

Sustainable Gardening and Foods Curriculum for Interior Alaska Schools

Grades 7-10

By

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Introduction

by Laura Henry-Stone

The following gardening curriculum is a design that emerged from working collaboratively with EKCS teachers and students in 2006 and 2007 on educational gardening and food activities. This process included my volunteering and substitute teaching at the school, as well as interviewing teachers and students and some other community members involved with the EKCS. I also worked extensively with Howard Luke at his camp, from taking students there to plant his garden to maintaining his garden for him to inviting him to the school to share stories with students.

Hence, the curriculum is tailored for a school with EKCS's educational philosophy and methods as well as its student body. Specifically, it reflects a place-based learning approach that emphasizes diverse intelligences and learning styles among students. These are characteristics of an Alaska Native approach to education as well as those of an emerging field known as sustainability education, or education for sustainability, which my research concerns. I believe that a gardening curriculum is an ideal way to integrate the goals of place-based, culturally-relevant, and ecological education. For instance, gardening can teach students caretaking skills that they can apply to their own families and communities. The flexibility in the curriculum of a charter school like EKCS has offered the opportunity to explore what is possible with such a gardening curriculum, but I hope that it can be adapted to any junior high school in Interior Alaska with similar goals concerning Alaska Native and/or sustainability education. The curriculum reflects an approach to sustainable agriculture in Interior Alaska, for reasons explained in the background sections of some sections of the curriculum.

The vision I had for this curriculum has changed multiple times since the time I first became interested in the project. In the summer of 2005, I worked for Calypso Farm and Ecology Center as the Youth Garden Supervisor at the former Howard Luke Academy. When this school became the site for the EKCS, I was excited to work with the new charter school, which I had been following with interest. I initially thought I would focus on integrating Calypso's youth gardening program into the new school's Spiral curriculum. However, that initial vision changed with time as I began volunteering in Sheryl Meierotto's classroom and working with her students in the fall of 2005. In January 2006, I helped her design and teach a three-week module on the boreal forest to gain experience and insight into how the new EKCS curriculum was being put together. I began envisioning designing my own gardening curriculum rather than integrating gardening with the Spiral curriculum.

The EKCS Academic Policy Committee approved my proposal to work with EKCS on gardening curriculum in February 2006. In the spring and summer of 2006, I continued to work with Sheryl and her students on various gardening activities, integrating some of them into her module in May 2006. As part of this module, we went to Howard Luke's camp to plant his garden and then planted new garden boxes behind the school's Elders' Room. Later in the summer and in the fall, I also volunteered and presented in some of the high school classes on gardening and local food systems. In the fall of

2006, I followed up with interviews with EKCS teachers and others asking for input on a gardening curriculum design for the school. I also held two garden meetings to talk about garden planning priorities for the next year. Finally, in the spring of 2007, I interviewed a selection of EKCS students who had gardened at the school in various capacities, including some of the students I had worked with as well as some who had worked for Calypso. I shared a draft of the curriculum with three EKCS teachers in the summer of 2007 and got feedback from them. All of these activities, as well as periodic conversations with Sheryl and other teachers about my work, have led to the design of this curriculum.

Another changing situation that has affected the development of this curriculum has been the shifting school year calendar at EKCS. Because the students' school year at EKCS initially included six weeks during the summer, I was excited about the ability to work with students during the gardening season as part of their class work. However, after the 2006 summer, the EKCS board decided to eliminate the six weeks of classes during the middle of the summer, hence changing my initial ideas for this curriculum as well. Because the EKCS school year now reflects a more traditional school year, the curriculum has had to adapt as well. This has had multiple effects, in some ways forcing the curriculum to be more flexible and hence more accessible to other teachers, but also helping me realize that the traditional school year in Interior Alaska offers real impediments to school gardening, making creative programs like Calypso's more favorable.

There are many different forms that a curriculum can take. One of the hardest decisions for me to make was to pick what kind of curriculum this would be and who would be its audience. Some suggested that I put together a series of gardening and food system activities that could be taught as a three-week module. However, gardening does not fit into three weeks. I could have instead designed a curriculum resource that mimicked other types of popular environmental education curriculum such as *Project Learning Tree* that any teacher could adapt into their classroom. But there are many such garden curriculum resources out there already, though most of them are not tailored to Alaska's growing context. What I settled on was creating a curriculum for an idealized gardening program in which I and/or another teacher(s) could work with a particular group of junior high students through the entire gardening season. The audience for this draft curriculum is any teachers in Interior Alaska or elsewhere interested in place-based or environmental education.

The curriculum includes several units involving garden planning, planting, maintenance, and harvest, as well as "bigger picture" topics such as community food systems and sustainable agriculture, and related skills such as nutrition and food preservation. Hence, the curriculum does not detail specific activities to be conducted in a linear order, but rather provides annotated resources for each topic area.

Overarching understanding goal for curriculum

Students will understand that gardening not only produces high quality food for themselves and their families and communities but also teaches important lessons about living in a healthy relationship with the land.

This curriculum is designed to use gardening as a vehicle for giving students the knowledge and skills they need for fostering healthy, sustainable communities through making informed choices about food.

Suggested timeline for implementing gardening curriculum

April, Intro to Gardening (2-3 weeks)

Unit 1: Sustainable Agriculture
Unit 2: Gardening in Interior Alaska
Unit 3: Garden Planning and Seed Starting

Academic emphasis
History, Social Studies
History, Social Studies
Biology, Ecology

June, Garden Planting (2-3 weeks)

Unit 4: Soil Preparation
Unit 5: Transplanting, Seeding, and Cultivating
Unit 6: Pest Management

Biology, Chemistry, Math
Botany, Ecology, PE
Ecology

August-September, Garden Harvest (3-4 weeks)

Unit 7: Food Systems
Unit 8: Nutrition, Cooking, and Preserving
Unit 9: Composting

Social Studies, Geography
Skills for Healthy Living
Ecology, Chemistry

Resources

The following resources have been extremely helpful in putting together this curriculum. There are many more, but these are the ones I would recommend for using in a school garden program.

Curriculum:

- *The Growing Classroom*, 2007 edition, published by a California-based program called Life Lab. Available for \$39.95 at www.lifelab.org. Targets grades K-6 but can easily be adapted to junior high level. An excellent resource for multiple topics, not just gardening.
- *French Fries and the Food System*, published by Boston-based program called The Food Project. Available for \$24.95 at www.thefoodproject.org. This book evolved out of their work employing youth in gardens during the summer, so it targets older students but can be adapted to younger ages.
- *Discovering the Food System*, an online curriculum published by Cornell University's at <http://foodsys.cce.cornell.edu/>. This is a free curriculum downloadable as one large PDF file or several smaller ones. It targets high school students.

Local:

- Calypso Farm and Ecology Center, 451-0691, www.calypsofarm.org.
- University of Alaska Cooperative Extension Service (CES) and Master Gardener Program; <http://www.uaf.edu/ces/> or (907) 474-1530 for the Tanana District located in Fairbanks. CES Publications list (many free PDF's available): <http://www.uaf.edu/ces/publications/anrpubs.html#fsg>
- Nurseries and greenhouses in Fairbanks, such as The Plant Kingdom (457-5268), Ann's Greenhouse (479-6921), and Holm Town Nursery (451-8733). Of these, The Plant Kingdom is the only one that grows organic plants and hence reflects a philosophy of ecologically-sustainable agriculture.

Internet:

- National Gardening Association has a special site devoted to gardening with kids, called KidsGardening (www.kidsgardening.com). It has multiple online articles and resources, as well as a store with a variety of curricula and other supplies.
- USDA has a website on Sustainable Agriculture Resources for K12 Teachers at http://www.nal.usda.gov/afsic/AFSIC_pubs/k-12.htm.

Background Reading:

- *How to Grow More Vegetables*, by John Jeavons, 6th edition, Ten Speed Press: Berkeley, 2002. This is a good how-to guide for gardening using a sustainable agriculture method called "biointensive." Calypso Farm uses many of these techniques. It includes background information that could make good reading material for students as well.
- *The Unsettling of America*, by Wendell Berry. This is a classic from 1977 in which Berry discusses the ecological and cultural problems with industrial agriculture. It is probably not accessible for junior high students, but teachers may find it good background material.

- *The Omnivore's Dilemma*, by Michael Pollan, 2006. This book quickly became a bestseller and has helped stimulate much of the current interest in food systems. In this book, Pollan defines and explores four different types of food systems. Much of this material is suitable for junior high students, and whole sections of his book can be assigned for reading.
- *Bringing the Food Economy Home: Local Alternatives to Global Agribusiness*, by Helena Norberg-Hodge, 2002. This is a clear and concise book examining the problems with global agribusiness and ways to promote local food systems.

Videos:

- *The Living Land*, by John Jeavons. Distributed by Foundation for Global Community. 1999. 27 minutes. This one would be appropriate for showing to junior high students.
- *The Future of Food*, www.thefutureoffood.com. 2004. \$25. From the website: "Shot on location in the U.S., Canada and Mexico, THE FUTURE OF FOOD examines the complex web of market and political forces that are changing what we eat as huge multinational corporations seek to control the world's food system. The film also explores alternatives to large-scale industrial agriculture, placing organic and sustainable agriculture as real solutions to the farm crisis today."

Additional:

- Please see attached table of resources, also available at www.kidsgardening.com.

Unit 1: Sustainable Agriculture

Understanding Goal:

Students will understand that there are different kinds of agriculture, and that sustainable agriculture takes into account cultural, ecological, and economic characteristics of the specific place where it occurs, in this case Interior Alaska.

Performance Task:

Students will work together to create a model of a small-scale farm or garden appropriate to Interior Alaska and describe how it is different from a large-scale corn field or cow farm in the US Midwest.

Background Information:

Sustainable agriculture is an approach to growing and producing food and fiber that has emerged as a movement in the last several decades. It provides an alternative to the model of *conventional agriculture* pursued by large *agribusiness* ventures. Many people are concerned that *large-scale industrial agriculture* has exploited environments beyond a healthy state through occurrences such as a loss of top soil through *erosion* and contamination of water and soil through overuse of chemical *fertilizers*, *pesticides*, and *herbicides*. There are many names for or versions of sustainable agriculture, including *organic agriculture*, *ecological agriculture*, *permaculture*, and *small-scale agriculture*. While these all have slightly different emphases, the unifying goal of sustainable agriculture is to produce food through agriculture that maintains or improves the health of local and global environments. Sustainable agriculture relies on a concept of *sustainability*, in which human activity exists in appropriate balance with the ecological systems of which it is a part and takes into account impacts on future generations of humans and their ecosystems. Organic agriculture tries to accomplish this balance by eliminating the use of synthetic fertilizers, pesticides and herbicides but does not necessarily take into account other concerns of sustainable agriculture, such as excessive energy use and soil erosion.

What constitutes sustainable agriculture depends on the characteristics of a specific place. Alaska has its own interesting agricultural history, and sustainable agriculture in Interior Alaska must take into account unique *ecological*, *economic*, and *cultural characteristics*. In this and the next unit, students will develop an understanding of the goals of sustainable agriculture generally and apply those to agriculture in Alaska. This will in part require an examination of the history of agriculture in Alaska to explore what has worked and what has not both ecologically and economically. Students will also need a basic understanding of the ecology of Interior Alaska, especially concerning factors such as climate and soil characteristics that most influence agriculture. Cultural concerns regarding appropriate agriculture will be addressed more thoroughly in the next unit on Gardening in Interior Alaska. This unit provides background information to prepare students for understanding how their school garden relates to a sustainable approach to agriculture.

Terms:

1. Agriculture
2. Sustainability
3. Sustainable agriculture
4. Organic agriculture
5. Permaculture
6. Industrial or conventional agriculture
7. Fertilizer
8. Pesticide
9. Herbicide

Activities:

1. Read about the American Dust Bowl. Summarize the reasons why this ecological disaster happened and how it contributed to the Great Depression.
2. Conduct a brief investigation into the history of specific types of agricultural products as a window into the history of agriculture. Students can use the internet or other resources to put together a timeline of the development of a specific type of food or fiber that is grown in Alaska. The University of Alaska Cooperative Extension Service has a list of plants that can be cultivated in Alaska. Questions to explore could include the following: What is the plant or animal's original source from the natural environment? Where is it most commonly grown now? What kind of climate does it like, especially growing season, temperature, and rainfall requirements? Brainstorm other questions with students related to the ecology, economics, and history of producing their food or fiber item.
3. Visit Calypso Farm and Ecology Center for a tour of the farm or arrange to have someone from the farm visit the classroom and guide students on a tour of the EKCS garden. While Calypso is not the only sustainable agriculture initiative in Fairbanks, they are the only non-profit with the mission of educating the public about this form of agriculture. They have regularly-scheduled field trips for elementary students. For a junior high group, a special tour with a focus on sustainable agriculture should be arranged. Students should come prepared with questions about why Calypso grows food the way it does. One idea could be to assign each student or pair of students a specific vegetable to investigate and then report findings back to the rest of the class upon return to the classroom.
4. Conduct a group discussion on the climate and ecology of Interior Alaska, focusing on limiting factors such as light and temperature that restrict how plants and animals survive here. This activity can draw upon other lessons from other units in which students may have learned about the ecology of Interior Alaska. Students can pretend to write an email to a pen pal in another state or country in which they describe the ecological characteristics of their home. What trees grow here? What animals live here? How do they adapt to the long winters and short summers? What are some of their favorite outdoor places and why?
5. Watch *The Living Land* video or PBS videos on sustainable agriculture.
6. Read about sustainability (in John Jeavons' book).

7. Explore health risks from pesticides in the food chain by using an activity such as “The Pesticide Banquet” from *French Fries and the Food System*.

Unit 2: Gardening in Interior Alaska

Understanding Goal:

Students will understand the role that gardening has played in Fairbanks and other Interior Alaska communities over the last hundred years, and what the status of gardening is now.

Performance Task:

Students will work in teams to present a written or oral report (or PowerPoint or iMovie) on a topic concerning local gardening. Topics could include Calypso Farm and Ecology Center, the Fairbanks Community Garden, Howard Luke's (or another elder's) garden, Creamer's Dairy, gardening in the villages from which the students' families come.

Background Information:

Small-scale gardening has been a part of home and community life in Interior Alaska for a long time. Cultivating home garden plots may not have existed among Athabascan communities before contact with Euro-Americans; nomadic family groups gathered their fruits and vegetables from the land instead. In the late 1800's, gold miners and missionaries brought the practice of home gardening with them to Alaska. As more permanent Athabascan communities grew up around missions and trading posts, many Native families took up gardening to supplement their wild harvest as well. For many decades, before shipping became affordable and stores began stocking fresh produce, wild harvest and gardening were the only ways for rural Alaskans to procure fruits and vegetables.

In this unit, students will learn about the practices of wild harvest and gardening in Interior Alaskan communities, both in rural villages and in Fairbanks. If agriculture can be considered a commercial enterprise, gardening can be considered more similar to a traditional subsistence activity, as it is usually done for home or community consumption. School gardens can be an opportunity to teach traditional Athabascan values, such as self-sufficiency, hard work, care and provision for the family, sharing, village cooperation, respect for the land, and respect for nature. In order to make this cultural connection, many activities suggested below involve interacting with an Athabascan Elder. All of the activities are primarily hands-on.

Terms:

1. Interior Alaska
2. Growing season
3. Climate zone map

Activities:

1. Interview a local Athabascan Elder about gardening. Brainstorm questions with students beforehand, focusing on how the elder learned to garden, what kinds of things he or she grows or used to grow.

2. Assign students different books written by Alaska Natives and ask them to find information about harvesting wild plants or gardening in various stories. There is not a lot of documentation of the practice of gardening in Alaska Native communities, so this activity will give students a chance to investigate the historical record for the few existing references.
3. Help an Elder plant his or her garden. In Fairbanks, visit Howard Luke's camp to help him plant his garden.
4. Invite an Elder or other community member to take students on a nature walk to identify wild plants that have different traditional uses, and if appropriate, harvest some samples. Assign a specific plant to each student or pair of students for them to research in greater depth, including the various Native, English, and scientific names for the plant.
5. In Fairbanks, visit the Fairbanks Community Garden or invite the garden manager to give a presentation in class about how the community garden works.
6. Invite a Master Gardener to class to give a presentation on the practice of gardening in your community.
7. Create a climate zone map of Alaska based on USDA plant hardiness map at <http://www.usna.usda.gov/Hardzone/alaska.html>. See "Frost and Planting Dates" in *French Fries and the Food System* for more an activity related to this.

Unit 3: Garden Planning and Seed Starting

Understanding Goal:

Students will understand how to plan a garden, including choosing what to plant, getting the supplies, and starting seeds.

Performance Task:

Students will work together with teachers to plan the garden, buy supplies, and start seeds.

Background Information:

This is a challenging unit to schedule according to what else is going on in the school's curriculum because the timing of garden planning and planting has to correlate with what is going on outdoors rather than what is happening in the classroom. In addition, the basic activities of planning and planting are probably not comprehensive enough to generate enough material as a stand-alone academic unit without supplementary material. Hence, these activities could either be integrated into other units at appropriate times, or they could be supplemented with material and activities from other units in this curriculum, such as those in the background units, or with plant and soil science activities, to make a more complete module. The main goal of the activities in this unit is practical—the planning of a garden.

In the spring, garden planting is generally determined by the last *frost date*, which is the date that on average marks the latest occurrence of overnight frost, after which plant starts can safely be transplanted outside. In Interior Alaska, common wisdom holds this date to be June 1st. However, there are local variations in climate, or *microclimates*, that may make some places colder longer or warmer earlier. For instance, on a south-facing slope, especially if garden beds are protected by plastic, the frost date could be much earlier. But to be on the safe side for schools in Interior Alaska, teachers can use the June 1st frost date.

For starting seeds in classrooms, garden planning happens backwards from the frost date. Most vegetables that can be grown in Interior Alaska need at least 4-6 weeks to germinate and grow to a suitable size to transplant to gardens. These include broccoli, cabbage, cauliflower, kale, kohlrabi, summer squash, winter squash, and head lettuce. Other vegetables that teachers may want to plant are best procured as starts from commercial farms or greenhouses because they need more time in a greenhouse, such as tomatoes, peppers, and onions. Finally, there are several vegetables that can be started as seeds directly in the ground after the last frost date. These include leafy greens such as spinach, leaf lettuce, and other salad greens; root crops such as radishes, carrots, beets, turnips, and potatoes; and peas and beans. (Much of this information can be found in documents published on the website of the Cooperative Extension Service at the University of Alaska Fairbanks.)

The basic supplies needed for starting seeds include the following: seeds, seed-starting soil (can purchase or make your own if you have ingredients), plastic or peat starter packs, flats or trays, growing lights (these are not absolutely necessary if you have direct daylight for 8-10 hours, but they help immensely), watering spritzer and can. If your goal is to emphasize ecologically healthy and sustainable gardening techniques, then you should try to obtain organic seeds and soil; however, this may not be feasible for you and your school, and the main goal is, after all, to plant a garden. You can discuss trade-offs with students and make it a learning activity.

Students can be involved in garden planning in a number of different ways. Ideally, they will be involved in every stage so that they learn necessary planning skills for their own garden and so they can understand the process from beginning to end. This kind of involvement increases student ownership in the garden as well. However, there are probably some elements of infrastructure and curriculum planning that are above the level of the students. At the least, students can help plan what to plant in the garden each year and where to plant it. Unfortunately, most school districts in Interior Alaska end their school year before June 1, which means that students may be able to start seeds in their classes but cannot be easily involved in school garden planting as part of their classes. However, some ideas and initial preparation relevant to planting are discussed here.

Terms:

1. Frost date
2. Seed pack
3. Flats
4. Plant starts
5. Transplant

Activities:

1. There are several activities in *The Growing Classroom* and other curricula that involve planning, such as ordering seeds in “Zip Code Seeds” and planning a garden in “Inch by Inch, Row by Row.” Zip Code Seeds describes a process for ordering seeds from a catalog, which is a good choice if you want to use organic seeds, but it requires ordering seeds several weeks in advance of seed-starting.
2. *French Fries and the Food System* also has an excellent unit on garden planning, leading students through several lessons, called “Garden/Farm Planning Unit.”
3. Students can also research the average late frost for Interior Alaska, such as using data from the National Weather Service or by interviewing local gardening experts, in order to plan when to start seeds and plant outdoors.
4. If there are other community members involved in the school garden, they could be invited to the school to work with the students in planning the garden, especially Elders or family members.
5. Seed starting: Again, there are several good activities in *The Growing Classroom* that provide detailed instructions for leading students through seed starting, such as “So What? Sow Seeds!” The UAF Cooperative Extension

Service also has a publication on seed starting online at <http://www.uaf.edu/ces/publications/freepubs/HGA-00032.pdf>. Before buying supplies, allow students to provide input in what they want to plant and then allow them to research what supplies they need for planting.

Unit 4: Soil Preparation

Understanding Goal:

Students will understand how to prepare soil as the necessary foundation for a healthy and sustainable garden.

Performance Task:

Students will demonstrate how to prepare garden soil while explaining how each step relates to soil fertility.

Background Information:

Soil health is key to a fertile and sustainable garden. In conventional agriculture, soil is often treated as nothing more than a medium for growing a monocrop, or a place to put the chemical fertilizers that contain the nutrients that the crop needs. Irresponsible soil management can result in such problems as erosion of topsoil, the thin layer at the top of the earth that contains many nutrients and organic material, or humus. In sustainable agriculture or small-scale gardening, the soil is treated as a living system that supports the plants that grow in it. The role of a responsible gardener with a long-term perspective is to nurture the health of this living system. In addition, in a school garden setting, treating soil as an ecosystem allows students to learn principles of ecology, such as interdependence.

Soil fertility in Interior Alaska is a special challenge because most local soils are of poor quality for gardening. Topsoil is usually very thin and low in nutrients and humus. It can also be cold and acidic, thanks to the permafrost underlying much of the region. Hence, gardeners in Interior Alaska almost always have to add something to their soils to improve their health and use creative means for warming up the soil. Rather than adding chemical fertilizers that do not have a long life in the soil, a gardener can use many options for sustainably improving soil fertility. These include composting and adding soil amendments from natural sources. For instance, rural gardeners often added fish scraps to their gardens to add nitrogen to the soil.

The primary purpose of this unit is to give students the skills and understanding they need to be garden soil caretakers. Many of these activities can and should be done in the spring to prepare the garden beds for planting. However, building your own compost for your garden is one of the best ways to improve soil fertility. Composting can be done any time of the year, but the process for making it will vary depending on the time of year. More specifics of composting will be discussed in the fall composting unit.

Terms:

1. Soil fertility
2. Topsoil
3. Humus
4. Erosion

5. Soil amendments
6. Clay
7. Sand
8. Silt
9. Macronutrients
10. Micronutrients

Activities:

1. First, students should learn about the composition of soil through some hands-on activities. Two good soil activities in *The Growing Classroom* are “The Nitty-Gritty” (learning about soil components—sand, silt, and clay) and “Living in the Soil” (making a soil mixture). From *French Fries and the Food System*, “The Great Soil Puzzle” also teaches about soil components.
2. Being a good gardener means becoming very familiar with the contents of your own soil. Students should not only examine the visible components of their soil but also conduct a soil test for nutrient composition. As part of this activity, they should research what kinds of nutrients plants need. After testing their own soil, they can then make a plan for how to add necessary nutrients to their soil. A good resource to guide students through soil testing is “Soil Doctors,” from *The Growing Classroom*. Any soil testing requires a soil test kit. For more extensive analysis, you may also send soil samples to labs. For more information, contact the Cooperative Extension Service.
3. Once soil exploration and testing is conducted, students are then ready to think about how to improve their garden’s fertility. This can be done in several ways, including adding compost and amendments to the soil, as well as through rotating crops from one season to the next so that nitrogen-fixing plants such as peas can add nitrogen to soil around the garden.
 - a. While composting can be done any time of the year, the best time to build an outdoor compost pile is in the summer or fall, when there are plenty of fresh green plants from weeds or garden harvest waste to add to a pile. However, for composting in the winter and spring, worm composting is an excellent option. Students can make compost in the spring unit and add it to their garden before planting. The UAF Cooperative Extension Service has an excellent publication on composting with worms.
 - b. *The Growing Classroom* has an activity called “Compost Bags,” which leads students through the process of making compost through anaerobic decomposition, which is different from the aerobic process used outdoors. Students mix ingredients into a garbage bag, seal it shut, and leave it for a month to decompose.
 - c. Even with good compost and crop rotation, Alaskan soils may still need additional soil amendments, especially in the early years of a garden. There are many traditional ways that rural people used to fertilize their gardens, such as burying fish scraps in their gardens for nitrogen. Students can explore these traditional methods by interviewing an elder or other local gardening expert and then creating a report or an instruction

sheet on using a particular method. They can then try these methods in their garden.

- d. There are also commercial soil amendments available in Fairbanks. These are similar to chemical fertilizers but come from natural sources. Commercial chemical fertilizers always contain the three macronutrients of nitrogen (N), phosphorous (P), and potassium (K). Many amendments are sold with all of these nutrients as well, but some offer primarily one of these. Students can compare chemical fertilizers to natural soil amendments and make a plan for how to add these to their soil and in what proportions. This can be a math lesson. It can also be a science experiment, if students want to compare different types of fertilizers and amendments.
4. Students can explore methods of warming soil, which is necessary in Alaska's cold climate. Various methods exist, such as raised beds, boxes, cold frames or tunnels. The UAF Cooperative Extension Service has publications and resources on each of these methods. If they do not already have boxes or raised beds, students can make a plan for building them.
5. Bed preparation.

Unit 5:

Transplanting, Seeding, and Maintaining the Garden

Understanding Goal:

Students will understand how to plant a garden through both transplanting seedlings started indoors and through seeding directly in garden beds, and then how to maintain a garden during the growing period.

Performance Task:

Students will work together to put in and maintain their garden.

Background Information:

Many times, gardening with students gets no farther than showing them how to plant things in the ground. However, actually putting plants and seeds into the ground is an intellectually small component of the whole gardening process. At the junior high level, students can and should be given more responsibility for planning and planting the garden. Hence, all of the preceding units have been preparation for this moment, while this unit focuses primarily on the practical objective of putting in the garden. The amount of time needed for this objective varies depending on the size and variety of the garden and on the number of students involved. Once the garden is planted, maintenance involves watering and weeding and re-seeding when necessary. The teacher and students will have to work together to create a maintenance schedule for this time period. Additional suggested activities during this unit include botany and ecology lessons that provide students with more in-depth understanding of plant biology through gardening.

Teacher background knowledge required for this unit is primarily practical knowledge of gardening. But if a teacher does not have this knowledge, there is probably someone close at hand who does and who would be happy to help. The UAF Cooperative Extension Service has some information as well. Again, if you are embracing a sustainable or organic agriculture model, there are some additional things to know about what kinds of techniques are better, such as using seeds that have not been treated with fungicide, as most commercial non-organic seeds have been. Many of the suggested resources on sustainable agriculture and organic gardening give helpful background.

Terms:

1. (Gardening tools, i.e. spade, trowel, rake, broadfork, etc.)

Activities:

1. *Garden Planting:*
 - a. This is an ideal time to invite a local expert to the classroom to guide students through the planting process. Local resources could be family members who garden or other volunteers such as Master Gardeners, who

can be identified through the Cooperative Extension Service. Students should take notes or otherwise document the steps necessary for transplanting so that they have something to refer back to when they go through the process themselves.

- b. For teaching students how to transplant and seed, an ideal process would be to demonstrate the process to them and then to allow them to practice the technique on their own. To demonstrate their mastery of the technique, they can teach the process to someone else. For instance, if each student is responsible for one type of vegetable, then after planting half of the designated area or amount, they can teach a partner how to do the rest.
 - c. Another possibility for teaching students first and allowing them to demonstrate their mastery is by having them work in a different garden first. For instance, they could help an elder or other community member plant his or her garden and then plant their own student garden using the skills that they learned.
2. *Garden Maintenance:*
- a. During the growing season, garden maintenance involves primarily watering and weeding, and perhaps adding additional nutrients to the soil along the way. Different crops will grow at different rates and be ready at different times, so depending on the teacher's flexibility, careful planning may be needed.
3. *Additional Activities:*
- a. In conjunction with starting the garden, there are many possibilities for teaching botany and ecology lessons. They could be simple projects, such as using empty CD cases with a piece of wet paper towel to germinate seeds and watch root growth. They could be more complex scientific activities, in which students could conduct different experiments with their garden plants, such as testing different varieties of the same vegetable, or growing plants in soil prepared in different ways, such as with or without compost. *The Growing Classroom* section on "Growing" has many good activities along these lines.
 - b. Garden journal. Students should keep a journal in order to record regularly what they do in the garden. They should also use the journal to make detailed observations about their crops and about the weather and other environmental factors. If they notice any insects or other creatures in their garden, they should make note of them, perhaps even sketching them in order to identify them later.

Unit 6: Pest Management

Understanding Goal:

Students will understand that gardening involves employing appropriate methods for keeping other animals from eating your plants.

Performance Task:

Students will each do research on what methods are available for managing a specific animal or insect pest in Interior Alaska and demonstrate a chosen method to his or her classmates.

Background Information:

The understanding goal includes the phrase “appropriate methods.” Again, in sustainable and organic agriculture, the methods used for pest management are different from those in traditional industrial agriculture. Organic growers do not use chemical pesticides, although they may use repellents from natural sources. Employing a sustainable agriculture philosophy for teaching students about pest management allows students to learn about ecological systems in a way that simply showing how to kill unwanted animals does not. Students will learn that their actions have consequences in the ecological systems around them, and that appropriate actions take into account these consequences. Rachel Carson in writing *Silent Spring* opened the world’s eyes to the dangers of using chemical pesticides in the environment. Students can learn about this relationship through gardening.

In some ways, we are lucky in Interior Alaska because the climate reduces the variety of garden pests. However, we have moose, which can completely destroy an entire garden in one night. While some farmers in other places design elaborate systems of integrated pest management, primarily targeting insect pests, gardeners here have to construct hardy moose fences or motion detectors with sirens to protect their gardens. There are certainly also some insect pests and small mammals that need monitoring in a garden as well.

Terms:

1. Pest management
2. Invasive species
3. Weeds

Activities:

1. Read all or part of Rachel Carson’s *Silent Spring* and discuss the effects of pesticides in the environment.
2. Research invasive plants in Alaska. Each student can do a report on a specific invasive. The UAF Cooperative Extension Service is a good resource for this.

3. Research various local methods for keeping moose out of a garden. If appropriate, choose and implement a method in the school garden together.

Unit 7: Composting

Understanding Goal:

Students will understand the skills and science necessary for composting organic matter at their school or home.

Performance Task:

Students will work together as a class to build a composting system, either a compost pile outside or some kind of indoor system such as a worm box.

Background Information:

While composting is addressed a bit in the unit on soil preparation, it really deserves a separate unit because there is so much that can be taught in composting. Building good compost is an art and a science, and students with bents in either direction will find something to enjoy in making compost. The primary goal in this unit is practical—building compost—but many subsidiary objectives concerning science can be pursued through additional activities.

Building compost is simply the process of putting together the right organic materials in the right proportions to foster the natural decomposition process and create soil. There are two types of decomposition—aerobic and anaerobic—which depend on two different types of bacteria to enact decomposition. The first—aerobic—occurs with bacteria that need oxygen. Anaerobic bacteria do not use oxygen. The latter is the type of decomposition that occurs when food spoils and starts smelling unpleasant. Most gardeners do not want compost that has been anaerobically decomposed, but rather prefer aerobic decomposition. This means building compost bins or piles that allow for enough oxygen flow to foster the growth of aerobic bacteria. Another possibility is to compost with worms, in which worms eat organic material and discharge casings that are very nutritious for plants.

For preparing compost for gardens, it is important to have the right mix of organic materials with a high carbon content and those with a high nitrogen content. Carbon (C) is the element that is found in all living organisms, while nitrogen (N) is one of the primary plant nutrients, along with phosphorus (P) and potassium (K). For instance, for building a compost pile, common ingredients with high carbon content include straw or brown leaves, while nitrogen comes from any fresh greens, such as grass clippings or green leaves or vegetable waste from the kitchen. A pile with a good mixture of these two different types of ingredients usually creates good compost, if it is also given enough oxygen. This can be done through regularly turning the pile, or by building it in such a way from the beginning that it composts quickly.

Depending on the teacher's level of expertise, there are many ways to approach composting in the classroom or in the school garden. Worm composting is an excellent way to compost kitchen scraps. Also, there are many commercial composters

available, in which kitchen scraps are added and then mixed regularly. Local gardeners and farmers can be excellent resources for this activity as well.

Terms:

1. Aerobic decomposition
2. Anaerobic decomposition
3. Decomposers
4. Organic material

Activities:

1. Many activities from *The Growing Classroom* on composting.
2. Research the process of decomposition and report on it.
3. Research the different possible ingredients for a compost pile and what primary nutrient(s) they may contribute.
4. Attend a composting workshop at Calypso Farm.
5. Build an outdoor compost pile together.

Unit 8: Nutrition, cooking, and preserving

Understanding Goal:

Students will understand the nutritional value of fresh garden produce and some basic methods for cooking and/or preserving garden produce.

Performance Task:

Students will each prepare one vegetable in a recipe and preserve at least one type of vegetable, creating documents for each that reflect nutritional value of the recipe and the vegetable.

Background Information:

There are many ways to learn about nutrition, cooking, and preserving, but having fresh produce is an excellent hands-on way to introduce the concepts of meal preparation and food preservation to students. Preparing the food that the students grew in the garden completes the seasonal learning cycle. Learning how to prepare and preserve ones own food also reflects a subsistence philosophy.

Terms:

Activities:

1. Another good resource for this unit is the textbook *Food for Today*, 2006, from Glencoe.
2. Many nutrition activities in *The Growing Classroom*.
3. Both of the above have versions of a food label reading activity, as does *Discovering the Food System*. In this activity, students practice reading nutrition labels.
4. Each student can do a report on the nutritional value of a chosen or assigned garden vegetable. They can compare and contrast a processed food label with their own vegetable nutrition report.
5. Invite an Elder or other community member to class to demonstrate traditional food preservation techniques. The UAF Cooperative Extension Service is another good resource for food preservation information.
6. Hold a class potluck in which students bring in a family recipe that includes a vegetable from the garden.

Unit 9: Food Systems: From Global to Local

Understanding Goal:

Students will understand their place in global and local food systems in preparation for understanding the place of gardening in their community food systems.

Performance Task:

Students will describe through a diagram, essay or oral presentation the components of a food system and their place in it.

Background Information:

A general food system includes all the steps necessary to get food from the land onto our plates, including production, processing, distribution, and consumption. Food systems are getting a lot of press these days because we are starting to discover that the industrial, global food system that most of us depend upon has a lot of problems. The global food system treats food as a free market commodity in which the primary goal is to produce as much food and distribute it as cheaply as possible in order to make as much profit as possible from it. Other concerns are considered externalities, factors outside the system that are only taken into account if consumers insist that they be addressed. For instance, there are many ecological problems that come from exploiting the land to produce a lot of food cheaply (students can examine some of these in the sustainable agriculture unit). Also, some people are concerned that the global food system is not secure in its ability to provide necessary quantities and qualities of food to all people. Finally, viewing food as a commodity is quite a different view of food from how it has been seen in traditional and indigenous systems throughout the world, in which food provides physical and cultural sustenance.

In order to address these problems, many people are advocating for increasing the role of local food systems to feed individuals and communities. A local or community food system simply means that more of the steps involved in the food system are moved closer to the consumer. Again, this type of food system reflects many traditional systems, such as Alaska Native subsistence, in which the production and consumption of food was closely integrated with the surrounding landscape and cultural community. Supporting local agriculture and gardening is one way to help create community food systems. For instance, community supported agriculture (CSA) enterprises, such as Calypso Farm in Fairbanks, serve as a way to allow consumers to buy from local farms. Shareholders pay for their produce at the beginning of the growing season and then receive a weekly share of whatever is ready for harvest throughout the season.

In this unit, students will explore food systems in order to gain a background understanding to the role their school garden plays in their own food system, primarily drawing from activities in Cornell University's online curriculum, *Discovering the Food System*. This extensive curriculum is targeted for the Northeast United States, but many units can be adapted for Alaska. In the activities section below, specific lessons from the curriculum are recommended.

Activities:

1. Conduct Lesson 2 (in Section 1), *Food Systems Basics*, from *Discovering the Food System*. This lesson provides a good overview of the components of a food system.
2. Perform an exploration of the food system(s) of which the students are a part. There are several ways to do this. Steps 1 and 2 (in Section 2) of *Discovering the Food System* has some excellent guidelines for finding facts about food systems and identifying local people to interview.
3. Another fun way to explore food systems is to examine school lunches. Students can trace the origins of each item in one school lunch by brainstorming and then interviewing their cafeteria director or another school district employee about food procurement. A version of this activity is described in “Lunch Bag Ecology” from *The Growing Classroom*.
4. Finally, another possible way to explore food systems is by taking a field trip to the local supermarket. Students can work in pairs to explore specific types of food and its origins. Before the trip, brainstorm questions for students to answer, and arrange with a manager prior to the trip so that students can interview him or her. The Growing Classroom includes an activity called “Supermarket Snoop” which can be adapted for this exploration, as its main focus is to teach students to be informed consumers. It also suggests many additional related activities.

Terms:

1. Food system
2. Global food system
3. Local or community food system
4. Subsistence
5. Community supported agriculture
6. Production
7. Food processing
8. Distribution
9. Consumption
10. Marketing

Appendix: Howard Luke Interview Transcript, February 2007

The following the transcript of an excerpt from an interview with Howard Luke conducted on February 9, 2007. I have included explanatory comments in select places of the interview to flesh out details from other conversations we had had or to offer my own interpretations about what Howard shared with me. These comments are in italics.

When I began recording for this interview, I had already been visiting with Howard for several hours. We watched footage from his birthday potlatch together, where he gave gifts to all the people who have helped him in his later life while he's been living on his own at camp. When we moved to the table for tea, I asked him to record him, but I didn't start until after the conversation had already begun, so Howard picks up here in the middle of what he was saying. I told him I wanted to record the stories that he'd already told me about gardening with his mother and other things he's learned about gardening.

Howard: ... My friends, them downriver down there. Geez, they got good garden, now they say it's cheaper to just buy it. What would you do if you got no money?

Laura: Good question.

H: Yeah... You gotta...(clears throat)... You mind the kids, you know, they see that. As they're growing up, they'll see that. They'll see that, when we don't got no money, we got garden. We got potatoes. We got carrots. We got everything. And that's what I mean, you know. That's... my heart goes out to the young people. I know that they gonna have a hard time, and garden, my mother and them always had a garden. Always had a little garden. Little small garden. Rhubarb, you know? Wild rhubarb? She had some planted out there. Someone spaded it up, because it growed up every year. Every year, they grow up, you know. All them things like that, you know, that, they were our fruit, you know, berries, and stuff like that. It's the same thing in the garden.

L: What else did she grow, in her garden?

H: Oh, uh, carrots and potatoes and mostly, we didn't have rutabagas and stuff like that. We didn't have any of that. I don't know how come we didn't. Just carrots and stuff like that.

L: Cabbage, did you have cabbage? Of course.

H: Cabbage, yeah. We never think about making sauerkraut.

L: Really? When did you learn to make sauerkraut?

H: Well, a couple of my friends from Germany lived in Fairbanks, and they came over one fall and they said, we'll help you dig the garden out. And said, You ever make sauerkraut? And I told them, No, I'd sure like to, I says. So he said he got this shredder, I'll bring it over tomorrow. So that's when we started, you know.

Howard gave me four jars of the sauerkraut that I helped him make last fall, when Brad and Jill accompanied me to camp one afternoon and we shredded about a dozen heads of cabbage from his garden.

L: So what kinds of jobs did your mother make you do when you were little in the garden?

H: Weed the garden all the time. Keep the garden, you know. Nowadays you, nowadays they use that plastic, you know, so the weeds ain't going to grow. And in the mission, that's all that we do. We had garden from here across the river. One was potatoes, and one was all the vegetables like carrots. Whole big gardens. Whole big gardens. And like big root cellar, bigger than this house, root cellar. And that's where we store all our stuff. Plus in the mission, you know, it was like a depression in them days, you know. You never throw nothing away.

Howard told me before that they also had a greenhouse in the mission at Nenana.

L: Did the kids eat all of that? Was it used in lunches and dinners and stuff?

H: Yeah, we had that. Every like, Fridays and Sundays, we'd have a good meal.

L: Where did the meat come from? Hunting and trapping?

H: Oh, people, uh, the village people, you know, give us meat, and then the people that managed the mission, they give them grub, you see, they trade off. They trade off. They give us meat, and then they give them potatoes and carrots and stuff like that. So you know, it's... people look after one another. That's what I'm saying, right now, you know, that we're not doing it. It's too much selfishness right now. And that's why I'm saying right now that I'm afraid for our young kids right now, the ones that's coming up right now, it's going to have a hard time. They wouldn't know how to do this. Cause it's going to be selfish. You see right now, people are so selfish right now. Everything you do, you get paid for it. And I, I never get paid. I traveled all over the world, you know. Go into schools, all the schools. I was down in Brazil. I stayed there one month and I went to, I covered all the schools, and I said, Well, I guess I'm done. And they say, You're not done yet, Howard, we gotta go to the university. In the university, they got down there, the girls and boys, they don't go to the same school. They're separate. They're separated. And they're all in uniforms. Same as the kids, too. Kids got their own uniforms and stuff, and they take care of their own clothes, just like Boy Scouts, you know. They take care of their own things. And that's what I mean, down there. They really look after one another. And that's what I'm trying to do right here, you know,

but nobody don't want to listen. We should have garden and stuff like that, you know. Nobody don't want to muck around in garden.

L: Some of us are listening.

H: What they going to do if depression comes? Everything will be gone. What are they going to do?

L: So what's the best way, with these kids at the charter school now, what's the best to teach them some of these gardening skills? I'm trying to design a curriculum to teach them about gardening skills, but I want to make sure they hear about your stories, and your, you know, your experience gardening. What do you think the best way is to teach them?

H: Well, it's just like I say. You gotta look to the future, and you gotta keep telling them that, not only one time. This is why I want you young people to be doing right now because we have to look after one another. We have to look after one another, and we have to help each other. If that other guy doesn't want to spade his garden, you just come in there and help him and then he'll say, Oh, gee, it's my turn to do my share, you know, something like that, you know.

L: How did you learn those lessons when you were little?

H: Well, my uncle and my mother always telling me these things. I tell you, every night after supper, mom blow the lights out, blow the candles out, and we'd sit down. She'd tell me about these things, about depression, that you gotta, you gotta look for the future. This thing is not going to be here forever. And not to be selfish. Not to go against nature. You go against nature, things are going to come back on you, one of these days. You wouldn't know it. You wouldn't know it if you do something wrong. Went against nature. You went against nature, now it's going to teach you.

L: You've told me before, I think, what do you think of using pesticides and herbicides and chemicals in the garden? A lot of farmers use a lot of chemicals in their farms and their gardens now.

H: I don't believe that. I don't think so. You know, we got our own, we got our own fertilizer. You're talking about fertilizer?

L: Fertilizers too, yeah. What do you use?

H: We have our own fertilizer.

L: Like what?

H: You see them spruce needles? Them spruce needles, when they get dry, you mix that right up in the garden.

L: It's good for potatoes, right?

H: Good for everything. Them people down the river down there, I taught them that, and they do that.

L: Really?

H: Yeah, they have good garden. They have good garden down there, but I don't know, they say, it's cheaper to go to the store and buy it, they say.

L: It's a strange thing when our economy works that way, when it's cheaper to buy something than to do it yourself.

H: I'll tell you, so much things we can save, you know. Just like your oil. You see, I don't burn oil, when it gets cold. Cold at night, I light my, cause this stove heats up. What's the use of having two things going? You gotta think about the future. You know, we're not thinking about the future, we're just thinking that thing is going to be there forever. It's not going to be there forever.

Howard has a wood stove in his front room that he uses exclusively during the day, but he also has an oil-burning stove in the back room that he uses at night.

L: How did your mom save seeds from one season to the next? Did she save seed potatoes and store them until the next year?

H: Yeah, yeah. Everybody got root cellar, you know.

L: Like, where did she get carrot seeds? Where did she get her seeds to plant?

H: Down there, you know, it's like berries and stuff, the fruit on there, they get the seeds, they get the seeds when they come to seeds, they take two, three years to grow, but once you grow, they come back all the time. Come back, like rhubarb and stuff. They're all seeds.

L: How is... I don't know what wild rhubarb looks like. Does it have a long, red stem just like the kind that people grow in their gardens around here?

H: Yeah, they grow about this high, and this part, this part down here turn into wood. Like willow. And this part up here, them seeds are in that, that tube in there. Just like berries. Berries like that too. I tell you, so many things right now, that's why I tell people, I say, depression comes. I say my daughter is going to be worth more than your daughter.

L: I think so. I think you're right. It's about skills and knowledge.

H: Them students that stayed with from out of state, you know. They stayed with me for three months, you know. I had four of them. They stayed three months, and the next year another two come and they stay with me, you know. And I talk about depression, and they don't know about depression, until I explain to them, you know. I explain to them. Oh, yeah, now I know what you're talking about. Well, if depression comes, they said, we're going to come and stay with you. (*Laughs*)...Because if depression comes, depression comes, everything going to go. Even the garden ain't going to grow. Your garden ain't gonna grow. I seen depression. No berries. No nothing. Not a thing. Them days, them white people, them sourdoughs. They work with the Native people. They teach each other. The native people teach them how they do things, and he tells us how to do things, just like making sourdough hotcakes like this. We didn't know nothing about it. They taught us how, so you see, it's a trade off. Trade off. We taught each other.

L: Did they also introduce gardening?

H: Yeah, umhmm. Yeah, they taught us about garden, you know, and stuff like that because them days, they never heard of no fertilizer, nothing. They tell us about, about that stuff, what the hell they call it? It grows in the garden, I mean, it don't grow in the garden, it grows out there—peat moss. Peat moss. They tell us about that, and we didn't know nothing about peat moss. And they told us about that.

L: Using it for the garden, you mean?

H: For the garden, yeah, yeah.

L: Do you know where the idea for using fish came from?

H: The white people did that. Yeah, yeah.

L: Cause that's a good fertilizer too, right?

H: Yeah, you use, you just dig it up, you dig a big hole, a trench like that, and you just cover it up and bury it again.

L: We should put some fish in your garden this spring.

H: That one guy downriver at fox farm. When you wash fish, all that blood and stuff like that, he don't throw it away. He use that to water his garden.

L: Let's make sure we water your garden with fish blood this spring.

H: I'll tell you, with so many things, I think about it all the time. Seems like I'm not making right, they just, I think that they just ignore me.

L: I think a lot of people listen to you, Howard.