**Concepts**
Students will explore the different ways that they interact with limu in everyday life.

**HCPS III Benchmarks**
SC 3.3.1

**Duration**
10-min prep period & one 1-hr period

**Source Material**
MARE
FOSS
PRISM
Other

**Vocabulary**
Algin
Carrageenan

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**Optional CULTURE Extension - Limu Party**

**Summary**
The class will explore household and grocery-store items for limu ingredients. Students will compile limu recipes and make dishes from home to share at Limu Party and eat algae cookies prepared by the teacher.

**Objectives**
- Students will identify several different human uses of limu
- Students will recognize limu derivatives in common household products
- Students will participate in the class Limu Party

**Materials**
**Algae cookies:**
- Concentrated chlorella powder (from natural food store) and/or another type of dried algae
- Flour
- Butter (or margarine/shortening)
- Milk (or soymilk/almond-milk … etc.)
- Baking Powder
- Sugar (white and powdered)
- Salt
- Eggs
- Sesame seeds (optional)
- Oven, cookie sheet, … etc.
- *Sesame seeds (if convenient – for texture)*
- *Vanilla (if convenient – for taste)*

**Making Connections**
This lesson provides a marvelous opportunity for students to share recipes and stories of limu uses from home with their classmates. Hopefully by going outside the typical framework of textbook science and literally bringing it close to home, the students will be excited that they too are ocean grazers like their many types aquatic friends we will explore later in the Ocean Grazers Unit.

**Teacher Prep for Activity**
The activities in the Lesson include parent and other household participation. Therefore, it is a good idea to send a note home to the parents and let them know what is going on. In other words, inform them which household objects (e.g. toothpaste, lotion, shampoo, ice cream) normally have algae components (like algin and carrageenan). Ask children to join their families at the grocery store (or at home in the bathroom/pantry) and go on a limu scavenger hunt. Tell them to
make a list of all the products they find that use algae (looking for algin and carrageenan in the ingredients). Some of these products might include toothpaste, ice cream, salad dressing, soap, cosmetics and certain medicines.

Up to now, this unit has incorporated a variety of uses of limu (e.g. food source for ocean grazers, consumed/used by humans), so we felt it might be fun and appropriate to throw a party centered around limu. Here especially, it is important to provide parents with a date for the Limu Party (see Optional Lesson 4) with sufficient notice allows them to participate (in bringing in dishes or joining the class during the celebration). Ask them to bring in any food dishes that they normally prepare that use algae (e.g. spam musubi, poke, seaweed salad) or to donate some commonly used limu-foods such as Arare (seasoned limu) from the local grocery store. Also, below is a recipe for “limu cookies” that was gleaned from a “Curricular Correlations” extension of a 4th-grade Oceanography curriculum (see http://www.utm.edu/departments/cece/old_site/fourth/4M3.shtml) ... however, the recipe has been adjusted by adding an egg, sesame seeds, and 1 ½ cups of sugar for taste (otherwise they are more like crumbly algae crackers).

Algae cookies:
¾ T Baking Powder
4 T (1/4 c) Butter (or margarine/shortening)
½ t Concentrated chlorella powder (from natural food store) or another type of dried algae
(Teacher can also try using a bit of spirulina and/or grind up any whole rehydrated dried limu species that can be purchased at stores like KTA. Some types of store-bought limu might include wakame (dried), mehiji (dried), and fresh ogo - ask the meat department.)
1 Egg
2 c Flour
¾ c Milk (or soymilk, almond-milk, ricemilk for students with dairy allergies)
Oven, cookie sheet, … etc.
½ t Salt
1 c granulated (white) sugar
½ c powdered sugar (if possible, otherwise use more granulated white sugar).
Sesame seeds (if convenient – for texture)
Vanilla (if convenient – for taste)

1. Preheat the oven to 350°F.
2. Mix ½ teaspoon of chlorella (and likewise ½ t of each of the other limu products/powders you have) with two cups of flour.
3. Add ½ t salt, ¾ Tablespoons baking powder, one c white sugar and a ½ c powdered sugar (if possible).
4. Next, add 4 T butter or shortening, and ¾ c milk (or soymilk, oatmilk ... etc.).
   (Add 2 T sesame seeds and 1 T vanilla if these ingredients are convenient and available. Teacher can also add a drop or two of green food-coloring too if they want.)
5. Mix thoroughly.
6. Place small teaspoon-sized drops of dough on a greased cookie sheets.
7. Cook at 350° for 10 – 15 minutes.
8. Let cool and serve within a day or two. Where possible, don’t store cookies on top of one another as they stick.
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[Recipe codes: T = tablespoon; t = teaspoon; and c = cup.]

*** Saving the Limu Party until the end of the quarter is also a nice thing to do after the research projects are presented and the Post-Assessments are complete. Up to the teacher ...

**Background**

In the days of old in Hawai‘i, limu was considered the third integral component of a healthy diet otherwise based on fish and poi (www.hawaii.edu.reefalgae/publications/ediblelimu/index.htm). In fact, more than 200 distinct Hawaiian names for limu have been documented (Huismann et al. 2007), and this further provides support for their cultural and historical importance in the Islands. Today, limu is a commonly used resource in Hawaii. It is incorporated into dishes like poke, salads, and soups and is also widely used commercially in products such as nori (for sushi), ice cream, toothpaste, and agar.

No additional background information is needed for these activities. For more information see Lesson 2: Exploring Limu Diversity and Resources section.

**Vocabulary**

Algin – Alginic acid (a.k.a. algin or alginate), is a viscous (gum) that is rich in the cell walls of brown algae and is used commonly in many household items as a gelling agent and a detoxifier (of metals), and for weatherproofing.

Carrageenan – A derivative or component extracted from red algae and used in many everyday products as a gelling agent, thickener, clarifier (in beer). Like algin, it is also a viscous gum-like material.

**Procedure**

**Activity 1. Limu Scavenger Hunt Preparation (10 minutes)**

1. Tell the students that they will be going on a Limu Scavenger Hunt outside the classroom.
2. This means that they will be looking for limu (algae) components included in the ingredients labels of common everyday items.
3. Tell them the good places to search (e.g. toothpaste, ice cream, salad dressing, soap, cosmetics and certain medicines) and the things to look for (words like seaweed, kelp, algae, carrageenan ... etc.).
4. Pass out the notes for students to bring home to their families.
5. Tell students about the upcoming Limu Party – and provide the date. This is also the due-date for them to bring their Limu Scavenger Hunt lists back to class (bring products if possible too to share).

**Activity 2. Class Party/Recipe-sharing/Limu Cookies (1 hour)**

Discuss the Limu Scavenger Hunt results:

1. Ask the students how many products they were able to find that used limu.  
*Who finds the most?*
2. Ask them if any of these additions surprised them?
3. Did they know there was algae in their toothpaste? Did their families?
4. What was the most interesting product they found that had limu in it?

Now comes the time for eating and sharing:
1. Ask students to introduce and share any family dishes for the Limu Party.
2. Now have each of the students share one thing they learned about algae with the class (have a note-taker to copy these down).
3. Once they have shared something, pass out one cookie (and possibly share any other limu dish brought in by the students/parents for the occasion).
4. They are now free to eat their cookie and comment accordingly.

Assessments
A good way to tell where students’ participation is at can be gleaned their Limu Scavenger Hunt lists, as well as from listening to the “one thing” that students share before they eat the limu cookies.

Resources
See resources from Lesson 2 – Exploring Limu Diversity and Optional ART Extension – Limu & ME!

Extension Activities
None.

Culture/Art/Math/Literature Connections
Class Limu Cookbook (20 minutes) –
Also, ask the students to bring all those limu recipes from home to compile into a classroom cookbook. This can be as elaborate or simple as deemed appropriate by the teacher. Now these cookbooks can be “published” for the school library, or class website, or student’s families. OR, if time and resources allow ask students to all bring in a sample of their limu plate as a fun limu pot-luck party.

When this is finished, talk to the class about the results:
• Ask the students how many family recipes they found that included limu as an ingredient?
• What types of foods are most commonly using limu? (musubi and other sushi, soups, poke, seaweed salad)
• Decide as a class what to do with the recipes.