laptop (optional) |
| • Protective vinyl gloves | • Eye dropper | • Algae Reference Chart |
| • White collection and observation trays | • 5 x Five gallon buckets or large ziplock plastic bags | • Waterproof Marker |
| • Data sheet & clipboard | • Rinse bucket and paper towels | • Slides and Cover Slide |
| • Magnifying lenses | | |
| • Microscopes | | |

Background:

- Vocabulary: periphyton, algae, diatoms; substrate
- Reference Material:
 - Power Point slide presentation by Jan Stevenson, <http://aquat1.ifas.ufl.edu/guide/periph.html>;
 - UF/IFAS Algae Website: <http://plants.ifas.ufl.edu/guide/2algae.html>
- Equipment Training: Use of the microscope, slide preparation

Procedure (Engage; Explore; Explain)

1. Ask students where they think algae fits into an ecosystem. Are there good and bad algae? When does a good algae go 'bad?' Have students complete the hypothesis and rationale on their data sheets.
2. Student teams will study algae samples on both macro and micro levels.
3. Teams will collect one algae sample from a pre-selected location near the waterfront and dock (dive tower, waterfront snags, submerged vegetation, leaf litter, T-dock (floating mats)) Students will record their macro observations at their assigned location. A sample will be carried back to the microscope station in a bucket, and should be large enough for all the groups to prepare sample slides. Each team will prepare study slides from each of the five sample locations. A rinse bucket will be available to clean slides.
4. Under microscopes, the teams will identify algae types using periphyton id charts. Students will draw the sample on their data sheet, and determine the algae richness of the sample slide.
5. At least one pupil cam and laptop will be available to record and label particularly clear or diverse algae samples.

Sunshine State Standards:

Science: SC.A.1.3.1, 3; SC.C.1.3.1; SC.D.1.3.1,3,5; SC.D.2.3.2; SC.G.1.3.4; SC.G.2.3.2,3,4; SC.H.1.3.2,4,6,7; SC.H.2.3.1; SC.H.2.3.7; **Language Arts:** LA.A.1.3.3; LA.C.1.3.1, 4 **Mathematics:** MA.A.1.3.1, 4; MA.B.4.3.1; MA.E.3.3.1 **Social Studies:** SS.A.6.3.2; SS.B.2.3.6, 9 **Climate Literacy:** 1-c,e,f; 5-a; 6-b,c **Ocean Literacy:** 2-c; 5-f; 6-e

Periphyton Lab

Student Data Sheet

General Information


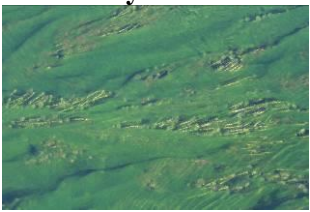

Name:		Date:	
Teacher:		Time:	

Student Hypothesis and Rationale

If algae attach themselves to submerged aquatic vegetation, then we would expect to find

(circle one: more or less) types of algae on vegetation with more surface area because _____

Field Observations/Measurements/Data

Macro Algae:	Eel Grass	Hydrilla	Leaf Litter
			
Surface Area			
Substrate (depth)			
Thickness (use scale below)			
Appearance (use analogy)			
Texture			
Estimated distance from spring vent			

Periphyton Thickness Scale

- 0 - substrate rough with no visual evidence of microalgae
 - 0.5 - substrate slimy, but no visual accumulation of microalgae is evident
 - 1 - a thin layer of microalgae is visually evident
 - 2 - accumulation of microalgal layer from 0.5-1 mm thick is evident
 - 3 - accumulation of microalgae layer from 1 mm to 5 mm thick is evident
 - 4 - accumulation of microalgal layer from 5 mm to 2 cm thick is evident
 - 5 - accumulation of microalgal layer greater than 2 cm thick is evident
- Actual - Mat thickness can be measured with a ruler

Source: Stevenson and Rier (<http://www.epa.gov/owow/monitoring/rbp/ch06main.html>)

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Student Data Sheet

Substrate	Algae Observed (drawings of unique types of algae and diatoms observed in one slide)	Richness (number of different types)
Eel Grass		
Hydrilla		
Leaf Litter		

Periphyton

Assessment

1. Which substrate had the highest diversity of algae?

2. What was the difference between the substrate with the highest number of algae identified and the substrate with the lowest?

3. Does your data support your hypothesis? Whether your hypothesis is supported or not, what can you infer from your observations, and results?

4. If algae are like plants in that they use photosynthesis to produce food and grow, what might happen if the amount of nutrients they receive increases?

5. Nutrients that contribute to the growth of algae come from many different sources. Try to identify some sources of nutrients that might come from the following land uses: farming, residential, recreational lands such as parks and golf courses?

6. Think about what you learned in this lab; has it generated any new questions? Write a new question about something you want to learn more about.

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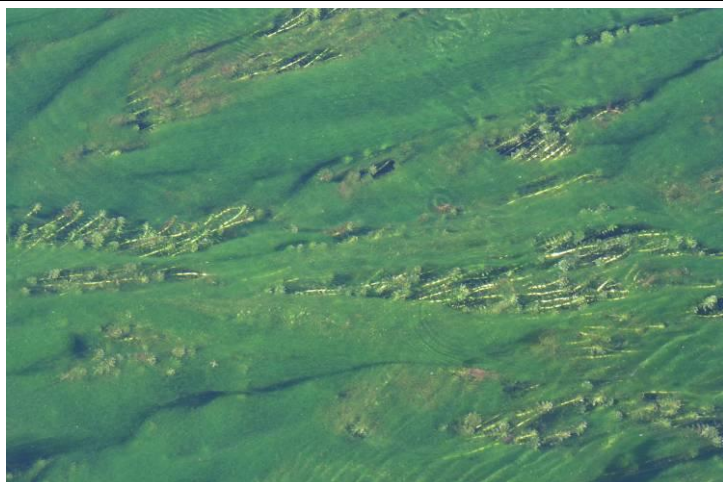
Macro Algae/Substrate Reference Chart



Eel Grass

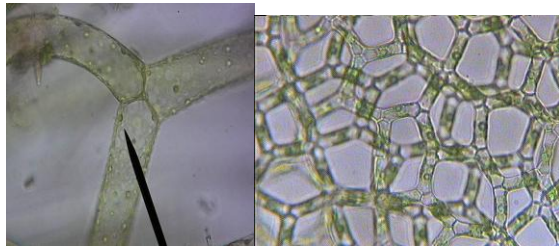


Leaf Litter

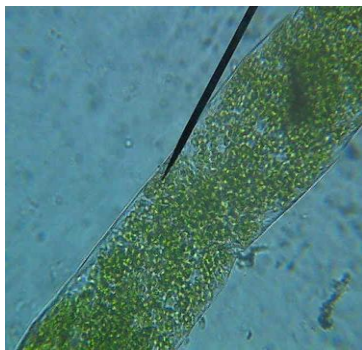


Hydrilla

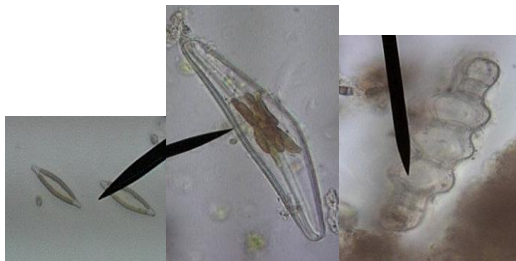
Periphyton Lab



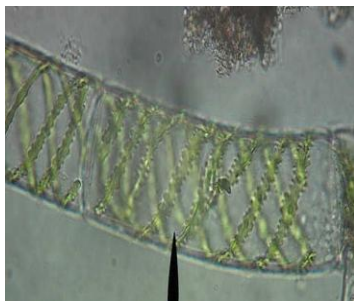
Green Algae (Hydrodictyon)



Vaucheria?

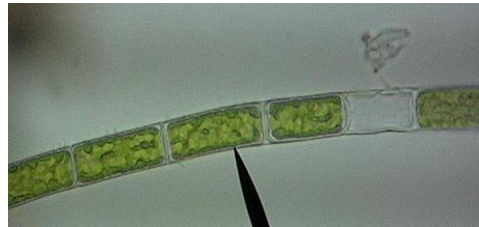


Diatoms Left: (Class Bacillariophyceae); Center: (Family Cymbellaceae); Right (Terspinoe musica)

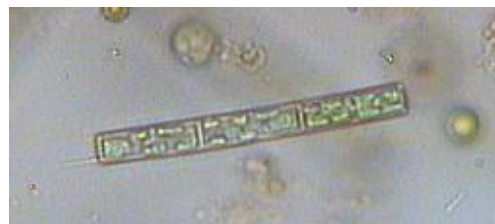


Spirogyra

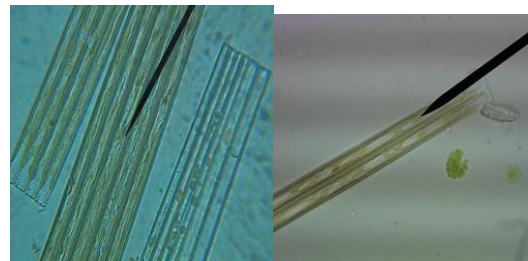
Micro Algae Reference Chart



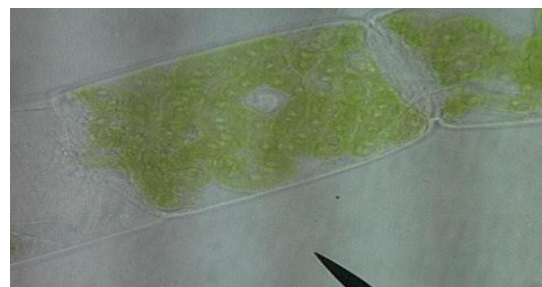
Coscindodicophyceae. (Aulacoseira or Melosira)?



Aulacoseria granulata



Diatom Chains (Class Fragilariaceae)



Unknown