Weg'et – Grass and Plant Fibers

Developed by Nancy Yeaton and Hanna Eklund

A Publication of Chugachmiut Heritage Preservation Department

1840 Bragaw Street, Suite 110, Anchorage, AK 99508-3463

With support from US Department of Education,

ANE Grant #S356AQ09090054-10

Valdez
Tatitlek
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Port Graham
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Chugachmiut
Heritage Preservation Department

We would like to thank the following people and institutions for their contributions: Jessica Selig-Boyle, Pua Weichart, Nancy Yeaton, The National Museum of Natural History at the Smithsonian Institute, Burke Museum, Alutiiq Museum,

WEG'ET – GRASS AND PLANT FIBERS

Copies of this publication can be ordered from:

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Funded by the United States Department Education, ANA Grant Number S356A090054. Other Heritage Kits available: Abundance of Birds , Medicinal Plants, They are Hunting, Sugpiaq Clothing, Driftwood, Storytelling, Honoring the Seal, Native Trade and Change, Storytelling , Gathering Plants to Eat, Ancestry, Our Foods from the Sea, Symbols, Tools and Technology, Wamluk – Let's Play, Alutiiq Hunting Hats, Traditional Fishing.

GRASSES – ACTIVITY PLANS

Major Graphics Suggestions: Historic photos/engravings of life with fibrous material products to identify, beginning, & end of unit work (perfect Bob research)

K-2 Themes: Usefulness; Over/Under Weaving & Knotting

Monday, February 4 - Grasses 0-2 (1)

K-2 (1) Time to Gather – Grass Heads 1- Planting Grass; 2 – Maintaining & Recording; 3 – Insulation Exercise?

Tuesday, February 5 - Grasses 0-2 (4)

K-2 (4) Natural Dyes: 1- Field trip; 2 – Dyeing; 3 – Paper & Grass Weaving

Wednesday, February 6 - Grasses 0-2 (2, 3)

K-2 (2) Root Scrubbers

K-2 (3) Seaweed Wreaths (NEW) 1- Gathering Field Trip; 2 – Wreath making

Thursday, February 7 - Grasses 0-2 (5, 6)

K-2 (5) Weaving on Wooden Disk Center (NEW)

K-2 (6) I Spy….Something Made of Grass (NEW) – Use Historic Photos

3-6 Themes: Insulation; Plaiting, Knotting

Friday, February 8 - Grasses 3-6 (1)

3-6 (1) Fibrous Materials: 1- Gathering; 2 – Stripping & Weaving mini-sample; 3 – Display

Monday, February 11 - Grasses 3-6 (2)

3-6 (2) The Store Outside Your Door: 1- Bull kelp harvest; 2 – Processing; 3 – Twining & Knot

Tuesday, February 12 - Grasses 3-6 (3)

3-6 (3) Cup Parkas (Helen has lesson plan)

Wednesday, February 13 - Grasses 3-6 (4, 5)

3-6 (4) Grass Socks (Wildly Colored Grass Socks?)

3-6 (5) Wildly Dye Experiments

7-9 Themes: Coiling, Barabara Model

Thursday, February 14 - Grasses 7-9 (1)

7-9 (1) Grasses: 1- Grass Collection; 2 – Cleaning [Bob – Alutiiq Museum videos?]
Learn how fiber is broken out
Research traditional tools used for collecting, cleaning
Estimatedifference between amount of grass collected and finished product

Tuesday, February 19 - Grasses 7-9 (2)

7-9 (2) Wild Dyeing (wild iris, octopus ink… Helen has Earth Dyes by Rita Blumenstein
Make display with with colored grass with a fiber connected to relevant Earth Dyes page showing how it's made

Wednesday, February 20 - Grasses 7-9 (3)

7-9 (3) Coiling (Flat & 3 Dimensional Projects) – or mini mats for Barabara

Thursday, February 21 - Grasses 7-9 (4)

Friday, February 22 - Grasses 7-9 (5)

7-9 (4) Barabara Model with Grass Mats: 1- Design & Collect Materials; 2 – Papier Mâché ground & barabara floor and sides; 3 - Removeable Stick Roof; 4 – Painting scenery; 5 – Interior details; 6 – hanging grass mats, labeling/presenting

10-12 Themes: Weaving, Bark & Roots

Monday, February 25 - Grasses 10-12 (1)

10-12 (1) Taking Root: 1- Spirituality; 2 – Gathering; 3- Cleaning Spruce Roots; 4 – Kids' ball

Tuesday, February 26 - Grasses 10-12 (2)

10-12 (2) Spruce Root Hats: 1 - Mini Spruce Root Hats; 2 – Design Analysis

Examine photos showing decorative features of spruceroot baskets and decide which are from a change in weave and which are from the use of nautral dyes (See Burke Museum photos)

Wednesday, February 27 - Grasses 10-12 (3)

10-12 (3) Spruce Root Uses: barrette

Thursday, February 28 - Grasses 10-12 (4)

10-12 (4) Bark: 1 – Gathering; 2 – Processing; 3 – Net Making; 4 – Fishing!

Grass & Plant Fibers – Resources

Helen's emails

2/12/13: Northwest Coast Basketry - book with descriptions of resources, weaving, uses (black & white illustrations)

2/19/13: 6 Basket fragment photos, one time use permission from Alutiiq Museum

2/19/13: 3 more basket fragments from Alutiiq Museum

2/28/13: Provisional Burke Museum photo permission (more paperwork required)

http://www.primitiveways.com/basketry2.html Retrieved 3.15.2013: Excellent Close-ups of Single & Multi Strand Woven and Single & Double Twining

www.burkemuseum.org/static/biderbost/ Retrieved 3.15.2013: Ancient basket fragments

http://www.wikihow.com/Understand-Basic-Basket-Weaving-Techniques

GRASS AND PLANT FIBERS: TIME TO GATHER K-2 (1)

Grade Level: K-2

Overview: Grass and fibrous materials have provided for insulation, extra warmth for clothing, materials to repel the weather, baskets and new bedding material.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	GEO E-1: Understand how resources have been developed and used	GS-4: Student should be knowledgeable about natural vegetation.

Estimated Time: 60 minutes, this particular activity will be ongoing due to recording growth and saving the trimming of the grass.

Lesson Goal: To collect, harvest, and appreciate the uses of a traditional natural resource.

Lesson Objectives: Students will:

- Create an art project with grass.
- Elaborate why and how grass was traditionally used.
- Observe and record the growth of the grass in the class room

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
grass	qiayaq	weget
grass head		weget pungit

Materials/Resources Needed:

CLASS I

- Heritage Posters (in kit)
- Camera, printer and photo paper
- Grass seeds (in kit)
- Plastic buckets with shovels (4 in heritage kits)
- Empty egg shells (for each student)
- Empty egg carton (two to three)
- Newspaper (to place on students desk)
- Petroglyphs (provided with activity)
- Googley eyes (pair of eyes , included in the heritage kit)
- Pencil
- Markers/crayons
- Plain paper
- Scissors
- Ruler
- Glue
- Portfolio folder titled "Grass and Plant Fibers." (for each student)
- Sample letter to parents provided
- Sample growth chart provided

CLASS II

Comment [ny1]: Posters of : grass mats, socks, jackets, hunting hat, roof thatches…

Comment [ny2]: Need grass seeds for this kit

- Newspaper (to place on desks)
- Small paper bags (in kit)
- Grass/raffia (in kit)
- Zip-loc baggies (two for each student, in kit)
- Enough ice cubes for each group to have two ice cubes
- Ruler

Website:

- http://www.ankn.uaf.edu/publications/clipart/catalog.pdf 1-24-12 , to see more petroglyphs

Teacher Preparation:

- Review all activities
- Portfolios to be used throughout all activities in heritage kit
- Take pictures of students as dig dirt, creating their Weget Pungit, as they trim the growing grass and as they insulate their ice cube.
-

CLASS I

- This activity will be ongoing due to the growth of grass seeds (anywhere from one to two weeks)
- Ask students to save clean empty egg shells for this activity, collect the egg shell as students bring them class. Designate an area where students can place their egg shells.
- Bring extra egg shells just in case there are some that break during this activity, remind students to gently handle the egg shells.
- The empty egg carton can be individually cut (egg cups) to use as stands for the, "Grass head, Weget Pungit."
- Make copies of these pictures for the students to enter information and display their work on a classroom wall.
- Make your own (make two different ones) "Grass Head, Weget Pungit," place soil in egg shell, glue googley eyes, or you can draw a petroglyph on your egg shell. You will let one grow without trimming and the other Weget Pungit you will trim, save the trimmings. There are examples of "Grass Head Weget Pungit," below:

- To view more "Grass heads," google images of Grass heads.
- Once you have gathered trimming to wrap around an ice cube, trim your untouched Weget Pungit, put your trimming to a test to see which one insulates better; shorter vs. longer trimming. Wrap the ice cube with grass trimmings, secure with raffia tied around to keep the grass wrapped around the ice cube. This will give you an opportunity to work with the grass and tying them with the raffia.
- To add some history of our Ancestors, pictures of petroglyphs are provided with this activity for students to sketch on their egg shell. This information is also to share with

Comment [ny3]: Do this 5 days in advance

Comment [ny4]: This project needs to tested in about 1.5 to two weeks ahead of time

students when it comes to decorating their egg shell. Here is a little bit of history about petroglyphs:

"**Petroglyphs and rock paintings occur as well in Cook Inlet, the Alaska Peninsula, and Prince William Sound. …a variety of human faces, many wearing labrets (indicated by dots below the mouth). The designs may be characters from myths or family stories, marked on the landscape to indicate ownership of traditional hunting and fishing territories. In Prince William Sound, rock art was associated with whaling magic (Birket-Smith 1953:34)** ***Crowell, Pullar, & Steffian, 2001, p.126***

- Place posters throughout the class to use as references when asking questions during the "Opening."
- Place pictures of the petroglyphs on a wall in the classroom
- Have a table with individual egg cups, pencils, markers/crayons, glue (if students draw petroglyphs or their own creation of a petroglyph, and face parts), plain paper and scissors.
- Place students in two groups, one group can trim and braid their "Weget Pungit," while the other group just let the "Weget Pungit," grow without being disturbed to grow to a useable length.

CLASS II

- As students trim their "Grass Head, Weget Pungit," they will save the trimmings in a paper bag to use in activity.
- Once students gather enough of the trimmings from their grass head, the grass can be used as an insulator.
- Groups will be given two ice cubes, two zip-loc baggies, and grass/raffia. In this activity the groups will test the grass as a way of which keeps the ice from melting, insulated vs. non-insulated. They will wrap an ice cube with the trimmings and lashing it down with the grass/raffia, placing it in the zip-loc baggies and no trimmings as an insulator, just placing the ice cube in the zip-loc bag. Tying this activity to the way our Ancestors used grass as an insulator to keep warm and dry. The posters can be used as reference.
- When the group has collected about a quarter to a third of the bag of grass trimmings, begin Class II:

  - Have the groups get together to start the activity with the ice cubes.
  -The group that has let their Weget Pungit grow without trimming can now trim their Weget Pungit.
  -Give each group an ice cube to wrap with the trimmings from their Weget Pungit and place in the zip-loc baggie
  -Give each group the other ice cube to place in the zip-loc baggie to compare which keeps the ice from melting, just being placed in a zip-loc baggie or the one that is wrapped with grass.
  -The two groups will test their ice cubes, which insulates better, the longer trimmings versus the shorter ones.

Opening: Display your "Grass Head Weget Pungit."

Activities:

CLASS I

1. Take students out to get dig up some dirt for their egg shells. They will have to take turns to shovel dirt into the bucket (tell students they will not have to get much dirt for the egg shells). As you and students are walking around ask the following:
   - Ask students to take notice of the color of grass

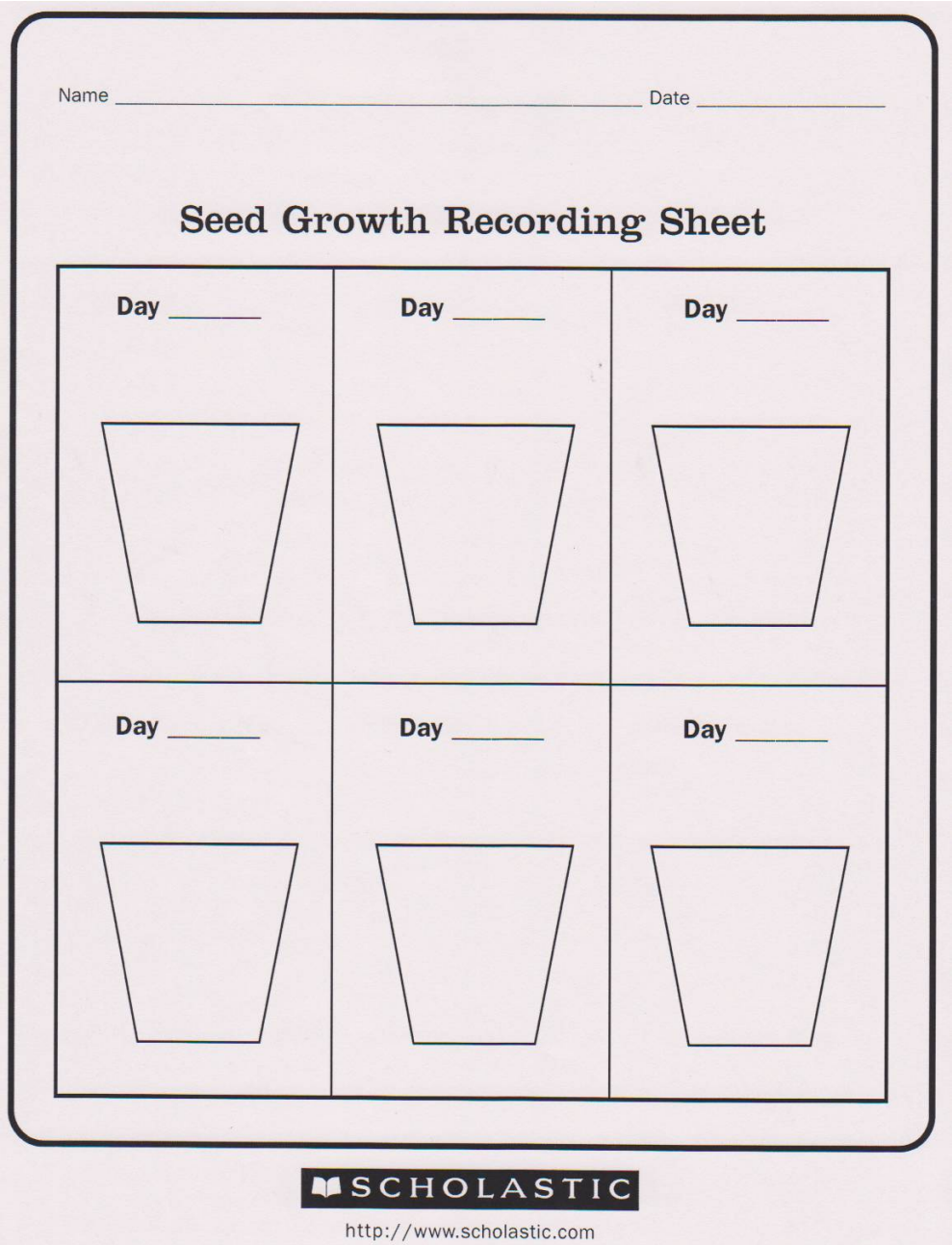
- Why do you think the grass is this color now?
- How do you think the grass will look in the spring?
- What season are we in now?

2. When enough dirt has been dug up, bring students back to the class and place buckets with dirt in designated area.
3. Tell students they are going to plant grass seeds with soil in an empty egg shell to make a Grass Head, Weget Pungit (**How do you say grass head in Sugt'stun? Weget Pungit**). Questions to ask:
    - Can you think of things made from grass? (**How do you say grass in Sugt'stun? Weget)**
    - What do you think you can make with grass
    - Have you seen things made from grass?
    - Has anybody in your family made things from grass?
    - What would you make with grass?
4. Give students newspaper to lie on top of their desks while putting dirt in their egg shells.
5. Introduce the petroglyphs, giving students a little background on petroglyphs from the information inserted in the teacher's preparation. Let students know they can draw a chosen petroglyph on their egg shell if they would like.
6. Hand out individual egg stand for students to place their Grass Head on (**How do you say Grass Head in Sugt'stun? Weget Pungit)**
7. Students can start decorating their grass head (**How do you say grass head in Sugt'stun? Weget Pungit**)
8. After students have completed decorating their grass head, have them put dirt in and sprinkle about a tablespoon of grass seeds on top of the dirt.
9. Have students pour some water (about a tablespoon or two) over the grass seeds.
10. Explain to students they will continue to take care of their "Grasshead Wegit Pungit," watering, trimming the grass (**How do you say grass in Sugt'stun? Weget**), have the group that is going to collect trimmings in paper bags, cleaning the old grass, braiding, giving a Mohawk or whatever design they would like as one group and the other group will let their Weget Pungit grow to a useable length.
11. Give students a recording sheet to enter: the date of the start of growth, measure from the start of the grass (**How do you say grass in Sugt'stun? Weget),** in the dirt. This sheet can be placed on a wall in the class for students to enter data.
12. Give students copies of their picture to glue onto a plain sheet of paper write/dictate what they were learning. Students can place their picture on a wall to display and later insert in their portfolio.

Class II

1. Give students newspaper to place on their desks.
2. Students will be given two ice cubes, two ice cubes, two zip-loc baggies, and grass/raffia. (**How do you say grass in Sugt'stun? Weget**) They will wrap an ice cube with the trimmings and lashing it down with the grass/raffia, placing it in the zip-loc baggie, wrapping another ice cube with the longer strands of grass and placing an ice cube in the zip-loc baggie without any grass trimmings. Questions to ask:
    - Which one do you think will melt faster?
    - Why do you think that?
    - Does the shorter or longer trimming keep the ice from melting faster?

3. Give students copies of their pictures to glue onto a plain sheet of paper write/dictate what they learning. Students can place their picture on a wall to display and later insert in their portfolio.


Name _____ Date _____
Seed Growth Recording Sheet
Day _____
Day _____
Day _____
Day _____
Day _____
Day _____
SCHOLASTIC
http://www.scholastic.com

Dear Parents,

During this week students will be involved with activities based on “Grass and Plant Fibers.” Students will be gathering sources from local area and using them in the classroom. We will start the activities with creating a “Grass Head.” Students will create this with an empty clean egg shell, adding soil and sprinkling grass seeds on top. Have your child bring in several clean empty egg shells for this activity.

The students will learn many new things through our discovery of local sources and how our Ancestors once utilized many things that came from land and water!

Please feel free to contact me by phone or stop by the class if you have any questions. Thank you for providing for your child.

Sincerely,

GRASS AND PLANT FIBERS: GRASS HARVEST K-2 (1)

Grade Level: K-2

Overview: Grass and fibrous materials have provided for insulation, extra warmth for clothing, materials to repel the weather, baskets and new bedding material.

Standards:

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Lesson Objectives: Students will:

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English:	PWS:	Lower Cook Inlet:
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Materials/Resources Needed:

CLASS I

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- Camera, printer and photo paper
- Grass seeds (in kit)
- Plastic buckets with shovels (4 in heritage kits)
- Empty egg shells (for each student)
- Empty egg carton (two to three)
- Newspaper (to place on students desk)
- Petroglyphs (provided with activity)
- Googley eyes (pair of eyes , included in the heritage kit)
- Pencil
- Markers/crayons
- Plain paper
- Scissors
- Ruler
- Glue
- Sample growth chart provided
- Portfolio folder labeled "Grass and Plant Fibers." (for each student)

CLASS II

- Newspaper (to place on desks)
- Small paper bags (in kit)
- Grass/raffia (in kit)
- Zip-loc baggies (two for each student, in kit)
- Enough ice cubes for each student to have three ice cubes
- Ruler

Website:

- http://www.ankn.uaf.edu/publications/clipart/catalog.pdf , to see more petroglyphs

Teacher Preparation:

- Review all activities
- Portfolios to be used throughout all activities in heritage kit.

CLASS I

- This activity will be ongoing due to the growth of grass seeds (anywhere from one to two weeks)
- Designate an area where students can place their egg shells.
- Bring extra egg shells just in case there are some that break during this activity, The empty egg carton can be individually cut (egg cups) to use as stands for the, "Grass head, Weget Pungit."
- Make copies of these pictures for the students to enter information and display their work on a classroom wall.
- Create your own Grass Head, Weget Pungit week ahead before introducing to class. Make your own (make two different ones) "Grass Head, Weget Pungit," place soil in egg shells, glue googley eyes and you can draw a petroglyph on your egg shell. You will let one grow without trimming and the other Weget Pungit you will trim, save the trimmings. There are examples of "Grass Head Weget Pungit," below:


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- To add some history of our Ancestors, pictures of petroglyphs are provided with this activity for students to sketch on their egg shell. This information is also to share with students when it comes to decorating their egg shell. Place pictures of the petroglyphs on a wall in the classroom. Here is a little bit of history about petroglyphs:

  Petroglyphs and rock paintings occur as well in Cook Inlet, the Alaska Peninsula, and Prince William Sound. …a variety of human faces, many wearing labrets

(indicated by dots below the mouth). The designs may be characters from myths or family stories, marked on the landscape to indicate ownership of traditional hunting and fishing territories. In Prince William Sound, rock art was associated with whaling magic (Birket-Smith 1953:34) *Crowell, Pullar, & Steffian, 2001, p.126*

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- Have a table with individual egg cups, pencils, markers/crayons, glue (if students draw petroglyphs or their own creation of a petroglyph, and face parts), plain paper and scissors.

CLASS II

- As students trim their "Grass Head, Weget Pungit," they will save the trimmings in a paper bag to use in activity.
- When the students have collected about a quarter to a third of the bag of grass trimmings, begin Class II.
- Tying this activity to the way our Ancestors used grass as an insulator; socks, jackets, floor mats, using grass for barabara roofs, grass mats for the walls of rooms and as a door. The posters can be used as reference.

Opening: Display your "Grass Head Weget Pungit."

Activities:

CLASS I

1. Take students out to get dig up some dirt for their egg shells. They will have to take turns to shovel dirt into the bucket (tell students they will not have to get much dirt for the egg shells). As you and students are walking around ask the following:
   - Ask students to take notice of the color of grass
   - Why do you think the grass is this color now?
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   - What season are we in now?
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   - Can you think of things made from grass?
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   - Have you seen things made from grass?
   - Has anybody in your family made things from grass?
4. Give students newspaper to lie on top of their desks while putting dirt in their egg shells.
5. Introduce the petroglyphs, giving students a little background on petroglyphs from the information inserted in the teacher's preparation. Tell students to select a petroglyph to sketch on their Weget Pungit.
6. Hand out individual egg stand for students to place their Grass Head on (**How do you say Grass Head in Sugt'stun? Weget Pungit)**
7. Students can start decorating their egg shell, grass head (**How do you say grass head in Sugt'stun? Weget Pungit**), remind students to be gentle with egg shells as they decorate.

8. After students have completed decorating their grass head, have them put dirt in and sprinkle about a tablespoon of grass seeds on top of the dirt.
9. Have students pour some water (about a tablespoon or two) over the grass seeds.
10. Explain to students they will continue to take care of their "Grass Head Wegit Pungit," watering, trimming the grass (**How do you say grass in Sugt'stun? Weget**), have each student collect trimmings in paper bags, cleaning the old grass, braiding, giving a Mohawk or whatever design they would like and the other Weget Pungit can grow to a useable length.
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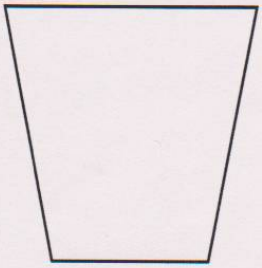
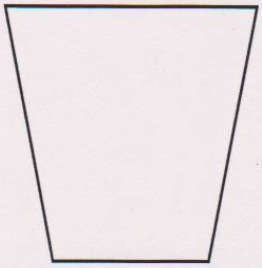
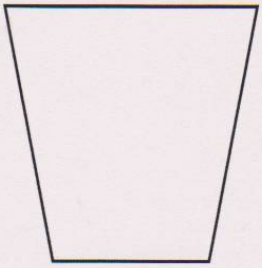
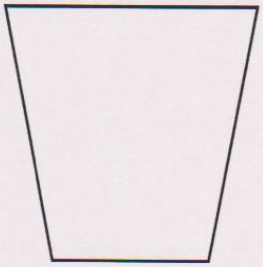
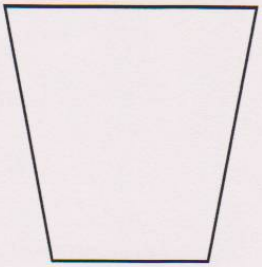
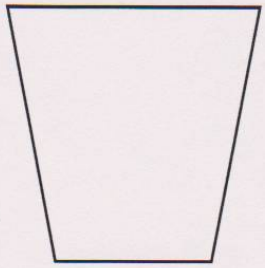
12. Give students copies of their picture to glue onto a plain sheet of paper write/dictate what they were learning. Students can place their picture on a wall to display and later insert in their portfolio.

Class II

1. Give students newspaper to place on their desks.
2. Students will be given two ice cubes, two zip-loc baggies, and grass/raffia. They will wrap an ice cube with the trimmings and lashing it down with the grass/raffia, placing it in the zip-loc baggies, wrapping another ice cube with the longer strands of grass and placing an ice cube in the zip-loc bag.
    - Which one do you think will melt faster?
    - Why do you think that?
    - Does the shorter or longer trimming keep the ice from melting faster?
    - Why do you think that?
3. Give students copies of their picture to glue onto a plain sheet of paper write/dictate what they were learning. Students can place their picture on a wall to display and later insert in their portfolio.

Name _____ Date _____

Seed Growth Recording Sheet

Day _____ 	Day _____ 	Day _____ 
Day _____ 	Day _____ 	Day _____ 

SCHOLASTIC

http://www.scholastic.com

GRASS AND PLANT FIBERS: BASKET WEAVING K-2 (3)

Grade Level: K-2

Overview: Grass was traditionally used to make baskets to gather, store, and cook food supplies and materials

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Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	GEO E-1: Understand how resources have been developed and used	GS-4: Student should be knowledgeable about natural vegetation.

Estimated Time: one 45 minute class (including short video)

Lesson Goal: To model and appreciate traditional basket making

Lesson Objectives: Students will:

- Observe traditional basket making.
- Model over/under weaving on bowl.
- Discuss traditional uses for baskets

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Basket		Rraakiq
Grass		Weget

Materials/Resources Needed:

- Posters
- Camera, copier, copy paper
- Raffia (various colors in kit)
- Styrofoam bowls (6 inch diameter) – one per student
- Yarn (at least three various colors)
- Plastic beads, feathers (in kit)
- Scissors
- Portfolios

Comment [ny1]: baskets

Comment [ny2]: Needed item

Comment [ny3]: Needed item for kit

Comment [ny4]: Needed items

Website:

http://www.education.com/activity/article/Teach_the_art_basket_weaving/ Retrieved 2.8.13. Styrofoam bowl weaving
http://www.nps.gov/akso/beringia/beringia/vodcasts.cfm Retrieved 2.8.13 Teaching and learning the art of grass basket weaving, 7:17 minutes long

Teacher Preparation:

- Review activities and above sites
- You may want to prepare Styrofoam bowls for students prior to the activity:

- ❖ Cut a slit from the top of the bowl to where the bottom starts (flat part of bowl)
- ❖ Make slits all around the bowl, keeping them two inches apart

- Make yourself a basket to display for the class and place posters throughout the classroom
- Take pictures of students as work on their bowls.

Opening: View the suggested website on basket making with the students. Display your completed basket in the class

Activities:

1. Have a discussion about how the baskets were being made on the video:
   - ❖ What were the baskets made from?
   - ❖ What do you think they put in the basket?
   - ❖ Do you think you can cook with the basket?
   - ❖ How would you use your basket?
2. Let students today they will practice weaving a basket in this activity.
3. Distribute Styrofoam bowls, yarn, raffia, beads, feathers and scissors.
4. Tell students to take their yarn and tie it to one of the sections on their bowl (you may have to help some of the students with this part).
5. Explain to students there are going to start weaving their basket with the yarn by going over and under each section in the bowl until the yarn runs out.
6. Once they are finished with the yarn they can tie another color where the first piece of yarn ran out and continue to weave over and under.
7. They will finish weaving with the raffia (creating several rows using raffia).
8. Give students their pictures to glue on white plain paper to write what they learned.
9. Place their picture in their portfolio.

GRASS AND PLANT FIBERS- WHAT DOES NATURE PROVIDE TO MAKE DYES K-2 (2)

Grade Level: K-2

Overview: "What about paint, what did they use for paint? The color white was made with crushed clam shell. You could crush those up until it looked like flour. Then you could add a little water to it. That is your white paint. The dark paint was made with very thin dark rocks. You have seen those small rocks. You can crush them up, you know how they would make snuff? You would mix it up that way. You would add a little water to it. That was your dark paint. The color red you would use berries and high bush cranberries. Boil them in the water until it would turn red. Soak the grass in the water. If you want to make blue paint, you have to use blueberries, boil them up. The water turns blue. When you make the color of the grass, use the fish gall bladder. I forgot to tell you about another red color, you can also use the blueberry stems to make another red color. When you boil them up, it will turn the water red. The mountain ash also makes the water turn red, but it might turn it brown too. They used to make their own paint. Sometimes they would make their baskets look pretty, sometimes they would put flowers or box marks on them." **(Sally Ash & Kathy Brewster from Nanwalek Interview October 17th-20th, 2003)** This would be a fall activity to gather the blueberries.

Comment [NI1]: See Style Book for APA citation format. Is this from a video? Could it be used in the lesson plan to share with the students?

Comment [ny2]: Talked with Kathy Brewster she did not remember where and who did the interview…

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-4 determine how ideas and concepts from one knowledge system relate to those derived from other knowledge systems	SCI E-1understand how resources have been developed and used	CES 3-students should have knowledge of Sugpiaq/Alutiiq traditional and contemporary art

Estimated Time: 45 minute field trip
Lesson Goal: To practice traditional dying techniques from local sources.

Lesson Objective(s): Students will:

- Locate, identify and gather local sources to make natural dyes.
- Repeat the Sugt'stun translations for clam shells, blueberries and grass when working with these material.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Clam shells		Saliam amiit
Blueberries		Atsat
Grass		Weget

Materials/Resources Needed:

Class I

- Permission slip according to school district policies (Sample note provided)
- Camera, printer, copy or photo paper
- Clam shells (in kit)
- Paper bags (for clam shells and blueberries) in kit
- Old clean sock (to contain clam shells during pounding)

Comment [ny3]: Clam shells needed

Comment [ny4]: Paper bags needed

- Students' "Grass and Plant Fibers" portfolio

Class II

- Crock pot
- Newspaper (to place around work areas for pounding clam shells and when dyeing grass/raffia)
- Grass/raffia (in kit)
- Plastic buckets (four in kit)

Class III

- Posters of baskets with dyed grasses
- Construction paper (offer various colors)
- Glue (for each student)
- Rulers (one per student)
- Scissors (one pair per student)

Comment [ny5]: Needed for kit

Comment [ny6]: Need poster of baskets

Website: http://www.dickblick.com/lessonplans/paperweaving/ 12-12-12

Teacher Preparation:

- Review activities
- Student's portfolio to be used throughout these activities.
-

Class I

- Invite an Elder/Recognized Expert, to have tea in the classroom with you, explain that the class is going to make a natural dye from clam shells and blueberries. Ask if the Elder/Recognized Expert has knowledge about making natural dyes from local sources. Would the Elder like to come to the class to share about making these types of dyes. Plan what day, what will be presented and how to make the Elder/Recognized Expert feel comfortable.
- Give students permission slip to take home three days in advance, along with a sample note to explain class activity and request an old sock for use in this activity.
- Permission slips sent home in timely manner.
- Arrange for transportation for the field trip
- Once you return from field trip make copies of pictures of each student and material gathered. Photograph the material itself for use by students absent from the fieldtrip.
- As students find materials use the Sugt'stun terms and have them repeat back to you :

  Point to gathered material:
  -Clam shells, "These are salaam amiit. What are they?"
  -Blueberries "These are atsat. What are they?"
  -Grass (this will not be gathered, it is in the kit) "This is weget. What is this?"

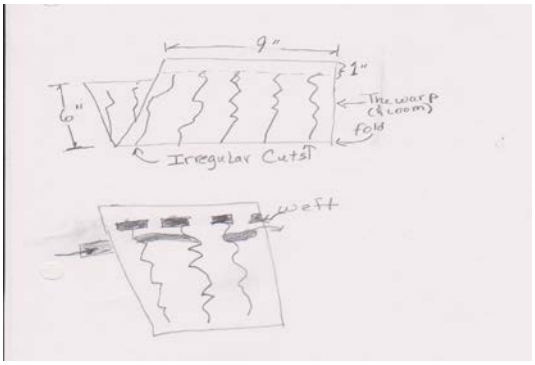
Class II

- Place blueberries in the crock pot, pour water (twice as much as water as blueberries), let simmer for an hour and shut off, remove cover to cool.
- Start pouring cooled dye into buckets (two buckets).
- Tell students to get their rocks out, put their clam shells in the sock, place the sock on the flatter rock and start pounding with the other rock.
- Have students pound the clam shells to smithereens! (Powder should look like flour.)

Class III

- In this activity it is time to introduce weaving techniques with construction paper and the the strips of dyed grass. Prepare yours the night before Class III, to share with students before they create theirs in class. Frame your end product with construction paper or a real frame. Place on a wall in the classroom for display.

Comment [B7]: Teacher Prep. Better yet, provide teacher with completed sample.



- The above illustration comes from the suggested site below, suggests how to cut the construction paper for the warp of the weaving project.
- If desired, colored construction paper can be pre-cut into 1" by 9" strips.

WEBSITE:
http://www.dickblick.com/lessonplans/paperweaving/
The activity is adapted from the above site, there is additional information as well as vocabulary words to use during this activity.
From this site vocabulary words:

- **Weaving** — The process of forming cloth or fabric on a loom by interlacing yarn or thread (or, as in this case, paper).
- **Loom** — A frame for weaving yarn or thread into cloth or fabric.
- **Warp** — Threads running lengthwise on the loom. The warp is placed on the loom prior to beginning the weaving process. In this activity the warp will be the construction paper.
- **Weft** — Threads that are weaved across the warp threads to form the web.
- **Web** — The cloth or fabric produced by weaving.

Opening: To prepare students for field trip to the beach to collect clam shells and berry patches for berries or stems describe how class will explore how items were traditionally colored by first collecting the local dye materials, then making the dye, then dyeing and using the colored materials in an art project.

Activities:
Class I: Field Trip
1. Go to gathering site.
2. Give each student a paper bag for the blueberries being gathered.
3. Tell students to fill no more than half of their bags with blueberries. (**How do you say blueberry in Sugt'stun? *Atsat)***

4. Have each student collect two clam shells and place in the bags. (**How do you say clam shells in Sugt'stun? *Salaamin Amiit***)
5. Take pictures of each student and the material being gathered during the field trip.
6. Have student's select two rocks to be used for pounding.
7. Once everyone has collected the material, bring bags back to the class.
8. Remind students to bring sock to class for the next activity.

Note: Take one picture of each child and each material being gathered for portfolio

Class II: Dyeing

1. Have students place blueberries in the crock pot in the morning and water; simmer for an hour and shut off. **(How do you say blueberries in Sugt'stun? *Atsat)***
2. Have students cover the floor with newspapers.
3. Once the dye has cooled down let students place their grass/raffia (**How do you say grass? *Weget)*** in the solution to soak to their liking of the color.
4. Have students get their rocks out, place their clam shells (**How do you say clam shells in Sugt'stun? Salamin Amiit)** in the sock, and start pounding with the other rock until their clam shells look like flour. **(How do you say clam shells? Salamin Amiit)**
5. Once students are done with their clam shells, place the powder into the remaining buckets and slowly add lukewarm water to make the dye thick like tempera paint.
6. Students can place their grass (**How do you say grass in Sugt'stun? Weget)**/raffia in the dye buckets of their choice.
7. Let students know that the longer the grass (**How do you say grass in Sugt'stun? Weget)** soaks in the dye the darker it will become.
8. Students can place their dyed grass on newspaper to dry for the next activity (**Class III).**

Class III: Weaving

1. Pass out construction paper, glue, scissors and rulers for each student.
2. Demonstrate and have students follow along by folding one sheet of construction paper horizontally, and drawing a line about an inch from the open end of the folded paper. This is the limit of cutting.
3. At the fold of the paper have students make irregular cuts up to line, or have older students help the smaller students.
4. Tell students it does not matter if cut lines are crooked; remind them it is their design.
5. Students can select strips of construction paper to weave with and collect their dyed grass/raffia (**How do you say grass in Sugt'stun? Weget)**
6. Encourage students to be creative: braid the dyed strips of grass/raffia, glue the grass strips onto the strip of construction paper to weave with.
7. It is time to demonstrate the weaving with construction paper and dyed grass with the class.
8. Have students start their project, using terminology about weaving.
9. After students have completed the activity they can frame their work with construction paper around their work.
10. Display students' final product on a wall.
11. This can eventually be included in their portfolio.

Sample Note:

Dear Parents,

During this week students will be involved with activities based on “Grass and Plant Fibers.” Students will be gathering sources from local area and using them in the classroom. We will head to the beach to gather clam shells and locate an area to collect blueberry stems for making natural dyes.

One of the items needed from home is a clean old wool sock. Your child will place clam shells in the sock and pound it until it becomes a powdery substance to use for dyeing in the class.

The students will learn many new things through our discovery of local sources and how our Ancestors once utilized many things that came from land and water!

Please feel free to contact me by phone or stop by the class if you have any questions.

Sincerely,

GRASS AND PLANT FIBERS – ROOT SCRUBBERS K-2 (4)

Grade Level: K-2

Overview: You can find beach wild rye grass on sandy beaches, spits, sea beaches, tidal flats, sea cliffs, and lakeshores. Beach wild rye grass can be found in different places around the world such as Green land, Alaska, California, and New York (Welsh, 1974).
"Grass wasn't cut and twined immediately. When grass was cut, they (Yupik people), spread it out to dry and kept it from getting wet. As soon as the grass turned pale, they stored it in the storage place. They did this with all the grass that was picked." *Catherine Moore (September 1997*) recalled. Page 220, *The Way We Genuinely Live*

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
A-3: acquire and pass on the traditions of their community through oral and written history	GEO E-1: Understand how resources have been developed and used.	GS-4: student should be knowledgeable about natural vegetation

Estimated Time: two 45 minute classes

Lesson Goal: To compare a commercial product with a traditional tool.

Lesson Objectives: Students will:

- Locate and identify wild rye grass
- Harvest and process rye roots for use as scrubber.
- Compare effectiveness of traditional item with store bought item

Vocabulary Words:

	Sugt'stun Dialects	
English:	PWS:	Lower Cook Inlet:
Beach grass		Qutem Wegii
Root scrubber		Ggaluteq

Materials/Resources Needed:

- Permission Slip for field trip according to school district policies
- Elder/Recognized Expert
- Heritage kit pictures
- Chore Girl scrubber (in package with price tag still attached)
- Camera, printer, and photo paper or copy paper
- Plain white paper for each student
- glue
- Students class scissors (to cut the roots), for each student
- Zip-loc® bag quart size for each student
- Permanent marker (to write their name on the zip-loc bag)
- Sink/plastic tubs to wash toys/items children play with in the classroom (for each students or group to use)
- Students portfolio

Teacher Preparation:

- Review activities and practice Sugt'stun pronunciation
- Take pictures of students while they are collecting roots and using them.
- Permission slips handed out to students in a timely manner.
- Locate nearby wild rye grass site and arrange transportation if needed in a timely manner.
- Invite an Elder/Recognized Expert to discuss what knowledge they have to offer about grass and roots. Reminding Elder to keep stories short due to age group.
- Ask Elder if he/she would be willing to:
  -Identify beach rye grass.
  -Demonstrate how to cut the roots off the beach rye grass.

- When using the terms "beach grass, qutem wegii and root scrubber, ggaluteq," ask students:
  -How do you say beach grass in Sugt'stun? Qutem wegii
  -How do you say root scrubber in Sugt'stun? Ggaluteq
- The roots from rye grass are often found after chunks of rye grass break away and the roots are exposed to be seasoned by the elements. See poster for picture.
- Today many of us use these roots to scrub dishes, pots, pans, and use them in the shower or steam bath.
- Take pictures of students cutting off the roots and make copies for students to put in their portfolios.
- Decide which toys or items need to be washed and designate a washing area in the classroom for Class two with this activity.

Opening: Ask students if they know what the roots might have been used for. Place posters/pictures throughout the classroom.

Activities:

Class 1:

1. Give each student a zip-loc bag and a permanent marker for each student to write their name on it.
2. To find the roots from beach rye grass (**How do you say beach rye grass in Sugt'stun? Qutem wegii)**, take Elder/Recognized Expert to the beach or where rye grass grows. You will find clumps of grass broken away from the rest of the patches of rye grass. At the bottom you will find dried roots to cut from the clump of rye grass.
3. Take pictures of students as they find rye grass roots **(How do you say rye grass roots in Sugt'stun? Ggaluteq)**, students place their roots in a Zip-loc bag.
4. During field trip ask students:
   - What do you think the root was used for?
   - How would you use this?
   - Is this something you would use at home? Why?
5. Collect bagged roots from students for Class II activity.

Class II:

1. Prepare students to wash toys/items from the classroom designating a sink /plastic tubs filled with warm soapy water.
2. Have some of the students use the chore girl and the other students use the root scrubbers (**How do you say rye grass roots in Sugt'stun? Ggaluteq).** Questions to ask:

Comment [ny1]: Floor instead of toys

- Which works better?
- Which is locally found?
- Which costs more?

3. How are these two types of scrubbers alike and what are makes them different from one another?
4. Compare Chore Girl and root scrubber;
    - How are they different?
    - What kind of material is the Chore Girl made from?
    - Do you think scrubbers were used only to clean toys and other items from the class room?
    - What would you scrub with scrubber (**How do you say rye grass roots in Sugt'stun? Ggaluteq**)?

Comment [NI2]: What sorts of things did people traditionally have to clean with a root scrubber? Toys?

5. Direct students to a dirty floor to scrub with …
6. Distribute photos, plain sheet of paper, and glue. Tell students to glue their picture on the paper.
7. Write/dictate comments of what they were doing when the photo was taken
8. Have students add their work to their portfolio.

GRASS AND PLANT FIBERS – I SPY K-2 (6)

Grade Level: K-2

Overview: Grass was important to our Sugpiaq ancestors. It was harvested from the early summer until the fall before it was covered by snow. Grass was used for many things: tissue, making mats, baskets, socks, hats, coats, and rope. It was even applied on the roof before the sod was laid.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	GEO E-1: Understand how resources have been developed and used	GS-4: Student should be knowledgeable about natural vegetation.

Estimated Time: 20 minute class

Lesson Goal: To identify products made from grass.

Lesson Objectives: Students will:

- Review a collage of pictures of items made from grass.
- Point out grass made items on the posters.
- Name at least three grass made items.

Vocabulary Words:

	Sugt'stun Dialects	
English:	PWS:	Lower Cook Inlet:
Spy		Teq'iq
Grass		Weget

Materials/Resources Needed:

- I Spy Posters (in the kit)
- Camera, copier, copy paper
- Students' "Grasses" portfolios

Teacher Preparation:

- Review activity and posters
- Place posters in the classroom
- Make copies of pictures taken when students were finding grass items on the posters.

Opening: Without calling attention to any poster items allow students a few minutes to take a close look at the 'I Spy' posters. As students return to their seats turn the posters over and ask students to recall as many grass-made items as possible. List them on the board. Did they miss any?

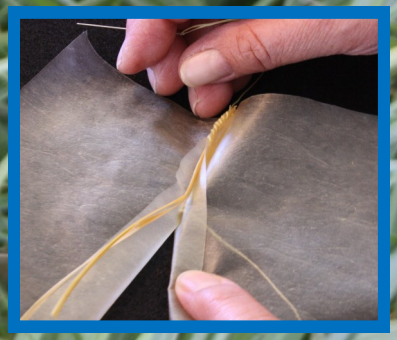
Activities:

1. Repeat the exercise but this time explain to the class that they will have two minutes to identify all the items made from grass they can find.
2. Take pictures while students are looking over the posters.

3. After the time allowed have students sit at their desks and list on the board what they have found. Did they miss anything?

4. Ask:
   - Why do you think so many things were made from grass and why? (**How do you say grass in Sugt'stun? Weget**)
   - Do you have any items made from grass at home? (**How do you say grass in Sugt'stun? Weget**)
5. Give students their photos to glue on plain white paper.
6. Tell students to write/dictate how many items they found and place in their portfolio.

I Spy...

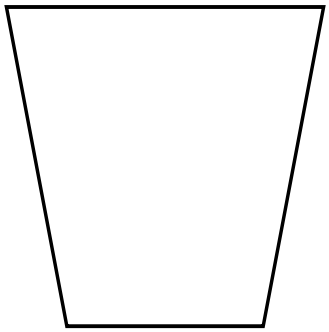
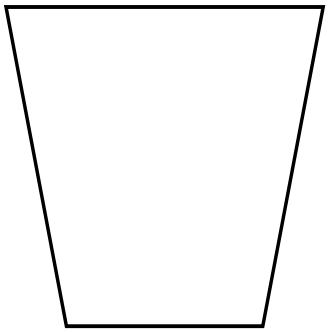
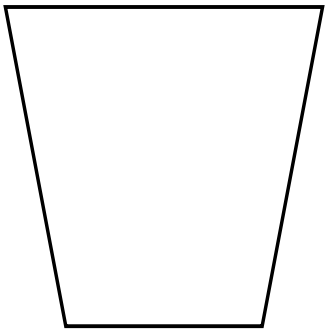
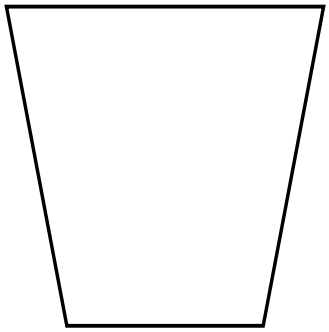
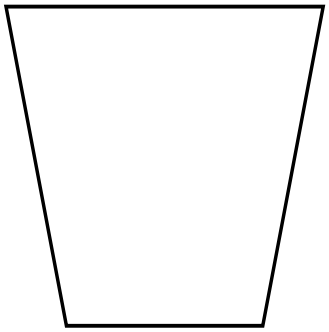
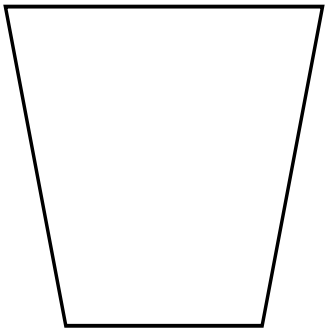


Burke Museum

NMNH,
Smithsonian Institution

Name _____ Date _____

Seed Growth Recording Sheet

Day _____ 	**Day** _____ 	**Day** _____ 
Day _____ 	**Day** _____ 	**Day** _____ 

GRASS AND PLANT FIBERS – FIBROUS MATERIALS 3-6 (1)

Grade Level: 3-6

Overview: Beach rye grass, abundant and easily harvested, was used for many purposes; food, clothing, insulators, mats, baskets, hats, sunglasses, rope, twine and so many needed things in order to survive. In this activity students learn three basic techniques to transform the grass into woven material. This is a fall activity.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:

Estimated Time: three classes-1-field trip; cleaning and drying; 2- Weaving Demo and sample making; 3- Examination of study prints; display posters, captions.

Comment [B1]: 3 Classes? 1- Field trip; cleaning, drying; 2 - Weaving Demo and Sample making; 3- Examination of study prints, display posters, captions

Lesson Goal: To learn how to weave with grass.

Lesson Objectives: Students will:

- Identify and harvest local beach grass for weaving.
- Learn and practice three different weaving techniques; plaiting, single strand, single twine
- Research use of techniques in traditional woven items
- Produce samples of three weaving techniques
- Display and caption weaving samples

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Beach grass		Wegpak
Stem		Punga

Materials/Resources Needed:

- Permission slip according to school district policies
- Elder/Recognized Expert
- Posters (in kit)
- Camera, copier, copy paper
- File folder labeled "Grass and Plant Fibers," (Portfolio) for each student

Comment [ny2]: Plaiting, single strand, single twine… rye grass, nettles, beach lupine

Website:

- http://www.gramene.org/species/oryza/rice_illustrations.html , retrieved 2/27/13 for labeled rye grass illustrations
- (http://www.timjohnsonartist.com/education-projects/workshop-projects/ Retrieved 2.21.13, Artist & Basketmaker, 3 weave sun, Workshop examples)
-

Class I

- Beach grass (garbage bag full)
- beach grass stems (each student should collect eight stems apiece)

- Garbage bag
- Newspaper
-

Class II

- 14”x 11”poster board for each student
- glue
- markers
- 10 wild beach rye grass stems for each student

Teacher Preparation:

- Review activities and suggested websites
- Sample letter to parents (in kit)
- Contact local Elder/Recognized Expert; discuss knowledge about uses of plants, what kind, where was it gathered, cured and how plants were used. Determine an appropriate field trip site. Ask Elder/Recognized Expert to join field trip to share knowledge with students.
- Hand out permission slips in timely manner

Opening: Display photo of rye grass for students to help them identify the grass they will gather during the field trip and display the labeled grass parts. Identify the blades of grass and the stem, tell students they will gather these parts during the field trip.

Activities:

Class I (Gathering)

1. If you have Elder/Recognize Expert go on fieldtrip have him/her point out other plants that have been used.
2. Go on field trip. Demonstrate how to identify and gather beach rye grass and teach them to say ‘**wegpak**’.
3. While gathering rye beach grass, take pictures of students
4. Have students place the beach grass in the garbage bag. (**How do say beach grass in Sugt’stun? Wegpak**) Gather a full bag. Ask:
    - Why do you think beach grass was used? (**How do say beach grass in Sugt’stun? Wegpak**)
    - What would you make?
    - Do you think plants could be used as rope? Why?
5. When back in the classroom have students spread beach grass and stems on newspaper in designated area. (**How do say beach grass in Sugt’stun? Wegpak**). Have students separate stems and blades of grass. Place stems in hot water until students work with it in Class II.
6. Have students clean the grasses, keep only the rye grass to work with for Class II and Class III. (**How do say beach grass in Sugt’stun? Wegpak**)

Opening: Display website with 3 weave sun

Class II

1. Have students’ select three strands of grass about the same length. (**How do say beach grass in Sugt’stun? Wegpak**)
2. Demonstrate how to plait the grass; first knot the strands together and proceed with the plaiting.

Comment [B3]: Three different demos needed.

3. Students can now start plaiting their grass.
4. After completing task, have students place the braided grasses aside to attach to their completed sun weave project. Students will use the braided grass as a hanger for their project.
5. Have students gather their grass stems, lay five stems down, take the other five stems and start weaving one at a time over and under opposite of the five laying down until all five have been woven with first five.
6. Demonstrate how to wind a piece of grass around one of the stems (from the above exercise), do not start at one of the corners.
7. Once the grass has been wound around the stem, start over and under each stem.
8. When one of the blades of grass runs out just keep adding more blades of grass until the students have created this project to be about the size of one's hand.
9. After completing the project, students can place their braided grass as a hanger to display their work, (when we did the project we just inserted the knotted ends into the woven grass).

Class III

1.

LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies

---

Dear Parents,

Our class is starting a new unit, using a heritage kit titled **Grass and Plant Fibers.** We will be investigating local areas regarding plants with an Elder or Recognized Expert for next three weeks. It will be quite an adventure of discovery!

You can add to your child's understanding and interest by asking your child what they discovered in the classroom about local plants. We will be taking field trips to gather plants and kelp to use in the classroom. Your child will learn about gathering, stripping and weaving with the plants. We will discover together the uses of local resources and history behind the uses.

We will continue to keep you updated about our activities in class by sending your child home with homework to share what we are doing in the classroom. If you have any questions please call or feel free to visit us in the classroom.

Comments_____
_____
_____
_____
_____

GRASS AND PLANT FIBERS – FINDING AND DEFINING NATURAL FIBROUS MATERIALS 3-6 (1)

Grade Level: 3-6

Overview: Alutiiq woman twisted several fibers from whales, porpoises, and bears into strong lines for hunting equipment and kayaks. Learning to make braided cords was one of young girl's first lessons. The cords can be decorated with colors and strands of animal hair. (Looking Both Ways pg. 149, Arctic Studies Center, University Press 2001)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CE 2	Community C1	History B1

Estimated Time: Two class periods of 55 minutes

Lesson Goal: To learn that fibrous materials are naturally occurring around us and define what fibrous materials are.

Lesson Objectives: By the end of this activity the students will able to:

- Have the students define fibrous materials. List at least "3" examples along with definitions.
- Give locations of where the fibrous materials can be found.
- List the purpose for the fibrous materials use.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Grass		weg'et
Sinew		yaluq
Roots		nukek
Cotton		wataaq

Materials/Resources Needed:

- Looking Both Ways Book, Indian Fishing Book, Alaska Native Arts and Crafts (in the Kit Library)
- Dictionary
- Computer access to look up materials for the activity and find pictures
- White construction , and multiple colored construction paper
- Pens, colored pencils, markers , rulers
- APA citation template for listing the resources

Teacher Preparation: Tell the students they are going to create a "3" part 9x12 pamphlets in groups. They will work together to define, label and show visuals of natural fibrous materials.

Opening:

To gather ideas for this activity we will list on the chalkboard the definition of the word fibrous material.

Fibrous material: The materials are composed of or consisting of fibers or fibrous body or substance. These substances are; sinew, grass, jute or any other strong binding material. The fibrous materials can be stringy or thread like. The materials can be naturally occurring in nature. (Merriam-Webster Dictionary)

Here are some examples:

- Cotton
- Seaweed
- Kelp
- Spruce roots
- Nettles

Activities:

1. The students will take the list form the chalkboard, and look at any additional grasses or fibrous materials to add to the list.
2. The students will decide which "3" grass or fibrous materials they would like to sue for the tri-fold information pamphlet.
3. The first fold will have a picture and title of the grass or fibrous materials.
4. The second fold will have the characteristics and description of the grass or fibrous material.
5. The third fold will have a list of the possible uses for the grass or fibrous materials.
6. The students will draw the pictures form the examples, this is why these will be done I groups.
    - Artist
    - Researcher
    - Writer
7. The size of the construction paper should be at least 12x12 in size to have enough room

for the pictures and information.

8. The students should do a rough draft together before putting it in final form on scratch paper.
9. Once they have finalized the rough draft, they can begin the application of pictures and information on the finished pamphlet.
10. The groups will present and explain their information to the class.

Traditions of Using Grass and Other Fibrous Materials in the Chugach Region

Activity Title: Drying the Bull kelp with Salt

Grade Level: 3-5

Overview: "Excellent lines for the fisherman came from many materials. Perhaps the most ideally suited was the bull kelp, seaweed found in rocky areas along the whole coast in the upper sub tidal zone and to a depth of several fathoms. From its holdfast, a root like structure clinging to the rock, the seaweed sends out a long stem for up to 81 feet. The stem, about 3/8 inches in diameter at the base, is cylindrical and solid, gradually increasing in thickness to become a hollow tube terminating in a bulb which serves as a float to hold the seaweed up. The solid part of the stem was used for fish lines after being soaked in fresh water, stretched, and twisted for extra strength. Lengths were joined together with a special knot to give the fisherman a long line of great strength" (Steward, H. 1977).

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
SS6	Science E1	D4

Estimated Time: 45 Minutes

Goal: To explore the uses of grass and fibrous materials.

Objective(s): By the end of this activity, students will be able to:

- Identify the bull kelp that often floats ashore.
- Observe the long fronds, air bladders, and anchoring holdfasts.
- Describe how the seaweed attaches to rocks.

Vocabulary:

Sugcestun:

English: Seaweed

Materials/Resources Needed:

- Cardboard, Saran wrap, Rock Salt
- Recognized Expert: Name:_____
- Texts: Stewart, H. (1977). Indian Fishing: Early Methods on the Northwest Coast. Seattle, WA: University of Washington Press

Teacher Preparation:

- Have the Local Education Coordinator identify a Recognized Expert to help students identify bull kelp.
- Review the overview.
- Contact the Local Education Coordinator at least two weeks in advance so that the Recognized Expert can be identified and briefed for this activity.
- Meet with the Recognized Expert in advance of the class time.
- Collect fresh bull kelp and complete dried bull kelp for display in the classroom.

Opening: Show the students the bull kelp in its fresh state and show an example of dried bull kelp. Note the softness of the fresh seaweed and the brittle dried seaweed. Have them discuss similarities and differences.

Activities:

1. Gain parental and principal permission to take students on a field trip with a Recognized Expert to observe bull kelp in its natural environment.
2. Collect fresh bull kelp and bring the samples to the classroom.
3. Identify the parts of the bull kelp.
4. Prepare the cardboard press by cutting the amount of cardboard for each student, 2 sheets per student.
5. Lay the bull kelp specimen on the cardboard #1.
6. Sprinkle enough rock salt to cover the while outer edge and the entire specimen, approximately 2 cups.
7. Lay cardboard #2 on top of the specimen.
8. Put enough books on top of cardboard #2 to provide weight.
9. Label the parts of the kelp to include the fronds, stem and holdfast.
10. Label the specimen with the date of collection and student name.
11. Have the specimen dry for at least 7 days.

GRASS AND PLANT FIBERS –3-6 DRYING BULL KELP WITH SALT (2)

Grade Level: 3-6

Overview: "Excellent lines for the fisherman came from many materials. Perhaps the most ideally suited was the bull kelp, seaweed found in rocky areas along the whole coast in the upper sub tidal zone and to a depth of several fathoms. From its holdfast, a root like structure clinging to the rock, the seaweed sends out a long stem for up to 81 feet. The stem, about 3/8 inches in diameter at the base, is cylindrical and solid, gradually increasing in thickness to become a hollow tube terminating in a bulb which serves as a float to hold the seaweed up. The solid part of the stem was used for fish lines after being soaked in fresh water, stretched, and twisted for extra strength. Lengths of these were joined together with a special knot to give the fisherman a long line of great strength" (Steward, H. 1977).

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
D4	Science E1	SS6

Estimated Time: 45 minutes

Lesson Goal: To learn how bull kelp was traditionally dried and used.

Lesson Objectives:

- Identify bull kelp that often floats ashore.
- Observe the long fronds, air bladders, and anchoring holdfasts.
- Describe how the seaweed attaches to rocks.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Seaweed		iituliq
Rocks		yaamat
Rope		qeluq
Salt		taryuq

Materials/Resources Needed:

- Cardboard, Saran wrap, Rock Salt
- Recognized Expert
- Stewart, H. (1977). Indian Fishing: Early Methods on the Northwest Coast. Seattle, WA: University of Washington Press

Teacher Preparation:

- Ask for a Recognized Expert to help students identify bull kelp.

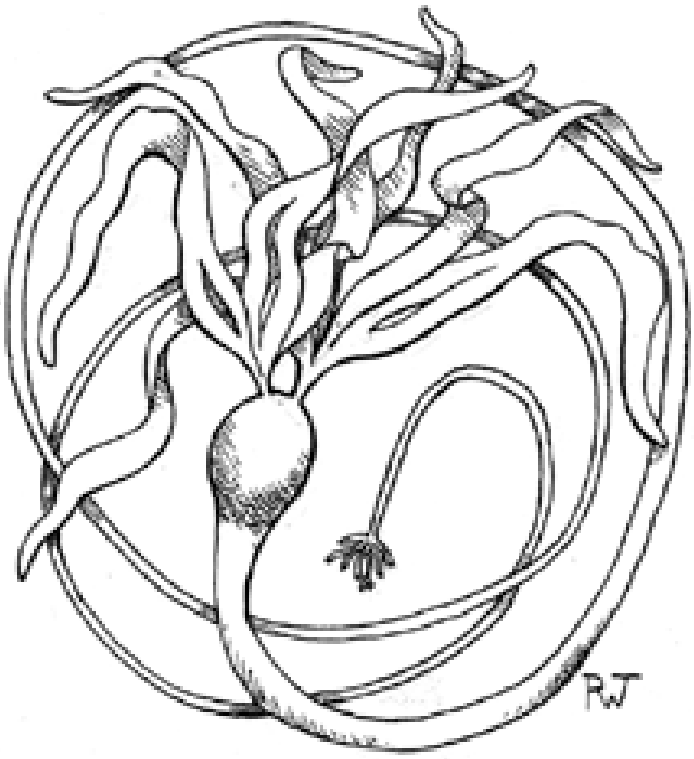
- Review the overview.
- Meet with the Recognized Expert in advance of the class time.
- Collect fresh bull kelp and complete dried bull kelp for display in the classroom.

Opening: Show the students the bull kelp in its fresh state and show an example of dried bull kelp. Note the softness of the fresh seaweed and the brittle dried seaweed. Have them discuss similarities and differences.

Activities:

1. Gain parental and principal permission to take students on a field trip with a Recognized Expert to observe bull kelp in its natural environment.
2. Collect fresh bull kelp and bring the samples to the classroom.
3. Identify the parts of the bull kelp. Ask each student to fill out the attached sheet with bull kelp parts and illustration.
4. Prepare the cardboard press by cutting the amount of cardboard for each student, 2 sheets per student.
5. Lay the bull kelp specimen on the cardboard #1.
6. Sprinkle enough rock salt to cover the while outer edge and the entire specimen, approximately 2 cups.
7. Lay cardboard #2 on top of the specimen.
8. Put enough books on top of cardboard #2 to provide weight.
9. Label the parts of the kelp to include the fronds, stem and holdfast.
10. Label the specimen with the date of collection and student name.
11. Have the specimen dry for at least 7 days.

IDENTIFY BULL KELP PARTS



1. **STIPE**

2. **HOLDFAST**

3. **BULB / AIR BLADDERS**

4. **FRONDS**

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Finding and Defining Natural Fibrous Materials**

Grade Level: 3-6

Overview: Alutiiq woman twisted several fibers from whales, porpoises, and bears into strong lines for hunting equipment and kayaks. Learning to make braided cords was one of young girl's first lessons. The cords can be decorated with colors and strands of animal hair. **(Looking Both Ways pg. 149, Arctic Studies Center, University Press 2001)**

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
History B1	Community C1	CE 2

Estimated Time: 2 class periods of 55 minutes

Goal: To learn that fibrous materials are naturally occurring around you and the students will define what fibrous materials are.

Objective(s): By the end of this activity the students will able to:

- Have the students define fibrous materials. List at least "3" examples along with definitions.
- Give locations of where the fibrous materials can be found.
- List the purpose for the fibrous materials use.

Vocabulary:

Sugcestun:

English: Fibrous materials, sinew, spruce roots, and grass (examples)

Materials/Resources Needed:

- Looking Both Ways Book, Indian Fishing Book, Alaska Native Arts and Crafts
- Library use to find a books that describes a natural fibrous material
- Computer access to quickly look up materials for the activity and find pictures
- Dictionary
- White construction , and multiple colored construction paper
- Pens, colored pencils, markers , rulers
- APA citation template for listing the resources

Teacher Preparation:

Tell the students they are going to create a "3" part 9x12 pamphlets in groups. They will work together to define, label and show visuals of a natural fibrous materials.

Opening: To gather ideas for this activity we will list on the chalkboard the definition of the word fibrous material.

Fibrous material: The materials are composed of or consisting of fibers or fibrous body or substance. These substances are; sinew, grass, jute or any other strong binding material. The fibrous materials can be stringy or thread like. The materials can be naturally occurring in nature. (Merriam-Webster Dictionary)

Here are some examples:

- Cotton
- Seaweed
- Kelp
- Spruce roots
- Nettles

Activities:

1. The students will take the list form the chalkboard, and look at any additional grasses or fibrous materials to add to the list.
2. The students will decide which "3" grass or fibrous materials they would like to sue for the tri-fold information pamphlet.
3. The first fold will have a picture and title of the grass or fibrous materials.
4. The second fold will have the characteristics and description of the grass or fibrous material.
5. The third fold will have a list of the possible uses for the grass or fibrous materials.
6. The students will draw the pictures form the examples, this is why these will be done I groups.
    - Artist
    - Researcher
    - Writer
7. The size of the construction paper should be at least 12x12 in size to have enough room for the pictures and information.
8. The students should do a rough draft together before putting it in final form on scratch paper.
9. Once they have finalized the rough draft, they can begin the application of pictures and information on the finished pamphlet.
10. The groups will present and explain their information to the class.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: How to make fishing line with Fibrous materials**

Grade Level: 3-6

Overview:

Excellent lines for the fisherman came from many materials. Perhaps the most ideally suited was the bull kelp (*Nereocystis Luetkeona)*, seaweed found in the rocky area along the whole coast in the upper sub tidal zone and to a depth of several fathoms.

From its holdfast, a root like structure tenaciously clinging to the rock, the seaweed sends put a long stipe, like a stem, for up to 25 meters (about 81 feet) The stipe, about one centimeter (3/8 inch) in diameter at the base is cylindrical and solid, gradually increasing in thickness to become a hollow tube terminating in a bulb which serves as a float to hold the seaweed up.

The solid part of the stem was used for fish lines after being soaked in fresh water, stretched, and twisted for extra strength. Lengths of these were joined together with a special knot, to give the fisherman along line of great strength. ***(Indian Fishing: Early Methods on the Northwest Coast by Hilary Stewart, University of Washington Press 1977)***

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Social Standards A1	History A6	CS B1

Estimated Time: (2) Class periods of 55 minutes

Goal:

To understand how the Chugach people used the resources of fibrous materials to ensure easier gathering tasks.

Objective(s): By the end of this activity the students will able to:

- Locate where the fibrous materials bull kelp can be found
- Comprehend the steps taken to make the bull kelp into fishing line.
- Create a sample of the fishing line from the guided book material.

Vocabulary:

Sugcestun:

English: bull kelp, fishing line

Materials/Resources Needed: **Use bullets when listing materials and resources.**

- The book Indian Fishing By Hilary Stewart
- Cotton Gloves
- Walking Boots/layered clothing
- Beach by the City Dock or the Mineral Creek Trail
- Buckets for Water
- Old Sheets

Teacher Preparation:

- Teachers please send out the permissions slips in advance to parents for the field trip.
- Please make sure to tell the students to dress appropriately.
- Please ask the students to bring in buckets for the field trip

Opening:

How many students wonder if it possible to make twine with bull kelp? Do you believe the fibrous materials will be strong enough?

Activities:

1. The students will be grouped together when they go to the location.
2. The students will look for the kelp that is washed up on the shore (best time is after a storm).
3. The students will put the stipes of bull kelp into the buckets.
4. The students will gather enough of the bull kelp stipe to make at least a (3) foot sample of twine.
5. The students will return to the classroom and soak, rinse the kelp. The students will try to remove all of the debris from the kelp. They may have to do this several times.
6. Once the bull kelp stipes are cleaned, the students can work together to gently stretch the stipes.
7. The students will begin, twisting the bull kelp stipes to start forming the fishing line. It should start shrinking to about ¼ inch thickness.

8. The students will notice at this time the bull kelp stipes are becoming wiry and tough. The fibrous material is also shrunken in size.
9. If the students re-wet the bull kelp it will expand again.
10. Then groups will show their finished fishing line to the rest of the class.

GRASS AND PLANT FIBERS –3-6 MAKING FISHING LINE WITH BULL KELP (3)

Grade Level: 3-6

Overview: Excellent lines for the fisherman came from many materials. Perhaps the most ideally suited was the bull kelp (*Nereocystis Luetkeona)*, seaweed found in the rocky area along the whole coast in the upper sub tidal zone and to a depth of several fathoms. From its holdfast, a root like structure tenaciously clinging to the rock, the seaweed sends put a long stipe, like a stem, for up to 25 meters (about 81 feet) The stipe, about one centimeter (3/8 inch) in diameter at the base is cylindrical and solid, gradually increasing in thickness to become a hollow tube terminating in a bulb which serves as a float to hold the seaweed up. The solid part of the stem was used for fish lines after being soaked in fresh water, stretched, and twisted for extra strength. Lengths of these were joined together with a special knot, to give the fisherman along line of great strength. ***(Indian Fishing: Early Methods on the Northwest Coast by Hilary Stewart, University of Washington Press 1977)***

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	History A6	Social Standards A1

Estimated Time: Two class periods of 55 minutes

Lesson Goal: To understand how the Chugach people used the resources of fibrous materials to ensure easier gathering tasks.

Lesson Objectives: By the end of this activity the students will able to:

- Locate where bull kelp can be found
- Comprehend the steps taken to make the bull kelp into fishing line.
- Create a sample of the fishing line from the guided book material.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Seaweed		iituliq
Rocks		yaamat
Rope		qeluq

Materials/Resources Needed:

- The book Indian Fishing By Hilary Stewart
- Cotton Gloves
- Walking Boots/layered clothing

- Buckets for Water
- Old Sheets

Teacher Preparation:

- Teachers please send out the permissions slips in advance to parents for the field trip.
- Please make sure to tell the students to dress appropriately.
- Please ask the students to bring in buckets for the field trip

Opening: How many students wonder if it possible to make twine with bull kelp? Do you believe the fibrous materials will be strong enough?

Activities:

1. The students will be grouped together when they go to the location.
2. The students will look for the kelp that is washed up on the shore (best time is after a storm).
3. The students will put the stipes of bull kelp into the buckets.
4. The students will gather enough of the bull kelp stipe to make at least a (3) foot sample of twine.
5. The students will return to the classroom and soak, rinse the kelp. The students will try to remove all of the debris from the kelp. They may have to do this several times.
6. Once the bull kelp stipes are cleaned, the students can work together to gently stretch the stipes.
7. The students will begin, twisting the bull kelp stipes to start forming the fishing line. It should start shrinking to about ¼ inch thickness.
8. Use the right knots if needed to tie the lines together.
9. The students will notice at this time the bull kelp stipes are becoming wiry and tough. The fibrous material is also shrunken in size.
10. If the students re-wet the bull kelp it will expand again.
11. Then groups will show their finished fishing line to the rest of the class.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Introduction to Usable beach wild rye grass**

Grade Level: 3-6

Overview:

The Aleut baskets are among the finest in the world. The weaving is so fine it looks like cloth. The baskets are usually small and cylindrical; about 3 inches high by 2 inches in diameter. The baskets have woven knobbed lids, and are decorated with dyed grass or colored threads.

To make baskets the Aleut women use beach wild rye grass (*Elymus Mollis)* which grows along beaches. In olden days the weaving would be done in July and August while the women were drying the fish.

When the grass was used right away, only the lower blades of the grass would be used, these were already bleached from the lack of sunlight. It was also possible to bleach the grass by putting it into a gunny sack covered with moss. The grass would be kept moist with sea water until it was bleached. After being washed and dried the grass could be stored in bundles for the future to use. **(Aleut Basket Weaving by Kathy Lynch Adult Literacy Library Standards 1974)**

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
CE 3	Science A2	CS A4

Estimated Time: 2 classes of 55 minutes

Goal: To understand the basics of beach wild rye grass in the culture of the Chugach region.

Objective(s): By the end of this activity the students will able to:

- State their understanding of beach wild rye grass.
- Display visuals of their knowledge of beach wild rye grass.
- Create art from the knowledge of the beach wild rye grass.

Vocabulary:

Sugcestun: Weg'et (grass)

English: beach wild rye grass

Materials/Resources Needed: **Use bullets when listing materials and resources.**

- Kathy Lynch Aleut Basket Weaving Book
- Construction paper in the a variety of colors; green, yellow, tan, orange, blue, white
- Scissors/Glue
- Hole puncher
- Scratch paper
- String / Yarn
- (3) pieces of pipe cleaner
- Tape/glue

Teacher Preparation:

The teacher may re-read the overview introduction to the students, and then ask the students please tell me "what are the key points of this information?" Let's list them on the chalkboard.

- Aleut Baskets
- Aleut women
- Wild rye beach grass
- Bleached from the sun and seawater
- Can be stored for future use.

Opening: The teacher can introduce the activity lesson to the students by telling them we are going to be making a mobile for display. We will make the mobiles from the information we have learned about the beach wild rye grass.

Activities:

1. The students will use a piece of scratch paper to design their mobile.
2. The mobile will include;
    - The sun
    - The seawater
    - A basket
    - Who makes them

- Scientific name of the grass

3. At least (3) of the items from the mobile must be objects (drawn) and (2) pieces are worded descriptions.
4. The students will design the pieces on the scratch paper.
5. The students will draw the design on the colored construction paper.
6. The students are to cut the design from the colored construction paper.
7. Measure twice and cut the strings or yarn for the mobile.
8. Use a hole punch on the construction paper designs, (remember to get it exactly center or make more than one punch on the design).
9. Loop the yarn/string through the punched holes, tie a small knot.
10. Use a piece of tape over both sides of the string/yarn in the hole to reinforce the strength.
11. Show the finished mobile to the rest of the class.

GRASS AND PLANT FIBERS –3-6 IDENTIFYING BEACH WILD RYE GRASS (4)

Grade Level: 3-6

Overview: The Aleut baskets are among the finest in the world. The weaving is so fine it looks like cloth. The baskets are usually small and cylindrical; about 3 inches high by 2 inches in diameter. The baskets have woven knobbed lids, and are decorated with dyed grass or colored threads.
To make baskets the Aleut women use beach wild rye grass (Elymus Mollis) which grows along beaches. In olden days the weaving would be done in July and August while the women were drying the fish.
When the grass was used right away, only the lower blades of the grass would be used, these were already bleached from the lack of sunlight. It was also possible to bleach the grass by putting it into a gunny sack covered with moss. The grass would be kept moist with sea water until it was bleached. After being washed and dried the grass could be stored in bundles for the future to use. (Aleut Basket Weaving by Kathy Lynch Adult Literacy Library Standards 1974)

You can find beach grass on sandy beaches, spits, tidal flats, all over the globe.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS A4	Science A2	CE 3

Estimated Time: Two class periods of 55 minutes

Lesson Goal: To understand the basics of beach wild rye grass in the culture of the Chugach region and to identify the plant.

Lesson Objectives: By the end of this activity the students will able to:

- Identify the parts of beach wildrye grass.
- Display visuals of their knowledge of beach wild rye grass.
- Create art from the knowledge of the beach wild rye grass.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Leaf	peluq	peluq
Stem	puk	puk
Root	nukeq	nuket

Materials/Resources Needed:

- Department of Natural Resources: Reeve and Benson Beach Wildrye identification flyers (in the Kit) or website: http://plants.alaska.gov/publications/pdf/plant-flyers/ReeveBeachWildrye.pdf and http://plants.alaska.gov/publications/pdf/plant-flyers/BensonBeachWildrye.pdf

- Alaska Forage Manual: Chapter C: Plant Profiles p. 35 (in the Kit) or website: http://plants.alaska.gov/forage/section-C.htm
- Kathy Lynch Aleut Basket Weaving Book
- Construction paper in the a variety of colors; green, yellow, tan, orange, blue, white
- Scissors/Glue
- Hole puncher
- Scratch paper
- String / Yarn
- (3) pieces of pipe cleaner
- Tape/glue
- http://frontierscientists.com/projects/alutiiq-weavers/

Teacher Preparation:

The teacher may re-read the overview introduction to the students, and then ask the students please tell me "what are the key points of this information?" Let's list them on the chalkboard.

- Aleut Baskets
- Aleut women
- Wild rye beach grass
- Bleached from the sun and seawater
- Can be stored for future use.

Opening: The teacher can introduce the activity lesson to the students by telling them we are going to be making a mobile for display. We will make the mobiles from the information we have learned about the beach wild rye grass.

Activities: The students will use a piece of scratch paper to design their mobile.

1. The mobile will include;
    - The sun
    - The seawater
    - A basket
    - Who makes them

- Scientific name of the grass

2. At least (3) of the items from the mobile must be objects (drawn) and (2) pieces are worded descriptions.
3. The students will design the pieces on the scratch paper.
4. The students will draw the design on the colored construction paper.
5. The students are to cut the design from the colored construction paper.
6. Measure twice and cut the strings or yarn for the mobile.
7. Use a hole punch on the construction paper designs, (remember to get it exactly center or make more than one punch on the design).
8. Loop the yarn/string through the punched holes, tie a small knot.
9. Use a piece of tape over both sides of the string/yarn in the hole to reinforce the strength.
10. Show the finished mobile to the rest of the class.

GRASS AND PLANT FIBERS –FIBROUS MATERIALS STORIES 3-6 (5)

Grade Level: 3-6

Overview: **"**They all rose bright and early, they had listened to Raven. He got up himself and took two young men with him. They carried the Silver Salmon tail and he also took a small seal stomach full of the seal oil. He hit the trees standing there with the stomach until the oil squirted out. Then he beat the trees with the salmon tail, telling the men that the trees would turn to fire, and would bake anything.

When he came back, he told the chief: "Make two sticks with a cord and we will have the fire started". The wood was red cedar. He told the Chief to take the young men and a weight to hold the sticks down while they were drilling. As they did so, the sticks began to smoke and sparks flew. Raven had the men make dry shavings to catch the fire. The shavings caught fire. They picked them up and waved them, and then they threw dry grass on them to flame up." (Excerpt from the Chugach Legends book "How Raven Brought Fire" page 86 CAC 1984)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS C1	Science A1	Survival Standards C

Estimated Time: Two class periods of 55 minutes

Lesson Goal: For the students to learn about the the traditional stories of the Chugach Legends and understand the lessons in them.

Lesson Objectives: By the end of this activity the students will able to:

- Recognize a traditional Chugach Legend
- Translate the meaning of the story
- Adapt the story into a version of their own to write

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Grass		weg'et
Cedar		
Raven		qanitiirpak

Materials/Resources Needed:

- Copy of the Chugach Legends book ; and the story "How Raven Brought Fire"
- Scratch paper/ Writing paper
- Colored pencils/Markers/Pencils/Pens
- Construction Paper in Multiple colors

- Glue/Tape
- Natural fibers and materials, that can be used to decorate the storyboards (leaves, grass, sand, twigs, shells…)

Teacher Preparation:

- The teachers can read in entirety the story "How Raven brought fire" to the students.

Opening:

Ask the students if they can think of stories with lessons in them? Ask the students if they can make up and write a story with a lesson in it? List some stories with a lesson in it on the smart/chalk board. For example;

- Boy Cries Wolf (Don't tell lies)
- Hansel & Gretel (Wandering far from home)
- Three Little Pigs (Don't be lazy)
- Little Red Riding Hood (Don't talk to strangers)

Activities:

1. The students will come up with another couple of stories to add to the list of lesson stories. This can be done individually or in groups.
2. If done with groups, they will have to make the story at least one page long.
3. The story must have in it; one of the natural fibrous materials discussed earlier in the unit:
    - Grasses/flowers
    - Spruce Root/cedar bark
    - Trees/ bushing plants
    - Kelp/seaweed
4. The group will write the story together and complete a rough draft.
5. Once they have finished the rough draft, they will transfer to a blank white construction paper at least 9x12 in size.
6. The students will make one small picture to illustrate a segment of their story on white construction paper. The paper should be at least 5x7 in size.
7. The students will glue the story and picture to a background construction paper, for a border. The size should allow a (2) inch border on the edge and at least 11x15 in size.
8. The students will present their story with picture to the rest of the class.
9. The storyboards can be set up for display e.g. at the village council office.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Spruce Roots and Bentwood hats**

Grade Level: 3-6

Overview: From the earliest Western contacts beginning with Russian fur trader Stepan Glotov's arrival on Kodiak Island in 1763, outsiders took special note of hats worn by the Alutiiq hunters. They were wooden helmets on the shape of seal heads, round basketry hats woven from strips of spruce roots, curved visors and peaked hats shaped from thinly shaved planks of wood.

To the painted imagery of the hats were added dentalium shells (delicate cone-shaped mollusk shells traded in from the Vancouver Island region in British Columbia.),glass trade beads and sprays form sea lions whiskers. The closed crown "style" of bentwood hat to use terminology, developed by Lydia-Black, was woven on Kodiak Island region and eastern Aleutians, while the "truncated cone" shape was typical of the Alaska Peninsula. Spruce root hats were worn through out the Alutiiq region and down, the North west coast, where the styles probably originated. **(Looking Both Ways, Arctic Studies Center University Press 2001 pages 152,155,156,157)**

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural
Cultural Expression D1	Science F3	CS B1

Estimated Time: 1 days of class time at 55 minutes each

Goal: To make on construction paper a replica of traditional spruce root hats or bentwood visors.

Objective(s): By the end of this activity the students will able to:

- Choose traditional style of hat or visor to create with construction paper.
- Observe the cultural practice involved in creating paper spruce root hats or bentwood visors.
- Construct the chosen style of spruce root hat or bentwood visor adding distinctive cultural designs.

Vocabulary:

Sugcestun:

English: Bentwood, spruce Root, hats and visors

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Materials/Resources Needed: **Use bullets when listing materials and resources.**

- 3 styles of templates for the bentwood visors and spruce root hats
- Looking both ways book pages 152-157, for the guide and imagery of the traditional style of the hats.
- Colored pencils/Markers
- Plastic beads/Pipe cleaners
- Colored raffia
- Tape/glue/string

Teacher Preparation:

- The teacher may show the students the pictures in the books of the bentwood and spruce root visors and hats.
- The teacher may ask the students to look very closely at the details on the hats and visors, including the colors and details used to decorate them.

Opening: The teacher may ask the students when wearing these hats and visors, do the styles of the hats and visors mean anything to the person who is wearing them? Who is the person that is wearing them? Why one hat is bigger than the other and the visor lengths why is one longer than the other? Let's discuss these answers and list them on the chalkboard.

- The bigger the hat with more decorations the experience the hunter or this is the sign of the importance of the village member.
- Smaller hats and visors are for the new hunters from the village, and that boy is in training to be a hunter.
- The visors main purpose is to make the sight seeing on land and water more visible, especially when the sun is really bright.

Activities:

1. The students will select the template style they would like to do.
2. The students will trace onto the heavy construction paper the template for their lesson activity of the hat or the visor.
3. The students will cut the paper hat or visor from the heavy construction paper.
4. The students will begin putting the designs and colors on their hat or visor using marker, colored pencils.
5. The students are to put the embellishments on their hat or visor, these are the added decorations.
6. The students will fold the backside of the hat or visor before taping or gluing, the students are to make sure it fits their heads securely before taping or gluing the hat or visor.
7. When the students are finished, they can place the hats or visors on their heads.
8. When the teacher prompts the students they will present their hat or visor to the rest of the class, describing the details they have chosen for their hat or visor.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Cleaning the Roots**

Grade Level: 7-9

Overview: The time of the year the roots are harvested determines if the job is easy or hard. Roots dug when the bark slips easily off the trees will also peel very easily (June-July). Roots dug in the spring and fall will be hard to bark, but certainly not impossible. Cleaning roots is far easier than digging them up. ***(Digging and Preparing the Spruce Roots by Alan and Helen Dick Iditarod Area School District McGrath, Alaska 1998)***

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Subsistence Standard A 1G, H	Science A1, 2	Cultural Standards A4 C1
	History A 2, 7	D5 E2
	Geography A 1, 2 B 1	

Estimated Time: (1) class periods of 55 minutes

Goal: To learn about cleaning spruce roots.

Objective(s): By the end of this activity the students will able to:

- Clean roots in a traditional manner
- Develop traditional skills while learning about spruce roots
- Interact with Elders in their community

Vocabulary:

Sugcestun:

English: spruce roots, pocket knife

Materials/Resources Needed:

- www.ankn.uaf.edu/curriculum/spruce .html
- Digging and Preparing the Spruce Roots by Alan and Helen Dick published by Iditarod Area School District 1997
- Broom/dustpan
- Hammer
- Tide or Regular laundry detergent
- Crisco oil (in the tub) or other oil
- Hand soap
- Other ***(Alaska Alive under Spruce Gum pg 67,68)***

Teacher Preparation:

- The teacher may ask the students to go to page 5 in the book or hand outs of copies from the book ***Digging and Preparing Spruce roots*****, cleaning spruce roots.** So the students get a better understanding of the lesson activity.

Opening:

The teacher can ask the students after reading the page on cleaning the roots "How many different techniques are there? (There are (3) methods)

Activities:

1. The students will choose one of the methods to clean the spruce roots.
2. The students when done when cleaning the roots in different manners, the students may want to discuss this with the rest of the students
    - Which one seemed to work best?
    - Which method seemed harder and why?
3. The students will clean there hands well after handling the spruce roots.
4. The students will when finished cleaning their hands discuss the best way to remove the spruce gum.
5. The students will provide answers to why it gets stuck to their hands, must wash hands thoroughly.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: The Colors of the Seasons**

Grade Level: 7-9

Overview: Not all Unangun/Aleut engaged in whaling. In the eastern areas, Unangun/Aleut hunted caribou and fished for salmon. Unangun/Aleut fisherman caught halibut and cod with ingenious wooden hooks and a line made from braided kelp or sea lion sinew. Women, children, and the elderly concentrated on collecting bird eggs, intertidal organisms (such as chitions, clams, sea urchins and sea weed) and plants, roots, berries, which is ripened in the late summer and fall. ***(The Native Peoples of Alaska: Traditional Living in Northern Land, Steve J. Langdon, Greatland Graphics, Anchorage Alaska 2002)***

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Subsistence Standard G	Technology a 1, B2	Cultural Standard A4
	Arts A6	

Estimated Time: (2) class periods of 55 minutes

Goal: For the students to display items of grasses and fibrous materials during different seasons showing the changes of colors and marking of the grasses and fibrous materials.

Objective(s): By the end of this activity the students will able to:

- Choose grasses and fibrous materials to display.
- Diagram the grasses and fibrous materials according to the seasons.
- Compile this information in a collage form on a poster board.
- **Vocabulary:**

Sugcestun: Weg'et

English: grasses, spruce roots, cedar bark, bull kelp, seaweed, maiden hair fern, berries, alder woods.

Materials/Resources Needed: Use bullets when listing materials and resources.

- Native Peoples of Alaska: Traditional Living in Northern Alaska Steve J. Langdon 2002
- The Chapters on Unangun/Aleut & Sugpiaq/Alutiiq
- Pacific Basket Makers: A Living Tradition , Consortium for the Pacific Arts &Cultures
- Crayons , markers, colored pencils
- Computer access with color printer
- poster board/scratch paper
- Glue/scissors/tape
- magazines

Teacher Preparation:

The teacher may ask the students to read more of the information about the materials they will include in the activity in the books that have been referred to them and looking on the websites for additional information.

Opening:

The teacher can ask the students "In what seasons do the grasses and fibrous materials grow?"

"Do some of the materials grow more than others?" Let's list some of the answers and suggestions for materials on the chalkboard.

Activities:

1. The students can go on the internet to look up grasses and fibrous materials that grow in

The Prince William Sound.

2. The students can locate the appearances of the grasses and fibrous materials during different seasons of the year.
3. The students will research on the website some images they wish to print for the activity.
4. The students must make sure they choose the same plant to represent th4 before and after during the seasonal changes.

5. The students can look in magazines perhaps the “National Geographic of Alaska” for images of the grasses and fibrous materials.
6. The students can also include flowers that are used for making a dye for the grasses and other fibrous materials. Such as uses in basketry dyes.
7. The students will on scratch paper do a rough draft design to figure out the placement of their visuals for the collage, or if they need to draw pictures because they were unable to find visuals on the web or in magazines.
8. The students must clearly label the time of the season the plant is in and clearly label the name of the grass or fibrous material.
9. The students will when finished with the rough draft begin pasting on the poster board the final draft for their collage.
10. The students will present the poster to the rest of the class and discuss their choices with the class.
11. The teacher will designate a location for the posters to be hung for display.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Locate and Experiment with natural dyes for grass baskets**

Grade Level: 7-9

Overview:

Alutiiq and Aleut grass baskets are woven beginning at the base of the basket. Typically a weaver wets her fingers to keep the grass the soft and pliable. Grass strands may also be soaked in cold water and wrapped in a damp towel. It is important however, not to over wet the weaving strands, as they may rot or darken in color. Weaving is a time consuming process. It takes great skill to produce the tiny even stitches, and to create unique shapes, like the woven grass bottle covers, tiny basket earrings, or wallets made by contemporary artists. Many traditional Alutiiq baskets were embellished with false embroidery. Geometric designs and occasionally animal images were woven into the outer surface of a basket with colored strands of grass or other natural fibers. For example; maiden hair fern, feathers and beads. Grass strands were tinted with natural dyes such as; blueberries, blackberries, cranberries, wild iris petals, alder bark and a mixture of charcoal and seal oil produce an array of hues. **(Alutiiq Museum Archeological Respiratory)**

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Cultural Expression C1	Arts A3	CS D4

Estimated Time: (3) days of **55 Minutes of class time**

Goal: To learn the natural dyes from nature used to color the grass strands and fibers.

Objective(s): By the end of this activity the students will able to:

- List some of the natural plants used for coloring and dying other materials.
- Locate some of the items used for dying the grass and fibrous materials
- Experiment with natural materials to create some of the dye colors

Vocabulary:

Sugcestun:

English: berries, alders, grasses and fibrous materials

Materials/Resources Needed: **Use bullets when listing materials and resources.**

- Access to the Alutiiq Museum website
- Large plastic bowls/ plastic spoons
- Pot holders/ Large cooking pots
- A stove available for use/potato mashers for the berries
- Strainers/ plastic gloves
- Large Sun tea containers
- Newspaper/rubber bands
- Tables for use
- White T-shirts
- Blueberries, cranberries, wild iris flowers, alder bark

Teacher Preparation:

- The teacher may ask the students in advance to begin bringing in some of the supplies for the lesson activity. Such as;
- Berries (they can be store bought)
- Old newspapers
- White T-shirts
- Pots
- Alder bark (This can be gathered in the late fall)
- Plastic gloves

Opening:

The teacher may ask the students "Are you ready to experiment with the natural dyes?" What colors do you believe these materials will make?

Activities:

1. The students will put the berries in a pot with water. There should be enough water to cover the berries entirely. The students will put (2) quarts of berries in the pots.
2. The students will boil the berries and water at medium temperature for at least 10-20 minutes to get a concentrated color.
3. The students will remove the pot from the stove and allow cooling, making sure they use the pot holders and not burn them selves.
4. The students will place the strainer on top of large bowl and pour the liquid into the plastic bowl. Don't throw out the berries; the students will mash them to further concentrate the color solution.
5. The students will repeat this step with the remainder of the items for creating the dye for the lesson activity. Repeat this for the alders, irises and other berries.
6. The students will use the rubber bands to bind the t-shirts in different spots.
7. The students will put on the rubber gloves.
8. The students will take turns to color their t-shirts in the different dyes.
9. Once the students have completed the dying and coloring of the t-shirts, they will wring out the excess dye and allow drying.
10. The students will remove the rubber bands from the t-shirts and present them to the rest of class.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Preparing the Nettles to make a Fibrous material item**

Grade Level: 7-9

Overview:

Cordage or twine was made in a variety of ways and from a variety of materials. For my experiment with the cattail mats, nettle and basswood were used to make the cordage. Milkweed, dogbane, slippery elm bark, cedar bark strips, shredded cattail sinew, hides and many other fibrous materials can be used to make cordage. (*Schultz, University of Washington)*

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural
Survival Standards G	Geography A5 C2	CS C 1

Estimated Time: (3) class periods of 55 minutes

Goal:

The Students can learn about the natural fibers in the Chugach region that were utilized to make usable items.

Objective(s): By the end of this activity the students will able to:

- Demonstrate knowledge of natural fibrous items that can be developed into usable applications.
- Select items from a field trip to use for creating a twine/cord material.
- Manipulate the fibrous materials into a finished twine or cordage material.

Vocabulary:

Sugcestun:

English: twine, cord, nettles, cedar bark

Materials/Resources Needed: **Use bullets when listing materials and resources.**

- Copy of Cordage Sample by Schultz, University of Washington
- Copy of Native American Cordage @www.nativetech.org/cordageindex. Html
- Round stones
- Nettles, maidenhair fern, spruce root, raffia grass
- Pipe cleaners for an alternative
- Rubber gloves or leather gloves
- Paper towel/ plastic bags
- Mineral creek or Airport camp site locations
- Good walking shoes/boots/ layered clothing
- Bottled Water/ first aid kit
- Step-by-step instructions on how to gather nettles and prepare nettles for use.

Teacher Preparation:

- The best time of year to gather the nettles is after a hard frost because you are less likely to get stung by the nettles.
- The teacher may hand out the permissions slips to the students when preparing to go on the field trip.
- The teacher may also ask the students to bring in the supplies needed to go on the field trip.

- plastic bags - plastic, rubber, leather gloves
- paper towel / newspapers
- The teacher may explain to the students that nettles are dangerous as you have read in the information, they can be very harmful, so please be careful when handling the nettles.
- If a lot of the students cannot do the activity Pipe cleaners can be used as the alternative for the activity, these can be used to demonstrate the skill of twining and cording.

Opening:

If you want to go to the store and buy items you know you need and you cannot, you would have to make them. This is one natural material that can be used for daily use. Can you thing of other materials that can be used in this way? Let's list them on the board.

Activities:

1. The students will read the instruction on how to prepare the nettle material for use (collecting Nettles)
2. The students will go to the field trip location to forage for the nettles material.
3. If there are not enough materials found, then in groups the students will prepare the nettles for use.

- Wearing the rubber gloves, the students will strip the green skin off the nettles and discard.
- To do this you must grab the base of the plant and tear upward and away from your body.
- Pluck all of the leaves off the plant
- The stalks are still intact pull the roots form the ground, tap and shake to remove the dirt.
- Take enough of the material to tie into bundles to dry.

4. To add to the drying process, you can rub the fibers with rubber gloved hands or rub the green fibers with a heavy round stone, these techniques will speed up the drying process.
5. Wetting the nettle strips helps to thin them out to make it more pliable so it is ready for use.
6. Once the nettle fibers are prepared and dried enough to be pliable, it is ready for use.
7. Take (3) strands of the nettle fiber and;

- lay them in your lap
- tie of one end of the (3) strands into a knot
- Braid the (3) strands together, wetting them with water lightly, so they don't dry out.

8. Once it is braided lay it on a clean cloth to dry, checking on it occasionally so that it doesn't twist up, it must remain flat to dry.
9. The groups of students will share their braided nettle cord/ twine to the rest of the class.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Gathering Spruce Roots**

Grade Level: 10-12

Overview: It is needless to say that the principal materials which were at the disposal of the Chugach win their struggle for existence were of local origin. However, the animal kingdom was not by far the source of supply to the same extent as among the Arctic Eskimo. Wood, bark, spruce roots, and grass were utilized almost as much as bone, horn etc. ***(The Chugach Eskimo by Kaj Birkett-Smith Museum of Copenhagen 1953, page 72 chapter 6)***

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Subsistence Standard A1, 2	Geography A 1, 2, 3	Cultural A4 C1, D5

Estimated Time: (2) class periods of 55 minutes

Goal: To appreciate the activity of gathering spruce roots.

Objective(s): By the end of this activity the students will able to:

- Comprehend all senses reactions to outdoor spruce root gathering.
- Develop a skill using tools to extract spruce roots from the ground.
- Engage in physical activity to gather spruce roots.

Vocabulary:

Sugcestun:

English: spruce roots, tools

Materials/Resources Needed: Use bullets when listing materials and resources.

- Permission slips from the previous activity lesson
- Large local map of local community that includes the spruce forest
- Good walking shoes and layered clothing
- Transportation to location
- Elder from the community to guide the students when at the location
- First Aid Kit/Bottled Water
- Plastic Bags/Gloves
- Hammer/Axe/Pocket Knife
- Compass/index cards

Teacher Preparation:
The teacher may want to make sure all of the permission slips have been collected before the student can go on the field trip, and please have the student inform the teacher of any other allergies that may be of concern. Please ask the students to bring in some plastic bags for the field trip.

- Have the students put on the index cards the notes from the field trip to include;
- The total physical response to the area they are gathering the spruce roots such as; smell sounds, types of other plants growing in the surrounding habitat.
- The index card can also include additional information the student believes is important to the activity lesson.

Opening: The teacher may announce to the students; we will be going on a field trip to get spruce roots. Do any of the students have any questions at this time? I want to remind the students to pay close attention to the total physical response when on this field trip when gathering the spruce roots.

Activities:

1. The students will travel to the location in their communities to find the spruce roots.
2. The students will work together to find the sites that the spruce roots can be found, if that location is not good they can travel to another area to gather the roots.
3. The students will use their tools properly to gather the spruce roots.
4. The students will take turns using the tools to dig up the spruce roots; this way every student has the opportunity to use the tools.
5. The students will gather as many spruce roots as possible when on the field trip; if there are not too many spruce roots to gather they may consider gathering willow, birch, or cottonwood roots.
6. The students will return to the school when finished gathering the roots.
7. The students will clearly label the index cards with the;
    - Location of the spruce roots gathering area
    - This is important when placing this on a map of the area found on the map.
    - What else was in the surrounding area when gathering the spruce roots.
8. The students will continue to use the index cards to describe; the feel and smell of the dirt at the location, what did the air smell like in the woods that day. What else did you see that day when you were gathering the spruce roots that day.
9. The teacher will ask the students to also list on the index cards the other types of roots that were gathered at the location.
10. The students can also list on the index cards the similarities and differences between the roots.
11. The students, when given direction by the teacher will discuss the different varieties of roots that were in the forest during their field trip.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Learn to Coil**

Grade Level: 10-12

Overview: As stated in Jones (1983), "Unlike plaited and twined basketry, which is constructed by manipulating or fastening a series of weft and warps in many diverse ways, coiled baskets are built from a continuous foundation or coil, that spiral horizontally upward to form basket walls. The coils are sewn together by lacing narrow strips of relatively flexible materials around each coil, interlocking with the coil immediately underneath. About a dozen varieties of coiling are recognized, depending on the composition and material of the coils, and the manner in which they are sewn together. In the simplest kind of coiled basketry, the coil foundation is a single element, such as a sapling or rod. The more complicated basketry, the coils maybe composed of tow or more rocks, or splints, placed side-by-side or above the other, or in any other combination as the number increases. Lengths of grass or straw sometimes separately wrapped into bundles or various combinations of rods and flat splints are also use for the coil foundation. How the individual coils are fastened together is a matter of equal variability coils may simply be spiraled together with a continuous loop of flexible material, or sewn with different kinds of interlocking stitches that sometimes penetrate into underlying coils. A pointed awl of bone ivory or some other material is often used to push the stitches around or through the foundation coils" (p. 42-43).

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Community A 2, A 3	Mathematics A 5, B 4	Cultural A 6, B 2

Estimated Time: 55 minutes

Goal: The goal of this lesson is to learn the basics of coiling materials as it is done in basketry

Objective(s): By the end of this activity the students will able to:

- Examine the materials used in making coiled basketry.
- Practice the methods of making coiled basketry.
- Create a small item made from grass or fibrous materials using coiling techniques.

Vocabulary:

Sugcestun: Weg'et (grass); Mingqun (sewing needle)
English: Coiling technique, wrap, twist, sew, needles, raffia

Materials/Resources Needed:

- Pacific Basket Makers: A Living Tradition (1983) page 42-43
- Dowels or skewers (wooden)
- Raffia or Beach WildRye grass
- Sink, water, dish soap
- Clothes pins (wooden)
- Wire hangers or cotton string

- Recognized Xexpert to teach coiling technique from the community.

Teacher Preparation:
The teacher may ask the students in advance to prepare the WildRye grass or raffia before use. The raffia must be washed and rinsed several times in soap water before use. Hang up the WildRye grass or raffia to dry.

Opening:
Explain to the students that a guest will be coming in to teach them how to coil the Beach WildRye grass or raffia correctly.

Activities:
1. The students will gather their dried raffia from the drying area.
2. The students will be listening to Elder expert as they explain how to coil the raffia.
3. The students will have an opportunity to ask the Elder questions, after they are done explaining techniques.
4. When instructed, the students will begin coiling their raffia or grass.
5. The students will be given copies of the pages from the book "Pacific Basket Makers: A Living Tradition" pages 42-43 to use as a guide to work with the grass or raffia.
6. If the students choose too, after beginning the coiling, they can continue reading page 43 on "Ornamentation" and decorate their coiled creation in one of the manners explained.
7. The students can say "Quyana" (Kwe-yahna) which is interpreted as thank you in Sugcesten, to the Elder expert who helped in the classroom with this activity.

Enduring Understanding: Grass and Fibrous materials have been an important natural resource used by the Chugach Native People through time.

Activity Title**: Processing Spruce Roots**

Grade Level: 10-12

Overview: Wild Rye or beach grass is still the predominant material used in Aleut basketry, although, analysis of fibers found in archeological sites on the islands of the four mountains particularly in the Kagamil Caves shows early use of a variety of materials, including spruce roots, and beach bark (either imports or trade items) and beach pea. The type of grass used and it's method of preparation may have varied from region to region along with different styles and techniques (Alaska Native Arts and Crafts, Alaska Geographic, Vol. 12(3), 1985).

Standards:

Chugach Cultural:	Alaska Content:	Alaska Cultural:
Subsistence Standard C 1, G	Arts A 3, A 5, Science A 1	Cultural C 1, D 5, E 2

Estimated Time: 55 minutes

Goal: To gain knowledge of the process of spruce root preservation.

Objectives: Students will be able to:

- Split spruce roots
- Store spruce roots properly

Vocabulary:

Sugcestun: Qangirllaq, Uksentuluni

English: Spruce Root, Pocket Knife, Skill, Elder

Materials/Resources Needed: Use bullets when listing materials and resources.

- Gathering and preparing Spruce Roots by Alan & Helen Dicks (Iditarod Area School District, McGrath Alaska, 1994)
- Pocket Knife
- Hand soap or Gojo hand wash
- Plastic bag

Teacher Preparation:

The teacher may ask the students to read and understand page eight of the book, splitting the roots.

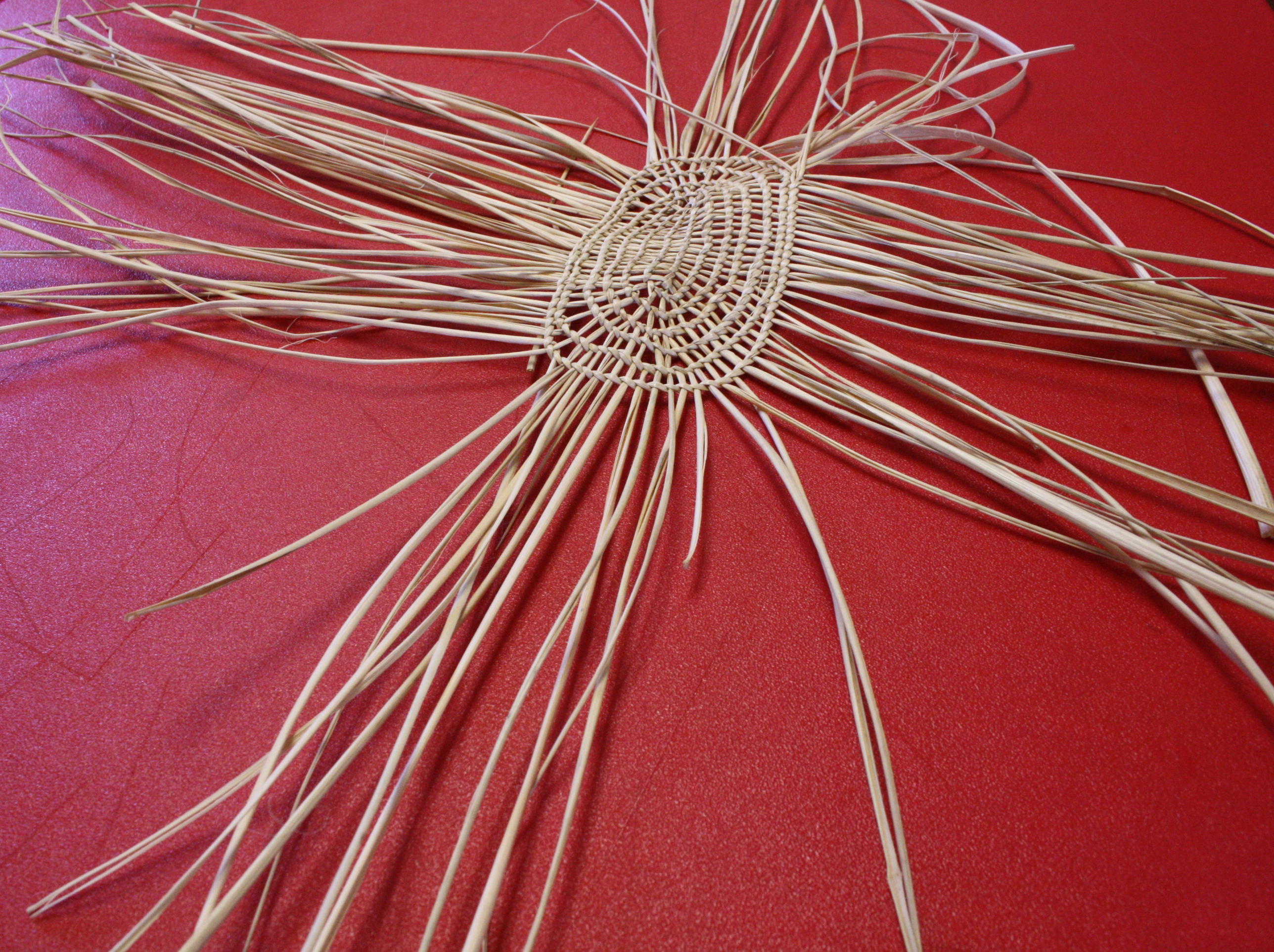
Opening:

For the students who do not understand splitting the spruce roots, they may observe the Elder(s) demonstrate how this is done.

Activities:

1. The students will finish reading "Split the Roots," on page eight (8).
2. Begin applying the directions given on how to split the spruce roots.
3. If the students are unable to split the roots have an Elder assist the student with this process.

4. The students are to take care and take their time as to not hurt themselves with knives and to not waste the spruce roots.
5. When the students are done splitting the spruce roots, cut them and put them away.
6. The students will discuss with the Elder expert whether or not the activity was easy or hard and why.



Activity Title: Grass and Spruce Roots used in Housing

Grade Level: Grade 9-12

Overview: "The log house was a late type that was to be found only in the winter villages. It had no corner posts, but the walls were of horizontally laid logs dovetailed together and chinked with moss. Stepan asserted that the logs were lashed together with spruce roots before nails were in use. The roof was of boards, with bark and grass on the top, held down longitudinally placed poles lashed on by beams of rawhide lines and spruce roots. The doorway was closed with a grass mat. The walls were covered with mats of variously colored straw woven with feathers" (Birket-Smith, K. 1953). "According to Herman Moonin, the Aleuts built sod houses. They built a wooden frame with driftwood. The wooden frame was covered with grass, moss and mud" (Alexandrovsk, English Bay in its Traditional Way, 1981).

Standards:

Chugach Cultural: C1 Alaska Content: Geography E1 Alaska Cultural: B2

Estimated Time: Two class periods.

Goal: To learn the uses of grass and spruce roots in traditional Sugpiaq housing.

Objective(s): By the end of this activity, students will be able to:

- Build a traditional model sod house.

Vocabulary:

Sugcestun:

English: driftwood, grass, sod, house

Materials/Resources Needed:

- 12 strips of driftwood 1' long
- 1 each 2' X 2' plywood
- Glue or yarn (traditionally spruce roots were used to tie the driftwood together)
- Wheat Paste
- Oatmeal
- Green Paint
- Brown Paint
- Moss
- Newspaper

Texts:

Birket-Smith, K. (1953). The Chugach Eskimo. Nationalmuseets Skrifter, Etnografisk Række VI. National Museum of Denmark, Copenhagen.

Kenai Peninsula Borough School District. (1980). Alexandrovsk: English Bay in its Traditional Way. Anchorage, AK: Alaska Printing Company

Teacher Preparation:

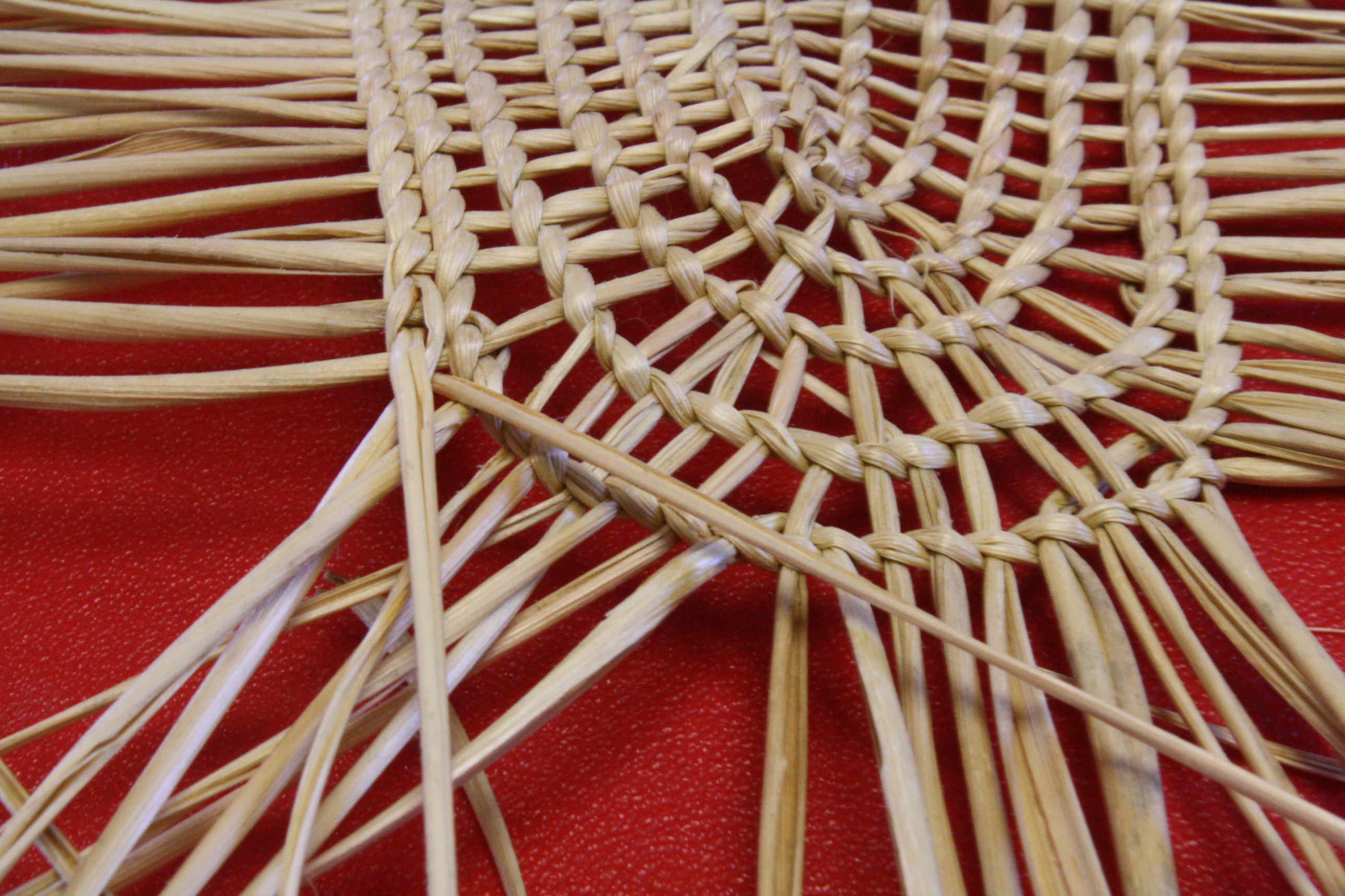
- Have students collect the driftwood.
- Ask the school maintenance department for the plywood.
- Buy the paint.
- Ask the LEC if there are any Recognized Experts that can tell a story about the house while it is being built.

Opening: Tell the students this activity will happen outdoors. Tell them the sod house will be in an area that is open for the public to observe.

Activities:

1. Mix wheat paste. Place a full sheet of newspaper on the plywood.
2. Build four walls that are 6' by 12' on the fourth wall build a door.
3. Build a barn-style roof frame.

4. Attach the framework together. Glue them and set to dry.
5. Apply strips of newspaper and wheat paste to the framework until it is completely covered. Then add newspaper to the sides to make it look bumpy. Let it dry overnight.
6. After it dries, paint the sod house brown and the ground around it green. Then paint a second coat.
7. After it dries, add moss around the sides and roof and make it look like grass growing.
8. It is finished except for the touch up work.



WEG'ET – GRASS AND PLANT FIBERS: LOCATING AND GATHERING SPRUCE ROOTS (1 & 2)

Grade Level: 10 -12

Overview:
The students will learn how to locate and gather spruce roots.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
A3: Acquire and pass on the traditions of their community through oral and written history	Science A3: Develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.	G4: Student should be knowledgeable about natural vegetation. L1: Students should understand the value and importance of the Sugt'stun language and be actively involved in its preservation.

Estimated Time: Three classes, one for locating and two for collecting.

Lesson Goal: The students will learn how to locate and gather spruce roots.

Lesson Objectives: Students will:
1. Learn to identify areas that have spruce roots in the community.
2. Learn to use tools to extract spruce roots from the ground.
3. Engage in physical activity to gather spruce roots.

Vocabulary Words:

	Sugt'stun Dialects	
English:	PWS:	Lower Cook Inlet:
Spruce		
Root		Nukek
Gather		Katurkeq

Materials/Resources Needed:
- Permission slips for the fiel trip
- Large map of the community
- Alaska Native Knowledge Network (2011). Alaska Science Camps, Fairs and Experiments: p. 105, Spruce and Other Roots. http://ankn.uaf.edu/Publications/Alaska_Science/
- Good walking shoes and layered clothing
- Elder from the community to guide the students when at the location
- First Aid Kit/Bottled Water
- Plastic Bags/Gloves
- Hammer/Axe/Pocket Knife
- Compass/index cards

Website:
- http://ankn.uaf.edu/Publications/Alaska_Science/

Teacher Preparation:

- Review activity plan and practice Sugt'stun vocabulary.
- Send letter home to parents requesting permission for gathering activity.
- Contact an elder in the community who can help with the locating and gathering.

Opening: Ask the students if they know what spruce root has been used for. Ask them to think about places in the community that have spruces, and locate them on the map. Explain to them, or ask the elder to explain, how spruce roots have been collected and used traditionally in the Chugach Region and nowadays.

Activities:

1. Hand out the Spruce and Other Roots text to the students and ask them to read it.
2. The students will work together to locate the sites that the spruce roots can be found. The students will have a chance to ask the elder if the places they thought of, have spruce and roots to dig.
3. The students will go to the site, and use their tools properly to gather the spruce roots with the help of the elder.
4. The students will take turns using the tools to dig up the spruce roots; this way every student has the opportunity to use the tools.
5. The students will gather as many spruce roots as possible when on the field trip; if there are not too many spruce roots to gather they may consider gathering willow, birch, or cottonwood roots.
6. The students should make notes of the collection site, for the index cards.
7. The students will return to the school when finished gathering the roots.
8. The students will clearly label the index cards with the;
    - Location of the spruce roots gathering area
    - This is important when placing this on a map of the area found on the map.
    - What else was in the surrounding area when gathering the spruce roots.
    - The students will continue to use the index cards to describe; the feel and smell of the dirt at the location, what did the air smell like in the woods that day. What else did you see that day when you were gathering the spruce roots that day.
9. The teacher will ask the students to also list on the index cards the other types of roots that were gathered at the location.
10. The students can also list on the index cards the similarities and differences between the roots.
11. The students, when given direction by the teacher will discuss the different varieties of roots that were in the forest during their field trip.
12.

LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies

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Dear Parents,

Our class is planning on a field trip to collect spruce roots from the community area for the Locating and Gathering Spruce Roots class in the Weg'et – Grass and Plant Fibers unit. We will be using these roots later in the Unit to learn coiling and about the properties of spruce roots.

We will be walking to the sites, and the duration will be about two hours. The field trip will take place on _/_/____ from __ to __.

If you have any questions please call or feel free to join us for the fieldtrip.

Sincerely,

_____

Teacher

WEG'ET – GRASS AND PLANT FIBERS: NATURAL DYES 7-9 (1)

Grade Level: 7-9

Overview: Alutiiq and Aleut grass baskets are woven beginning at the base of the basket. Typically a weaver wets her fingers to keep the grass the soft and pliable. Grass strands may also be soaked in cold water and wrapped in a damp towel. It is important however, not to over wet the weaving strands, as they may rot or darken in color. Weaving is a time consuming process. It takes great skill to produce the tiny even stitches, and to create unique shapes, like the woven grass bottle covers, tiny basket earrings, or wallets made by contemporary artists. Many traditional Alutiiq baskets were embellished with false embroidery. Geometric designs and occasionally animal images were woven into the outer surface of a basket with colored strands of grass or other natural fibers. For example; maiden hair fern, feathers and beads. Grass strands were tinted with natural dyes such as; blueberries, blackberries, cranberries, wild iris petals, alder bark and a mixture of charcoal and seal oil produce an array of hues. **(Alutiiq Museum Archeological Respiratory)**

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS D4	Arts A3	Cultural Expression C1

Estimated Time: 1 hour

Lesson Goal: To learn about natural dyes used to color grass and fibers.

Lesson Objectives: By the end of this activity the students will able to:

- List some of the natural plants used for coloring and dying other materials.
- Locate some of the items used for dying the grass and fibrous materials.
- Experiment with natural dyes and color a t-shirt.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Berry		alagnaq
I'll go pick some berries.		Alagnasurciqua.
Alder		uqgwik
Color		kelásiirluku

Materials/Resources Needed:

- Alutiiq Museum website: http://alutiiqmuseum.org/exhibits/exhibits-on-line/277-grass-baskets-of-kodiak-island.html
- Large bowls and spoons

- Pot holders
- Large cooking pots
- A stove available for use
- Salt, vinegar
- Potato mashers for the berries
- Strainers
- Plastic gloves
- Newspaper
- Rubber bands
- White T-shirts, or pieces of light colored fabric
- Blueberries, cranberries, wild iris flowers, alder bark
- Pitka Blumenstein, Rita. (1984). Earth Dyes – Nuunam Qaralirkai. Fairbanks, Alaska, USA: The Institute of Alaska Native Arts. (In the kit library)
- Alutiiq Museum website (or the attachment) for information on colors and dyes: http://alutiiqmuseum.org/files/Ed%20Handouts/23%20Colors.pdf
-

Teacher Preparation:

- Review the book and website materials. Great instructions with photos: http://www.nhm.ac.uk/kids-only/things-to-make-and-do/natural-dyes/
- The teacher may ask the students in advance to begin bringing in some of the supplies for the lesson activity;
    - Berries (they can be store bought)
    - Old newspapers
    - White T-shirts
    - Pots
    - Alder bark (This can be gathered in the late fall)
    - Plastic gloves

Opening:

The teacher may ask the students “Are you ready to experiment with the natural dyes?” What colors do you believe these materials will make?

Activities:

1. The students will put the berries in a pot with water. There should be enough water to cover the berries entirely. The students will put (2) quarts of berries in the pots.
2. The students will boil the berries and water at medium temperature for at least 10-20 minutes to get a concentrated color.
3. The students will remove the pot from the stove and allow cooling, making sure they use the pot holders and not burn them selves.
4. The students will place the strainer on top of large bowl and pour the liquid into the plastic bowl. Don’t throw out the berries; the students will mash them to further concentrate the color solution.
5. The students will repeat this step with the remainder of the items for creating the dye for the lesson activity. Repeat this for the alders, irises and other berries.
6. The students will use the rubber bands to bind the t-shirts in different spots.
7. The students will put on the rubber gloves.
8. The students will take turns to color their t-shirts in the different dyes.
9. Once the students have completed the dying and coloring of the t-shirts, they will twist out the excess dye and allow drying.
10. The students will remove the rubber bands from the t-shirts and present them to the rest of class.

Alutiiq Colors

The world's societies interpret colors in different ways. The Alutiiq language has just 4 basic color terms – *Kawirtuq* (it is red), *Tan'ertuq / Tamlertuq* (it is black), *Qatertuq* (it is white), and *Cungartuq* (it is blue). Each of these color terms is a verb root (i.e., *kawirtuq* means "it is red") as the Alutiiq language has no adjectives. Alutiiqs recognized a broader range of colors, but their traditional language describes most hues with these four terms. For example, green is a shade of blue. Alutiiq speakers also describe colors by their similarity to common things. For example, an Alutiiq speaker might say that a yellow object is the color of oil.

It Is Red - *Kawirtuq*
Alutiiq people manufactures red pigments from minerals and plants. They ground ochre, a soft, naturally occurring iron oxide, into a fine powder and mixed it with oil to make paint. On Kodiak, people produced a reddish-brown dye by boiling alder bark. In Prince William Sound, people boiled hemlock bark or a mixture of cranberry and blueberry juices to produce a dark red dye. Widely used in body painting and to decorate objects, the color red may represent ancestral blood.

It Is Black – *Tan'ertuq / Tamlertuq*
Historic sources indicate that Alutiiqs collected a specific stone to make black pigment. They also produced black pigment from a copper ore and from wood charcoal. With black paint Alutiiqs painted faces, particularly of people in mourning. Black paint also adorned masks, both as a background color and as a design component. Black paint often outlines facial features or illustrates brows and eyes.

It Is White - *Qatertuq*
Alutiiqs made white pigment from limestone obtained in trade with the Alaska mainland, grinding this soft rock into a powder and mixing it with oil to create paint. At winter hunting festivals, the faces of the first two dance performers were often painted white and red, and masks were often decorated with white.

It Is Blue - *Cungartuq*
To Alutiiqs, blue is a powerful color. It is associated with the supernatural, particularly the worlds below the sea. Blue pigment was never used in body painting. However, a blue-green paint adorned hunting hats, and whalers, the magical hunters who pursued giant sea mammals, carried blue or green stones.

Payulik – Bringer of Food, wood and leather mask, Pinart Collection, Château-Musée, France.

Produced by the Alutiiq Museum, Kodiak, Alaska

WEG'ET – GRASS AND PLANT FIBERS: CLEANING AND SPLITTING SPRUCE ROOTS (3 & 4)

Grade Level: 10 -12

Overview:
The students will learn how to clean and split spruce roots. The time of year roots are harvested determines if the job is easy or hard. Roots dug when the bark slips easily off the trees will also peel very easily (June-July). Roots dug in the spring and fall will be harder to bark, but certainly not impossible.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
A3: Acquire and pass on the traditions of their community through oral and written history	Science A3: Develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.	G4: Student should be knowledgeable about natural vegetation. L1: Students should understand the value and importance of the Sugt'stun language and be actively involved in its preservation.

Estimated Time: two hours

Lesson Goal: The students will learn how to clean and split spruce roots.

Lesson Objectives: Students will:
1. Learn to use tools to clean and split spruce roots.
2. Understand

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Spruce		Napaq
Root		Nukek
Clean it		Perrircarluku

Materials/Resources Needed:
- www.ankn.uaf.edu/curriculum/spruce .html
- Digging and Preparing the Spruce Roots by Alan and Helen Dick published by Iditarod Area School District 1997
- Broom/dustpan
- Hammer
- Pocket knife
- Tide or Regular laundry detergent
- Crisco oil (in the tub) or other oil
- Hand soap

Website:
- http://ankn.uaf.edu/Publications/Alaska_Science/

- http://www.ankn.uaf.edu/curriculum/units/spruceroots.html

Teacher Preparation:

- Review activity plan and practice Sugt'stun vocabulary.
- Review the Digging and Preparing Spruce roots, cleaning spruce roots –material from the website above.

Opening: The teacher can ask the students after reading the page on cleaning the roots how many different techniques there are to clean the roots? (There are 3 methods.)

Activities:

1. The students will choose one of the methods to clean the spruce roots.
2. The students when done when cleaning the roots in different manners, the students may want to discuss this with the rest of the students
3. Which one seemed to work best?
4. Which method seemed harder and why?
5. The students will clean there hands well after handling the spruce roots.
6. The students will when finished cleaning their hands discuss the best way to remove the spruce gum.
7. The students will provide answers to why it gets stuck to their hands, must wash hands thoroughly.
8.

WEG'ET – GRASS AND PLANT FIBERS: COILING 10 - 12 (5)

Grade Level: 10-12

Overview: As stated in Jones (1983), "Unlike plaited and twined basketry, which is constructed by manipulating or fastening a series of weft and warps in many diverse ways, coiled baskets are built from a continuous foundation or coil, that spiral horizontally upward to form basket walls. The coils are sewn together by lacing narrow strips of relatively flexible materials around each coil, interlocking with the coil immediately underneath. About a dozen varieties of coiling are recognized, depending on the composition and material of the coils, and the manner in which they are sewn together. In the simplest kind of coiled basketry, the coil foundation is a single element, such as a sapling or rod. The more complicated basketry, the coils maybe composed of tow or more rocks, or splints, placed side-by-side or above the other, or in any other combination as the number increases. Lengths of grass or straw sometimes separately wrapped into bundles or various combinations of rods and flat splints are also use for the coil foundation. How the individual coils are fastened together is a matter of equal variability coils may simply be spiraled together with a continuous loop of flexible material, or sewn with different kinds of interlocking stitches that sometimes penetrate into underlying coils. A pointed awl of bone ivory or some other material is often used to push the stitches around or through the foundation coils" (p. 42-43).

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Cultural A 6, B 2	Mathematics A 5, B 4	Community A 2, A 3

Estimated Time: 1 hour

Lesson Goal: The goal of this lesson is to learn the basics of coiling and materials used in basketry.

Lesson Objectives: Students will:

1. Examine the materials used in making coiled basketry.
2. Practice the methods of making coiled basketry.
3. Create a small item made from grass or fibrous materials using coiling techniques.

Vocabulary Words:

		Sugt'stun Dialects
English:	PWS:	Lower Cook Inlet:
Grass		Weg'et
Sewing needle		Mingqun
Basket		Rraakiq

Materials/Resources Needed:

- Pacific Basket Makers: A Living Tradition (1983) page 42-43
- Northwest Coast Basketry by Silvia Koros, p.13 (in the Kit)
- Dowels or skewers (wooden)

- Roots, grass or other raffia
- Sink, water, dish soap
- Clothes pins (wooden)
- Wire hangers or cotton string
- Recognized expert to teach coiling technique from the community.

Website:

- http://www.burkemuseum.org/static/baskets/Teachersguideforbasketry.htm
- http://frontierscientists.com/projects/alutiiq-weavers/

Teacher Preparation:

The teacher may ask the students in advance to prepare the grass or raffia before use. The raffia must be washed and rinsed several times in soap water before use. Hang up the grass or raffia to dry. The teacher should review the Northwest Coast Basketry website, and find an elder from the community who can help with the technique.

Opening: Explain to the students that coiling is a weaving technique which involves sewing. A foundation material (such as wild grass or spruce roots) are coiled upwards and stitched into place. A an awl is used to pierce a hole in each coil. The sewing element (such as the shiny outer surface of a split cedar root) is then threaded through the hole and sews that coil down to the coil below it. Coiled baskets can be woven so tightly that they hold water and in the past, coiled baskets were also used for cooking.

Activities:

1. The students will gather their dried raffia from the drying area.
2. The students will be listening to Elder expert as they explain how to coil the raffia.
3. The students will have an opportunity to ask the Elder questions, after they are done explaining techniques.
4. When instructed, the students will begin coiling their raffia or grass.
5. The students will be given copies of the pages from the book “Pacific Basket Makers: A Living Tradition” pages 42-43 to use as a guide to work with the grass or raffia.
6. If the students choose too, after beginning the coiling, they can continue reading page 43 on “Ornamentation” and decorate their coiled creation in one of the manners explained.
7. The students can say “Quyana” (Kwe-yahna) which is interpreted as thank you in Sugcesten, to the Elder expert who helped in the classroom with this activity.

WEG'ET – GRASS AND PLANT FIBERS: PREPARING NETTLES 7-9 (2)

Grade Level: 7-9

Overview: Cordage or twine was made in a variety of ways and from a variety of materials. For my experiment with the cattail mats, nettle and basswood were used to make the cordage. Milkweed, dogbane, slippery elm bark, cedar bark strips, shredded cattail sinew, hides and many other fibrous materials can be used to make cordage. (Schultz, University of Washington)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS C 1	Geography A5 C2	Survival Standards G

Estimated Time: (3) class periods of 55 minutes

Lesson Goal: To identify nettle and learn to prepare and make cord of it.

Lesson Objectives: By the end of this activity the students will able to:

- Demonstrate knowledge of natural fibrous items that can be developed into usable applications.
- Select items from a field trip to use for creating a twine/cord material.
- Manipulate the fibrous materials into a finished twine or cordage material.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Nettle		uuqayanaaq
Rope		qeluq
Braid		qillerqaacuk

Materials/Resources Needed:

- Copy of Cordage Sample by Schultz, University of Washington
- http://www.naturessecretlarder.co.uk/bushcraft-tutorials/nettle-corgage-tutorial_1.htm
- http://www.primitiveways.com/cordage.html
- http://www.woodcraftwanderings.org/cordage.html
- Round stones
- Nettles, or fern
- Pipe cleaners for an alternative
- Rubber gloves or leather gloves

- Paper towel/ plastic bags
- Good walking shoes/boots/ layered clothing
- Bottled Water/ first aid kit
- Step-by-step instructions on how to gather nettles and prepare nettles for use. http://www.naturessecretlarder.co.uk/bushcraft-tutorials/nettle-corgage-tutorial_1.htm

Teacher Preparation:

- The best time of year to gather the nettles is after a hard frost because you are less likely to get stung by the nettles.
- The teacher may hand out the permissions slips to the students when preparing to go on the field trip.
- The teacher may also ask the students to bring in the supplies needed to go on the field trip.
    - plastic bags - plastic, rubber, leather gloves
    - paper towel / newspapers
    - The teacher may explain to the students that nettles are dangerous as you have read in the information, they can be very harmful, so please be careful when handling the nettles.
    - If a lot of the students cannot do the activity Pipe cleaners can be used as the alternative for the activity, these can be used to demonstrate the skill of twining and cording.

Opening:

If you want to go to the store and buy items you know you need and you cannot, you would have to make them. This is one natural material that can be used for daily use. Can you thing of other materials that can be used in this way? Let's list them on the board.

Activities:

1. The students will read the instruction on how to prepare the nettle material for use (collecting Nettles)
2. The students will go to the field trip location to forage for the nettles material.
3. If there are not enough materials found, then in groups the students will prepare the nettles for use.
    - Wearing the rubber gloves, the students will strip the green skin off the nettles and discard.

- To do this you must grab the base of the plant and tear upward and away from your body.
- Pluck all of the leaves off the plant
- The stalks are still intact pull the roots form the ground, tap and shake to remove the dirt.
- Take enough of the material to tie into bundles to dry.

4. To add to the drying process, you can rub the fibers with rubber gloved hands or rub the green fibers with a heavy round stone, these techniques will speed up the drying process.
5. Wetting the nettle strips helps to thin them out to make it more pliable so it is ready for use.
6. Once the nettle fibers are prepared and dried enough to be pliable, it is ready for use.
7. Take (3) strands of the nettle fiber and;
    - lay them in your lap
    - tie of one end of the (3) strands into a knot
    - Braid the (3) strands together, wetting them with water lightly, so they don't dry out.
8. Once it is braided lay it on a clean cloth to dry, checking on it occasionally so that it doesn't twist up, it must remain flat to dry.
9. The groups of students will share their braided nettle cord/ twine to the rest of the class.

WEG'ET – GRASS AND PLANT FIBERS: SPRUCE ROOT HATS 10 - 12 (6)

Grade Level: 10-12

Overview: From the earliest Western contacts beginning with Russian fur trader Stepan Glotov's arrival on Kodiak Island in 1763, outsiders took special note of hats worn by the Alutiiq hunters. They were wooden helmets on the shape of seal heads, round basketry hats woven from strips of spruce roots, curved visors and peaked hats shaped from thinly shaved planks of wood.

To the painted imagery of the hats were added dentalium shells (delicate cone-shaped mollusk shells traded in from the Vancouver Island region in British Columbia.), glass trade beads and sprays form sea lions whiskers. The closed crown "style" of bentwood hat to use terminology, developed by Lydia-Black, was woven on Kodiak Island region and eastern Aleutians, while the "truncated cone" shape was typical of the Alaska Peninsula. Spruce root hats were worn through out the Alutiiq region and down, the North west coast, where the styles probably originated. (Looking Both Ways, Arctic Studies Center University Press, 2001, pages 152,155,156,157)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	Science F3	Cultural Expression D1

Estimated Time: 1 hour

Lesson Goal: The goal of this lesson is to learn about the different types of hats worn in the region and the materials used to make them. Focus will be on the woven spruce root hats.

Lesson Objectives: Students will:

1. Practice research skills from books and online.
2. Learn about the different hat styles of Alaska and the Northwest Coast.
3. Identify where the different styles of hats originate from.
4. Answer the question why spruce root was a good material to make hats with.

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Hat		saapek
Visor		saquyaq
Root		nukek
Wear it		aturluku

Materials/Resources Needed:

Website:

- http://www.burkemuseum.org/static/baskets/artists/hats.html
- http://museums.alaska.gov/online_exhibits/JustOldHats.html

- http://www.alaskanativearts.org/shop-artist-individual?id=1163
- http://www.youtube.com/watch?v=Pb9hytGCKt8

Teacher Preparation:

- Visit the Alaska State Museum online exhibit: Just Old Hats and review: http://museums.alaska.gov/online_exhibits/JustOldHats.html
- Review the Burke Museum website: http://www.burkemuseum.org/static/baskets/artists/hats.html

Opening:

Activities:

1. Ask the students find images of various kinds of hats made of grass, roots, bark and other raffia.
2. Ask them to identify hats from Alaska, and from what specific regions and tribes they are from.
3. Ask the students to examine the pictures of the Alaskan hats, and what the hats tell them.
4.

WEG'ET – GRASS AND PLANT FIBERS: TWINING 7-9 (5)

Grade Level: 7-9

Overview: Twining is a technique in which two wefts cross over each other between warps. There are numerous variations of twining, including variances in the number of wefts, the number of warps crossed by the wefts and the angle of the warps. Each of these variations changes the surface appearance of the object.

Color designs on twined basketry can be achieved with false embroidery or overlay. Both these techniques add a third, colored weft to the usual two wefts. False embroidery is only incorporated into the outside wefts, making the design visible only on the outer surface of the object. False embroidery slants in an opposite direction to the rest of the twining. The name of this technique is based on the definition of true embroidery, in which decorative material is added to the surface of an object after it has been completed. False embroidery is added to the surface of basketry during its making.

Overlay differs from false embroidery in that overlay's extra weft is woven into both the outside and inside wefts of the object. Depending on the overlay twining technique used, the design may or may not be visible on the inside surface. Unlike false embroidery, overlay slants in the same direction as the rest of the twining. (Northwest Coast Basketry by Silvia Koros, p. 15)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Cultural A 6, B 2	Mathematics A 5, B 4	Community A 2, A 3

Estimated Time: 1 hour

Lesson Goal: The goal of this lesson is to learn the basics of twining and materials used in basketry.

Lesson Objectives: Students will:

1. Examine the materials used in making twining.
2. Practice the methods of twining.
3. Understand how widely weaving skills were used in every day lifes.
4. Learn to make part of a fish trap using twining.

Vocabulary Words:

English:	PWS: (Sugt'stun Dialects)	Lower Cook Inlet: (Sugt'stun Dialects)
Grass		Weg'et
Sewing needle		Mingqun
Basket		Rraakiq

Materials/Resources Needed:

- Northwest Coast Basketry by Silvia Koros, p.13 (in the Kit)
- Dowels or skewers (wooden)

- Roots, grass or other raffia
- Sink, water, dish soap
- Clothes pins (wooden)
- Wire hangers or cotton string
- Recognized expert to teach coiling technique from the community.

Website:

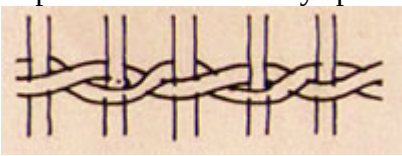
- http://www.wikihow.com/Understand-Basic-Basket-Weaving-Techniques
- http://www.burkemuseum.org/static/baskets/Teachersguideforbasketry.htm
- http://www.primitiveways.com/basketry2.html
- http://www.lowtechmagazine.com/2012/02/basketry-the-art-of-producing-sustainable-consumer-goods.html
- http://frontierscientists.com/projects/alutiiq-weavers/

Teacher Preparation:

The teacher may ask the students in advance to prepare the grass or raffia before use. The raffia must be washed and rinsed several times in soap water before use. Hang up the grass or raffia to dry. The teacher should review the Northwest Coast Basketry website, and find an elder from the community who can help with the technique.

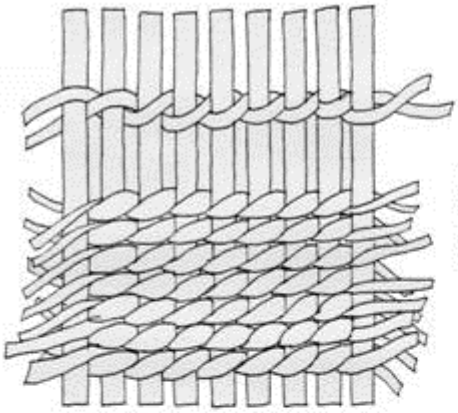
Opening: Explain to the students that twining consists of passing horizontal elements (weft) around stationary vertical elements (warp). Specifically, it is a technique in which two wefts cross over each other between warps. Twining is a basketry technique using two or more sets of elements in which one set encircles the other. The first use of 'twining' was probably to hold twigs and sticks together to construct shelter walls.

Twining has also been used in ancient times by people as they spaced out twined rows to make traps and fish nets. They spaced their twined rows closer together to make lightweight baskets.

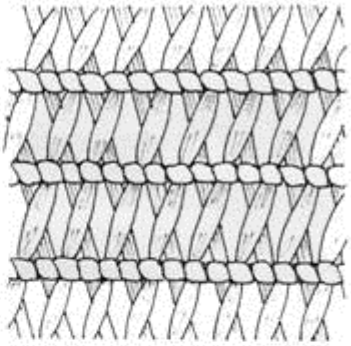


Activities:

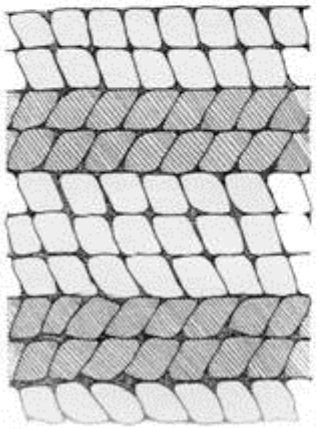
1. The students will gather their dried raffia from the drying area.
2. The students will be listening to Elder expert as they explain how to twine the raffia.
3. The students will have an opportunity to ask the Elder questions, after they are done explaining techniques.
4. When instructed, the students will begin twining their raffia or grass.
5. The students will be given copies of the pages from the book “Pacific Basket Makers: A Living Tradition” pages 42-43 to use as a guide to work with the grass or raffia.
6. If the students choose too, after beginning the twining, they can continue reading page 43 on “Ornamentation” and decorate their twined creation in one of the manners explained.



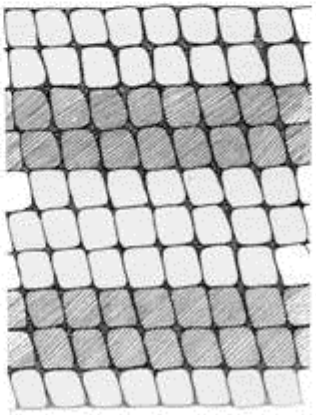
plain twining (2-strand)



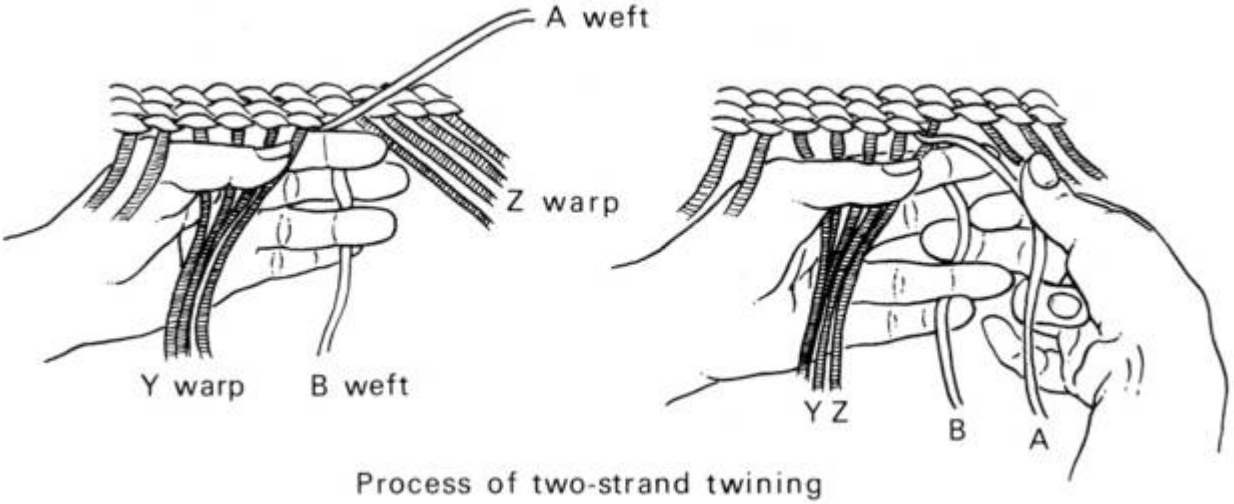
cross warp twining



close-up of false embroidery (stitch slants in opposite direction to rest of weaving)



close-up of overlay (stitch slants in same direction as rest of weaving)



Process of two-strand twining

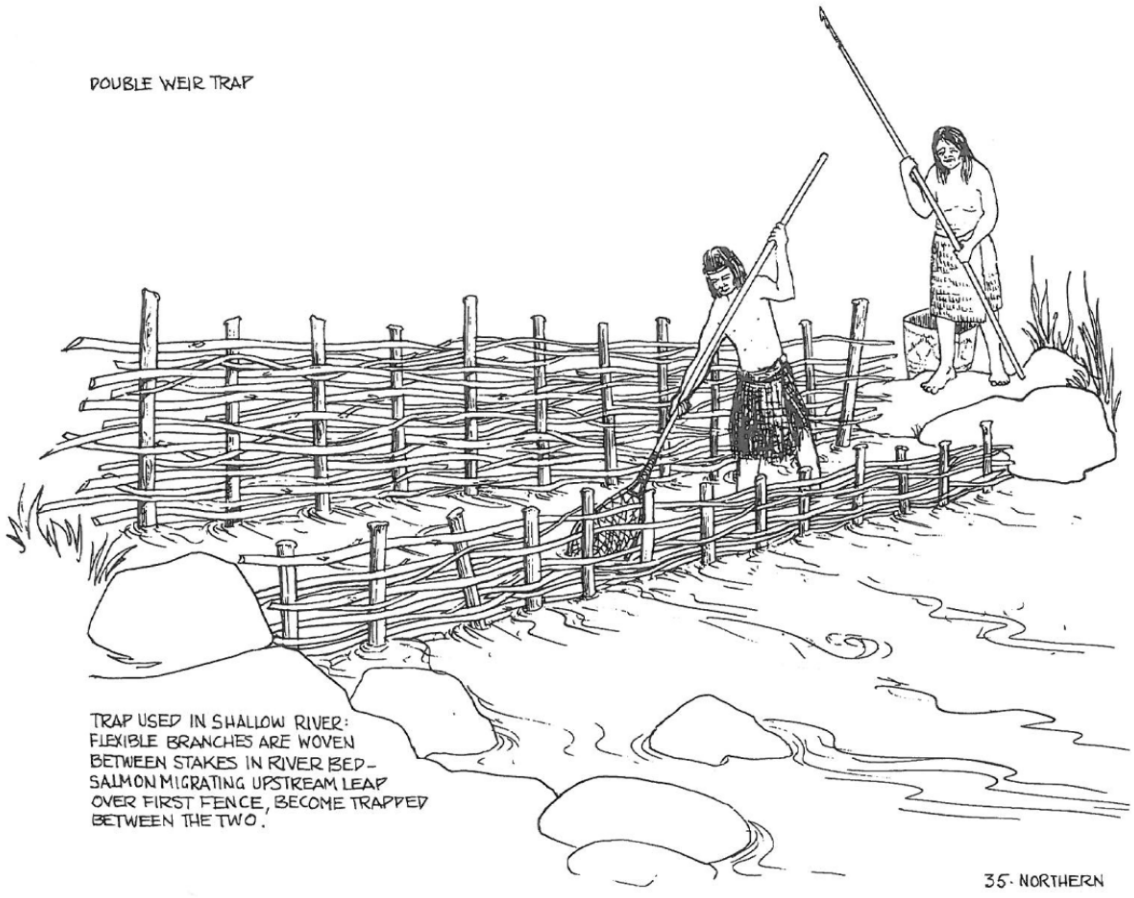


Illustration from: Indian Fishing, Early Methods on the Northwest Coast, p. 106, (1977), Hilary Stewart. © Harbour Publishing Co Ltd / Douglas and McIntyre (2013) Ltd.

WEG'ET – GRASS AND PLANT FIBERS: INSULATION PROPERTIES OF GRASS 7-9 (4)

Grade Level: 7-9

Overview: Grass and other plant materials were widely used in the Alutiiq culture for insulation in clothing and housing. Grass socks were inserted to leather shoes, to keep feet dry. Moss and grass were used to insulate roofs in the homes. This is a hands-on investigation into finding effective insulation that will keep a cup of hot water from losing heat too quickly.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Cultural A 6, B 2	Mathematics A 5, B 4	Community A 2, A 3

Estimated Time: 2 hours

Lesson Goal: To show that heat is lost through the sides and base of a container and to demonstrate that the cooling process can be slowed down by trapping the air using insulation.

Lesson Objectives: Students will:

- Learn that the cooling process can be slowed down by trapping the air using insulation
- Learn about how grass was used in insulating in the Alutiiq culture
-

Vocabulary Words:

English:	PWS:	Sugt'stun Dialects Lower Cook Inlet:
Insulation		iluliyaq
Grass		weg'et
Fur, skin, hide		amiq
Cup		caskaq
Water		meq
Hot water		kulacaq

Materials/Resources Needed:

- Four plastic cups per group
- Four large plastic containers per group that the smaller cups will fit with the insulation around them.
- Insulating material such as newspaper, aluminum foil, cotton wool, corrugated cardboard, felt material, etc.
- Four easy to read thermometers per group
- Hot water
- Large plastic bags – the same number as insulating materials that you have
- Paper
- Pencils
- Stopwatch or timer
- http://www.school-for-champions.com/science/heat_transfer_coffee.htm

- http://www.ankn.uaf.edu/publications/vs/insulation.html

Website:

- **http://frontierscientists.com/videos/where-are-my-grass-socks/**

Teacher Preparation:

This is a hands-on investigation into finding effective insulation that will keep a cup of hot water from losing heat too quickly. Use the cups and cup socks (fur, fish skin, grass, gut, felt, fabric) provided in the Kit. Other materials you can use can be commonly found around the house or school making this project easy to set up.

Opening:

1. Introduce the importance of taking care when using hot water. Ensure that the children understand the dangers involved when using hot water.
2. Put the investigation into context and set the children a problem which they have to solve. For example you could ask them "How can we stop the water in the cups from cooling down?"
3. Fill one of the plastic cups with hot water and allow the children to carefully feel the outside of the cup to see what they notice about it. There should be heat coming through the sides and base and heat rising from the top. Ask questions about what they feel and discuss ways in which they could stop the heat escaping.
4. Show the children the various insulating materials. Place some of each insulating material into separate plastic bags and let the children test it's "warmth" by placing their hands in the bag to see which material keeps their hands the warmest.
5. Have one plastic bag with no insulating material in it to see if they notice the difference. Ask the children to predict which material will be the best insulator – record these predications.

Activities:

1. Give the students (or each group) 4 plastic cups, 4 thermometers and 4 larger plastic containers. Let each group choose three different types of the insulating materials and have equal quantities of each.
2. Discuss making it a fair test by adding the same amount of water in each cup and measuring the temperature at the same time for each cup, etc.
3. Ask each group to "wrap" their cups in each of the chosen insulating materials in a way that they think will work the best. Then place their wrapped cup upright into a larger container so that the water won't spill out.
4. Ensure that one cup is left uninsulated to act as a control.
5. Carefully, fill the cups with equal amounts of hot water.
6. Measure the temperature with the thermometers and record it on a chart.
7. Set the timer and measure the temperature again every fifteen to thirty minutes throughout the day. Record the results each time.
8. Create a graph to chart the results.

WEG'ET – GRASS AND PLANT FIBERS: CREATING A PRESENTATION 7-9 (5)

Grade Level: 7-9

Overview: Primitive art, like all art is and important means of expressing both personal creativity and cultural symbolism. Most pieces of historic and probably pre-historic native art were functional parts of the culture of its origin; visual expressions of an organized and often highly formal system of beliefs. For example, Northwest Coast artists known as master carvers of wood , carved and ornamented a variety of objects, including masks, bentwood boxes, ladles, hats, pattern boards and totem poles.
Though these objects are carefully made and beautifully decorated, they address more than aesthetics. They also record ownership of clan crests for all to see, telling the histories of the individual clans and perpetuating, the importance of kin groups in the Northwest Coast culture. The function of art has changed through time in Alaskan native cultures. Objects which were once important for daily and ceremonial use are now prized by private collectors and museums, although seem major pieces remain in tribal hands. (Alaska Native Arts and Crafts, Introduction Alaska Geographic Vol. 12#3 1985)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B 2	Library Information CS, B2 Literary A1 Technology A 1, 2	Geography D

Estimated Time: 2 hours

Lesson Goal: For the students to use computer skills to create a power point presentation of cultural significance of grass and fibrous materials found in the Chugach region.

Lesson Objectives: Students will:

- Plan a computer based presentation
- Construct a presentation including grass and fibrous materials
- Present the power point to the rest of the class

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Search		yuaraalluni
Find		ikugluku
Picture		patliitaq
Read		naaqilkuni

Materials/Resources Needed:

- Computers with online access, PowerPoint access
- Notebooks or scratch paper

Website:

- www.prezi.com
- http://plants.alaska.gov/publications/
- www.vildaedu.org
- www.alutiiqmuseum.org
- www.akmuseum.org
- www.articstudies.org
- http://ankn.uaf.edu/curriculum/resources.html
- http://www.burkemuseum.org/static/baskets/Teachersguideforbasketry.htm

Teacher Preparation:

- The teacher may want to look at the websites to find some of the information the students will be looking for in advance, to prepare them to look at additional locations for the information.
- Review the website for information on how to make your presentation flow nicely: http://www.sliderocket.com/blog/2013/01/finding-the-right-flow-in-your-presentation/
- The teacher may ask the students to form into groups to work together on the activity.

Opening:

Ask the students what makes a good presentation? Where can you find information for a presentation? What are other possible locations we can look to find additional information for the grasses and fibrous materials to put into the power point presentation? Let's list these locations on the chalkboard.

Activities:

1. The students choose a plant and will write and draw a plan on paper for the development of the power point presentation.
2. The students will write a list of how the plant was used in the history and the items made from the plant.
3. The students will use mind mapping and flow charting to plan the presentation.
4. The students together will search and review the information for the power point presentation, checking for errors and making sure they cite where they found their information correctly. They can use both online and hared copy materials (e.g. from the Kit library).
5. The students will gather pictures and any relevant visuals for the power point presentation, the pictures must relate to the presentation. Make sure the photos and texts have correct referencing on them.

For a passing reference to a website in text, the URL is sufficient; no reference list entry is needed.
Gussie Fink-Nottle has set up a discussion forum for newt fanciers (http://gfnnfg.livejournal.com/).

However, when you are citing a particular document or piece of information from a website, include both a reference list entry and an in-text citation. The key to creating the reference list entry is to determine the type of content on the web page. Basically, provide the following four pieces of information:
Author, A. (date). Title of document [Format description]. Retrieved from http://xxxxxxxxx
The in-text citation includes the author and date (Author, date), as with any other APA Style citation.

6. The teacher will review the student's information for the power point presentation, and schedule a time for the group to present to the remainder of the class.

7. The students when giving the presentation will allow for the other students, to respond and ask questions about the items included in the power point presentation.

8. The presentations can be shown at a community event or placed online for sharing with other schools.

GRASS AND PLANT FIBERS – PLANTS K-2 (1)

Grade Level: K-2

Overview: You can find beach wildrye grass on sandy beaches, spits, sea beaches, tidal flats, sea cliffs, and lakeshores. Beach wild rye grass can be found in different places around the world such as Greenland, Alaska, California and New York. (Welsh, 1974)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
GS C2	Geography E4	GS G4

Estimated Time: 45 minute class

Lesson Goal: To learn to name parts of the plants and identify what grasses are.

Lesson Objectives: Students will:

- Identify the parts of plants; Plants have roots, stems, leaves, flowers, and seeds.
- Understand that seeds need water, sunlight, and nutrients to sprout and that plants are living things.
- Some plants and seeds are edible.

Vocabulary Words:

English:	PWS:	Sugt'stun Dialects Lower Cook Inlet:
Leaf	peluq	peluq
Stem	puk	puk
Root	nukeq	nuket
Grass		weg'et

Materials/Resources Needed:

- "From Seed to Plant" book by Gail Gibbons
- Booklet "All About Plants" from http://www.montessoriforeveryone.com/assets/PDF/All_About_Plants_Printable_Book.pdf
- Prints of the flower and grass to label (in the Kit) http://www.superteacherworksheets.com/science/plant-parts_WMTFQ.pdf
- Paper notes
- Crayons, markers (in the Kit)

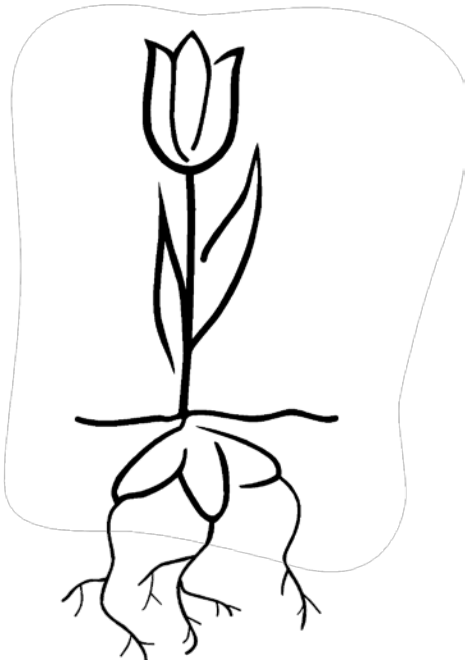
Teacher Preparation:

- Find examples of different kinds of plants to show the students: grass, a flower, moss, a tree (or pictures of them).

Opening: Read the book "From Seed to Plant" to the students. Explain to the students that plants are living things and need air, water, soil and sunlight to live. Ask the students how they can take care of plants at home or at school. Ask how they think plants are used.

Activities:

1. Show the students different kinds of plants, and ask them to identify what kind of plants they are (a tree, a flower, a grass…). Ask the children about the color, texture, and leaves of these plants. Include at least one grass.
2. Ask the students if they can name the different parts of the plants and ask if they know what the purpose of the different parts are. Explain to them that:
    - The flower makes seeds for the plant
    - The stem supports the plant. It contains thin tubes for carrying food, minerals, and water.
    - Leaves make food for the plant. They take in carbon dioxide and release oxygen into the air.
    - The roots soak up water and minerals. They also store food for the plant.
3. Ask the students to write plant parts on pieces of paper. (Roots, leaves, stem, flower, petals…)
4. Ask them to attach them to the picture below (or to the flower image http://www.superteacherworksheets.com/science/plant-parts_WMTFQ.pdf), to the right place.
5. Color the plants and display them on the wall.



GRASS AND PLANT FIBERS – GOING TO THE NATURE STORE K-2 (2)

Grade Level: K-2

Overview: In the old days, there were no stores to go buy items from. People used to collect materials from the nature, and make items out of them. Grass was an important material to our Sugpiaq ancestors. It was harvested from the early summer until the fall before it was covered by snow. Grass was used for many things: tissue, making mats, baskets, socks, hats, coats, and rope. It was even applied on the roof before the sod was laid.

"Right now it is easy; I just go out here and pick them (grass). When they were building a road, they were bringing rocks from the beach; where the grass grows. They must have spilled those rocks right out there on the road. I go out to pick those in the winter; I don't have to go down to the beach. When they pick these grasses half of these are without flowers? Those are ones they pull. Those are the ones they use. They are good; they don't break, like the ones in the store. The ones in the store are hard because they break. The ones we get from here are good because, they don't break." (Interview with Sally Ash & Kathy Brewster 10/17-10/20 2003)

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Survival SS6	Subsistence S1A	CS A5

Estimated Time: 45 minute class

Lesson Goal: Learn about items that were traditionally harvested from the nature to make items, such as mats, baskets, ropes and clothing.

Lesson Objectives: Students will:

- Name at least three items that one can buy nowadays from the store, that were traditionally made of plants.
- Draw a picture of an item made of grass.

Vocabulary Words:

English:	PWS:	Sugt'stun Dialects Lower Cook Inlet:
Plant		nauq
Flower	nanahuat	suitkáq
Grass		Weg'et

Materials/Resources Needed:

- Blank white paper, scratch paper
- Crayons, markers, pencils
- Copy of the interview between Sally Ash and Kathy Brewster

Teacher Preparation: Read the interview between Sally Ash and Kathy Brewster. Find an elder from the community, who can come talk about the old days, and what natural resources items were made of.

Opening: Read the interview to the students. Ask them to list out items that were made of natural materials. Ask them to list items made from grass. Write them on the board.

Activities:

1. The Recognized Elder will tell the students how plants were used in the old days. The elder can also describe some collection and preparation methods.
2. Ask the students to choose two items made of grass.
3. Ask the students to write two sentences to describe each grass item. For example; *The grass mittens are made to perfectly fit the person they are made for. The mittens are brown in color.*
4. Ask the students to draw a picture of the two items they chose.
5. Ask the students to name and label the items in the pictures.
6. Ask the students to share their work with the other students.

GRASS AND PLANT FIBERS – PLATING A MAT K-2 (4)

Grade Level: K-2

Overview: Also called checker work because of the finished appearance, plaited basketry like matting is generally woven from elements of similar texture and pliability. Most often the same material is used for both wefts and warps. These are usually ribbon-like strips of equal width, but subtle effects of design can be achieved by selecting different shades or colors for some of the wefts or warps. Plaiting is done by weaving individual wefts over and under alternating warps one at a time, producing the characteristic checked pattern. **(Pacific Basket makers: A Living Tradition Published by Consortium of the Pacific Arts Honolulu , Hawaii & University of the Alaska Museum Fairbanks, Alaska 1983)**

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	Arts A3	Community A4

Estimated Time: 50 minute class

Lesson Goal: The students will learn plaiting weaving technique; used in traditional weaving patterns. The design is very similar to checker board design.

Lesson Objectives: Students will:

- Use a 9x12 construction paper to make a traditional style mat.
- Learn how to plait (weave) on construction paper
- Learn to use a pattern process to finish a traditional style mat project

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Mat		alliqaruaq
Paper		kalikaq

Materials/Resources Needed:

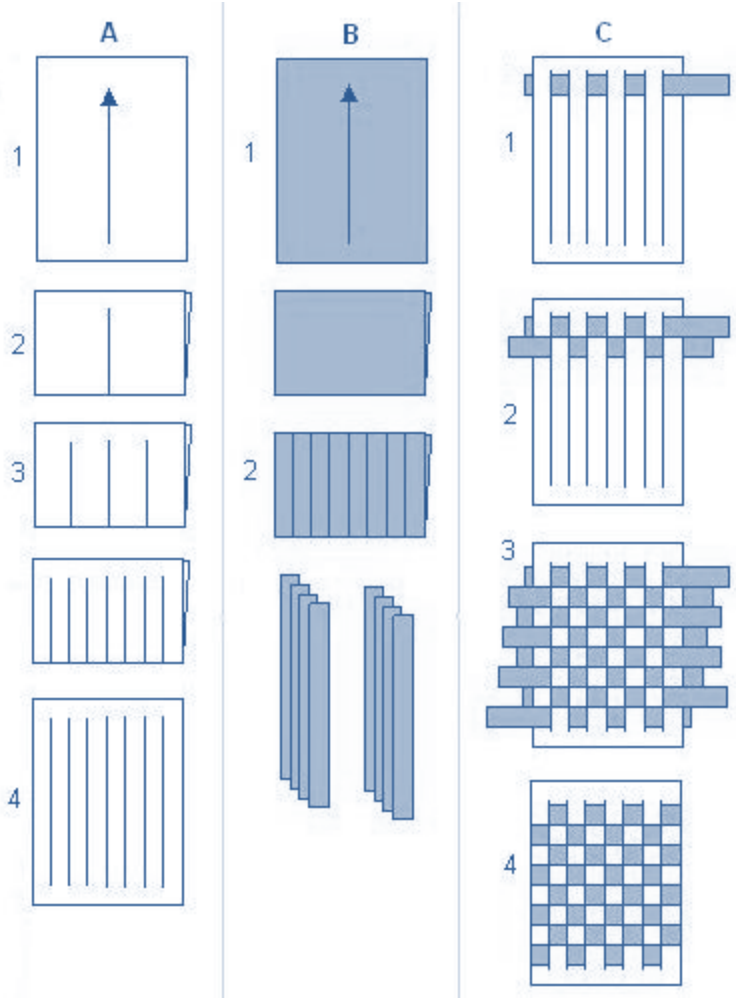
- Construction Paper in Tan , Brown, Yellow 9x12 size
- The base mat is to be cut with a ¾ inch edge and a ¾ inch space slits
- Long strips of construction paper in multiple colors that are 2x12 in width and length
- Tape or Glue to hold down strips on the back side of paper

Teacher Preparation:

- Review the Northwest Coast Basketry Plaiting chapter, p. 14: http://www.burkemuseum.org/static/baskets/Teachersguideforbasketry.htm
- The teacher in advance may prepare the base mat and strips of construction paper for the lesson activity. For detailed instructions you may visit: http://www.wikihow.com/Make-

Placemats-by-Weaving-Paper-Strips
or http://www.enchantedlearning.com/crafts/kwanza/placemat/
or http://craft.tutsplus.com/tutorials/paper-crafts/make-a-woven-paper-artwork/

- The base of the mat will have (9) slits when cut at a ¾ inch span apart from each slit. See the picture below. (A)
- For each one of the mats there are (8) colored strips needed to finish the mat. The strips are two inches wide and 12 inches long. (B)

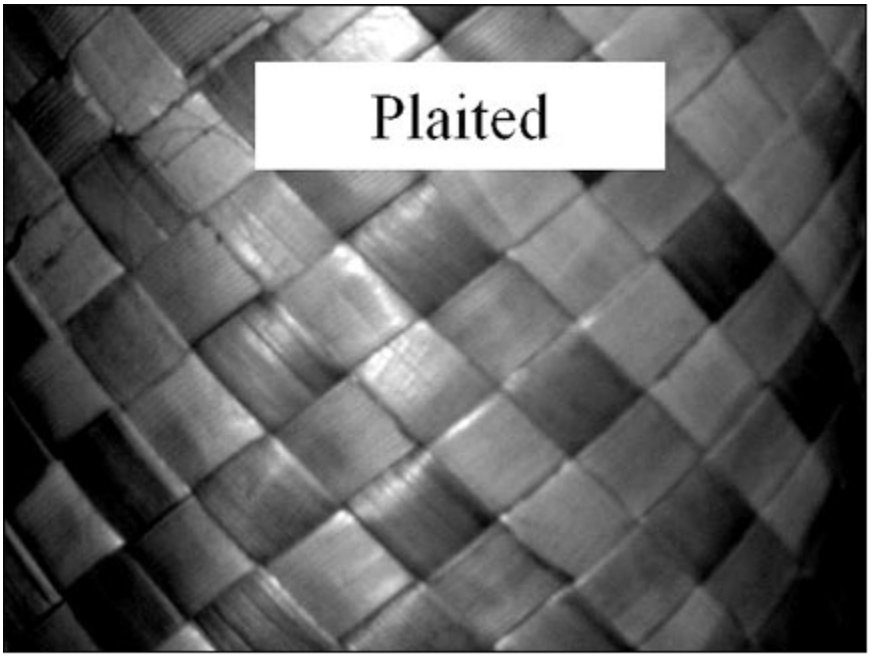


Opening:
There are many different ways to create art and many old techniques that are still used. Today we are going to learn how to plait; it is a traditional weaving pattern, which looks very similar to a checker board.

Activities:

1. Ask the students by groups to come and select the colors for their strips and base mat.
2. The students will need (8) 2x12 colored strips

3. The teacher may hand out randomly the base mats to the students or ask them to select the color of the base they would like to use.
4. Once the students have selected the colors for strips and mats please be seated at their desk or table, so we can begin the activity.
5. Take the first strip and slowly guide it through the top of the paper. The first weave will go over the first slit in the base mat.
6. The second weave will go under the slit, this will continue until the paper has gone all the way through to the edge of the mat.
7. This pattern will continue until all of the (8) strips are used up. This will look like a completed checker board.
8. On the backside of the paper tape or glue the strips down, so that it stays secure.
9. The students can put their names on the outer edge of the base mat.
10. The teacher can display the finished plaited mats in designated place. (suggestions; as a backdrop for a display case or as a cool wallpaper design in the classroom)



Plaited: typically done on the diagonal using flat strips that follow an over-under pattern with half the strips moving to the right and the other half to the left equally, so that there is no distinction of ribs and weavers, warp and weft. The Native People of the Southeastern United States used split river cane to make plaited baskets. Plaiting is also commonly used to weave mats, hats and bags in the Pacific Islands. A common feature of plaited projects is the formation of an edge by folding a strip at a 45-degree angle and sending it back in the opposite direction, sometimes forming a second layer of the basket (Tarahumara for example) or mat. Plaiting also refers to flat braided strips (very long and narrow mats?) used to make straw hats.
(How to Weave a Basket, by Norm Kidder)

This article was first published in The Bulletin of Primitive Technology (Fall 2002, #24)

http://www.burkemuseum.org/static/biderbost/photos.php

GRASS AND PLANT FIBERS – I SPY K-2 (3)

Grade Level: K-2

Overview: Grass was important to our Sugpiaq ancestors. It was harvested from the early summer until the fall before it was covered by snow. Grass was used for many things: tissue, making mats, baskets, socks, hats, coats, and rope. It was even applied on the roof before the sod was laid.

Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	GEO E-1: Understand how resources have been developed and used	GS-4: Student should be knowledgeable about natural vegetation.

Estimated Time: 20 minute class

Lesson Goal: To identify products made from grass.

Lesson Objectives: Students will:

- Review a collage of pictures of items made from grass.
- Point out grass made items on the posters.
- Name at least three grass made items.

Vocabulary Words:

	Sugt'stun Dialects	
English:	PWS:	Lower Cook Inlet:
Spy		Teq'iq
Grass		Weget

Materials/Resources Needed:

- I Spy Posters (in the kit)
- Camera, copier, copy paper
- Students' "Grasses" portfolios

Teacher Preparation:

- Review activity and posters
- Place posters in the classroom
- Make copies of pictures taken when students were finding grass items on the posters.

Opening: Without calling attention to any poster items allow students a few minutes to take a close look at the 'I Spy' posters. As students return to their seats turn the posters over and ask students to recall as many grass-made items as possible. List them on the board. Did they miss any?

Activities:

1. Repeat the exercise but this time explain to the class that they will have two minutes to identify all the items made from grass they can find.
2. Take pictures while students are looking over the posters.

3. After the time allowed have students sit at their desks and list on the board what they have found. Did they miss anything?

4. Ask:
   - Why do you think so many things were made from grass and why? (**How do you say grass in Sugt'stun? Weget**)
   - Do you have any items made from grass at home? (**How do you say grass in Sugt'stun? Weget**)
5. Give students their photos to glue on plain white paper.
6. Tell students to write/dictate how many items they found and place in their portfolio.

Alaska Forage Manual

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Published November, 2012:

State of Alaska
Department of Natural Resources
Division of Agriculture

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5310 S. Bodenburg Spur Rd.
Palmer, AK 99645

NRCS
Natural Resources Conservation Service

This publication was funded in part by a grant from the United States Department of Agriculture, Natural Resource Conservation Service.

Front Cover: Hay field near Palmer, Alaska

Cover Photo: Alaska Division of Agriculture

Alaska Forage Manual

By

Casey L. Dinkel & Philip K. Czapla

Layout and Design: Brennan Veith Low

Above: Casey Dinkel at the Arctic Circle monument on the Dalton Highway

At right: Phil Czapla in Barrow, Alaska

Foreword

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May 1, 2012

Dear Alaskans,

When I turned the page on my Potash Corporation calendar today, there was a quote by President Eisenhower printed next to the date. The quote read: "Farming looks mighty easy when your plow is a pencil and you're a thousand miles from the corn field." Anyone who has been involved in Alaska agriculture for the last thirty years can easily relate to President Eisenhower's comment!

Farming isn't easy. Farming in Alaska can be very difficult. Alaskan farmers face challenges that are unique to Alaska. The list is long and varied: unpredictable weather, cold soils, nutritional deficiencies, acidic soils, short seasons, limited infra-structure, limited expertise, long supply lines, higher costs, and smaller markets. Those are the challenges that come to mind and I know there are more. We can't do anything about the weather, the short season, and the cold soils, but many of the other issues can and will be resolved.

I'm a big fan of the Plant Materials Center. The PMC is a good example of a government entity that actually does what it was intended to do and does it well. The PMC really does promote the agricultural industry in Alaska through the work and research of the staff. Their publications are top notch. The Staff at the Plant Materials Center in Palmer is providing practical, useful expertise and services in areas that will benefit local farmers. They are not a thousand miles from the farmer's field; they are in the field and they are talking to farmers. The new Forage Publication produced by the Plant Materials Center is another excellent publication providing the information that will help farmers make the best possible management decisions relating to their specific area, climate, and soil. Everyone who is involved with raising forage crops and hay will benefit from using this current publication as a reference.

Take advantage of the resources offered by the Plant Materials Center and let them know that you appreciate all the fine work that they have done.

Sincerely,

Ken Sherwood
CEO

The Alaska Forage Manual was released by the Alaska Plant Materials Center, a part of the Department of Natural Resources, Division of Agriculture. This publication is intended for use by forage producers, users and the general public. It was produced at a cost of $15.45 per copy, and printed in Anchorage, Alaska. This publication is also available online, at plants.alaska.gov.

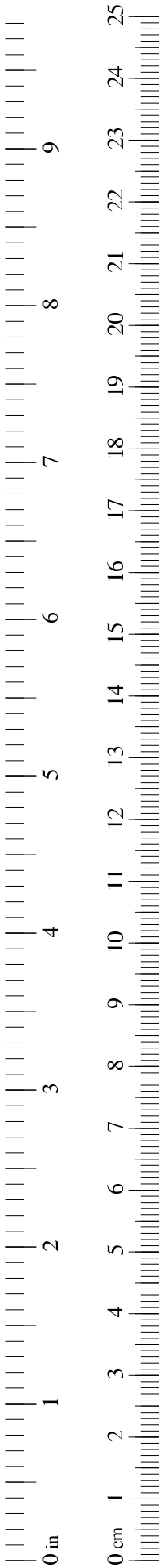
Temperature		Temperature		Volume		Length		Length	
C	F	C	F	Liters	Quarts	cm	inch	cm	feet
100	212	5	41	1	1.1	2.5	1	300	10
90	194	0	32	2	2.1	5	2	400	13
80	176	-5	23	3	3.2	10	4	500	16
70	158	-10	14	4	4.2	20	8	1,000	33
60	140	-15	5	5	5.3	30	12		
50	122	-20	-4	6	6.3	40	16		
40	104	-25	-13	7	7.4	50	20		
35	95	-30	-22	8	8.5	60	24		
30	86	-40	-40	9	9.5	70	28		
25	77					80	32		
20	68					90	36		
15	59					100	39		
10	50					200	79		

Metric Conversions

To convert this	*to this*	*multiply by*
Length		
inches	millimeters (mm)	25.4
feet	centimeters (cm)	39
yards	meters (m)	.91
miles	kilometers (km)	1.61
millimeters	inches	.04
centimeters	inches	.4
meters	inches	39.37
meters	yards	1.1
kilometers	miles	.6
Temperature		
Fahrenheit	Celsius	.56 (after subtracting 31)
Celsius	Fahrenheit	1.82 (then add 32)
Farm products		
pounds per acre	kilograms per hectare	1.14
short tons per acre	kilograms per hectare	2.25
kilograms per hectare	metric tons per hectare	.001
kilograms per hectare	pounds per acre	.88
tons per hectare	short tons per acre	.44
tons per hectare	kilograms per hectare	1,000
Area		
square inches	square centimeters	6.5
square feet	square meters	.09
square miles	square kilometers	2.6
acres	hectares	.4
square centimeters	square inches	.16
square meters	square yards	1.2
square kilometers	square miles	.4
hectares	acres	2.5

Back cover photos:
Upper left: *A swather mows grass near Palmer;*
Upper right: *A tedderer lays down hay for drying;*
Center: *Horses feed on pastureland in Palmer;*
Bottom left: *A mower-conditioner working a hay crop;*
Bottom right: *Pasture field near Palmer;*

Photos: Casey Dinkel, AK PMC




NEW HOLLAND

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Grasses

Photo: Casey Dinkel,AK PMC

Bluejoint reedgrass, *Calamagrostis canadensis*

Alpine Bluegrass, *Poa alpina*
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Annual Ryegrass, *Lolium multiflorum*
Beach Wildrye, *Leymus mollis*
Bering Hairgrass, *Deschampsia beringensis*
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Slender Wheatgrass, *Elymus trachycaulus*
Smooth Brome, *Bromus inermis*
Spike Trisetum, *Trisetum spicatum*
Timothy, *Phleum pratense*
Tufted Hairgrass, *Deschampsia cespitosa*

ALPINE BLUEGRASS

Photo: Casey Dinkel,AK PMC

A mature stand of Alpine Bluegrass

Alpine Bluegrass

Poa alpina (L.)

Description

Poa alpina (Alpine Bluegrass) is a cool season perennial bunch grass that grows in mountainous areas. It is relatively short, growing erect culms between 15 and 20 centimeters (6 to 8 inches) tall. Alpine Bluegrass has short leaves, a tight crown, and an inflorescence that is from 2.5 to 5 cm (1-2 inches) long. Alpine Bluegrass is a pioneer species, and is usually long lived. The grass grows a small to medium seed and produces about 1,070,000 seeds per pound of seed.

Uses

Livestock: Alpine Bluegrass is palatable to all classes of livestock, such as cattle, sheep and horses. However, it does not produce a large amount of forage.

Wildlife: Alpine Bluegrass provides excellent forage for elk, deer, mountain sheep and bison. It is moderately palatable to all classes of wildlife, and is often used on big game ranges.

Forage Value

Alpine Bluegrass produces high quality forage for most classes of livestock and wildlife. It provides an ample protein supply, but forage yields are usually moderate to low. This grass is palatable for both livestock and wildlife. Alpine Bluegrass has moderate digestibility in comparison with other forage grasses.

Distribution and Adaptation

Alpine Bluegrass can be found growing in sub-alpine to alpine regions throughout Alaska. It has a pH range of 5 to 7.2, and typically prefers moderately fine to moderately coarse textured or well drained soils. Alpine Bluegrass is not tolerant of highly saline or waterlogged soils, but it can withstand prolonged periods of drought. Alpine Bluegrass has low nutrient needs, and will tolerate most nutrient deficient soils.

Culture

Alpine Bluegrass seed should be planted ¼ to ½ inches deep in coarsely textured soils, and ¼" or shallower in finely textured soils. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 4-8 lbs/acre and 2-4 lbs/acre when drill seeding. When seeded in a mixture, apply at a rate of 4-6 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Alpine Bluegrass is best suited for pasture land use but it does not respond well to heavy grazing, and new seedlings should be protected from grazing if possible. Little research has been done to examine the effects fertilizer and irrigation might have on Alpine Bluegrass yields. Alpine Bluegrass should not be grown in conjunction with Annual Ryegrass, as ryegrass has negative allelopathic effects. At the present time there are no known major pests that threaten Alpine Bluegrass.

Photo: Stoney J. Wright, AK PMC

Alpine Bluegrass, Poa alpina

Cultivars and Releases

- '**Gruening**' - *Alaska PMC release.*

A W I SW SC SE

- **Teller** - selected class germplasm; *Alaska PMC release.*

W I SW SC SE

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Wright, S.J. and P.K. Czapla (2010) Alaska Coastal Revegetation & Erosion Control Guide, State of Alaska, Division of Agriculture, Plant Materials Center, Anchorage, Alaska. 234 pp Link: http://dnr.alaska.gov/ag/akpmc/reveg/

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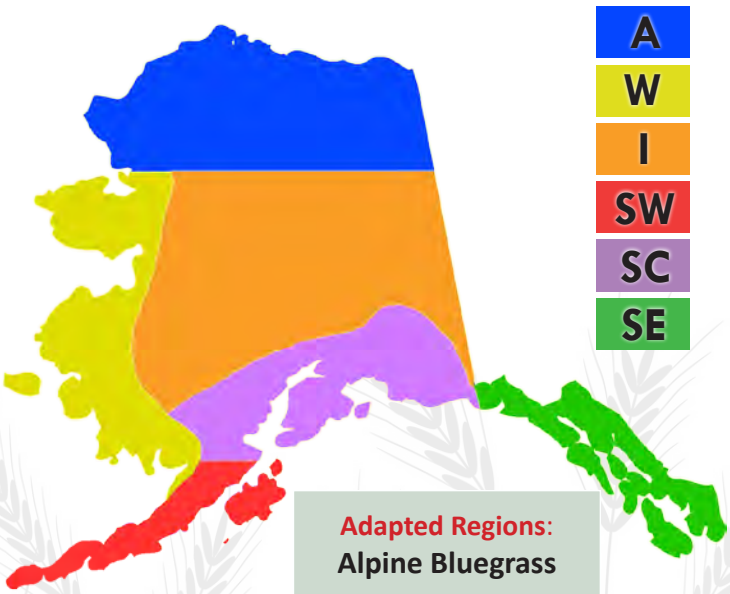
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	0

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Species not adapted to region

Adapted Regions:
Alpine Bluegrass

- All Regions

see variety detail at left

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Bunch	6 - 8 in.	Native	Poor	Good	Poor	Weak	5 - 7.2

AMERICAN SLOUGHGRASS

Photo: Brennan Veith Low, AK PMC

A mature stand of American Sloughgrass

American Sloughgrass

Beckmannia syzigachne (L.)

Description

Beckmannia syzigachne (American Sloughgrass) is a short lived perennial grass that is commonly found in shallow marshes or sloughs. Its shallow root system supports a leafy stem which may be up to 45 centimeters (18 inches) tall. Branched inflorescence, classified as closed panicle. Spikelets have very short pedicels that are arranged on only one side of the panicle. One or two flowered spikelets disarticulate below the glumes. There are approximately 1,270,000 American Sloughgrass seeds per pound of seed.

Uses

Livestock: American Sloughgrass can be used for hay meadows or pasture land. It is highly palatable to all classes of livestock, such as cattle, sheep and horses.

Wildlife: American Sloughgrass is an important component of Alaskan wetland environments. The grass provides shelter and food for wildlife such as waterfowl, songbirds and various small mammals.

Forage Value

American Sloughgrass is highly palatable and a valuable forage species. It has good energy and high protein value. American Sloughgrass is also know to contain high amounts of nonstructural carbohydrates. Livestock and wildlife generally concentrate in the wet meadows and riparian areas where American Sloughgrass grows.

Distribution and Adaptation

American Sloughgrass grows wild in Alaska and the northern United States in wet meadows, marshes and swamps. It is also grown and used as forage in parts of Europe and Russia. American Sloughgrass generally prefers a pH ranging from 5.5 to 7.5. It is commonly found growing in areas that receive at least 30 inches of precipitation per year.

Culture

An average broadcast seeding rate for American Sloughgrass is 10 lbs/acre. A rate of 5 lbs/acre is used when drill seeding, or when seeded in a mixture. American Sloughgrass seed should be planted to a depth of $^{1}/_{4}$ - $^{1}/_{2}$ inch. Be mindful of this grass's high water requirement when choosing a growing site. If the planting site is dry at the time of seeding, irrigation may be necessary. American Sloughgrass seed should be planted in moist to wet soils that are of medium to fine texture. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied.

Management

American Sloughgrass normally produces an abundance of seed that will readily germinate upon reaching a suitable growing site. It can be feasible to use American Sloughgrass on seasonally inundated sites where grain production is unpredictable. American Sloughgrass's vigorous growth habit is suited to sites where temporary, yet productive, cover is desired. The seed unit that falls from the inflorescence at maturity is a firm, free flowing spikelet that presents no difficulties for conventional planting equipment.


Photo: Casey Dinkel, AK PMC

American Sloughgrass, Beckmannia syzigachne

Cultivars and Releases

- **'Egan'** - *Alaska PMC release.*

W I SW SC SE

References

Wright, S.J. and P.K. Czapla (2010) Alaska Coastal Revegetation & Erosion Control Guide, State of Alaska, Division of Agriculture, Plant Materials Center, Anchorage, Alaska. 234 pp Link: http://dnr.alaska.gov/ag/akpmc/reveg/

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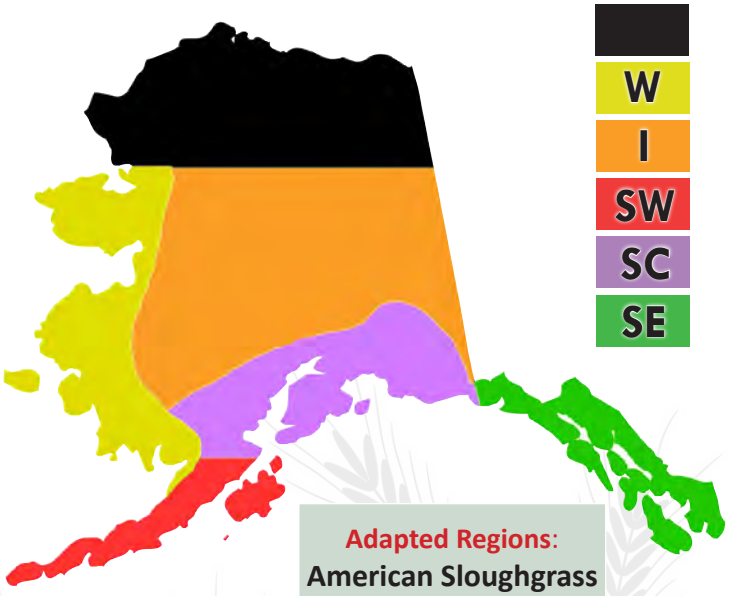
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	3	2

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
American Sloughgrass

- Western
- Interior
- Southwest
- Southcentral
- Southeast

Species not adapted to region

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	18 in.	Native	Good	Poor	Excellent	Moderate	5.5 - 7.5

ANNUAL RYEGRASS

A mature stand of Annual Ryegrass

Annual Ryegrass

Lolium multiflorum (L.)

Description

Lolium multiflorum (Annual Ryegrass) is an annual, cool-season, introduced bunch grass. This grass grows erect or decumbent culms between 30 to 60 centimeters (12 to 24 inches) tall. Annual Ryegrass's foliage is usually glossy and produces a spike inflorescence that is between 7 to 15 cm (3 to 6 inches) long. As with most annual grasses, Annual Ryegrass produces a small root structure. This grass produces a medium size seed that grows at a rapid rate. Annual Ryegrass produces approximately 240,000 seeds per pound of seed.

Always use ryegrass labeled for "forage or pasture use". Some available varieties can be toxic. Non-forage types can contain harmful endophytes.

Uses

Livestock: Annual Ryegrass is used for pasture, hay, or silage. It is highly palatable to all classes of livestock, including cattle, sheep and horses.

Wildlife: Annual Ryegrass is consumed by most classes of large wildlife, such as bison, elk, deer, and mountain sheep. Small mammals and song birds will also utilize this grass when available.

Forage Value

Annual Ryegrass produces good quality forage for most classes of livestock and wildlife. It is considered to have high palatability for grazing animals and low palatability for browsing species. This grass has a moderate digestibility, and makes an excellent forage crop when planted with legumes.

Distribution and Adaptation

Annual Ryegrass can be found growing throughout most of North America. Introduced from Europe, it is adapted to cool moist climates, like those found in the Pacific Northwest. Although it can be found growing in Alaska, it will not persist due to its inability to over winter in harsh climates. It can tolerate a pH range of 5 to 8, and typically prefers moderately course to moderately fine textured soils. Annual Ryegrass will not persist during prolonged periods of drought, but it will tolerate areas of high moisture. This grass can withstand highly saline and nutritionally deprived soils.

Culture

Annual Ryegrass seed should be planted no deeper than ½ inch in most soil conditions. It is commonly planted in mixtures with legumes or small grains. Annual Ryegrass seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 8-16 lbs/acre and 4-8 lbs/acre when drill seeding. When Annual Ryegrass is seeded in a mixture, apply at a rate of 6 - 10 lbs/acre. Seeding rates should be increased by 5 - 10 lbs/acre when planting on poor seedbeds or harsh sites. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilizer should increase overall yields.

Management

Annual Ryegrass is excellent for temporary pastures or early growth on permanent pastures. This grass should be seeded with other pioneer grass species, due to its short life cycle. Annual Ryegrass will succumb to winters in Alaska. It is also prone to several types of rust disease, although the species is somewhat resistant. Annual Ryegrass requires ample moisture and irrigation should be applied when necessary.

Photo: Casey Dinkel, AK PMC

Annual Ryegrass, Lolium multiflorum

Cultivars and Releases

- There are currently no developed northern cultivars or releases of Annual Ryegrass. Use of locally grown cultivars is advised whenever possible.

References

Wright, S.J. and P. Hunt (2008) A Revegetation Guide for Alaska, State of Alaska, Division of Agriculture, Plant Materials Center, Anchorage, Alaska. 160 pp Link: http://dnr.alaska.gov/ag/akpmc/pdf/RevegManual.pdf

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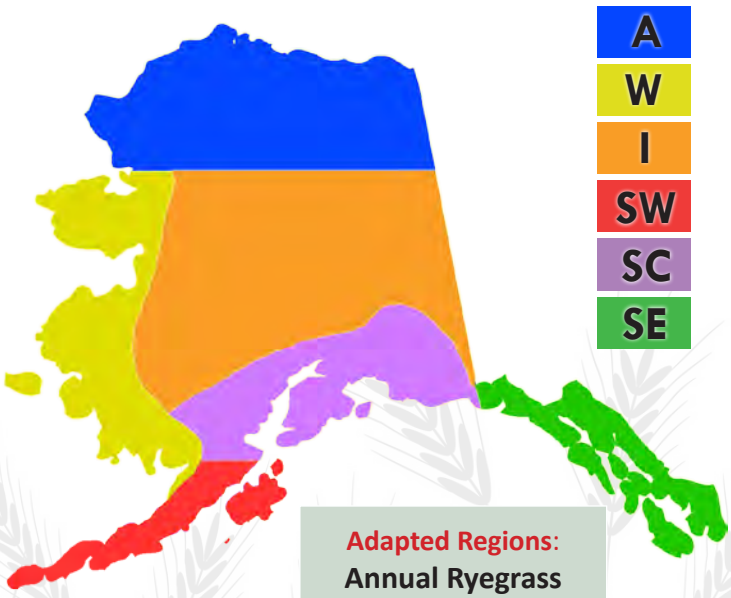
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Annual Ryegrass

- All Regions

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	12 - 24 in.	Introduced	Excellent	Low	Excellent	Strong	5 - 8.0

BEACH WILDRYE

A mature stand of Beach Wildrye

Beach Wildrye

Leymus mollis (L.)

Description

Leymus mollis (Beach Wildrye) is a long lived, cool season, perennial sod forming grass. It grows erect culms 50 to 60 centimeters (20 to 24 inches) tall, from long creeping rootstocks. Beach Wildrye produces stout, aggressive rhizomes, which increases its ability to spread. Leaves vary in length from 25 to 51 cm (10 to 20 inches), and are coarse-textured. The inflorescence is a stiff spike that is 10 - 25 cm (4 to 10 inches) in length and roughly 13 mm (½ inch) wide. Beach Wildrye produces a large sized seed (33,000 seed per pound) and has low seedling vigor and germination rate. A fifty percent germination percentage for Beach Wildrye seed should be considered acceptable.

Uses

Livestock: Beach Wildrye can be used for pasture or silage. It is moderately palatable to a select class of livestock, such as cattle. This grass can be useful forage if grazed or cut for silage at the optimum growth stage.

Wildlife: Beach Wildrye is utilized by small mammals and song birds for forage and cover. Due to its limited range and moderate palatability, it is generally not consumed by large grazing or browsing animals such as moose, caribou, elk or bison.

Forage Value

Beach Wildrye produces a moderate forage yield compared to other forage grasses such as Smooth brome or Timothy. Its palatability for browsers is moderate to low. Beach Wildrye provides moderate to low nutritional value, depending upon when it is cut or grazed. This grass is usually easily digested, but can cause impaction problems in horses if consumed when the moisture content of the grass is low.

Distribution and Adaptation

Beach Wildrye is adapted to tidal and coastal areas and can be found growing along the coast of Alaska. It prefers coarse textured, sandy and/or well drained soils. Beach Wildrye will grow well in soils with a pH between 6.0 and 8.0. This grass can tolerate excessively wet and droughty conditions, and can withstand saline soils.

Culture

Beach Wildrye is commonly grown by planting sprigs from existing plants. A sprig is the smallest division taken from a live plant to grow a new plant. Survival percentage is greater when Beach Wildrye sprigs are planted than from seed. If using seed, drill to a depth of ¼ to ½ inch. Seeding rates depend greatly upon soil type, moisture, and location. The seeding rates below only apply to 'Reeve' Beach Wildrye, and the European species *Leymus arenarius*. An average rate for broadcast seeding of Beach Wildrye is 60 lbs/acre, and 30 lbs/acre when drill seeding. Including Beach Wildrye seed in a mixture is not recommended due to its weak ability to compete with other plants. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Beach Wildrye is highly responsive to nitrogen fertilizer. 20N-20P-20K fertilizer applied at a rate of 500 to 600 lbs/acre yield good results.

Management

Beach Wildrye may be severely damaged or destroyed from traffic that causes compaction. Digestive impaction may occur in horses if grazed when the moisture content is low. A fungus and pest called ergot can replace or destroy Beach Wildrye seed. Ergot occasionally occurs in many cereal crops and other various grass species. This fungus can be poisonous if consumed by animals and should be avoided.


Photo: Casey Dinkel, AK PMC

Beach Wildrye, Leymus mollis

Cultivars and Releases

- '**Benson**' *(Leymus mollis) - Alaska PMC release;* Available only as vegetative cuttings (sprigs).

[ ] W [ ] SW SC SE

- **'Reeve'** (*Leymus arenarius*) - *Alaska PMC release;* Available as seed.

[ ] W [ ] SW SC SE

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Wright, S.J. and P.K. Czapla (2010) Alaska Coastal Revegetation & Erosion Control Guide, State of Alaska, Division of Agriculture, Plant Materials Center, Anchorage, Alaska. 234 pp Link: http://dnr.alaska.gov/ag/akpmc/reveg/

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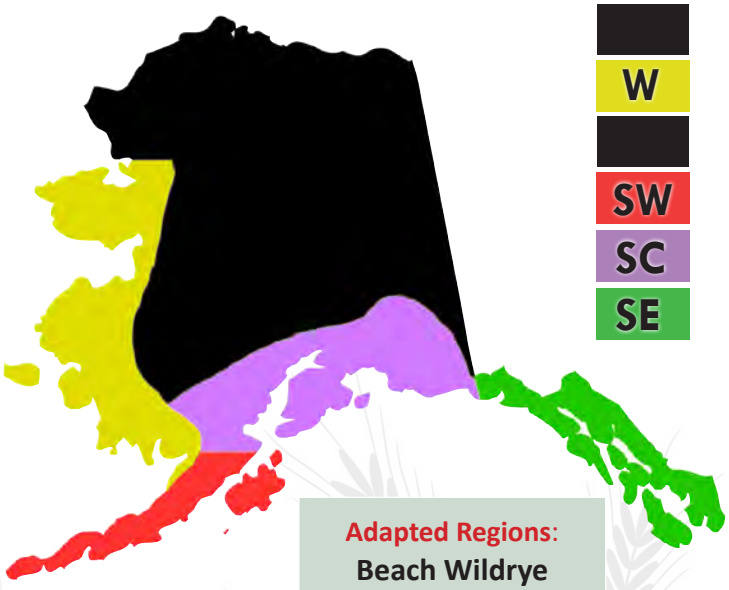
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
2	3	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Beach Wildrye

- Western
- Southwest
- Southcentral
- Southeast

see variety detail at left

[ ] *Species not adapted to region*

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Sod	24 in.	Native	Excellent	Good	Good	Weak	6.0 - 8.0

BERING HAIRGRASS

Photo: Stoney J. Wright, AK PMC

Bering Hairgrass has tufted leaves and a branched inflorescence

Bering Hairgrass

Deschamspia beringensis (L.)

Description

Deschampsia beringensis (Bering Hairgrass) is a highly variable, perennial, cool season bunch grass. The species grows from 50 to 60 centimeters (20 - 24 inches) tall. Stems are erect, and the leaves are between 1.5 - 4 mm (.06 and .16 inches) wide, flat or rolled. The leaves are mostly basal in a dense tuft. Bering Hairgrass's inflorescence is a loosely branched, open panicle from 10 - 25 centimeters (4 to 10 inches) in length. There are two florets (flowers) per spikelet. Flowering occurs from May to September. Bering Hairgrass seeds mature from late June to late September, depending on location. *Deschampsia beringensis* produces approximately 1,360,000 seeds per pound of seed.

Uses

Livestock: Bering Hairgrass can be utilized as hay or as a pasture crop. It is used by cattle, horses, and sheep. The palatability of Bering Hairgrass is moderate to low for most classes of livestock.

Wildlife: A large variety of wildlife utilize Bering Hairgrass for cover. Most wildlife will not typically utilize the species as often as domestic livestock. Bering Hairgrass has moderate to low palatability for elk, bison and moose.

Forage Value

Bering Hairgrass produces good quality hay for most classes of livestock and wildlife. Hairgrass provides ample amounts of protein, depending on its growing stage. Bering Hairgrass can provide good summer pasture forage, however most livestock find this grass unpalatable. As a result, an animal's diet may consist of only 1-3% Bering Hairgrass.

Distribution and Adaptation

Bering Hairgrass populations occupy moist to seasonally flooded, sunny environments. Bering Hairgrass is adapted to a pH range from 5.5 to 7.2. Salinity tolerance is generally low, but plants growing in coastal estuaries may be slightly more salt tolerant. Bering Hairgrass habitat includes coastal terraces, upper tidal marshes, seasonally wet prairies, and moist subalpine mountain meadows.

Culture

When planting Bering Hairgrass, seed should be planted ¼ to ½ inch deep. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 12 lbs/acre and 6 lbs/acre when drill seeding. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary. Irrigation in combination with fertilization should increase overall yields.

Management

Bering Hairgrass is adapted to coastal regions and is well suited for Alaska's maritime environments. One should be aware that Bering Hairgrass grows aggressively and tends to compete with other grass species. Several diseases are associated with Bering Hairgrass, including ergot, stripe smut, blind seed and several turf diseases. Hairgrass is also vulnerable to several leaf spots and rusts. Insect pests such as aphids, billbugs, and leafhoppers can threaten stands of Bering Hairgrass, and should be monitored.

Photo: Brennan Veith Low, AK PMC

Bering Hairgrass, Deschampsia beringensis

Cultivars and Releases

- **'Norcoast'** - *University of Alaska Fairbanks release.*

A W I SW SC SE

References

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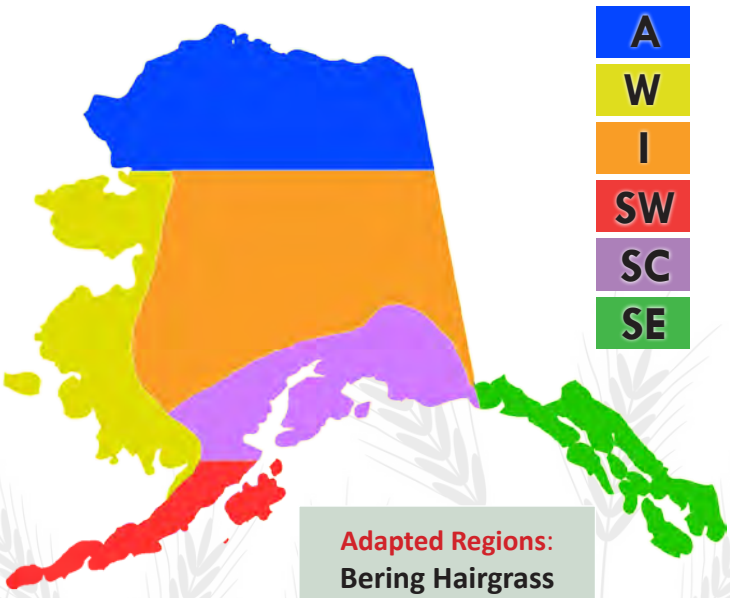
Natural Resource Conservation Service (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	3	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Bering Hairgrass

- All Regions

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	20 - 24 in.	Native	Poor	Good	Good	Strong	5.5 - 7.2

BLUEJOINT REEDGRASS


Photo: Casey Dinkel, AK PMC

Bluejoint Reedgrass, Calamagrostis canadensis

Bluejoint Reedgrass

Calamagrostis canadensis (L.)

Description

Calamagrostis canadensis, Bluejoint Reedgrass is a tall, erect, cool season perennial grass that is found in wet meadows and prairies. The creeping rhizomes and rootstocks result in natural stands having a hummocky, uneven appearance. Erect culms are slender, not branched; grow to be 90 to 100 centimeters (36 to 40 inches) tall. Leaves are bluish green, elongated and very narrow; rough to the touch. The caryopses are ellipsoidal, yellow-brown, smooth, and about .76 to 1.27 mm (.03 -.05 inches) long. Inflorescence (seed-head) open panicle with single caryopsis borne in each spikelet (Barkley, 1986). Bluejoint flowers from June to August and is a typical wind pollinated species like most grasses. *Calamagrostis canadensis* produces approximately 2,720,000 seeds per pound of seed.

Uses

Livestock: Bluejoint may be used for hay or pasture land. Cattle, sheep and horses find this grass highly palatable during early growth prior to seedhead formation.

Wildlife: Bluejoint is utilized by bison, elk and deer, especially during the early portion of the growing season. It also has value as food and cover for waterfowl, small rodents, and some upland game birds.

Forage Value

Bluejoint furnishes excellent forage for livestock and some wildlife. As this grass matures, it quickly becomes tough and unpalatable, causing protein values to drop considerably and crude fiber content to increase. Bluejoint makes favorable hay and is palatable forage if managed properly. However, when putting effort and expense into seedbed preparation, one should consider growing more desirable forage grasses than Bluejoint Reedgrass. Seed availability is poor and prices are usually high for this species.

Distribution and Adaptation

Stands of Bluejoint can tolerate a thick build up of litter and mulch. This species can be found in highly organic peat and clay soils, but prefers a silty soil. Bluejoint is adapted to a wide range of temperatures (-40 °F to 105 °F) and precipitation regimes. It is extremely winter hardy.

Bluejoint has broad ecological adaptations; occurring in a wide range of environments - from lowland wetlands to wind-swept alpine ridges. The species has a wide pH tolerance (pH 4.5 to 8), from very acidic to moderately alkaline soils. Bluejoint can tolerate fresh to slightly brackish water.

Culture

An average broadcast seeding rate for Bluejoint is 6 - 8 lbs/acre. When drill seeding, 2 - 4 lbs/acre is appropriate. Fall seedings should be made at least 6 weeks before a killing frost is expected. Seedings should be drilled at a depth of $^{1}/_{4}$ inch and no deeper than $^{3}/_{8}$ of an inch if possible. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Bluejoint responds well to nitrogen, which has been shown to increase protein levels and overall forage yields. Pastures and hay fields should be irrigated when necessary. Irrigation, in combination with fertilization, should increase overall yields.

Management

Bluejoint is intolerant of heavy grazing and/or repeated harvests. Heavy trampling by livestock or wildlife can break the rhizomes and add to soil compaction in wetter areas. When over 40 percent of the plant is grazed, future yields can decrease by 15-20 percent. Harvesting should be restricted to a single cutting per growing season. When unfertilized and subjected to frequent grazing or harvest, Bluejoint stands are often damaged and persistence is poor.

Fertilized stands of Bluejoint may produce 2 or 3 times more total forage than unfertilized stands. Also, fertilized stands can produce 10-20% higher protein yields and are considered more palatable for livestock and wildlife. Problems can occur with virgin stands of Bluejoint Reedgrass due to the large amount of surface debris that can accumulate from previous years' growth. This hummocky layer can prevent top dressed fertilizers from reaching the living grass root zone. This layer can be removed by burning, blading, or mechanical mixing of the surface organic layer.

Several potential pests have been associated with Bluejoint Reedgrass throughout the lower 48 states and parts of Alaska. The nematode *Subanguina calamagrostis* invades the leaf tissue of the grass, forming galls that cause the leaves to become twisted and contorted. A fungus, *Dilophospora alopecuri*, can then invade the leaves of Bluejoint Reedgrass, using the entry wound caused by the aforementioned nematode.

Cultivars and Releases

- '**Sourdough**' - *University of Alaska Fairbanks release.*

A W I SW SC SE

Photo: Brennan Veith Low, AK PMC

A mature stand of Bluejoint Reedgrass

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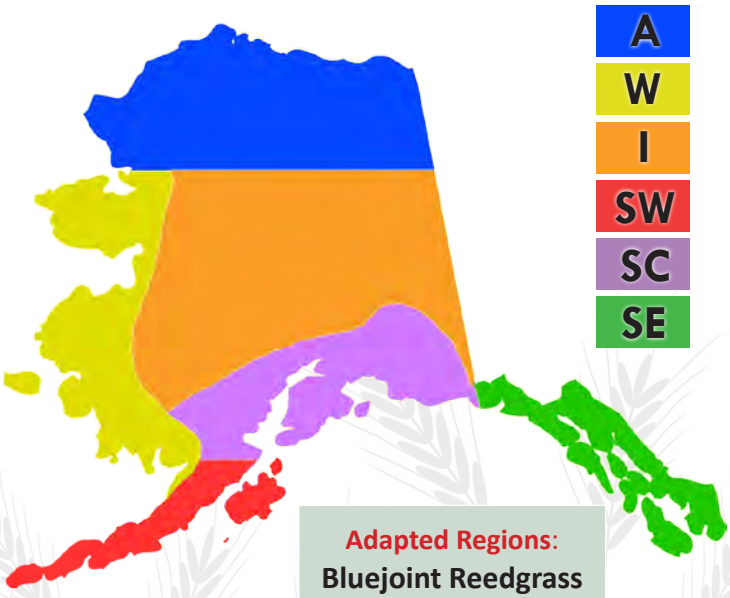

Adapted Regions:
Bluejoint Reedgrass

- All Regions

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	3	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Sod	36 - 40 in.	Native	Poor	Good	Good	Strong	4.5 - 8

KENTUCKY BLUEGRASS


Photo: Alaska PMC

Kentucky Bluegrass, Poa pratensis

Kentucky Bluegrass

Poa pratensis (L.)

Description

Poa pratensis (Kentucky bluegrass) is a perennial, cool-season, sod-forming grass native to Europe. This plant is about 45 to 60 centimeters (18 - 24 inches) tall, although this height falls to 10 to 15 cm (4 - 6 inches) when intensively grazed. Inflorescence (seed-head) has an open panicle and produces many small seeds. There are about 2,177,000 seeds per pound of seed.

Leaves are from 15 to 30 cm (6 to 12 inches) long, and boat-shaped (keeled) at the tips. Leaves are smooth, soft, and about 3 - 7 mm ($^1/_8$ to $^1/_4$ inch) wide. Kentucky bluegrass becomes dormant during the heat of summer, but regains its green color in fall. Growth starts early in the spring. Tiller buds develop into stems or rhizomes. New rhizomes also arise from nodes of older rhizomes. Most rhizomes will penetrate 2 to 4 inches into the soil, but some go down more than 5 inches.

Uses

Livestock: Kentucky bluegrass is typically used for pasture land rather than as a hay crop, due to its shorter growing height. It is highly palatable to cattle, horses and sheep early in the spring, before other plants begin to grow. Kentucky bluegrass produces relatively low yields compared to other pasture grasses.

Wildlife: Kentucky bluegrass is highly palatable to bison and elk. The tender plants are grazed immediately after growth begins, and the leaves remain succulent and green as long as soil moisture is present. *Poa pratensis* seeds are also eaten by several kinds of songbirds and rodents.

Forage Value

Kentucky bluegrass is excellent forage grass for most livestock and wildlife. It provides adequate nutritional value in the early spring before other plant species emerge. Once Kentucky bluegrass develops seed, the forage value and palatability drop considerably. Kentucky bluegrass is commonly used for pasture land, but considered undesirable for hay fields because of its low growth form, poor yield, and early maturity.

Distribution and Adaptation

Kentucky bluegrass is used throughout the U.S. It is best adapted to well-drained, fertile, medium-textured soils of limestone origin. Performance on poorly drained and heavy-textured soils is satisfactory. Favorable pH level for Kentucky bluegrass is between 6.0 and 7.5. Kentucky bluegrass grows best in humid areas. Optimum temperatures for forage production are between 60 °F and 90 °F. Kentucky bluegrass is essentially dormant during dry or excessively hot weather, allowing it to survive extreme temperatures. It grows best with direct sunlight, but will do well in the shade, so long as ample moisture and nutrients are available.

Culture

An average broadcast seeding rate for Kentucky bluegrass is 6 - 10 lbs/acre; a rate of 2 - 4 lbs/acre is used for drill seeding or when seeded in mixtures. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B. Kentucky bluegrass seed should be planted to a depth of $^1/_4$ inch to $^1/_2$ inch.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. A pasture containing Kentucky bluegrass should be irrigated when necessary. Irrigation in combination with fertilization should increase overall yields.

Management

Proper fertilization and liming are the most important phases of Kentucky bluegrass management. For pastures, grazing should begin when grass is about 5 inches tall. Kentucky bluegrass should not be grazed shorter than 1-$^1/_2$ to 2 inches. Otherwise, sod will become weedy and unproductive. When overgrazed, poor root and rhizome development occurs, allowing weeds and shrubs to invade the pasture.

Kentucky bluegrass is susceptible to attack by many diseases and insects. It is sometimes vulnerable to fungal infections, leaf spot, rust and powdery mildew. Depending on region, the grass is also susceptible to white grubs, billbugs, and sod webworms.

A field of Kentucky Bluegrass in southcentral Alaska

Cultivars and Releases

- '**Nugget**' - *released by University of Alaska Fairbanks.*

I SC SE

- '**Park**' - *released from Minnesota*

I SC SE

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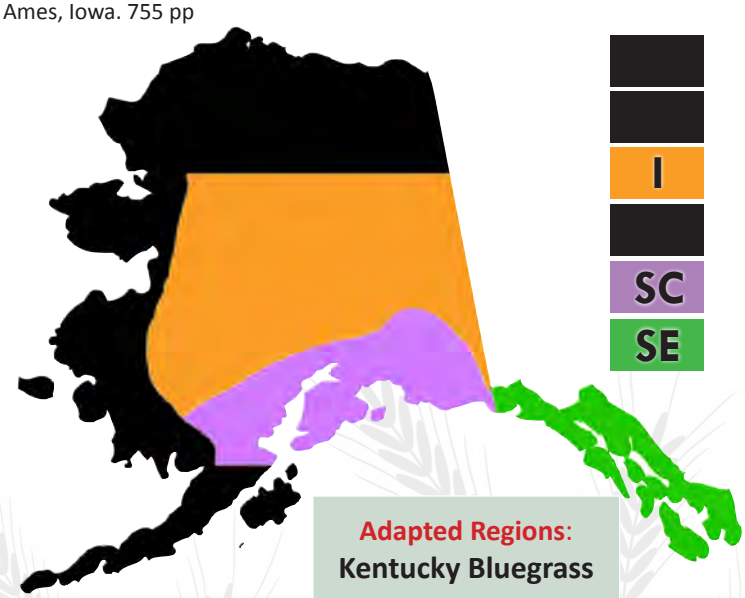
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	3	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Kentucky Bluegrass

- Interior
- Southcentral
- Southeast

see variety detail at left

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Sod	18 - 24 in.	Introduced	Poor	Poor	Good	Moderate	6 - 7.5

MEADOW BARLEY

Photo: Casey Dinkel, AK PMC

Meadow Barley has a narrow panicle with a purplish hue.

Meadow Barley

Hordeum brachyantherum (L.)

Description

Hordeum brachyantherum (Meadow Barley) is a short to intermediate lived, cool season, perennial bunch grass. It grows semi erect to erect culms 38 - 75 centimeters (15 to 30 inches) in height. Leaves are green to bluish green, and are 3 to 6.5 mm (1/8 to 1/4 inch) wide. The inflorescence, or seed-head, is a narrow panicle that is 2.5 - 10 cm (1 to 4 inches) in length and often of purplish color. This grass produces a medium sized seed with good seedling vigor. Meadow Barley seed possesses bristle like awns and non-viable florets that should be removed for easier seed flow through planting machinery. Seed per pound can vary widely depending upon the degree of seed conditioning. Bulky seed may contain 30,000 to 100,000 seeds/lb, while highly processed seed can have upwards of 150,000 seeds per pound of seed.

Uses

Livestock: Meadow Barley can be used for pasture land or hay. It has moderate to low palatability for most classes of livestock. Palatability is higher if grazed in early spring before setting seed. Meadow Barley starts its growth in the early spring and matures in early to mid September.

Wildlife: Meadow Barley is considered to have low palatability for most large wildlife animals, such as elk, bison, and moose. However, deer are known to utilize Meadow Barley in the spring, when nutrient values are still high. Small mammals, song birds, and water fowl may use this grass for cover and food, throughout various stages of its life cycle.

Forage Value

Meadow Barley produces a marginal amount of protein and is utilized most often by large grazing animals in the early spring. As with most grasses, nutritional value and digestibility diminish substantially after seed development or without adequate moisture.

Distribution and Adaptation

Meadow Barley is adapted to cool climates and can be found growing in wet meadows, salt marshes, along beaches, and riparian areas. This grass is adapted to finer textured soils like silts and clays but can also tolerate coarser textured soils that have adequate moisture. It prefers soils with a pH of 6.0 - 8.5, and will not persist well in acidic environments. Meadow Barley has a moderate tolerance to drought conditions. It can also tolerate low nutrient and high saline soils.

Culture

Meadow Barley seed should be planted ¼ to ½ inch deep when drill seeded. This grass establishes easily and has high seedling vigor. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcast seeding is 4-8 lbs/acre, or 2-4 lbs/acre when drill seeding. When seeded in a mixture, apply at a rate of 4-6 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary. Irrigation, in combination with fertilization, should increase overall yields.

Management

Meadow Barley is responsive to irrigation and should be irrigated if planted on drier sites. It does not respond well to heavy grazing and pasture deferment should be considered for healthy stands to persist. This grass may be susceptible to several fungal diseases such as head smut and/or leaf and stem rust. Meadow Barley's bristly awn can cause harm to some animals by working its way into the nose, mouth, and intestine.

Photo: Brennan Veith Low, AK PMC

Meadow Barley, Hordeum brachyantherum

Cultivars and Releases

- **Lowell Point** selected class germplasm;
  - Alaska PMC release.

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Wright, S.J. and P.K. Czapla (2010) Alaska Coastal Revegetation & Erosion Control Guide, State of Alaska, Division of Agriculture, Plant Materials Center. Palmer, Alaska. 234 pp Link: http://dnr.alaska.gov/ag/akpmc/reveg/

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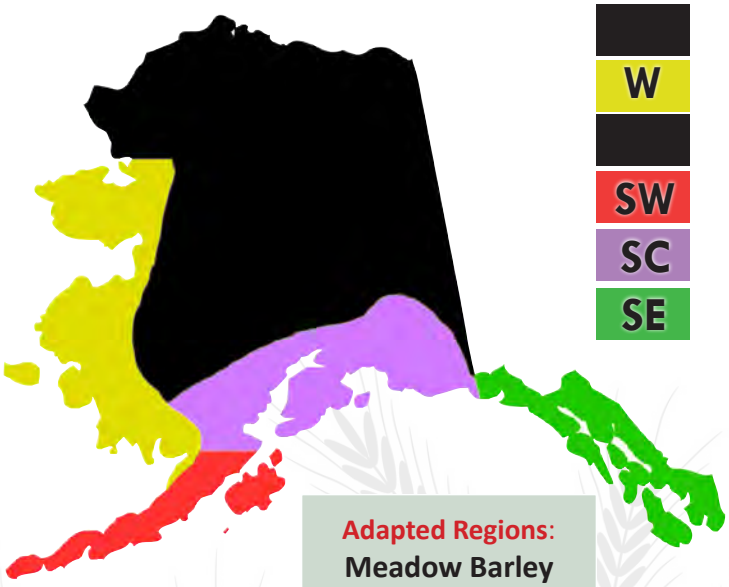
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	3	2

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Meadow Barley

- Western
- Southwest
- Southcentral
- Southeast

Species not adapted to region

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Bunch	24 in.	Native	Good	Good	Good	Weak	6.0 - 8.5

MEADOW FOXTAIL

Meadow Foxtail, Alopecurus pratensis

Meadow Foxtail

Alopecurus pratensis (L.)

Description

Alopecurus pratensis (Meadow Foxtail) is a long lived, cool season, perennial bunch grass. It grows decumbent or erect culms 30 to 50 centimeters (12 to 20 inches) tall. Leaves vary in length from 5 to 30 cm (2 - 12 inches), and are roughly 6 to 13 mm (1/4 to 1/2 inch wide). Meadow Foxtail's inflorescence is a dense panicle and is 2.5 to 7.5 cm (1 to 3 inches) in length, and usually about 6 to 13 mm (1/4 to 1/2 inch) wide. This grass produces a medium size seed, which retains a hairy pubescence making it light and/or fluffy. Once established, Meadow Foxtail has high seedling vigor. Meadow Foxtail produces approximately 406,000 seeds per pound of seed.

Uses

Livestock: Meadow Foxtail can be used for pasture, hay, or silage. It is highly palatable to all classes of livestock, such as cattle, sheep, and horses. Meadow Foxtail starts its growth in early spring and provides livestock with adequate forage.

Wildlife: Meadow Foxtail has moderate palatability for most classes of wildlife. Grazers such as elk and bison tend to select Meadow Foxtail more often than moose. It is also utilized by small mammals and song birds.

Forage Value

Meadow Foxtail produces moderate amounts of protein and is excellent quality forage for large grazing animals. It possesses good nutritional value and digestibility similar to that of Timothy (*Phleum pretense*). Browsers such as moose do not find Meadow Foxtail to be as palatable as do grazing animals like cattle, bison and elk. As with most grasses, nutritional value diminishes substantially after seed development or without adequate moisture.

Distribution and Adaptation

Meadow Foxtail is adapted to cool, wet climates. It can be found growing in hay meadows, irrigation ditches, and along stream banks. Meadow Foxtail prefers fine-textured or poorly drained soils, such as silts and clays. This grass performs well in soils with a pH ranging from 5.8 to 8.0. Meadow Foxtail has a moderate tolerance to droughty and saline environments. *Alopecurus pratensis* can be found growing throughout most of Alaska, and portions of Canada and the United States.

Culture

Meadow Foxtail seed should be planted a ¼ to ½ inch deep, when drill seeded. This grass can be difficult to establish, but once in place seedling vigor is considered high. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 4-8 lbs/acre and 2-4 lbs/acre when drill seeding. When Meadow Foxtail is seeded in a mixture, apply at a rate of 4-6 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Meadow Foxtail makes an excellent pasture, hay, or silage forage crop. It is less winter-hardy than Smooth Brome (*Bromus inermis*) but is more tolerant of acidic soils. Meadow Foxtail is found in areas with milder winters and more acidic soils, such as the Kenai Peninsula. Meadow Foxtail can be problematic when planting with a drill seeder, due to the hairy pubescence that remains on the seed after cleaning. To reduce mechanical problems, Meadow Foxtail can be planted along with other grass or legume species. It responds well to grazing as long as there is ample moisture. At present, there are no major pests in Alaska that threaten Meadow Foxtail.

Photo: Paul Slichter, Pacific Northwest Wildflowers

A mature stand of Meadow Foxtail

Cultivars and Releases

- There are no developed northern cultivars or releases of Meadow Foxtail at present.

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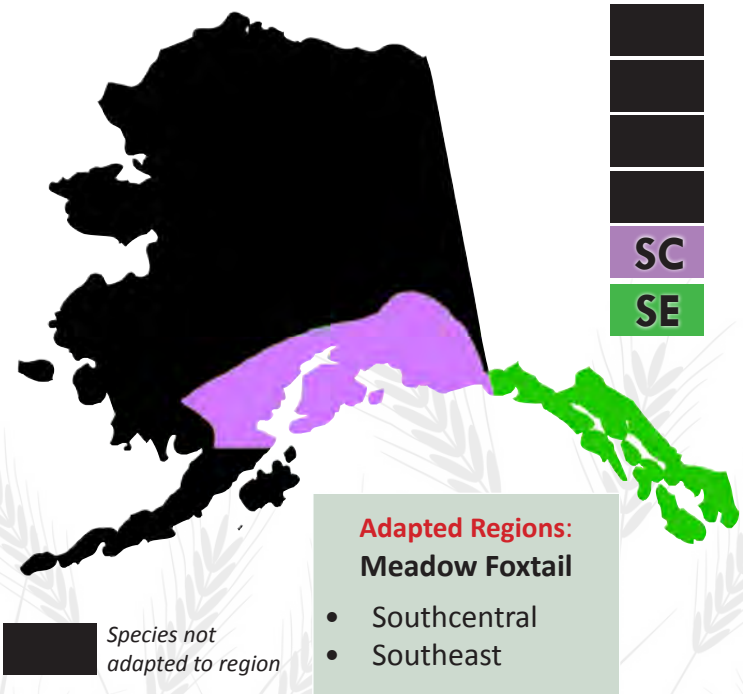
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	3	2

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Bunch	12 - 20 in.	Introduced	Good	Good	Excellent	Strong	5.8 - 8.0

POLARGRASS

Polargrass, Arctagrostis latifolia

Polargrass

Arctagrostis latifolia (L.)

Description

Arctagrostis latifolia (Polargrass) is a long lived, cool season, perennial, sod forming grass. It grows erect culms 45 to 60 centimeters (18 to 24 inches) tall. Polargrass leaves vary in length from a few inches to a foot and are usually 6 to 13 mm ($^1/_4$ - $^1/_2$ inch) wide. Inflorescence (seed-head) is narrow to somewhat open panicle 8 to 28 cm (3 to 11 inches) in length. Polargrass has low seedling vigor and produces a small seed with about 1,800,000 seeds per pound of seed.

Uses

Livestock: Polargrass can be used for pasture, hay, or silage. This grass is capable of generating high yields and can provide livestock with adequate forage and nutrition.

Wildlife: Polargrass has shown to provide good forage for caribou and reindeer in northern regions throughout Canada and Alaska. Grizzly bears have been observed grazing large quantities of polargrass during spring and summer months. It also provides cover and forage for small mammals and various song birds.

Forage Value

Polargrass produces large amounts of protein and is a high quality forage for large grazing animals. It possesses good nutritional value and digestibility similar to that of Timothy (*Phleum pratense*). Browsers such as moose and deer do not find Polargrass to be as palatable as grazing animals like cattle, bison and elk. As with most grasses, the nutritional value of Polargrass diminishes substantially after seed development or without adequate moisture.

Distribution and Adaptation

Polargrass is adapted to cool, wet climates, and is found growing along rivers, meadows, tundra, fresh water marshes, and inland levees. It is adapted to cold boggy soils and/or mesic up lands. This grass will grow well in soils with a pH ranging from 4.9 to 6.8. Polargrass is intolerant to droughty and/or saline environments. It prefers northern latitudes and can be found growing in portions of Greenland, Canada, and Alaska.

Culture

Polargrass seed should be planted ¼ to ½ inch deep. Low seedling vigor can make this grass difficult to establish. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate when broadcasting Polargrass is 8 lbs/acre and 5 lbs/acre when drill seeding. Seeding Polargrass as part of a mix is not recommended because of the grass's weak ability to compete with other plants. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary. Irrigation in combination with fertilization should increase overall yields.

Management

Polargrass seedling vigor is poor and early growth rates are usually slow. It requires an environment with low competition, moderate moisture, and adequate nutrients. However, once Polargrass is established, it has early and vigorous spring growth. Production trials of unfertilized vs. fertilized Polargrass have shown the differences in yield to be insignificant, suggesting that Polargrass does not respond well to commercial fertilizers. More research needs to be conducted to validate this theory, however.

Polargrass requires moderate amounts of moisture and should be irrigated when applicable. *Arctagrostis latifolia* is an extremely winter hardy grass, with a greater tolerance to winter ponding and icy conditions than other forage grasses like Timothy (*Phleum pratense*) and Smooth Brome (*Bromus inermis*).

Photo: USDA Natural Resource Conservation Service

A field of Polargrass, Arctagrostis latifolia

Cultivars and Releases

- '**Kenai**' - *University of Alaska Fairbanks release.*

  A W I SW SC SE

- '**Alyeska**' - *University of Alaska Fairbanks release.*

  A W I SW SC SE

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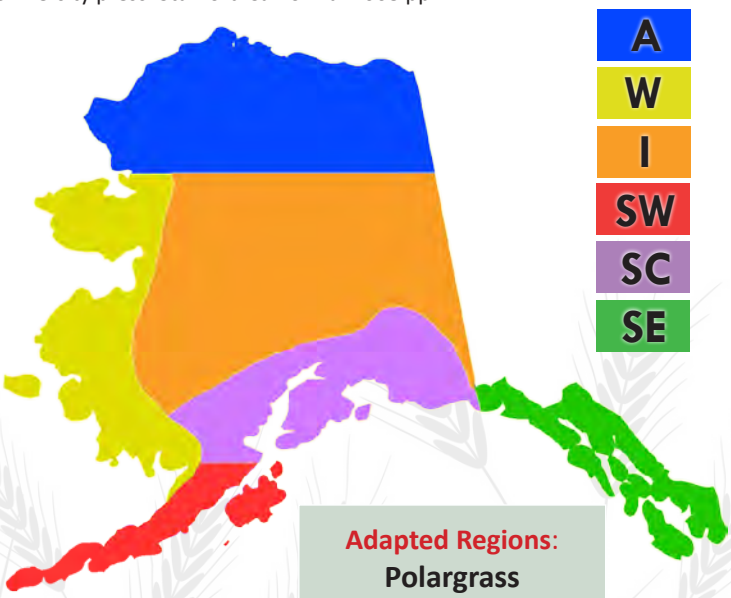

Adapted Regions:
Polargrass

- All Regions

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Sod	24 in.	Native	Poor	Good	Excellent	Poor	4.9 - 6.8

RED FESCUE


Photo: Brennan Veith Low, AK PMC

Red Fescue is a winter-hardy grass, adapted for use across Alaska.

Red Fescue

Festuca rubra (L.)

Description

Festuca rubra (Red Fescue) is a cool season, introduced, sod-forming grass. Leaves of Red Fescue are bright green, wiry, and narrow. They are pressed together in a "V" shape and appear nearly round. Sheaths reddish or purplish at base, culms sometimes bent and growing to about 35 - 46 centimeters (14 - 18 inches) tall. The inflorescence (seed-head) is a contracted and/or narrow panicle. Red Fescue produces about 410,000 seeds per pound of seed.

Uses

Livestock: Red Fescue is used for hay, pasture land, or silage. It is also utilized by cattle and horses. In some cases, Red Fescue will make up 10-15% of domestic sheep diets.

Wildlife: Red Fescue is consumed by deer, moose, elk and a variety of other wild ungulates. It is also great forage for upland game birds and various species of water fowl such as the lesser Canada goose.

Forage Value

The forage value of Red Fescue ranges from fair to good, depending on geographic location. It possesses fair nutritional value, even after freeze-up, until snow becomes too deep for grazing. Red Fescue is also known to retain high protein values throughout its growth stage.

Distribution and Adaptation

Red Fescue is hardy, wear-resistant, and shade tolerant. This grass is adapted to wet, acidic environments. It prefers well drained soils with a pH between 5 and 7.5, but requires ample moisture to become established. Red Fescue is adapted to cooler zones.

In areas of high temperatures and humidity, Red Fescue may turn brown or deteriorate during the summer months. This grass will generally recover in the fall when temperature and moisture conditions are more favorable. Red Fescue is highly competitive and is found all over North America.

Culture

When planting Red Fescue, seed should be planted ¼ to ½ inch deep. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting Red Fescue is 12 lbs/acre and 6 lbs/acre when drill seeding. Seeding rate calculations are based on Pure Live Seed (PLS), as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Fertilization, combined with irrigation, may increase overall yields.

Management

One should be aware of Red Fescue's aggressiveness and ability to out-compete other plants. It is not uncommon for Red Fescue to dominate a growing site even when planted in a mix with other grass species. This should be considered when formulating a forage seeding mix. Red Fescue can also be used to prevent the invasion of alders and willows.

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Photo: Alaska PMC

A field of Red Fescue in southcentral Alaska

Varieties and Releases

- '**Arctared**' - *University of Alaska Fairbanks release.*

  A W I SW SC SE

- '**Boreal**' - *Alberta, Canada release.*

  [redacted] W I SW SC SE

- '**Pennlawn**' - *Pennsylvania release.*

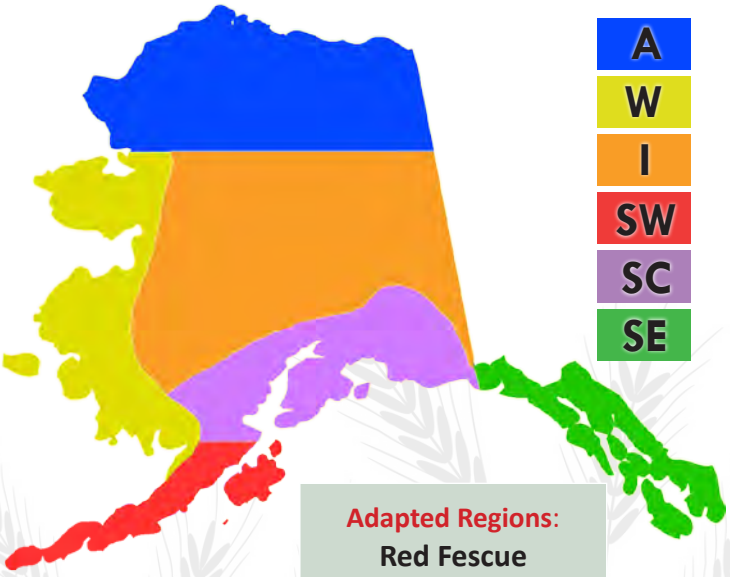
  [redacted] [redacted] [redacted] SW SC SE

- **Henderson Ridge** selected class germplasm; *- Alaska PMC release.*

  [redacted] [redacted] [redacted] SW SC [redacted]

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	2	3	3	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



[redacted] *Species not adapted to region*

Adapted Regions:
Red Fescue

- All Regions

see variety detail at left

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor - Good	Sod	14 - 18 in.	Introduced	Poor	Good	Good	Strong	5 - 7.5

SIBERIAN WILDRYE


Photo: Casey Dinkel, AK PMC

Siberian Wildrye seedhead

Siberian Wildrye

Elymus sibiricus (L.)

Description

Elymus sibiricus (Siberian Wildrye) is a tall growing, erect perennial bunchgrass, that grows from 75 - 90 centimeters (30 to 36 inches) in height. It is a cool season species native to fragmented intermountain areas. Siberian Wildrye can be easily identified by its long, lax, drooping seedhead. This grass species produces an abundance of seed, and has a conspicuous ability to grow in open, unshaded and infertile sites. Siberian Wildrye is known for its extreme winter hardiness and excellent seedling vigor. It produces approximately 127,000 seeds per pound of seed.

Uses

Livestock: Siberian Wildrye can be utilized as hay or as a pasture crop. It is used by cattle, horses, and sheep. The palatability of Siberian Wildrye is moderate to low for most classes of livestock.

Wildlife: A large variety of wildlife utilize Siberian Wildyre for cover. Most wildlife will not typically utilize this grass for feed as often as domestic livestock. Siberian Wildrye has low palatability for elk, bison and various species of waterfowl.

Forage Value

Siberian Wildrye has marginal forage quality. This grass also has poor digestibility due to large amounts of lignin, cellulose and hemicellulose. It has a protein content similar to Polar Brome (*Bromus inermis*), Slender Wheatgrass (*Elymus trachycaulus*), and Timothy (*Phleum pratense*), after the first year of establishment. Like most forage grasses, Siberian Wildrye nutrient levels are highest just before the plant develops its seedhead. There is limited Siberian Wildrye research data available concerning actual nutritional value, palatability, and grazing utilization.

Distribution and Adaptation

Siberian Wildrye is distributed across Europe, Asia, Russia, and parts of Canada and Alaska. It can be found growing in sandy soils, in areas receiving between 24 and 55 inches of annual precipitation. Siberian Wildrye is a very drought tolerant species and will not grow well in wet areas or areas with poorly drained soils. The grass is adapted to slightly acid to neutral soils, with a pH range from 5.0 to 7.2. Siberian Wildrye will not tolerate saline soils or shaded environments.

Culture

An average broadcast seeding rate for Siberian Wildrye is 12 lbs/acre. A rate of 6 lbs/acre should be used when drill seeding or when seeded in a mixture. Siberian Wildrye seeds should be planted at a depth of $^{1}/_{4}$ in. to 1 in. Seed should be planted in medium to coarse textured, well drained soil if possible. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Little information is available regarding the effect fertilizer and irrigation may have on Siberian Wildrye yields.

Management

Siberian Wildrye appears to be a good forage species, although more research is needed to determine its overall value. There are several potential problems for growers dealing with Siberian Wildrye. This grass possesses a needle like appendage or awn that could potentially be harmful to livestock. Siberian Wildrye should not be grazed within the first year of its planting. Grazing could potentially destroy or diminish its life span. During its first year of growth, Siberian Wildrye does not produce a high overall yield. There has been little research into pests (such as insects, mildews, or rust) that could be harmful to Siberian Wildrye.

Photo: Casey Dinkel, AK PMC

A field of Siberian Wildrye in southcentral Alaska.

Cultivars and Releases

- *There are no commercial Siberian Wildrye cultivars or releases currently available.*

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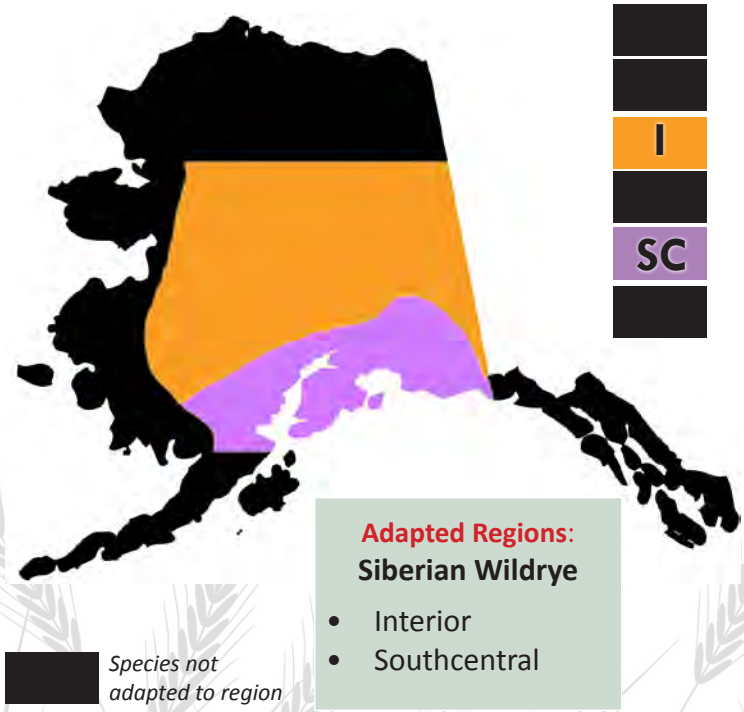
Klebesadel, L.J. (1993) Winterhardiness and Agronomic Performance of Wildryes Compared with Other Grasses In Alaska, and the Responses of Siberian Wildrye to Management Practices. Agricultural and Forestry Experiment Station, University of Alaska. Palmer, Alaska. 19 pp.

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	2	2	1	0

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Bunch	36 in.	Disputed	Poor	Good	Poor	Moderate	5.0 - 7.2

SLENDER WHEATGRASS

Photo: Brennan Veith Low, AK PMC

Slender Wheatgrass seed head

Slender Wheatgrass

Elymus trachycaulus (L.)

Description

Elymus trachycaulus (Slender Wheatgrass) is an erect, tufted bunchgrass ranging in height from 60 to 70 centimeters (24 to 30 inches). It is a cool season, perennial species native to the mountain and intermountain areas of the western United States and the northern Great Plains. Slender Wheatgrass has very short rhizomes and the seedstalks and stems have characteristic reddish to purplish tinge at the base. It is seldom found in pure stands and is relatively short lived with a life expectancy of only 4-6 years. Slender Wheatgrass has about 133,000 seeds per pound of seed.

Uses

Livestock: Slender Wheatgrass can be used for hay or pasture land. It's highly palatable to cattle and sheep, and provides good quality animal fodder.

Wildlife: Slender Wheatgrass is utilized by buffalo, elk, moose, mountain goat and dall sheep throughout Alaska. It is also used as forage and cover for some songbirds, upland game birds, small mammals, and waterfowl.

Forage Value

Slender Wheatgrass is valuable forage for most classes of livestock and wildlife. It is generally considered to have a good energy value and high protein content compared to other grasses. Slender Wheatgrass produces good quality hay if managed properly.

Distribution and Adaptation

Slender Wheatgrass is widely distributed across North America. Its range extends from Alaska to Newfoundland and south to North Carolina, Kentucky, Arkansas, Texas, and western Mexico. Slender Wheatgrass has been found growing at elevations from 4,500 to 12,000 feet. It prefers loams to sandy loams in areas receiving at least 14 inches of annual precipitation. Slender Wheatgrass is a drought tolerant species, but may still succumb to drought, since it sometimes matures later in the fall. The grass is adapted to slightly acid to slightly alkaline soils, growing in soils with a pH ranging from 5.6 to 9.0. Considerable genetic variability is present in Slender Wheatgrass populations, and some ecotypes may be rather specific to their original sites.

Culture

An average broadcast seeding rate for Slender Wheatgrass is 10 lbs/acre, or 5 lbs/acre used when drill seeded or included in mixtures. Seeding depth should be $^{1}/_{4}$ to $^{3}/_{4}$ inch. Seed should be planted in fine to medium textured well drained soil if possible. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures containing Slender Wheatgrass should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Slender Wheatgrass is best suited as a filler seed in mixtures containing slower establishing, longer lived grass species. It performs well when grown in combination with legumes. Slender Wheatgrass is moderately tolerant to grazing pressure, and requires good management to maintain stands. It is also considered to be a decreaser species on over grazed rangelands.

When choosing Slender Wheatgrass as forage in Alaska, one should highly consider planting a cultivar or release that is adapted to the climate in which the plants will become established.

Photo: Casey Dinkel, AK PMC

Slender Wheatgrass is an excellent drought-tolerant forage crop.

Cultivars and Releases

- **Wainwright** selected class germplasm;
  - Alaska PMC release.

  W I SW SC

- **'Revenue'** *- Canada release.*

  W I SW SC

- **'Primar'** *- released from Oregon and Washington.*

  W I SW SC

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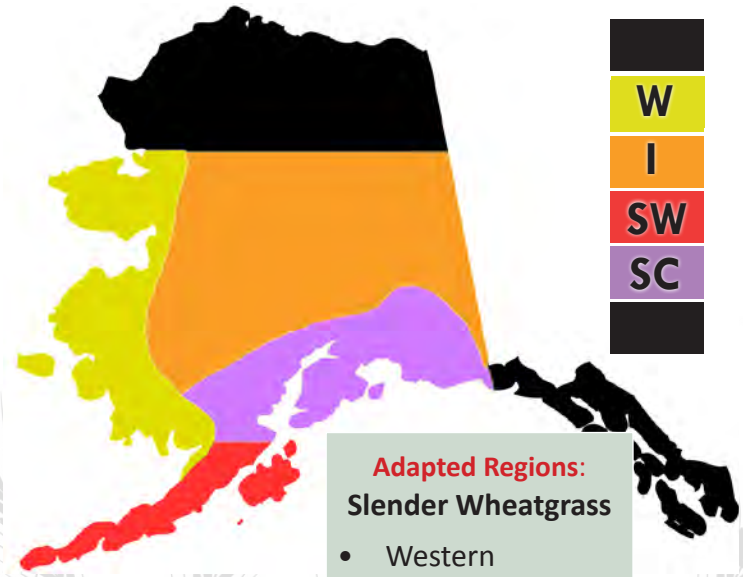
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	0

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Adapted Regions:
Slender Wheatgrass

- Western
- Interior
- Southwest
- Southcentral

Species not adapted to region

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	24 - 30 in.	Native	Excellent	Excellent	Good	Strong	5.6 - 9

SMOOTH BROME


Photo: Casey Dinkel, AK PMC

Smooth Brome is resistant to drought and temperature extremes.

Smooth Brome

Bromus inermis (L.)

Description

Bromus inermis (Smooth Brome) is a sod-forming perennial cool season grass that spreads by rhizomes. Culms vary from 30 to 45 centimeters (12 to 18 inches) in height on average. This plant produces numerous basal and stem leaves that vary in length from 10 to 25 cm (4 to 10 inches). Frequently, Smooth Brome leaves are marked by a transverse wrinkle resembling a "W" a short distance below the leaf tip. The inflorescence develops a characteristic rich purplish-brown color when mature. Brome seed is produced in semi-compact, 127 mm (5 inch) long panicles with ascending branches. The flat compressed seed is usually awnless, about 8.5 mm ($^1/_3$ inch) long, and smooth. Smooth Brome is the most widely used of the cultivated brome grasses. It produces approximately 142,000 seeds per pound of seed.

Uses

Livestock: Smooth Brome is used for hay, pasture, and/or silage. Cattle, sheep and horses find this grass highly palatable during the early growth stage, as well as late in the year after fall green-up.

Wildlife: Smooth Brome is used by wildlife to varying degrees, depending upon the quality of the grass and the animal species. Elk and Bison use it as winter forage. Upland game birds and waterfowl use Smooth Brome for nesting cover and rearing their brood. Rodents such as voles and shrews use it for food and cover throughout the year.

Forage Value

If grazed before flowering, Smooth Brome is high in protein with relatively low crude-fiber content. Forage value decreases rapidly with maturity, once seed is produced. Northern varieties of Smooth Brome produce less forage on average than southern varieties, but are just as palatable for livestock and wildlife.

Distribution and Adaptation

Smooth Brome is adapted to cool climates. It is resistant to drought and extremes in temperature. It is a long lived grass, living 5 to 7 years on average, but can live as long as 10 years or more. This plant is very susceptible to disease in areas of high humidity. Smooth Brome grows best on well drained silt and clay loam soils with high fertility. It will also grow well on lighter textured soils where adequate moisture and fertility are maintained. Smooth Brome performs best in a slightly acid to slightly alkaline environment (pH range of 6.0 to 7.5). Stands are difficult to obtain and growth is poor on soils high in soluble salts.

Smooth Brome's range of distribution is centered within the corn belt of North America and includes portions of Canada and Alaska. Depending on variety, this grass can grow in several regions of Alaska, as far north as Fairbanks.

Culture

Due to slow rates of germination and establishment, Smooth Brome requires a clean, firm seedbed. An average seeding rate for broadcast seeding is 20-25 lbs/acre, 10-15 lbs/acre when drill seeding. If seeded as part of a mixture, 5-10 lbs/acre should be used. When seeding in the fall, make sure to have seed in the ground at least six weeks prior to the first expected frost. Seedings should be drilled at a depth of $^1/_2$ to $^3/_4$ inch. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios for Smooth Brome depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation, in combination with fertilization, should increase overall yields.

Management

Smooth Brome requires heavy applications of nitrogen in early spring and in fall to maintain high yields in a pure stand. Optimum forage production is obtained when brome is used in a planned cropping system and plowed out after 3 to 4 years. Smooth Brome's heavy sod makes it an excellent soil-conditioning crop, when included in cropping systems. In deep, well-drained soils it will root to 4 feet. Smooth Brome performs best in grassed waterways, field borders, and other conservation uses, where the forage can be cut and removed while in early bloom.

Pastures should not be grazed prior to attaining a minimum height of about 10 inches at the beginning of the grazing season. Grazing pressures should be adjusted throughout the season to avoid grazing this grass below a minimum height of 4 inches.

Grasshoppers and seed blight can be a factor during grass establishment, in semi-humid areas. Foliar diseases in humid areas have also been known to cause serious problems. Smooth Brome can be dramatically affected by seed midges, such as *Stenodiplosis bromicola*, in some northern areas.

Cultivars and Releases

- '**Carlton**' - *Western Canada release.*

  I SC

- '**Manchar**' - *Washington release.*

  I SC

- **'Polar' -** *Alaska developed 'Polar' Brome may become commercially available in the future. Check with the Alaska Plant Materials Center for further detail.*

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Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	3	3	3	2

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Photo: Alaska PMC

Smooth brome, Bromus inermis

Klebesadel, L.J. (1992) Bromegrass in Alaska. I. Winter Survival and Forage Productivity of Bromus Species, Types, and Cultivars as Related to Latitudinal Adaptation, University of Alaska Fairbanks, School of Agriculture and Land Resources Management, Bulletin 87, 13 pp

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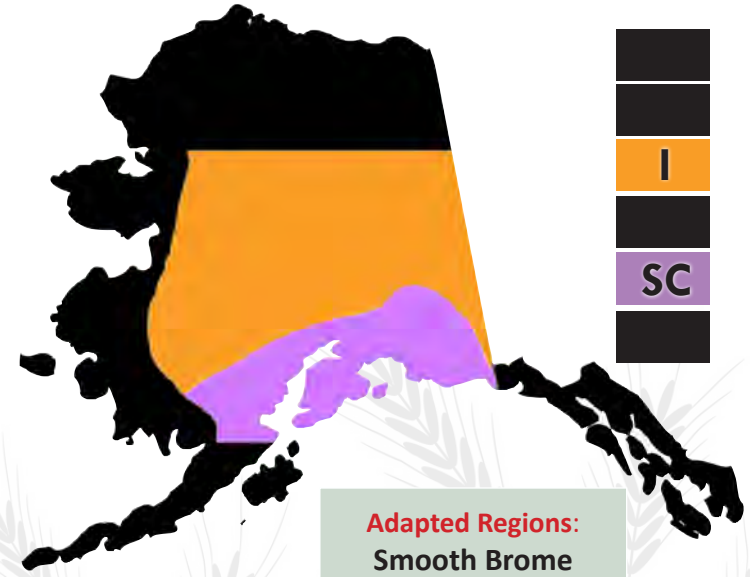

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Sod	12 - 18 in.	Introduced	Poor	Good	Fair	Strong	6.0 - 7.5

SPIKE TRISETUM

Photo: Natural Resource Conservation Service (NRCS)

Spike Trisetum seed head

Spike Trisetum

Trisetum spicatum (L.)

Description

Trisetum spicatum (Spike Trisetum) is a relatively short-lived, cool-season perennial bunch grass. It grows erect culms 50 to 75 centimeters (20 to 30 inches) tall. Leaves are usually flat to folded, and 2.5 to 13 cm (1 to 5 inches) in length. The inflorescence is also 2.5 to 13 cm (1 to 5 inches) long, narrow, dense, and sometimes purplish green. Spike Trisetum seed is small, with about 2,000,000 seeds per pound of seed. Spike Trisetum has a high root/shoot ratio in comparison with other grasses.

Uses

Livestock: Spike Trisetum is commonly used for pasture. It is considered highly palatable for all classes of livestock. When used for hay, Spike Trisetum provides nutritious forage for cattle, sheep, and horses.

Wildlife: Big game animals such as bison, elk, and deer, commonly utilize Spike Trisetum throughout its growing season. This grass is highly palatable to all classes of wildlife.

Forage Value

Spike Trisetum produces excellent quality forage for all classes of livestock and large wildlife, though it does not respond well to heavy grazing pressure. It is highly palatable to browse and grazing animals, and produces large amounts of protein in comparison to other grasses. Spike Trisetum has good digestibility and is considered to be an important grass for mountainous regions.

Distribution and Adaptation

Spike Trisetum is adapted to medium textured or well drained soils, and prefers a pH range of 4.9 to 7.5. It is found growing on drier areas of mountain meadows, roadsides, clear cuts, and is distributed almost worldwide. Spike Trisetum is tolerant of prolonged periods of drought or moisture, though it will not persist under conditions of high salinity.

Culture

Spike Trisetum seeds should be planted from ¼ to ½ inch deep. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcast seeding is 6 - 12 lbs/acre and 4 - 6 lbs/acre when drill seeding. When seeded in a mixture, apply at a rate of 2 - 4 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Spike Trisetum starts its growth in early spring. Like many grasses, its protein values diminish upon setting seed. Spike Trisetum does not respond well to heavy grazing pressure. Precaution should be taken not to over graze this grass. Spike Trisetum will stay green well into August or until covered by snow. It seldom occurs in dense stands, but usually cures well when cut for hay. Seed can be damaged more easily than most other grasses due to a liquid endosperm. Care should be taken when drill seeding to limit seed damage. At present, there are no known pests that are a concern for Spike Trisetum.

Photo: Casey Dinkel, AKPMC

A mature stand of Spike Trisetum

Cultivars and Releases

- **Nelchina** - selected class germplasm; *Alaska PMC release.*

W I SW SC SE

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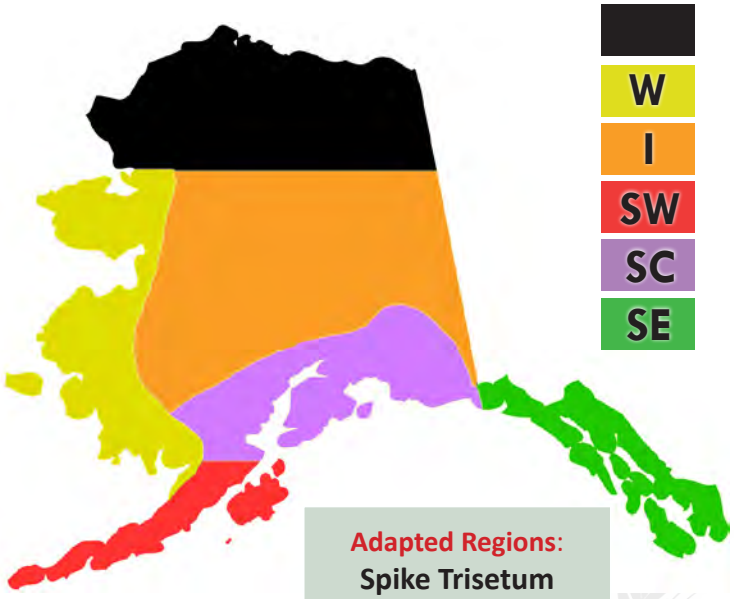

Species not adapted to region

Adapted Regions:
Spike Trisetum

- Western
- Interior
- Southwest
- Southcentral
- Southeast

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Bunch	20 - 30 in.	Native	Poor	Good	Good	Strong	4.9 - 7.5

TIMOTHY

Timothy seed head

Timothy

Phleum pratense (L.)

Description

Phleum pratense, Timothy is a relatively short-lived, cool-season perennial bunch grass that grows in stools or clumps and has a shallow, compact, and fibrous root system. It grows in erect culms 50 to 100 centimeters (20 to 40 inches) tall. Leaves vary in length from 5 to 30 cm (2 to 12 inches) and are about ($^1/_4$ inch) wide, narrowing gently toward the tip. Heads spike-like and dense, from 5 to 15 cm (2 to 6 inches) in length. The seed is very small and usually remains enclosed within the glumes. Timothy produces approximately 1,230,000 seeds per pound of seed. Timothy is different from most other grasses in that 1, or occasionally 2, of the basal internodes of the stem swell into a bulb-like growth. This characteristic is often used to identify the plant during its early stages of growth.

Uses

Livestock: Timothy is used for pasture and silage, but mostly for hay. It is palatable and nutritious for cattle and sheep, and also makes excellent hay for horses. Timothy is considered good forage for cattle and horses during the spring, summer, and fall. When being grazed by sheep it is considered good forage during the summer and fair during the spring and fall.

Wildlife: Big game animals such as bison, elk and deer commonly utilize Timothy throughout its growing season. Some studies have shown that Timothy makes up to 20% of bison and elk diets. Small mammals, song birds, upland game birds and waterfowl will also use Timothy for nesting, brood rearing and escape cover.

Forage Value

Timothy produces good quality hay for most classes of livestock and wildlife. It also provides ample amounts of protein within the first 25 days of its growing cycle. Once Timothy is mature, crude protein values and digestibility diminishes greatly, a fact that should be considered when producing a hay crop. After the first hay cutting, Timothy can provide good late summer and early fall pasture forage.

Distribution and Adaptation

Timothy is adapted to a cool, humid climate. Timothy thrives in rich moist bottomlands and on finer textured soils, such as clay loams. It does not do well on coarser soils. Timothy prefers a pH of 5.5 to 7.0. Timothy will grow for a time on soils low in fertility, but it is better adapted to high fertile soil. It is not well adapted to wet, flat land where water stands for any considerable time, although it can withstand somewhat poorly-drained soils. Under conditions of limited moisture, Timothy performs poorly; it does not tolerate drought or prolonged high temperatures. Timothy is distributed throughout the entire United States.

Culture

When planting Timothy, seeds should be planted a ½ inch deep in moist soil, and ¾ inch in dry or coarse textured soils. It is commonly planted in mixtures with legumes or small grains. Seeding rates for Timothy depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 4-8 lbs/acre, and 2-4 lbs/acre when drill seeding. When Timothy is seeded in a mixture, apply at a rate of 4-6 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Timothy is highly responsive to fertilizers and should be fertilized frequently and in ample quantities. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Timothy makes a first rate companion grass for alfalfa, trefoil, or clover as it is the grass that competes least with legumes. Over 31 diseases have been reported as affecting Timothy; however, most of these are of little concern and can be controlled. Timothy is susceptible to stem rust disease which can cause loss of vigor and forage quality. Rust-resistant varieties have been developed to control this disease.

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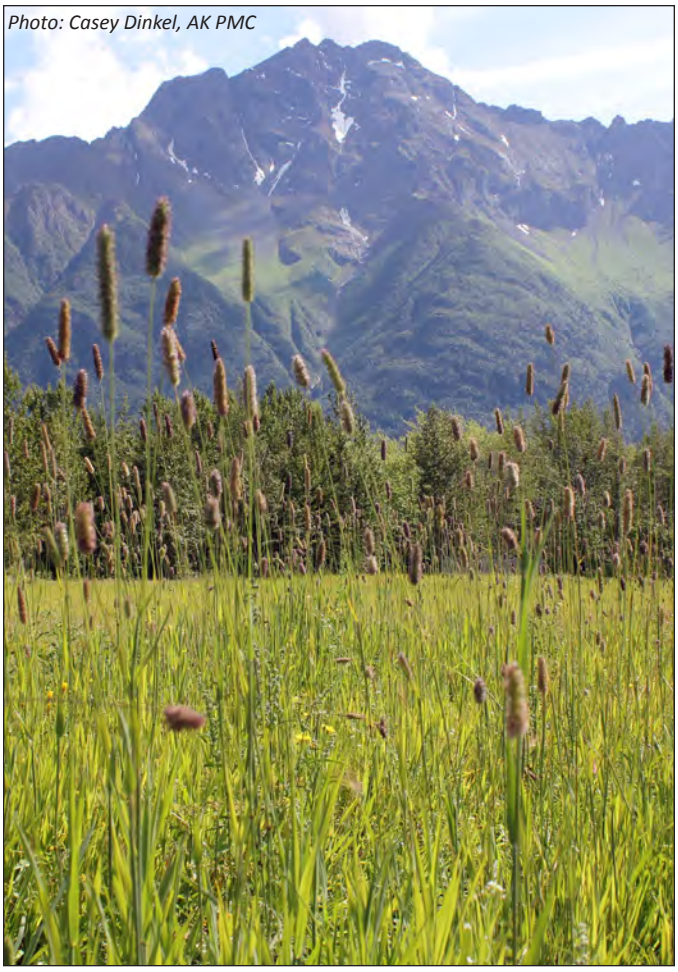
Photo: Casey Dinkel, AK PMC



A mature stand of Timothy, Phleum pratense

Cultivars and Releases

- **'Engmo'** - *Norway release.*

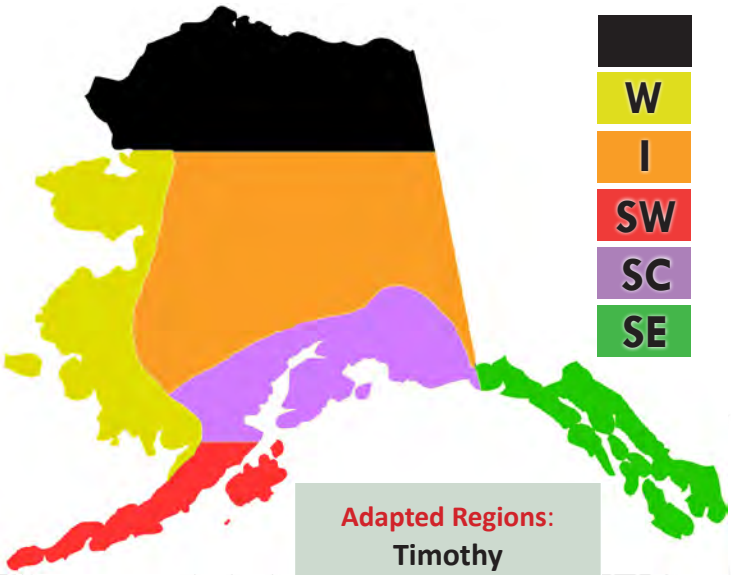
  W I SW SC SE

- **'Climax'** - *Canada release.*

  W I SW SC SE

- **'Champ'** - *Canada release.*

  W I SW SC SE



Adapted Regions:
Timothy

- Western
- Interior
- Southwest
- Southcentral
- Southeast

Species not adapted to region

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	3	2

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	30 in.	Introduced	Poor	Poor	Good	Moderate	5.5 - 7.0

TUFTED HAIRGRASS


Photo: Brennan Veith Low, AK PMC

Tufted Hairgrass is well suited for Alaskan environments.

Tufted Hairgrass

Deschampsia cespitosa (L.)

Description

Deschampsia cespitosa (Tufted Hairgrass) is a highly variable, perennial cool season grass species that grows from 51 to 61 centimeters (20 - 24 inches) tall. Stems are erect, and the leaves are between 1.5 and 4 mm (.06 - .16 inches) wide, flat or rolled. The leaves are mostly basal in a dense tuft. Tufted Hairgrass's inflorescence is upright to nodding, loosely branched, open and 10 to 25 cm (4 to 10 inches) long. There are two florets (flowers) per spikelet. Flowering occurs from May to September. Tufted Hairgrass seeds mature from late June to late September, depending on location. Tufted hairgrass produces approximately 1,360,000 seeds per pound of seed.

Uses

Livestock: Tufted Hairgrass can be utilized as hay or as a pasture crop. It is used by cattle, horses, and sheep. The palatability of Tufted Hairgrass is high to moderate for most livestock.

Wildlife: A large variety of wildlife utilizes Tufted Hairgrass as forage and/or cover. However, most wildlife will not utilize Tufted Hairgrass as often as domestic livestock. The species has moderate to low palatability for elk, bison, bear and various species of waterfowl.

Forage Value

Tufted Hairgrass produces good quality hay for most classes of livestock and wildlife. It also provides ample amounts of protein depending on its growing stage. Tufted Hairgrass can provide good summer pasture forage for livestock. Although forage value is usually moderate to high, Tufted Hairgrass consist of only 1-3% of wild animal diets.

Distribution and Adaptation

Populations of Tufted Hairgrass occupy sunny to partially shaded environments that are moderately moist to seasonally flooded. The species grows in a wide variety of soils; fine to coarse, mesic to hydric soil types. Tufted Hairgrass is adapted to a pH range from 4.8 to 7.5. Some populations have extreme tolerance to heavy metals and high soil acidity. The salinity tolerance of Tufted Hairgrass is generally low, but plants growing in coastal estuaries may be slightly more salt tolerant.

Tufted Hairgrass crowns typically survive all but the most severe (hottest) fires. One of the most widely distributed grasses on earth, Tufted Hairgrass is found in arctic and temperate regions. It occurs from sea level to elevations of up to 14,000 ft. Tufted Hairgrass habitat includes coastal terraces, upper tidal marshes, seasonally wet prairies, moist subalpine mountain meadows, open forests, and alpine areas above timberline.

Culture

When planting Tufted Hairgrass, seed should be planted ¼ to ½ inch deep. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate for broadcasting is 12 lbs/acre and 6 lbs/acre when drill seeding. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied.

Management

Tufted Hairgrass is adapted to northern regions and is well suited for Alaskan environments. One should be aware of Tufted hairgrass's aggressive growth characteristics; it tends to compete with other grass species. A number of diseases are associated with Tufted Hairgrass, including ergot, stripe smut, blind seed and other turf diseases. Hairgrass is also vulnerable to several rusts and leaf spots. Insect pests such as aphids, billbugs, and leafhoppers can threaten stands of Tufted Hairgrass, and should be monitored.

Photo: Casey Dinkel, AK PMC

Tufted Hairgrass, Deschampsia cespitosa

Cultivars and Releases

- **'Nortran'** - *University of Alaska Fairbanks release.*

W I SW SC SE

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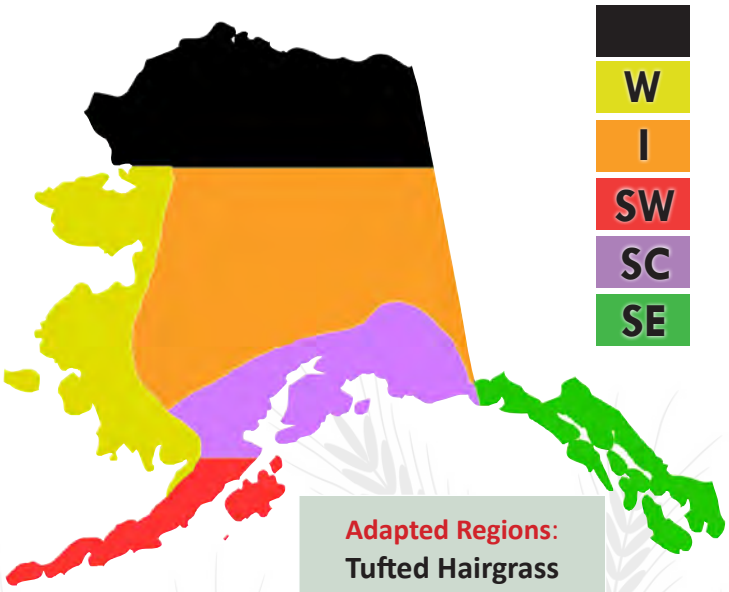
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	1	3	3	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Species not adapted to region

Adapted Regions:
Tufted Hairgrass

- Western
- Interior
- Southwest
- Southcentral
- Southeast

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	20 - 24 in.	Native	Poor	Good	Good	Strong	4.8 - 7.5

Cereal Grains

Photo: Brennan Veith Low,AK PMC

Barley, *Hordeum vulgare*

Barley, *Hordeum vulgare*

Common Oat, *Avena sativa*

BARLEY (Cereal)

Barley seedhead

Barley

Hordeum vulgare (L.)

Description

Hordeum vulgare (Barley) is an erect annual bunch grass that can reach a height of 90 centimeters (36 inches) depending on the variety. This small grain can be intercropped with legumes, such as Field Pea, to increase forage nutrients and palatability. Properly managed, legumes provide needed nitrogen for grasses and protein for livestock. Stems of Barley are hollow, smooth, and glabrous (shiny). Some varieties are susceptible to lodging. Barley leaves are typically 13 - 19 mm (½ to ¾ of an inch) wide and roughly 30 cm (12 inches) in length. Barley spikelet's exhibit short or long, narrow, and scabrous (rough) awns that can be problematic when fed to livestock. It produces a large spindle shaped seed with high seedling vigor. Barley plants produce roughly 13,000 seeds per pound of seed.

Uses

Livestock: Barley is commonly produced for grain fodder, but is sometimes fed directly as "green cut" when intercropped with a legume such as peas. This small cereal grain produces excellent forage and is highly palatable to all classes of livestock. In addition, Barley produces excellent straw, generally used by dog mushers for bedding.

Wildlife: Barley makes excellent fodder for large ungulate wildlife, such as moose, elk and bison. It also provides feed and cover for upland game birds, small mammals, waterfowl and various song birds.

Forage Value

Barley is considered highly palatable and excellent forage for most classes of livestock and wildlife. On average this small grain produces 12% protein when grown in monoculture. Total forage protein levels should increase if Barley is intercropped with Field Pea. Nutritional levels will vary depending on climate, location, and other agronomic inputs such as fertilizers, irrigation, and harvest time.

Distribution and Adaptation

Barley can be found growing throughout much of the world including Alaska, Canada, and the contiguous United States. It is adapted to medium textured soils and prefers a pH ranging from 5.3 to 8.5. Barley is moderately tolerant of droughty and/or wet conditions but does not persist well in shady environments. It is highly tolerant of saline soil conditions.

Culture

Barley grows well in cool moist climates and should be planted ½ to 1½ inches deep. A firm seedbed is essential in providing good seed to soil contact. This will provide a more reliable water supply and prevent large air pockets in the soil that are less than ideal for seedlings to establish.

Barley is typically drill seeded at a rate of 70 to 100 lbs/acre depending upon soil type, moisture, and location. When seeded with a legume, seeding rates should be reduced by about half and growth cycles must be synchronized. Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before seeding. Irrigation in combination with fertilization should increase field productivity.

Management

Barley is an excellent grain and forage crop if properly managed. Barley is well adapted to Alaska's long day length and short growing season. Several barley cultivars have been specifically developed to survive Alaska's harsh climate, while producing higher nutritional grain and forage values. The cultivar '*Weal*' is an awnless Barley that was developed as a dual purpose grain and/or forage.

Barley requires adequate moisture and responds well to nitrogen fertilizer. When planting Barley with legume species nitrogen should not be over applied due to the adverse affects it can have on nitrogen fixing plants. Lodging can also be problematic with some Barley cultivars; one should conduct ample research about their selected cultivar before planting. Currently, producers are evaluating the costs and benefits of irrigation on the production of Barley and other cereal grains throughout Alaska.

Barley is susceptible to powdery mildew (*Blumeria graminis*), leaf scald (*Rhynchosporium secalis*), and barley rust, (*Puccinia hordei*), covered smut (*Ustilago hordei*), loose smut (*Ustilago nuda*) and ergot (*Claviceps purpurea*). To date, these Barley diseases have not been found in Alaska. Therefore, cultivars developed for Alaska do not have a strong resistance to disease. Before planting, many farmers treat seed to prevent ergot and smut. Managers should also rotate crops and select disease free seed when applicable.

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Cultivars and Releases

- **'Otal'** - *University of Alaska Fairbanks release.*
- **'Datal'** - *University of Alaska Fairbanks release.*
- **'Albright'** - *Canada release.*

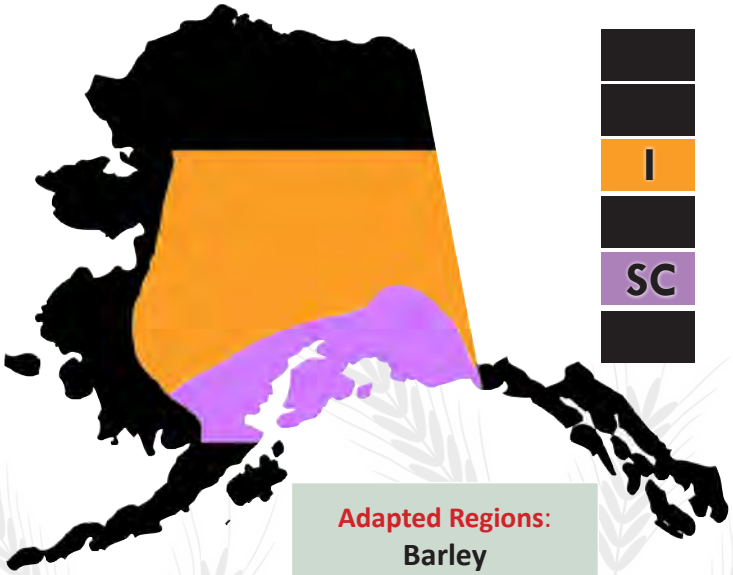
- **'Thual'** *(hulless)* - *Univ. of Alaska Fairbanks release.*
- **'Weal'** *(awnless)* - *Univ. of Alaska Fairbanks release.*

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Photo: Powell Gardens, Kansas City's Botanical Garden (powellgardens.org)

Barley, Hordeum vulgare



Adapted Regions:
Barley

- Interior
- Southcentral

see variety detail at left

Species not adapted to region

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	24 in.	Introduced	Good	Good	Good	Moderate	5.3 - 8.5

COMMON OAT (Cereal)

Photo: Henrik Reinholdson (Wikimedia.org)

Common Oat, Avena sativa

Common Oat

Avena sativa (L.)

Description

Avena sativa, Common Oat is an erect growing annual bunch grass that produces a fibrous root system. This small grain can attain heights greater than 60 centimeters (24 inches), depending on variety. Oats are generally intercropped with various legumes such as clovers and/or field peas to increase forage nutrient levels. This also allows some legumes to use their tendrils to climb the stalks of standing grass. Leaves are non-auriculate and medium to dark green in color. *Avena sativa* produces a large, lance shaped seed with high seedling vigor. Oat plants typically produce 20,000 seeds per pound of seed, depending upon the variety.

Uses

Livestock: Oats are commonly used as a hay and silage crop, but can also be used for pasture. This small cereal grain makes excellent forage and is highly palatable to all classes of livestock. Early growth oat plants can be fed as "green cut" forage for livestock. In addition, oat straw makes excellent roughage.

Wildlife: Oats have excellent forage value for a large variety of wildlife such as bears, elk, bison and moose. They are also used for food and cover by upland game birds, waterfowl, small mammals and various song birds.

Forage Value

Oats are highly palatable and excellent forage to all classes of livestock and wildlife. The species produces moderate/high protein and carbohydrate levels. Oats can be fed as hay, silage, green cut, grain, and/or eaten directly on the pasture. Nutritional levels will vary depending upon the selected form that oats are fed as well as how other agronomic inputs (fertilizer, irrigation, harvest time) are managed and applied. Oat hay generally contains 10 to 15 % protein and is typically intercropped with a legume such as peas for added nutrition.

Distribution and Adaptation

Oats can be found growing throughout much of the world including Alaska, Canada, and the contiguous United States. It is adapted to fine to coarse textured soils, and prefers a soil pH between 5.3 - 8.5. Oats are moderately tolerant of saline soils and droughty conditions. However, this small grain prefers adequate moisture and will not tolerate shady growing environments.

Culture

Oats are best adapted to cool moist climates and should be planted 1½ to 2 inches deep. A firm seed bed allowing good seed to soil contact is essential. Soil samples should be collected and analyzed before seeding. Oats are generally drill seeded at a rate of 50 to 90 lbs/acre. Seeded with a legume, seeding rates should be reduced by about half, and growth cycles should be synchronized. Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Irrigation in combination with fertilization should increase field productivity.

Management

Oats make an excellent forage crop when properly managed. This small grain is well adapted to Alaska's long days and short growing season in the summer. Oats are better adapted to lower pH soils than Barley or Wheat. Oat will complement various legumes when intercropped, and the species makes a high protein and carbohydrate fodder. When planting oats with a legume species, nitrogen should not be over applied due to the adverse affects it can have on nitrogen fixing plants.

Common Oat (*Avena sativa* L.) is the species most used in in Alaska, although other species such as Black Oat (*Avena strigosa* L.), Red Oat (*Avena byzantina* C. Koch), and Hulless Oat (*Avena nuda* L.) are also successfully grown throughout the state. Oat straw does not contain long awns, making it more desirable than barley straw for use as animal bedding. Some oat varieties have difficulty with lodging - conduct research prior to planting.

Oat diseases have not been a significant problem in Alaska. Fungi such as scald (*Rhynchospoium secalis*), stripe (*Pyrenophora graminea*), net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*) and smuts (*Ustilago spp*.) have been known to occur. To help prevent disease outbreaks, managers should rotate crops in the field periodically and be prudent about selecting disease free seed.

Cultivars and Releases

- **'Toral'** - *University of Alaska release.*
- **'Nip'** - *Sweden release; Univ. of AK Fairbanks release.*
- **'Ceal'** - *University of Alaska release.*

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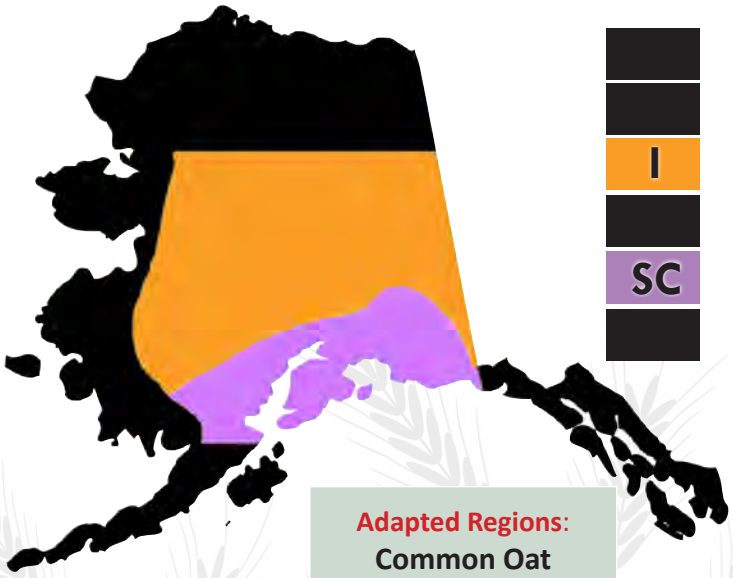
Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Photo: H. Zell (Wikimedia.org)

Common Oat, Avena sativa



Adapted Regions:
Common Oat
- Interior
- Southcentral

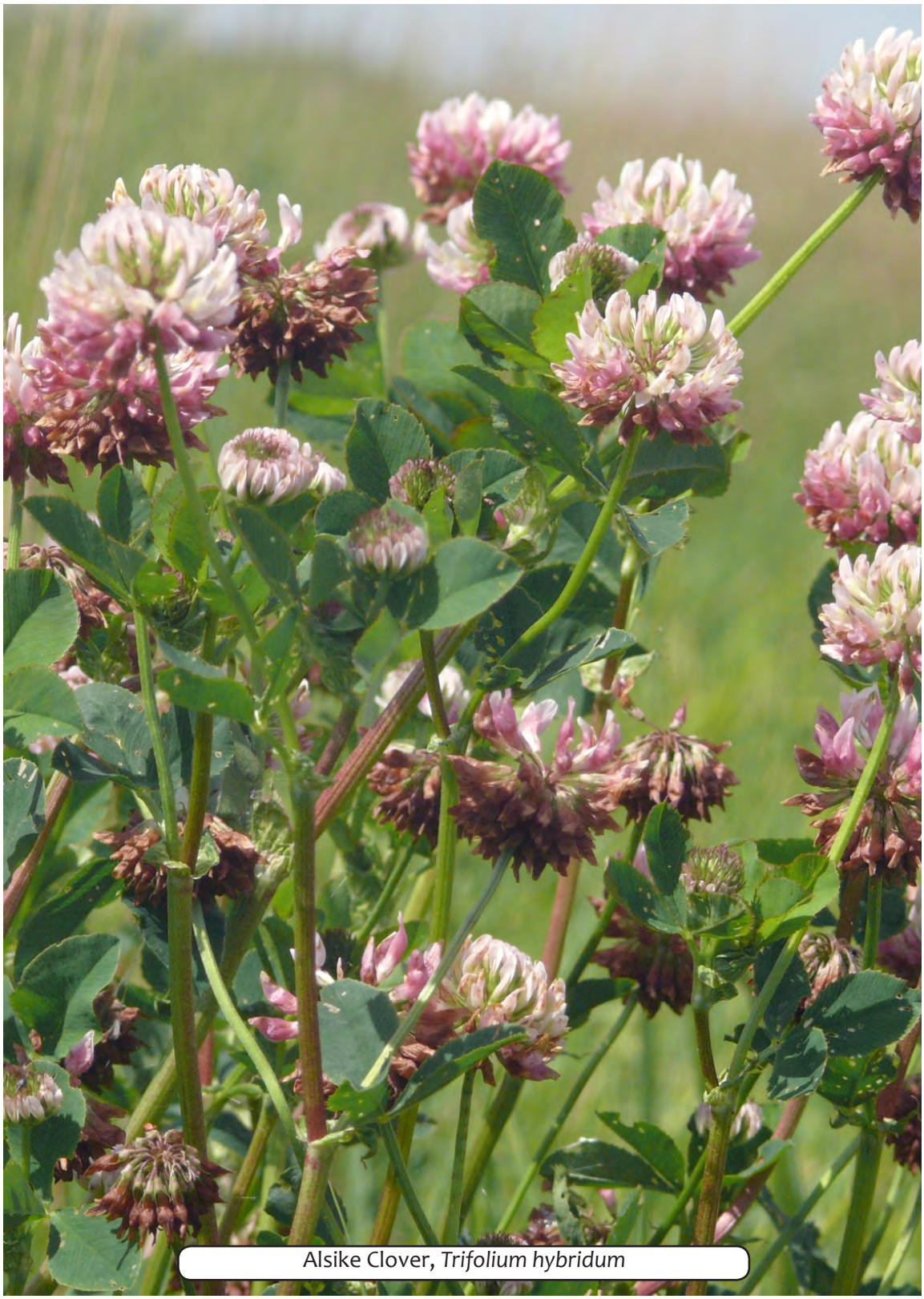
see variety detail at left

Species not adapted to region

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Bunch	24 in.	Introduced	Fair	Fair	Good	Moderate	5.3 - 8.5

Legumes

Photo: User BerndH (Wikimedia.org)



Alsike Clover, *Trifolium hybridum*

Alfalfa, *Medicago sativa*
Alsike Clover, *Trifolium hybridum*
Field Pea, *Pisum sativum*
Red Clover, *Trifolium pratense*
White Clover, *Trifolium repens*

ALFALFA

Photo: Sten Porse (Wikimedia.org)

Alfalfa

Medicago sativa (L.)

Description

Medicago sativa, Alfalfa is a long lived perennial legume. It grows erect culms, 76 - 91 centimeters (30 to 36 inches) in height, branching from a single base. Leaves alternate on the stem and are pinnately trifoliolate, while individual leaflets are obovate (ovalish) or lancolate (lance shaped). Alfalfa produces numerous flowers that are purplish to yellow and borne in loose racemes or clusters. Alfalfa grows a series of lateral roots, with a distinct tap root that may penetrate 6 to 9 meters (20 to 30 feet) below soil surface. This legume produces a small kidney shaped seed. Alfalfa produces 190,000 to 220,000 seeds per pound of seed, depending upon variety. Seedling vigor can be low to moderate, also depending upon the selected variety.

Uses

Livestock: Alfalfa is typically used for haying, silage, and pastures land. However, it can also be fed as haylage, wafers, pellets or dried meal. It is highly palatable to all classes of livestock, but caution is advised when feeding Alfalfa due to its high bloat hazard.

Wildlife: Alfalfa is highly palatable to a variety of large wildlife, such as deer, elk and bison. It is utilized as food and cover by small mammals, waterfowl and upland game birds. Canada geese, sandhill cranes, rough grouse and mallard ducks can be found utilizing Alfalfa.

Forage Value

Alfalfa produces large amounts of protein and is excellent quality forage for all classes of livestock and wildlife. This legume has the highest feed value of all commonly grown hay crops. Alfalfa is one of the most important forage plants in production agriculture; sometimes called the "*Queen of the Forages*". It is high in mineral content and possesses excellent nutritional value, containing at least 10 different vitamins.

Distribution and Adaptation

Alfalfa is adapted to a variety of climatic and soil conditions, and can be found growing throughout the United States and parts of Canada. Varieties such as 'Denali' have been hybridized to better withstand extreme Alaskan climates. Generally, Alfalfa prefers deep well drained medium textured soils, with a pH of 6 to 8.5. It is highly drought tolerant and can withstand saline soils. Alfalfa will not tolerate sites with frequent overflow or high water tables.

Culture

Alfalfa should be planted no deeper than a ¼ inch on fine textured soils and ½ inch deep on coarse soils. It should be drill seeded on a firm seed bed. Cultipacking the soil before and after planting Alfalfa is normally recommended. Seeding rates depend greatly upon soil type, moisture, and location. Note that Alfalfa can have trouble over-wintering and competing with perennial grasses.

An average seeding rate when broadcasting Alfalfa is 10 lbs/acre and 5 lbs/acre when drill seeding. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B. Appropriate fertilizer ratios depend upon soil type, chemistry and location. Research in Alaska has shown that the application of fertilizer produces no significant yield change. If applying fertilizer, collect and analyze soil samples first. Pastures and hay fields should be irrigated when necessary and/or applicable.

Management

Alfalfa makes an excellent pasture, hay or silage forage. Although this crop is usually harvested 2 years after planting, one should be aware that most varieties will not over-winter throughout Alaska. This can be attributed to several environmental factors such as acid soils, nutrient deprived soils, cold stress and damage to the plants root system. There are several varieties of Alfalfa that have been developed or hybridized to combat these factors.

Alfalfa will tolerate moderate pasture grazing, but stands will weaken if over grazed or grazed too often. When applicable, Alfalfa can be grown with a perennial grass species, such as

Photo: Wikimedia.org

Alfalfa, Medicago sativa

Smooth Brome (*Bromus inermis*). This can greatly reduce the danger of bloating in livestock when pasture grazing. Alfalfa is susceptible to many agricultural pests, including spotted or pea aphid, alfalfa weevil, stem nematode, bacterial wilt, snout beetle and several leaf spots.

Cultivars and Releases

- *Denali Alfalfa was developed by UAF, but is not commercially available as of mid 2012. Check with the Alaska Plant Materials Center for further information.*

References

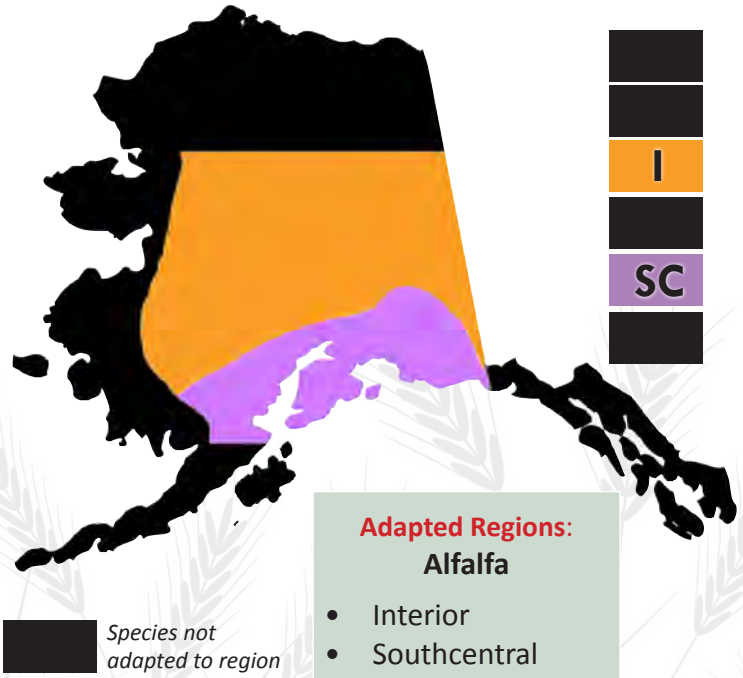
Natural Resource Conservation Service (NRCS) (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

Stubbendieck, J., S.L. Hatch, L.M. Landholt, (2003) A Field Guide, North American Wildland Plants, University of Nebraska, University of Nebraska press. Lincolin, Nebraska. 501 pp

Klebesadel, L.J., and Taylor, R.L, (1973) Research Progress With Alfalfa in Alaska. *In* Agroborealis, Vol 5, # 1, July, 1973, pp 18-20

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
1	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Upright crown	30 - 36 in.	Introduced	Excellent	Poor	Excellent	Strong	6 - 8.5

ALSIKE CLOVER

Photo: User Aiwok (Wikimedia.org)

Alsike Clover, Trifolium hybridum

Alsike Clover

Trifolium hybridum (L.)

Description

Trifolium hybridum, Alsike Clover is a short lived perennial and/or biennial legume that can reach 45 to 60 centimeters (18 to 24 inches) tall. It grows decumbent to erect vertically ridged culms. Leaves are palmately trifoliate with long petioles on the lower leaves and smaller or reduced petioles on the upper leaves. Individual leaflets are obovate (ovalish) or elliptic (narrow oval) with narrow tipped stipules. Alsike produces numerous flowers that are pink, red, and/or white and borne in leaf axils at the end of stems.

Alsike is similar to several other introduced *Trifolium* species that occur throughout Alaska, such as Golden Clover (*Trifolium aureum*), Lupine Clover (*T. lupinaster*), Red Clover (*T. pratense*), White Clover (*T. repens*), and Field Clover (*T. campestre*). This legume produces a small round shaped seed, and most varieties produce roughly 650,000 seeds per pound of seed. Seedling vigor is low to moderate, depending upon the selected variety.

Uses

Livestock: Alsike is used for hay and pasture grazing. It is highly palatable to all classes of livestock. Caution should be taken when feeding Alsike to horses, as it can be toxic under some conditions. Also be cautious when feeding Alsike in large quantities, due to its high bloat hazard.

Wildlife: Alsike is highly palatable to a variety of large wildlife, such as deer, elk and bison. It is utilized as food and cover by small mammals, waterfowl and upland game birds. Canada geese, sandhill cranes, rough grouse and mallard ducks utilize Alsike Clover.

Forage Value

Alsike is capable of producing large amounts of protein and is excellent quality forage for most classes of livestock and wildlife. Although it is generally out-produced by other legumes, it is highly palatable and produces a high relative feed value (RFV). It provides adequate mineral and vitamin content and is commonly grown with other grass species, including Timothy (*Phleum pratense*). As with most legumes, caution should be taken when feeding alsike due to the possibility of bloat.

Distribution and Adaptation

Alsike is adapted to a variety of climatic and soil conditions. It is found growing throughout the entire United States and parts of Canada. Alsike can tolerate fine to medium textured soils with a pH ranging from 5.6 to 7.5. Although it can persist in wetter and more acidic soils better than other clover species, Alsike will not tolerate shady, droughty or saline environments.

Culture

Alsike should be planted ¼ to ½ inches deep in a firm seed bed, preferably in silty loams and/or finer textured soils. Seeding rates depend greatly upon soil type, moisture, and location. An average seeding rate when broadcast seeding Alsike is 6 lbs/acre and 2-4 lbs/acre when drill seeding. Seed should be inoculated prior to planting with appropriate rhizobium to assist plant establishment. Seeding rates are determined using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before field seeding. High rates of nitrogen application can damage or destroy stands of Alsike, and caution should be taken when applying fertilizer. Pastures and hay fields should be irrigated when necessary and/or applicable.

Management

Alsike makes an excellent pasture or hay forage. This legume is adapted to acidic, poorly drained, and/or moderate to low nutrient soils. Alsike can be difficult to control for the first several years of production, due to its aggressive nature and tendency to compete with other plants. It is highly recommend that Alsike be seeded in combination with a grass species to keep it from dominating a forage stand. Typically, Alsike Clover is seeded with a grass species such as Timothy (*Phleum pratense*) to reduce the risk of bloating and toxic affects when feeding to horses. Seeding with a grass species will also help Alsike stand upright making for an easier harvest.

Photo: User BerndH (Wikimedia.org)

A mature stand of Alsike Clover

LEGUME

This legume will readily move into disturbed areas, and one should be mindful when selecting this species as a forage choice. Alsike requires a minimum of 110 frost-free days for successful reproduction and will continue to bloom throughout the entire growing season. Alsike responds well to irrigation, moderate grazing pressure, and commercial fertilizers. Little research has been conducted concerning potential pests that may affect Alsike in Alaska.

Cultivars and Releases

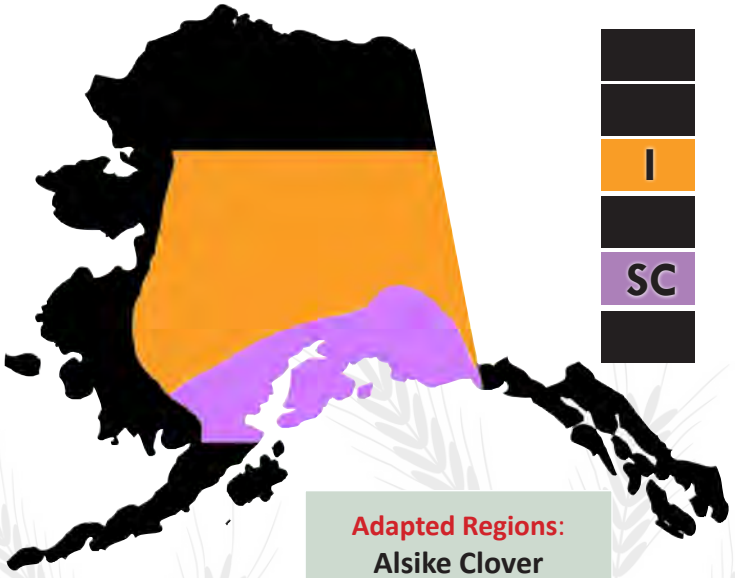
- **'Aurora'** - *Alberta, Canada release.*

- **'Dawn'** - *Canada release.*

References

Natural Resource Conservation Service (NRCS) (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

Montana State University, Extension Service Alsike Clover (*Trifolium hybridum*) [online] Link: http://animalrangeextension.montana.edu/Articles/Forage/Species/Legumes/Alsikeclover.htm



Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	0

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Upright crown	18 - 24 in.	Native	Poor	Poor	Good	Weak	5.6 - 7.5

FIELD PEA

Photo: User Rasbak (Wikimedia.org)

Mature Field Pea plant

Field Pea

Pisum sativum (L.)

Description

Pisum sativum, Field Pea is an annual legume that is prostrate (flat growing) by nature. When intercropped with a grass or small grain, however, the legume can reach a height of 60 to 120 centimeters (24 to 48 inches), depending on variety. Intercropping allows Field Pea to wrap itself around the secondary crop allowing it to grow upward. A single leaf consists of one to three pairs of leaflets that are terminated with a branched tendril (used for climbing). Field Pea leaves are usually pale green with white blotches. This legume has a large round shaped seed and generally produces 1,600 to 5,000 seeds per pound of seed, depending upon variety. Seedling vigor is low to moderate and seeds should be inoculated with proper bacterium when applicable.

Uses

Livestock: Field Pea is used for pasture, hay, silage and/or green cut. It is excellent forage and is highly palatable to all classes of livestock. This legume is often intercropped with annual grasses or oats to obtain optimal nutrient and mineral requirements of livestock.

Wildlife: Field Pea is highly palatable to a variety of wildlife such as deer, elk, moose and bison. It is also utilized as food and cover for small mammals, waterfowl and upland game birds.

Forage Value

Field Pea is highly palatable to all classes of livestock and wildlife. It produces 20 to 25 percent protein on average and contains high levels of carbohydrates. This legume generally produces greater than 85% total digestible nutrients, with low fiber content. Intercropped with annual grasses or small grains, Field Pea can increase combined protein levels two to four times higher than with grass or small grains in monoculture. Field Pea has a moderate bloating factor, compared to other legumes, and should be fed with a grass or small grain forage to reduce the risk of bloating.

Distribution and Adaptation

Field Pea prefers cool, moist conditions and can be found growing throughout parts of Alaska, Canada, Greenland and the contiguous United States. Field Pea is adapted to a variety of soil textures such as sandy loams, silts to heavy clays, and requires adequate drainage with a pH between 5.2 and 6.5. This legume cannot tolerate saline or droughty conditions.

Culture

Field Pea should be planted 1 to 3 inches deep in a moist firm seedbed. This promotes good seed to soil contact. Seeding rates depend greatly upon soil type, moisture, and location. Field Pea should be drill seeded when applicable, and is generally seeded at a rate of 190 lbs/acre, or 7 to 9 plants per square foot. This legume does not compete well with other species. A heavier seeding rate allows field pea to better compete with weeds.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before seeding. Field Pea requires phosphorus and potassium in relatively large amounts. Nitrogen is also necessary if planting in nutrient deprived soils. Over application of nitrogen fertilizer can have adverse affects, however, reducing the potential of nitrogen fixation by plants. Fields should be irrigated when necessary. Irrigation in combination with fertilization can increase field productivity.

Management

Field Pea makes an excellent forage crop if properly managed. It can provide needed nitrogen for grasses and protein for livestock. Field Pea is not typically used for grazing, but rather it is used for silage or green chop. There are several pests that can affect Field Pea production, such as *Mycosphaerella* and *Ascochyta*. These fungi can result in poor plant performance and death if not managed. A preferred management tactic is to rotate field pea stands for several growing seasons, thus not allowing the fungus spores to persist. Fungi can survive for several years on Field Pea stubble and seed. Insects such as aphids, lygus bugs and grass hoppers can also affect Field Pea performance, though they are not usually a problem.

Photo: Jean Tosti (jeantosti.com)

Field Pea, Pisum sativum

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Cultivars and Releases

- **'Century'** - *Canada release.*
- **'Lenca'** - *Canada release.*
- **'Procon'** - *Minnesota release.*

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Natural Resource Conservation Service (NRCS) (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

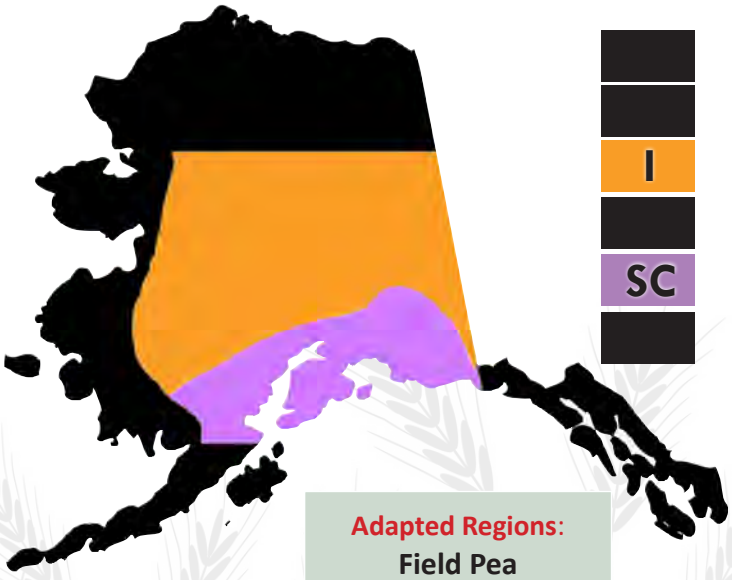
Oelke, E.A., E.S. Oplinger, C.V. Hanson, D.W. Davis, D.H. Putnam, E.I. Fuller, & C.J. Rosen (1991) Dry Field Pea, Alternative Field Crops Manual University of Wisconson Cooperative Extension & University of Minnesota Extension Service. St. Paul MN. 10 pp [online] Link: http://www.hort.purdue.edu/newcrop/afcm/drypea.html

McKay, K., B. Schatz, G. Endres, (2003) Field Pea Production. North Dakota State University Extension Service [online] Link: http://pulseusa.com/pdf/fieldpea.pdf

Klebesadel, L.J., (1966) Planting of Oats & Peas: some yield, quality, and cost considerations. Research report #4. University of Alaska Experiment Station. Palmer, AK 7 pp

Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.



Species not adapted to region

Adapted Regions:
Field Pea

- Interior
- Southcentral

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Upright / Prostrate	24 - 48 in.	Introduced	Poor	Poor	Fair	Moderate	5.2 - 6.5

RED CLOVER

Photo: Michael Apel (Wikimedia.org

Red Clover, Trifolium pratense

Red Clover

Trifolium pratense (L.)

Description

Trifolium pratense, Red Clover is a short lived perennial or biennial legume. It grows erect to decumbent culms that are hairy and hollow. Each leaf consists of a slender stalk which is petiolated and bearing 3 leaflets, which are oblong to obovate (ovalish shape). Red Clover produces numerous flowers borne in compact clusters that are reddish to pink in color. There are two types of Red Clover that are commonly referred to as **Medium** and **Mammoth**. Medium Red Clover ranges in height from 45 - 60 centimeters (18 to 24 inches), while Mammoth Red Clover reaches an average height of 75 centimeters (30 inches). Red Clover grows a series of lateral roots with a tap root that is extensively branched. This legume produces a small kidney shaped seed that is yellow to deep violet in color. Red clover has high seedling vigor and produces roughly 270,000 seeds per pound of seed.

Uses

Livestock: Red Clover is typically used for hay, pastureland, and/or silage. It produces high quality forage that is palatable to all classes of livestock.

Wildlife: Red Clover is highly palatable to large grazing and browsing animals such as deer, elk and bison. It is also utilized as food and cover by small mammals, waterfowl, and upland game birds.

Forage Value

Red Clover can produce high yields and is excellent forage for all classes of livestock and wildlife. Depending on season of harvest, protein content of 15-25% is common. Digestibility and relative feed value start high, but decline with plant maturity. Caution should be taken when feeding *Trifolium pratense* to animals due to the possibility of bloat.

Distribution and Adaptation

Red Clover is adapted to a variety of soils types but grows best in well drained loamy soils. It can be found growing throughout the United States and Canada. Red Clover prefers a pH of 5.5 to 7.5 and has low drought tolerance. This legume can tolerate high moisture environments and has a moderate to low shade tolerance.

Culture

Red Clover should be planted at ¼ to ½ inch deep in well drained loamy to silt loam soils that have a high water holding capacity. It should be inoculated with the appropriate rhizobium innoculant, as this will help with plant establishment and seedling vigor. When seeded alone in pure stands, Red Clover should be drill seeded at a rate of 6-12 lbs/acre and 20-25 lbs/acre when broadcast seeding. Red Clover can also be seeded in mixtures with small grains or grasses like Barley (*Hordeum vulgare*), Timothy (*Phleum pratense*), and Smooth Brome (*Bromus inermis*). Standard seeding rates when seeded in a mix is 4-8 lbs/acre. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before fertilizer is applied. Phosphorus is used in large quantities by Red Clover, which is a limiting factor on most soils. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase overall yields.

Management

Red Clover makes an excellent pasture, hay, or silage forage. It should be harvested ¼ to ½ in bloom during the first cutting. Successive grazing or a second cutting should occur when the legume is ¼ of the way into bloom stage, and at least 2 inches of growth should remain after harvest. Red Clover responds well to fertilizers and should be supplied with ample amounts of phosphorus and/or potash. Red Clover also responds well to irrigation when planted in moderate to well drained soils. When growing Red Clover, one should monitor for powdery mildew in areas of high humidity and/or rainfall. Resistant cultivars have been developed to reduce the occurrence of these pests.

Photo: Wikimedia.org

A mature stand of Red Clover

Cultivars and Releases

- **'Alaskaland'** - *University of Alaska Fairbanks release.*

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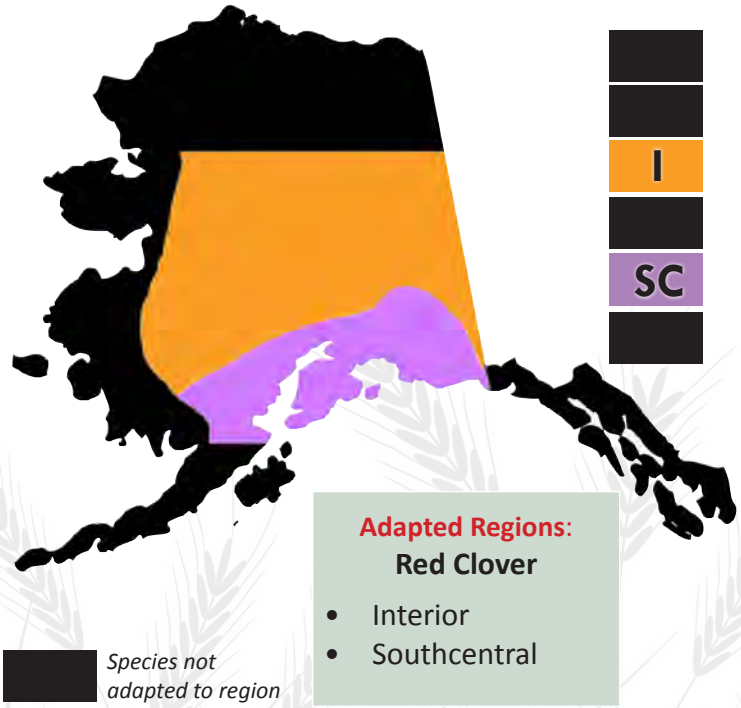
References

Natural Resource Conservation Service (NRCS) (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

Maurice, E.H., D.S. Metcalfe, R.F. Barnes (1973) Forages, The Science of Grassland Agriculture. Iowa State University Press. Ames, Iowa. 755 pp

Hulten, E. (1968) Flora of Alaska and Neighboring Territories. Stanford University press. Stanford California. 1008 pp



Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	1

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Good	Upright crown	18 - 24 in.	Introduced	Poor	Poor	Good	Moderate	5.5 - 7.5

WHITE CLOVER

Photo: Wikimedia .org

White Clover in bloom

White Clover

Trifolium repens (L.)

Description

Trifolium repens, White Clover is a moderate lived perennial legume that can attain heights of 15 - 30 centimeters (6 to 12 inches), depending upon variety. It has a prostrate (flat) growth habit, spreading laterally by stolons. Leaves are composed of three leaflets that sometimes display a watermark or crescent. Leaves and roots are borne along the stolon at each node. Inflorescence (seed-head) consists of 40 to 100 florets that are borne along long slender stalks. Florets are usually white, but sometimes display a pink hue. White Clover has a shallow root system with a primary tap root that seldom roots deeper than 60 centimeters (24 inches). This legume grows a small heart shaped seed, and produces roughly 700,000 seeds per pound of seed. Seedling vigor is low to moderate depending upon the selected variety.

Uses

Livestock: White Clover can be used for pasture, hay or silage production. It is highly palatable to all classes of livestock and has a low potential of bloating.

Wildlife: White Clover is highly palatable to a variety of large wildlife, such as deer, elk, moose and bison. It is also utilized as food and cover by small mammals, waterfowl and upland game birds.

Forage Value

White Clover is highly palatable to all classes of livestock and wildlife. It produces ample amounts of protein with consistently high mineral content, compared to other clover species. This legume is highly digestible and generally produces a higher percentage of amino acids than Alfalfa and/or Red Clover. When nutrients are available, White Clover can concentrate Na, P, Cl, and/or Mo, delivering these nutrients to grazing animals. The risk of bloating is generally moderate to low and is greatly reduced when White Clover is grown with grass species.

Distribution and Adaptation

White Clover is adapted to moist and/or wet conditions and can be found growing throughout the United States, Canada, and some portions of Alaska. It prefers fine texture soils such as silts and clays, containing moderate to high nutrient levels. White Clover will persist in soils with a pH ranging from 5.2-8.0. It will not tolerate or sustain in shady, droughty, saline, or nutrient deprived environments.

Culture

White Clover should be planted ¼ to ½ inch deep in a firm seed bed with well drained silty or clay loam soils. Seeding rates depend greatly upon soil type, moisture, and location. It is highly recommended that White Clover be drill seeded to ensure good seed to soil contact. An average seeding rate when drill seeding White Clover is 2-4 lbs/acre. This seeding rate applies to almost all situations and can be used when planting White Clover with a grass species. A widely accepted ratio of 2:1 is an ideal balance of grass to clover, using the above recommended clover drilling rate. All seeding rates are determined by using Pure Live Seed (PLS) calculations, as described in Appendix B.

Appropriate fertilizer ratios depend upon soil type, chemistry, and location. Soil samples should be collected and analyzed before field seeding. High application rates of nitrogen can damage or destroy stands of White Clover and caution should be taken when applying fertilizer. Pastures and hay fields should be irrigated when necessary and/or applicable. Irrigation in combination with fertilization should increase field productivity.

Management

White Clover makes an excellent pasture forage, but is generally not used for hay or silage production unless large and/or tall cultivars are selected and grown. The cultivar '**Ladino**' is a large and tall growing variety of white clover that is commonly used for hay, silage, and green chop production. White Clover will respond well to irrigation, moderate grazing pressure, and commercial fertilizers. This legume usually displays adverse affects when nitrogen fertilizers are supplied in excess. Liming may be necessary to achieve the optimal pH for white clover growth.

Photo: Forest and Kim Starr (Wikimedia.org)

White Clover, Trifolium repens

LEGUME

White Clover is typically grown with other forage grasses. This is generally implemented in order for grasses to take advantage of the nitrogen fixating ability of White Clover, and to lower the potential of bloating by adding dry matter to the feed mix. White Clover can be susceptible to a number of root and leaf diseases as well as insect pests. Most of these potential problems exist in mid to lower latitudes.

Cultivars and Releases

- '**Ladino'** (Large type) - *developed in Italy.*

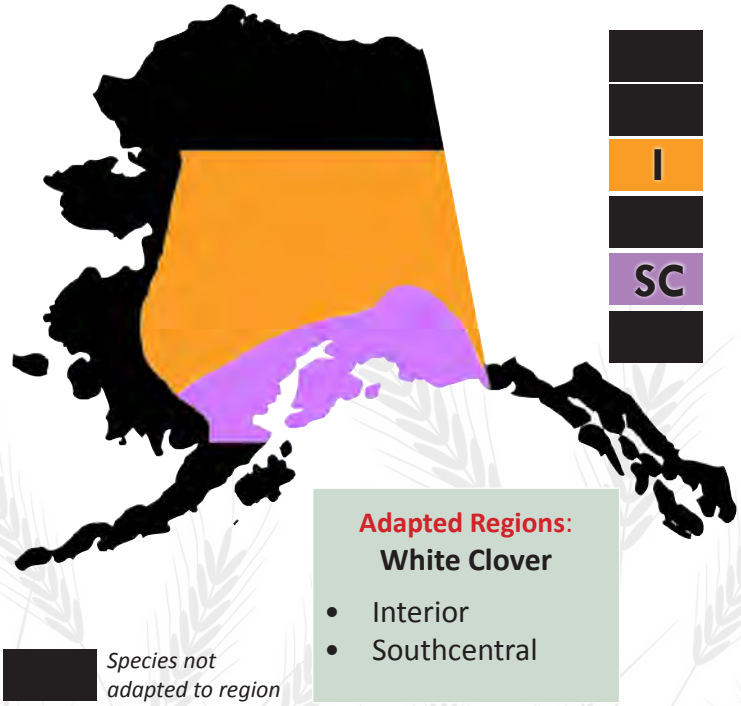
- **'Pilgrim'** (Large type / winter-hardy)
- **'Merit'** (Large type / winter-hardy)
- **'New York'** (Small type)
- **'Kent Wild'** (Small type)

References

Natural Resource Conservation Service (NRCS) (2000) USDA National Plant Data Center [online] Link: http://plants.usda.gov/java/

Maurice, E.H., D.S. Metcalfe, R.F. Barnes (1973) Forages, The Science of Grassland Agriculture. Iowa State University Press. Ames, Iowa. 755 pp

Hulten, E. (1968) Flora of Alaska and Neighboring Territories. Stanford University press. Stanford California. 1008 pp



Soil Texture *				
Coarse	Moderately Coarse	Medium	Moderately Fine	Fine
0	2	3	2	0

* **Soil texture is** graded on a scale of 0 to 3; higher numbers denote textures to which species is most adapted.

Availability	Growth Form	Average Height	Native or Introduced	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness	pH Range
Poor	Prostrate	6 - 12 in.	Introduced	Poor	Fair	Good	Weak	5.2 - 8

All About Plants

What are plants?

Plants are living things that are made up of cells. They need air, water, soil, and sunlight to live. They cannot move from place to place, but their leaves move to catch the sun and their roots move towards water. Their seeds can be carried by animals or blown by the wind.

We get food from all different parts of the plant: flowers, fruits, vegetables, seeds, nuts, stems, and leaves. Grass gives us a cool, soft place to walk. Some plants give us medicine, and trees are used to make paper and furniture.

In this book, you will learn about how plants are classified (organized), how they live, and how they make their own food. You will discover that the world uses plants in many different ways.

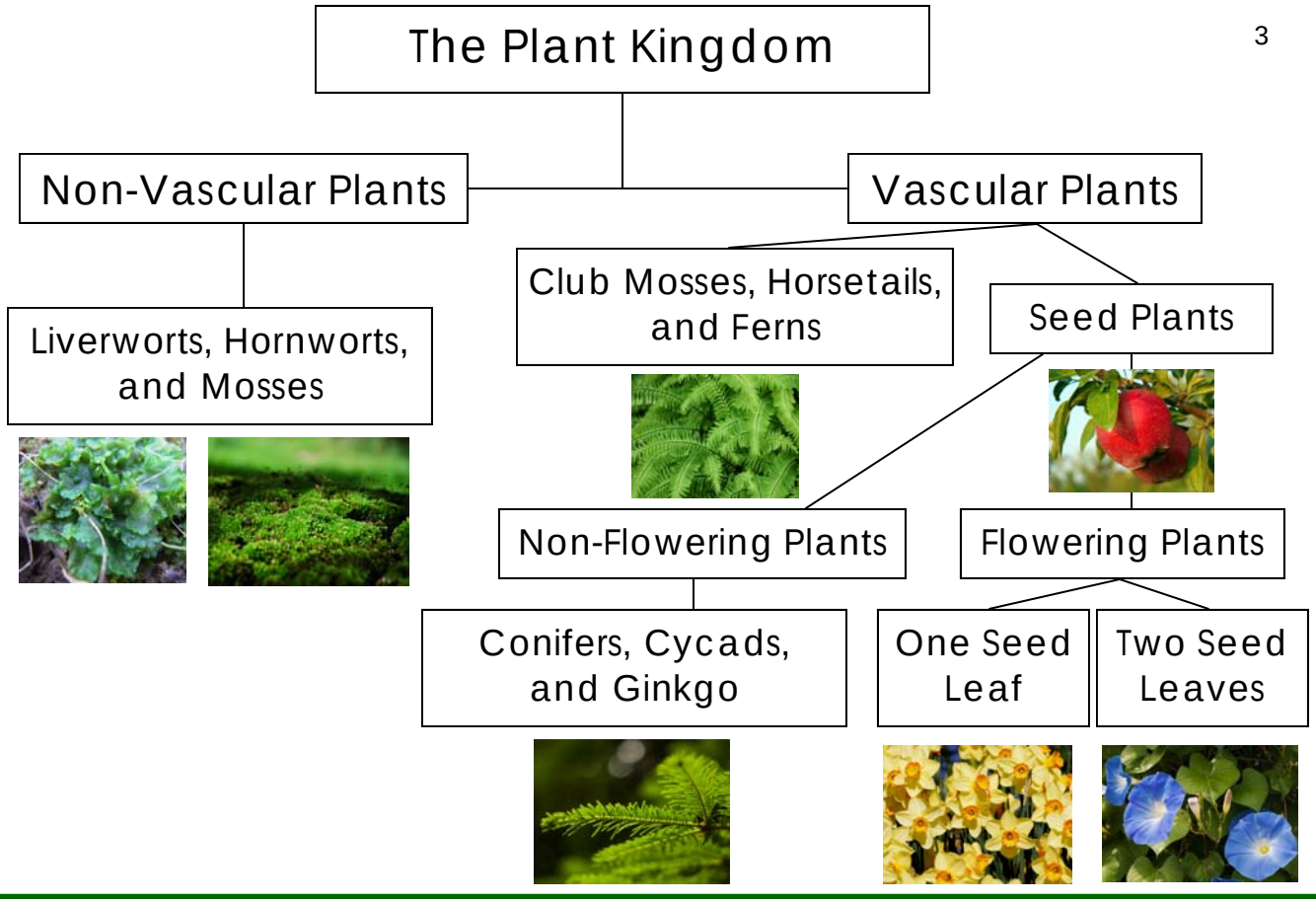
Over 270,000 species of plants have been identified and classified, but scientists believe that there are millions more waiting to be discovered.

About the Plant Kingdom

The Plant Kingdom is a way to classify (or organize) plants. They are divided into groups based on the traits they have in common. Scientists change the way plants are classified from time to time, when they discover new types of plants or learn new things about plants.

The two main groups are vascular plants (plants that use stems and veins to transport food and water), and non-vascular plants (plants with no roots, stems, or leaves).

Vascular plants can divided into smaller groups, one of which is seed plants. This group includes flowering and non-flowering plants. Flowering plants include monocots (one seed leaf) and dicots (two seed leaves). The non-flowering plants can also be divided into several groups, including cycads, conifers, and ginkgo.



All About Flowering Plants

All green plants that have flowers are called flowering plants. Scientists have grouped these according to the number of seed leaves found in each plant.

Monocots (or monocotyledons) have one seed leaf; dicots (or dicotyledons) have two seeds leaves. These leaves provide the food the young plant needs until it can make its own food. Flowering plants consist of four main parts: (1) roots, (2) stem, (3) leaves, and (4) flowers.

Dicot
(two seed leaves)

Monocot
(one seed leaf)

All About Non-Flowering Plants

Plants without flowers are called non-flowering plants, or gymnosperm. While they do produce seeds, the seed is not enclosed in a flower (and eventually a fruit) the way seeds are in flowering plants.

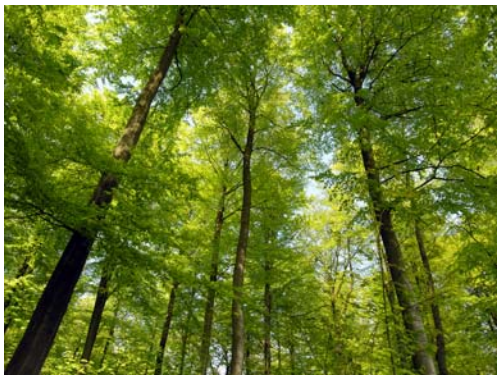
Non-flowering plants are very common, and include evergreens (conifers), cycads, and ginkgo. Popular types of conifers include fir and pine trees. These trees are characterized by sharp needles and produce cones that hold the seeds. *(See picture: pine cones and needles)*

Cycads are tropical plants with compound leaves and a sturdy trunk. Ginkgo trees are one of the oldest kinds of trees known to exist. They are usually very tall and have unique fan-shaped leaves.

All About Trees

There are two different types of trees: non-flowering trees that have seeds that are not enclosed, and flowering trees that have seeds that are enclosed. An example of a non-flowering tree would be an pine tree. An example of a flowering tree would be a fruit tree, such as peach or orange.

Flowering trees are deciduous; that is, they shed their leaves every year. Other trees are conifers; they grow new leaves before shedding old ones, and stay green all year round ("evergreen").



Trees consist of roots, trunk (stem), branches, twigs, and leaves. The tallest trees in the world are the redwoods of California, which can grow to be 379 ft (115.55 m) in height.

All About Roots

The roots of a plant have root hairs that absorb water and minerals from the soil. The root caps protect the root when it bumps into hard things under the ground.

The roots of a plant always grow towards water. They will even grow around rocks or other obstacles to reach water. They also help anchor the plant in the ground, and keep soil in place so it is not washed away.

Some of the food we eat comes from roots, like carrots, beets, turnips, radishes, and potatoes. These are roots that store food for the growing plant.

Radishes—an edible root.

All About Leaves

Leaves help plants make their own food. Within the leaf is a green material called chlorophyll. Chlorophyll absorbs sunlight to make a natural sugar that the plants uses for food.

This process is called photosynthesis. During photosynthesis, carbon dioxide is used by the plant, and oxygen is released. This makes trees and plants a great way to keep the air on earth fresh and clean.

The leaf has veins for carrying this sugar to other parts of the plant. The flat, green part of the leaf is called the blade. The edge of the leaf is called the margin. A good nickname for leaves is “suncatchers”, because they catch the sun that the plant needs to make food.

In the fall, leaves lose their chlorophyll. That allows the other colors in the leaf to show, so that we see yellow, orange, red, and even purple leaves.

All About Flowers

Plants use flowers to reproduce (make more of themselves). The flower’s job is to produce a fruit, which contains seeds. Flowers are used by humans to add beauty to outdoor and indoor areas, and some flowers can also be eaten.

Flowers, or blossoms, are made up of petals, called the corolla, which are usually brightly colored. The bright colors attract birds and insects, who spread pollen from one flower to another. This fertilizes the seeds and allows new plants to grow.

Other parts of the flower include the calyx, the green leaves that surround the petals; the stamen, which produces the pollen; and the pistil, which receives the pollen from another flower to fertilize the plant.

All About Seeds

Many plants use seeds to reproduce. A plant produces a very small version of itself, called an embryo. This embryo, together with its stored food, is covered with a thin covering called the testa (seed coat). The embryo, stored food, and testa make up the seed.

This seed will grow into a new plant. The seed uses the stored food to grow until it is big enough to make its own food, using its leaves. The seed coat protects the seed until it is ready to grow.

For a seed to germinate (start to grow), it needs to be in moist soil. The water causes the testa to split apart. Then the root tip of the seeds can grow into the ground.

Plants spread their seeds in many ways. Some seeds are blown by the wind; others are carried by insects, birds, or mammals. Nuts, a type of seed, are often buried in the ground by animals and some result in new plants. Some seeds fall into water and are carried to new places.

All About Fruit

Some plants grow a covering for their seeds. This ripened part of the seed is called fruit. Tomatoes, apples, and peaches are some of the plants that grow in this way.

Vegetables are actually the fruit part of the plant. Generally, the ripened part of the plant is called “fruit” if it is sweet, and “vegetable” if it is savory, or less sweet.

The outer skin of the fruit is called the exocarp. The fleshy part of the fruit, the part we eat, is called the mesocarp. The inner part of the fruit that covers the seeds is called the endocarp. All three of these layers put together are called the pericarp.

Humans and animals use fruits and vegetables as a great source of food. Most fruits can be eaten raw, although they can also be cooked or baked. Vegetables generally taste better after being cooked.

All About Stems

There are several different types of stems. Flowering plants like carnations and tomatoes have soft stems. Trees and bushes have hard, woody stems.

Woody stems have an outer covering called bark. Underneath the bark is a layer of growing cells called cambium. Every year, trees grow another layer of cambium. Counting these layers (or rings) tells you how old the tree is.

The stem of a plant has five main jobs: (1) to support the leaves, flowers, and fruit of the plant; (2) to act as a highway, bringing water and nutrients to the plant; (3) the storage of food for the plant; (4) holding up the leaves so that they can catch sunlight; (5) producing new living tissue for the plant.

Some stems are edible—asparagus (shown) and rhubarb are two examples.

Sentence Completion

Find the correct word to complete the sentence and write it on your paper.

1. The _____ of a plant hold it in the ground.
2. A _____is a living thing that makes its own food.
3. The _____of the flower produces pollen.
4. _____ is the substance that makes leaves green.
5. Some flowers make a cover for their seeds. This is called _____.
6. The roots are protected by the _____.
7. The plant uses air, water, and _____ to make its own food.
8. Plants use flowers to _____.
9. The embryo of the plant is covered by the _____.
10. One of the jobs of a _____is to support the leaves, flowers, and fruit.

fruit **chlorophyll** **stamen** **roots** **stem**

plant **seed coat** **sunlight** **root caps** **reproduce**

Self-Study Questions

Write the answers on your paper in complete sentences.

1. What two groups make up the plant kingdom?
2. Name one type of non-flowering plant.
3. How many seed leaves does a monocot have?
4. List the four main parts of a flowering plant.
5. Name two jobs of the root.
6. Name three kinds of roots that we eat.
7. What kind of stem do trees and bushes have?
8. Name two jobs of the stem.
9. How do leaves make food for the plant?
10. Why are the petals of a flower brightly colored?
11. What is the part of the fruit we usually eat?
12. Name the four things that a plant needs to survive.

‘Benson’ Beach Wildrye

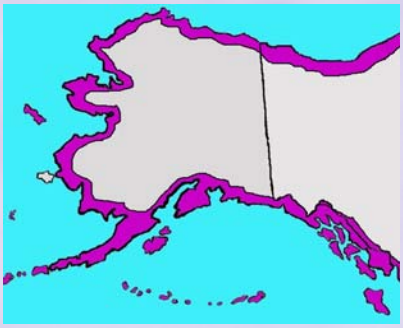
Leymus mollis (Elymus mollis)

Uses: Revegetation by Sprigs in Coastal Alaska

Background Information

Beach Wildrye grows wild in Alaska mainly on sandy beaches on the coast.

Beach Wildrye has many different common names. It is also known by several different scientific names. Current synonyms are *Elymus mollis* or *Elymus arenarius.* In describing this specific cultivar, *Leymus mollis* is the most up to date name. Beach Wildrye also has several subspecies and varieties.



Map from Hultén, 1968.
Used with the permission of Stanford University Press.

Growth

Beach Wildrye is easy to recognize in the wild. Its spike of seed/flowers is large, compact, and slightly greenish. The vigorous rhizomes are the main way this grass spreads.

It is perennial, with stout stems that are slightly hairy beneath the spike. It is sod-forming, growing nearly 4 ft. high, with many leaves overlapping at the base (Wright, 1991b). Leaf color is green.

Cultivar: ‘Benson’

Plant introduction number: 567896

‘Benson’ was released by the Alaska Plant Materials Center in 1991 (Wright, 1991b).

The parental seed for ‘Benson’ was collected in 1980 from Kodiak Island, Alaska.

This cultivar provides rapid recolonization of critical coastal areas where natural erosion would prevent traditional seeding methods.

Plant ‘Benson’ for commercial production of sprigs—i.e. only for vegetative reproduction (Wright, 1993).

Distribution

Find Beach Wildrye on sandy beaches, spits, sea beaches, tidal flats, sea cliffs, and lakeshores from Alaska to Greenland and south to New York and central California (Welsh, 1974).

‘Benson’ Beach Wildrye is recognized in breeder, foundation, registered, and certified seed classes.

Breeder and foundation seed is maintained by the Alaska Plant Materials Center.

Registered and certified seed is available through the Alaska Seed Growers, Inc.

Historical Uses

Klebesadel (1985) stated that Beach Wildrye was used for forage in Alaska. Native Peoples used it for thatching for shelters, basketry, food, and cordage.

Alaska Plant Materials Center
Serving Alaska’s needs in production of Alaska native plants

July 17, 2007

‘Benson’ Beach Wildrye

‘Benson’ Beach Wildrye for Alaska Revegetation Purposes

Throughout the coasts of Alaska, beach wildrye can be found. Thus, for revegetation in sandy or gravelly places, it makes sense to use a species that might naturally occur. ‘Benson’ sprigs effectively and quickly recolonizes extreme but important coastal areas especially where there are dunes and blowing sand conditions.

‘Benson’ provides good erosion control because of its aggressive vegetative growth. It can successfully revegetate areas unsuitable for other species. Prior planning is essential.

‘Benson’ seed

‘Benson’ Peculiarities

Beach wildrye works best in sandy or gravelly soils—but does poorly in organic, silt, or clay soils. It does not tolerate excessive foot traffic. It also does not compete well with other grasses (Wright, 1994).

‘Benson’ beach wildrye does not produce well by seed. It does produce seed, but most of the head is empty.

‘Benson’ Beach Wildrye production at the Plant Materials Center in Palmer, Alaska.

‘Benson’ Beach Wildrye is a sand-binder. Transplanting has been both practical and successful.

To Produce ‘Benson’ Beach Wildrye

- Typical transplanting equipment and potato harvester (or hand tools) are needed.
- ‘Benson’ does not decline in production over time.
- Poor seedling vigor occurs if there is not enough sand in the soil.
- Beach wildrye responds well to high nitrogen fertilizers (Wright, 1994).

Plant as sprigs, not seed!

Peggy Hunt & Stoney Wright
State of Alaska
Department of Natural Resources
Division of Agriculture
Plant Materials Center
5310 S. Bodenburg Spur Rd.
Palmer, AK 99645-9706

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Klebesadel, L.J. 1985. *Beach Wildrye Characteristics and uses of a Native Alaskan Grass of Uniquely Coastal Distribution.* Agroborealis, 17: 31-38.

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Wright, S.J. 1993. *Information and Data Leading to the Release of ‘Reeve’ Beach Wildrye...and ‘Benson’ Beach Wildrye...for Commercial Production.* State of Alaska, Division of Agriculture, Plant Materials Center.

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Alutiiq Colors

The world's societies interpret colors in different ways. The Alutiiq language has just 4 basic color terms – *Kawirtuq* (it is red), *Tan'ertuq / Tamlertuq* (it is black), *Qatertuq* (it is white), and *Cungartuq* (it is blue). Each of these color terms is a verb root (i.e., *kawirtuq* means "it is red") as the Alutiiq language has no adjectives. Alutiiqs recognized a broader range of colors, but their traditional language describes most hues with these four terms. For example, green is a shade of blue. Alutiiq speakers also describe colors by their similarity to common things. For example, an Alutiiq speaker might say that a yellow object is the color of oil.

It Is Red - *Kawirtuq*

Alutiiq people manufactures red pigments from minerals and plants. They ground ochre, a soft, naturally occurring iron oxide, into a fine powder and mixed it with oil to make paint. On Kodiak, people produced a reddish-brown dye by boiling alder bark. In Prince William Sound, people boiled hemlock bark or a mixture of cranberry and blueberry juices to produce a dark red dye. Widely used in body painting and to decorate objects, the color red may represent ancestral blood.

It Is Black – *Tan'ertuq / Tamlertuq*

Historic sources indicate that Alutiiqs collected a specific stone to make black pigment. They also produced black pigment from a copper ore and from wood charcoal. With black paint Alutiiqs painted faces, particularly of people in mourning. Black paint also adorned masks, both as a background color and as a design component. Black paint often outlines facial features or illustrates brows and eyes.

It Is White - *Qatertuq*

Alutiiqs made white pigment from limestone obtained in trade with the Alaska mainland, grinding this soft rock into a powder and mixing it with oil to create paint. At winter hunting festivals, the faces of the first two dance performers were often painted white and red, and masks were often decorated with white.

It Is Blue - *Cungartuq*

To Alutiiqs, blue is a powerful color. It is associated with the supernatural, particularly the worlds below the sea. Blue pigment was never used in body painting. However, a blue-green paint adorned hunting hats, and whalers, the magical hunters who pursued giant sea mammals, carried blue or green stones.

Payulik – Bringer of Food, wood and leather mask, Pinart Collection, Château-Musée, France.

Purple Is to Dye For

Karen Dillman, Tongass National Forest and Erin Cooper, Chugach National Forest

Since before medieval times, lichens have been used to dye wool and other natural fibers in many cultures around the world. Specific lichens produce a rainbow of permanent colors on all types of fibers, producing shades of red, gold, brown, yellow and purple. This ancient but still thriving craft was introduced to Alaska fiber artists through workshops held in 2009 during the Cordova Fungus Festival in Cordova and the Tongass Rainforest Festival in Petersburg. Participants learned the history, technique and sustainable collection practices of lichens for their use as natural dyes. The hands-on workshops were conducted by one of North America's prominent lichen dye historians and lichen dye experts, Dr. Karen Casselman of Nova Scotia, Canada. Casselman has worked for over 25 years in the history and technique of lichen dyes. She has written many books and research articles on the subject.

What makes lichens a desirable medium for fiber artists is that they contain unique pigments and chemicals that fix the color to the fiber without the added step of preparing the fiber to receive the natural pigment, called mordanting. They are also generally easy to find year-round when other natural dye materials such as mushrooms and plants are under snow or dead. Lichens are also one of the few natural dye sources in the Alaska Region that produce the often sought after purple hues. During the workshops, participants used two methods to extract color from lichens. The boiling water method produces a variety of earth tones, while other lichens fermented in ammonia produce the purples.

The workshops provided excellent opportunities for participants to connect with the natural world and learn about the variety of lichens in their habitats around Petersburg and Cordova. Participants learned about how lichens cycle nutrients within an ecosystem, as well as other ecological functions such as providing nesting material, food, and shelter for animals in Alaska's temperate rainforest.

For the arboreal lichens which produce the earth tones, sustainable collecting practices include scavenging for lichens on roads, yards, or in ditches after a windstorm or firewood cutting. For the purple producing lichens which primarily grow on rocks, portions of the lichen body can be severed while leaving the rest to grow. They can also be gathered from the base of the rocks where lichens fall after being dislodged by animals or other natural processes. A dyer only needs about one-half cup of purple-producing lichens to dye one pound of wool or silk.

A workshop participant learns how to remove fiber from the dye bath. Photo by Karen Dillman.

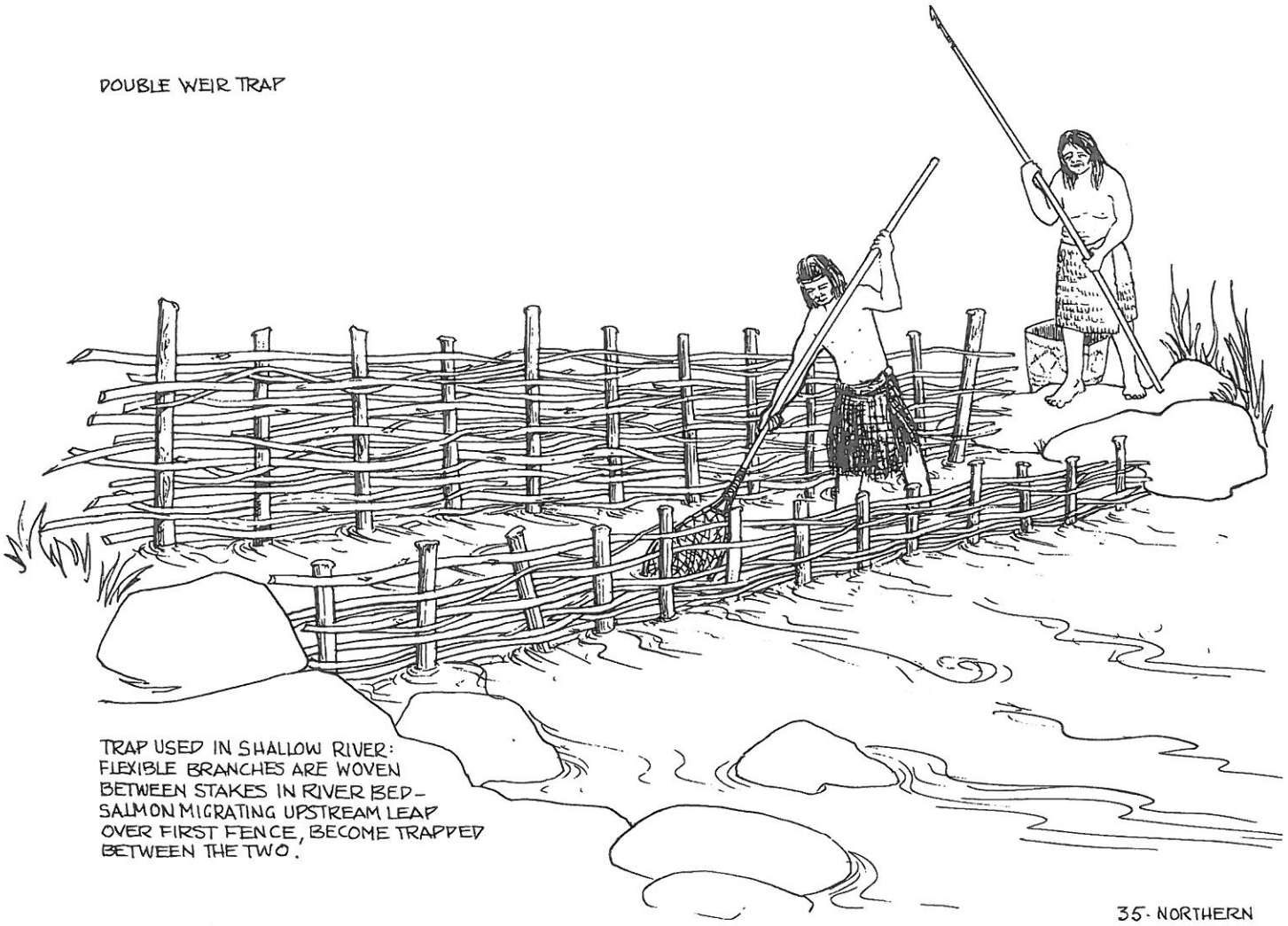
Dr. Karen Casselman holds the lichen "Lobaria oregana" that is used for natural dye.

Volumes of lichen-dyed silk and wool were produced during the workshops, which will eventually be used in projects by the artists including quilting, knitting and crocheting. Although time consuming, arts and craft enthusiasts in remote Alaskan communities enjoy learning and using handcrafted processes which hark back to earlier times and reinforce their appreciation of nature. In fact, indigenous cultures of Southeast Alaska used lichens for dying basket material and mountain goat wool, a process some still use today. It is unknown what the future the craft of using lichens as natural dyes will be but one thing is sure; fiber artists of Cordova and Petersburg now see lichens and the color purple in a whole new light.

For more information on the **Cordova Fungus Festival**: http://www.cordovachamber.com.

Tongass Rainforest Festival: http://tongassrainforestfestival.org

DOUBLE WEIR TRAP



TRAP USED IN SHALLOW RIVER: FLEXIBLE BRANCHES ARE WOVEN BETWEEN STAKES IN RIVER BED - SALMON MIGRATING UPSTREAM LEAP OVER FIRST FENCE, BECOME TRAPPED BETWEEN THE TWO.

GRASS AND PLANT FIBERS: ALASKA CULTURAL, ALASKA CONTENT & CHUGACH REGIONAL CULTURAL CONTENT STANDARDS

K-2 (1)
Standards:

AK Cultural:	*AK Content:*	*CRCC:*
GS C2	*Geography E4*	*GS G4*

K-2 (2)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Survival SS6	*Subsistence S1A*	*CS A5*

K-2 (3)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	*GEO E-1: Understand how resources have been developed and used*	*GS-4: Student should be knowledgeable about natural vegetation.*

K-2 (4)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
E-8: Identify and appreciate who they are and their place in the world.	*GEO E-1: Understand how resources have been developed and used*	*GS-4: Student should be knowledgeable about natural vegetation.*

K-2 (5)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	*Arts A3*	*Community A4*

3-6 (1)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CE 2	*Community C1*	*History B1*

3-6 (2)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
D4	*Science E1*	*SS6*

3-6 (3)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	*History A6*	*Social Standards A1*

3-6 (4)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS A4	*Science A2*	*CE 3*

3-6 (5)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS C1	*Science A1*	*Survival Standards C*

7-9 (1)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS D4	*Arts A3*	*Cultural Expression C1*

7-9 (2)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS C 1	*Geography A5 C2*	*Survival Standards G*

7-9 (3)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Cultural A 6, B 2	*Mathematics A 5, B 4*	*Community A 2, A 3*

7-9 (4)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:

7-9 (5)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:

10-12 (1&2)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
A3: Acquire and pass on the traditions of their community through oral and written history	*Science A3: Develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding*	*G4: Student should be knowledgeable about natural vegetation.*

	scientific concepts and global issues.	

10-12 (3&4)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
A3: Acquire and pass on the traditions of their community through oral and written history	*Science A3: Develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.*	*G4: Student should be knowledgeable about natural vegetation.*

10-12 (5)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
Cultural A 6, B 2	*Mathematics A 5, B 4*	*Community A 2, A 3*

10-12 (6)
Standards:

AK Cultural:	*AK Content*:	*CRCC*:
CS B1	*Science F3*	*Cultural Expression D1*

K-2 (1)

K-2 (2)

K-2 (3)

K-2 (4)

K-2 (5)

3-6 (1)

3-6 (2)

3-6 (3)

3-6 (4)

3-6 (5)

7-9 (1)

GRASS AND PLANT FIBERS: SUGT'STUN GLOSSARY K-12

K-2 (1)

Vocabulary Words: Sugt'stun Dialects

English:	PWS:	Lower Cook Inlet:
Leaf	peluq	peluq
Stem	puk	puk
Root	nukeq	nuket
Grass		weg'et

K-2 (2)

Plant		nauq
Flower	nanahuat	suitkáq
Grass		weg'et

K-2 (3)

K-2 (4)

Spy		teq'iq
Grass		weg'et

K-2 (5)

Mat		alliqaruaq
Paper		kalikaq

3-6 (1)

Grass		weg'et
Sinew		yaluq
Roots		nukek
Cotton		wataaq

3-6 (2)

Seaweed		iituliq
Rocks		yaamat
Rope		qeluq
Salt		taryuq

3-6 (3)

Seaweed		iituliq

Rocks		yaamat
Rope		qeluq

3-6 (4)

Leaf	pe̲luq	pe̲luq
Stem	puk	puk
Root	nukeq	nuket

3-6 (5)

Grass		weg'et
Cedar		
Raven		qanitiirpak

7-9 (1)

Berry		alagnaq
I'll go pick some berries.		Alagnasurciqua.
Alder		uqgwik
Color		kelásiirluku

7-9 (2)

Nettle		uuqayanaaq
Rope		qeluq
Braid		qillerqaacuk

7-9 (3)

Grass		weg'et
Sewing needle		mingqun
Basket		rraakiq

7-9 (4)

7-9 (5)

10-12 (1&2)

Spruce		napaq
Root		nukek
Gather		katurkeq

10-12 (3&4)

Spruce		napaq

Root		nukek
Clean it		perrircarluku

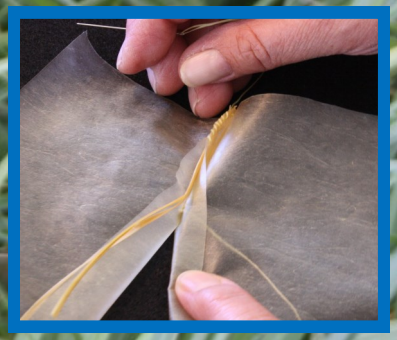
10-12 (5)

Grass		weg’et
Sewing needle		mingqun
Basket		rraakiq

10-12 (6)

Hat		saapek
Visor		saquyaq
Root		nukek
Wear it		aturluku

I Spy...

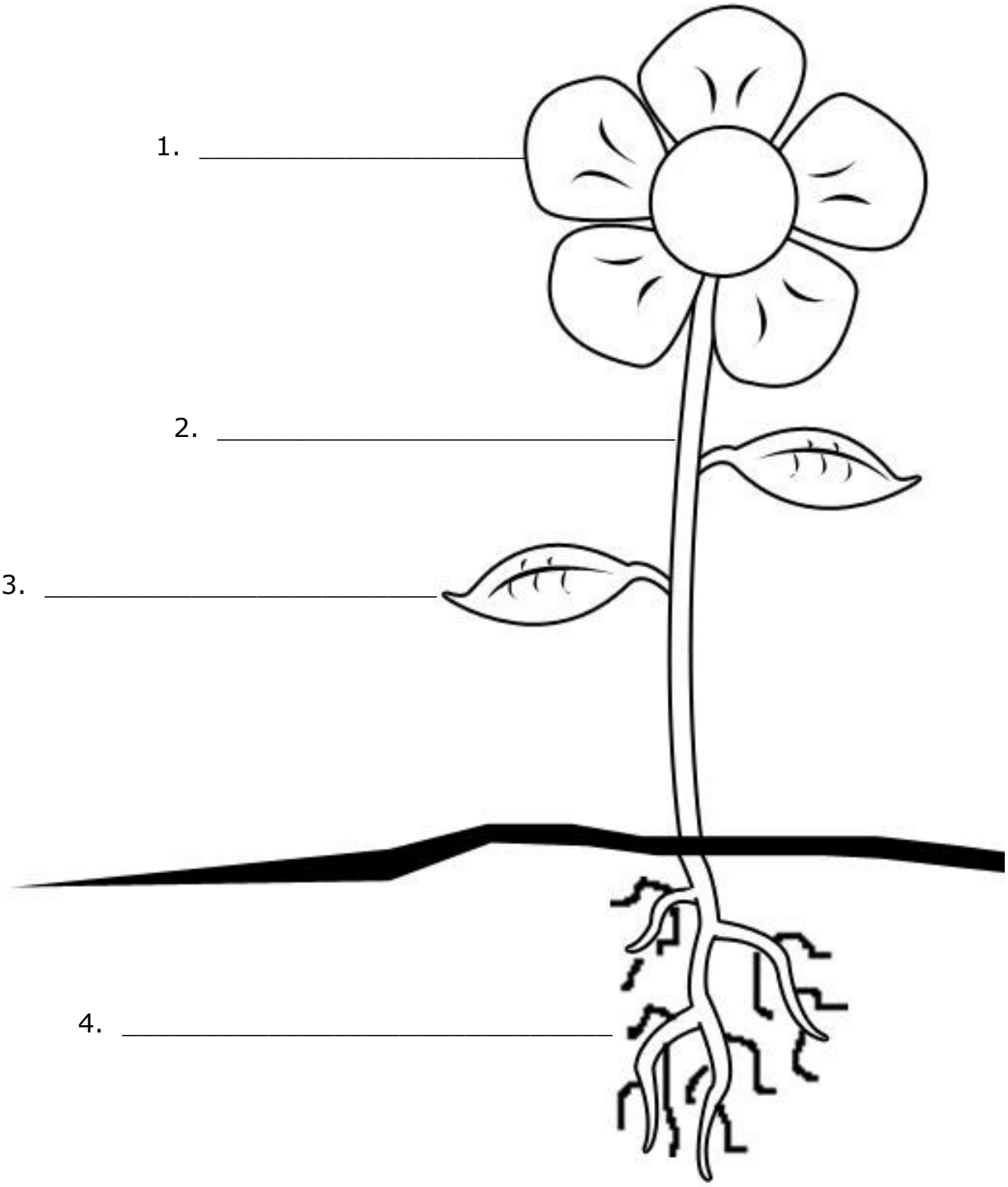


Burke Museum

NMNH,
Smithsonian Institution

Name: _____

Parts of a Plant



1. _____

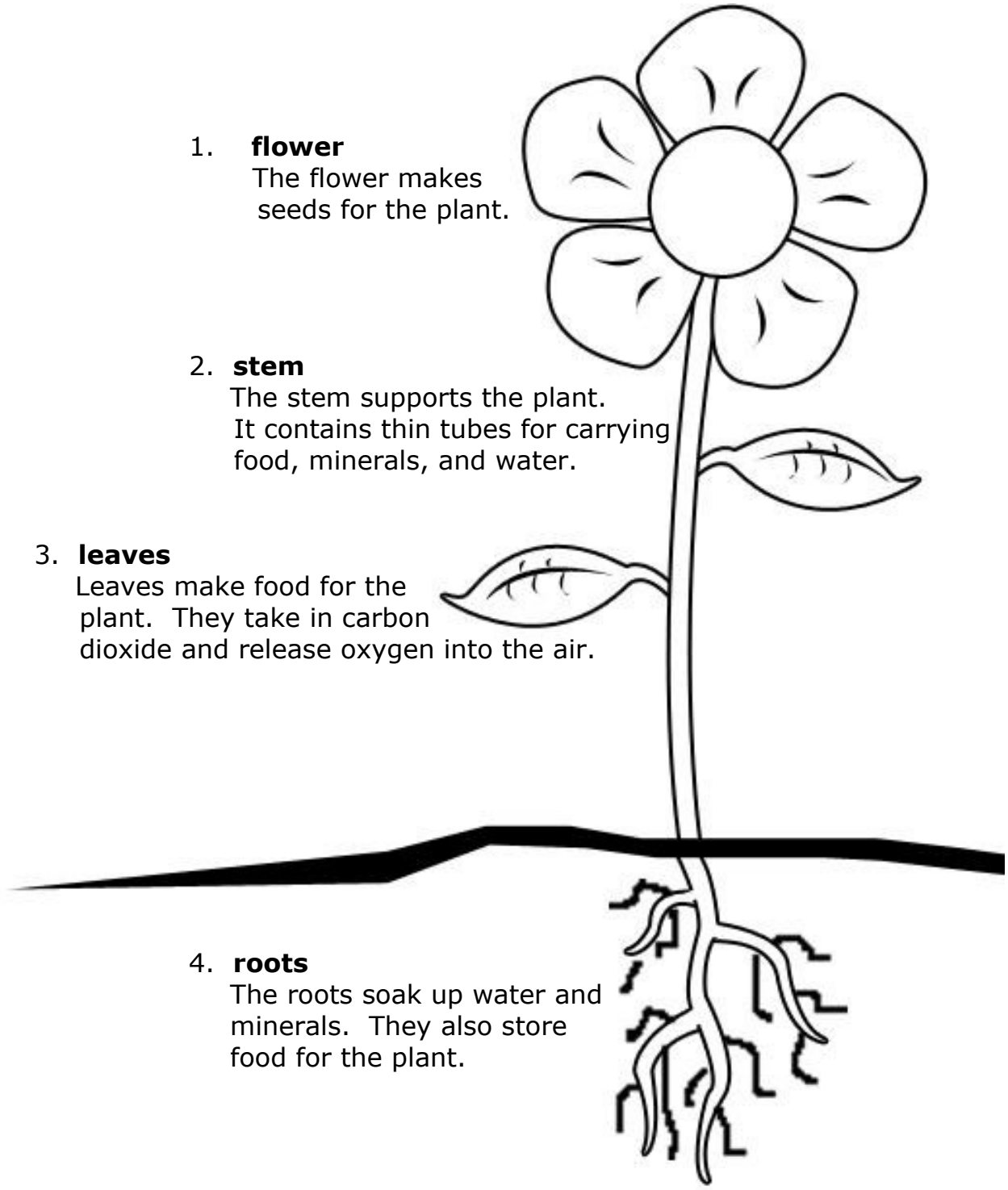
2. _____

3. _____

4. _____

Name: _____

Parts of a Plant

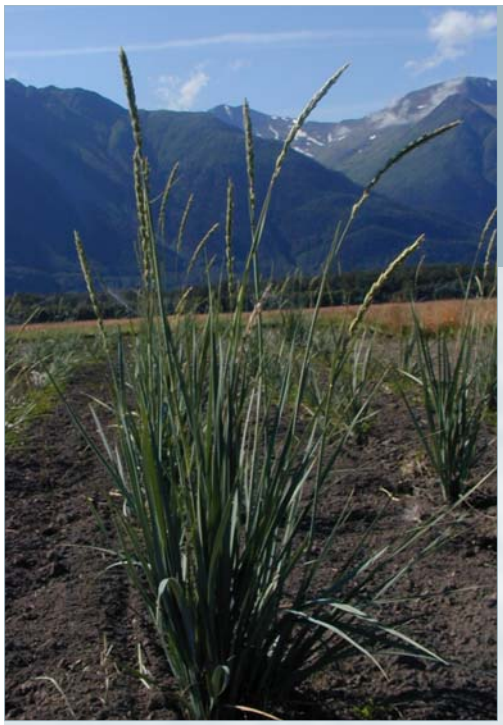


1. **flower**
   The flower makes seeds for the plant.

2. **stem**
   The stem supports the plant. It contains thin tubes for carrying food, minerals, and water.

3. **leaves**
   Leaves make food for the plant. They take in carbon dioxide and release oxygen into the air.

4. **roots**
   The roots soak up water and minerals. They also store food for the plant.



‘Reeve’ Beach Wildrye

Leymus mollis (Elymus mollis)

Uses: Revegetation and Erosion Control by Seed in Coastal Alaska

Background Information

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Map from Hultén, 1968.
Used with the permission of Stanford University

Distribution

Beach wildrye is found on sandy beaches, spits, sea beaches, tidal flats, sea cliffs, and lakeshores from Alaska to Greenland and south to New York and central California (Welsh, 1974).

Growth

Beach wildrye is easy to recognize in the wild. Its spike of seed/flowers is large and compact. The vigorous rhizomes are the main way this grass spreads.

It is perennial, with stout stems that are smooth beneath the spike. It is sod-forming, growing to about 4 feet high, with many leaves overlapping at the base (Wright, 1991a). The blue color of its leaves is distinctive.

Cultivar: ‘Reeve’

Plant Introduction Number: 572569

‘Reeve’ beach wildrye can produce commercially viable amounts of seed (compared to wild beach wildrye and to the cultivar ‘Benson’ wildrye).

The original collection for ‘Reeve’ was from Norway. ‘Reeve’ meets the need for a wildrye that would produce seed.

The Alaska Plant Materials Center began evaluating this cultivar in 1979. With ‘Reeve’s’ ability to produce seed for coastal area revegetation, it was released in 1991 (Wright, 1991a).

‘Reeve’ Beach Wildrye is recognized in breeder, foundation, registered, and certified seed classes.

Breeder and foundation seed is maintained by the Alaska Plant Materials Center.

Registered and certified seed is available through the Alaska Seed Growers, Inc.

Historical Uses

Klebesadel (1985) stated that beach wildrye was used for forage in Alaska. Native Peoples used it for thatching for shelters, basketry, food, and cordage.

Alaska Plant Materials Center
Serving Alaska’s needs in production of Alaska native plants

July 23, 2007

‘Reeve’ Beach Wildrye

‘Reeve’ Beach Wildrye for Alaska Revegetation Purposes

Beach wildrye grows throughout the coasts of Alaska. Thus, for revegetation in sandy or gravelly places, it makes sense to use a species that might naturally occur. The native beach wildrye does not form viable seed. Use the cultivar ‘Reeve’ for places that need seed.

‘Reeve’ provides good erosion control because of its aggressive rhizomes and roots. It can successfully revegetate areas unsuitable for other species. Prior planning is essential.

‘Reeve’ Peculiarities

Beach wildrye does poorly in organic, silt, or clay soils. It does not tolerate excessive foot traffic. It also does not compete well with other grasses (Wright, 1994).

Plant by seed, not sprigs!

‘Reeve’ beach wildrye seed ~33,000 seeds per pound

To Produce ‘Reeve’ beach wildrye

- ‘Reeve’ produces seed three years after the first planting.
- ‘Reeve’ does not decline in production over time.
- Poor seedling vigor occurs if there is not enough sand in the soil.
- Weed control is important for beach wildrye seedlings to become large enough to out-compete weeds.
- Beach wildrye responds well to high nitrogen fertilizers (Wright, 1994).

‘Reeve’ beach wildrye production field at the Plant Materials Center in Palmer, Alaska.

‘Reeve’ beach wildrye is a beautiful landscape plant.

With its distinctive blue coloration, ‘Reeve’ makes a barren, sandy, or gravelly place look beautiful. Its plumes are beige when ripe.

‘Reeve’ will hold the soil in place for many years because of its spreading, tenacious rhizomes.

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Division of Agriculture
Plant Materials Center
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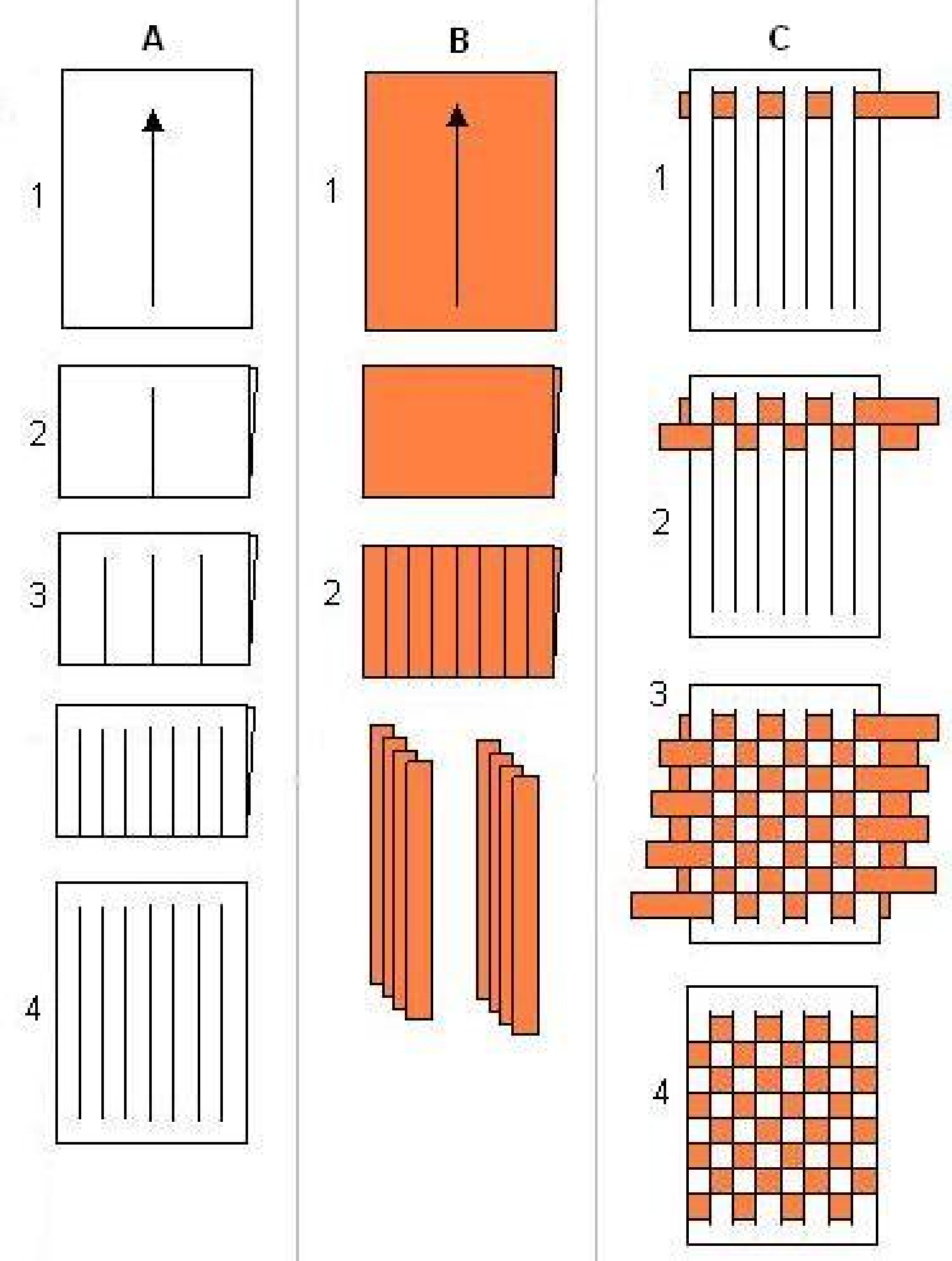
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