2013

Creating an Urban Food Forest

Restoration of Natural Systems ER 390 Project

By Helen King

Table of Contents

List of Figures

List of Figures

CREATING AN URBAN FOOD FOREST

Abstract

Victoria is being presented with an opportunity to increase its urban food forest due to trees coming to the end of their lifespan. Located on the Saanich Peninsula of Victoria, this project shows how a residential urban food forest can be created and examines the soil needed to make it successful. A hummingbird garden will also be created as they are frequent visitors to the garden and provide valuable pollination and pest control. The project will also examine the tree inventory on Denrob Place. By examining this tree inventory we can determine how the area contributes to the urban food forest in its neighborhood and to the Victoria area. The project also looks at 4 different areas around the world including Spring Ridge Commons in Victoria, Vancouver, B.C., Seattle, Washington, and Cuba to determine how well Victoria stands up to places that are already establishing their urban food forest.

Introduction

In the 1800's Victoria was a major fruit tree producer for British Columbia. The remains of these orchards can be found in the backyards of homes throughout the Victoria region. There is an example of the remains of an orchard on the University of Victoria grounds by Henderson Road. Today these remaining sites are being severely impacted by urban sprawl with roads and houses now occupying these sites. Even so, Victoria still has the potential to increase its food supply by increasing its urban food forest and creating a holistic, edible ecosystem.

I have determined that there is a high interest in creating an urban food forest by becoming involved with the community at various events through the various Restoration of Natural Systems (RNS) class projects and through events presented by the University of Victoria. This includes the UVic Community Market and creating The Urban Harvest through a Geography class project. There is a growing interest in replacing standard ornamental trees with fruit and nut trees and also increasing the number of these trees in new subdivisions. Residents in the area are reducing areas of lawn and converting them to productive vegetable lots.

This project will focus on creating an urban food forest in a Victoria backyard residence and establish an inventory of the type of trees that exist in the immediate surrounding neighborhood to determine its contribution to the food forest in Victoria. It will also look at other cities and countries around the world to see what they are doing to contribute to their urban food forest. These examples

include Spring Ridge Commons in Victoria, Vancouver, B.C., Seattle, Washington, and Cuba. There are many benefits to having an urban food forest. With proper implication and plant selection, a food forest can be self sustaining. It not only provides the home owner or property owner with sustainable food but also provides essential habitat for wildlife and insects. It also provides pest control and pollination which is a major part of healthy ecosystem. Keeping plants in the soil conditions that suite them best also helps to reduce the amount of water usage needed to maintain a garden.

The Goals of the project include:

- Tree Inventory of Denrob Place
- Determine other vegetable gardens in the street
- Determine its contribution to the Victoria Food Forest
- Create an urban food forest in a backyard setting
- Create a hummingbird garden
- Wildlife Inventory
- Use methods learned in the Restoration Program to determine site specifications

Site Location

The study site is in the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic zone and is located approximately 5km north of Victoria, in the Saanich municipality, on the Saanich Peninsula on Vancouver Island, British Columbia. The street location for the tree inventory and the house location is Denrob Place located just off Panorama Drive in a neighborhood called Christopher Heights.

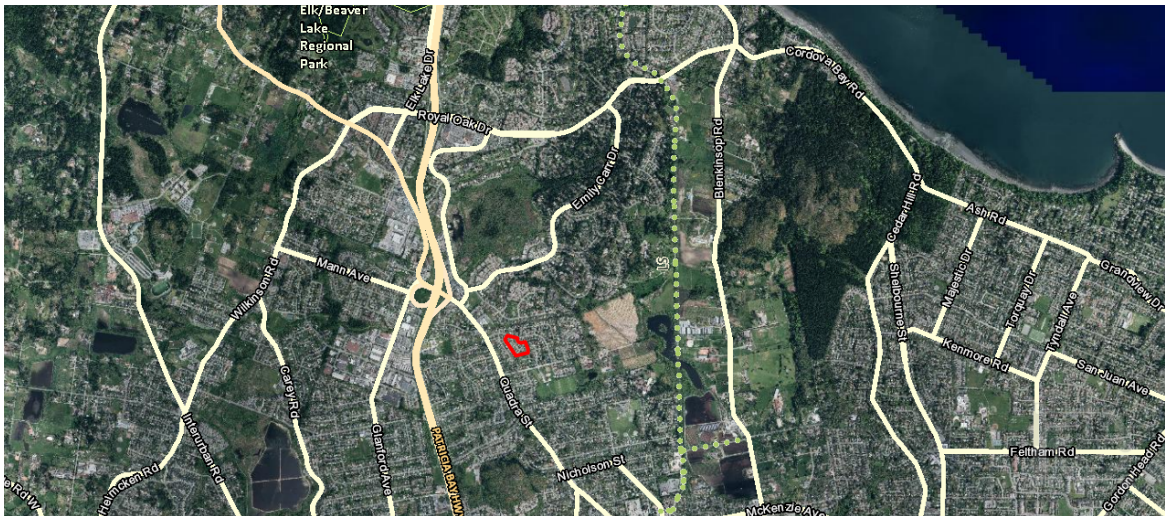


Figure 1 Site Location on Peninsula

Figure 2 Site Boundary

The location for the backyard food forest is located in the rear of the property in the north east corner of the lot. The site receives a lot of sunlight during the daytime. The location is protected from wind and erosion as there are many larger shrubs, homes and fences protecting the site. The existing site conditions, from previous home owners, include 1 plum tree (sp.), 1 cherry tree, 3 fig trees and a purple plum known as Purple Gage *(Prunus domestica)* (Keepers Nursery). Already frequenting the garden are several Anna's hummingbirds *(Calypte anna)* which are present throughout the year in part due to two hummingbird feeders maintained by the owners. Plants will also be chosen to create a healthy hummingbird habitat. These will include flowering plants that produce nectar and attract other insects. Already existing in the backyard is a Western Red Cedar *(Thuja plicata),* a Brandon Cedar Hedge *(Thuja occidentalis)* and several smaller trees that can be used for nesting and resting.

Figure 3 Site of Food Forest

Wildlife

The study site is a relatively open street with few fences separating most lots. Frequent visitors to this street include deer (*Cervidae*), rabbits (*Leporidae*), grey squirrels (*Sciurus carolinensis*), mason bees (*Osmia*), bumble bees (*Bombus*), wasps (*Vespula*), and many bird species. While the presence of deer can pose challenges when creating an open food forest they also need to be considered by planting shrubs in accessible areas, this will provide additional food and perhaps help reduce some of the damage resulting from their grazing. Determining the existing wildlife is an essential factor when considering what species to plant and where its location in the food forest should be. By increasing the biodiversity of the area it can increase the list of wildlife species that come into the area which will further enhance the biodiversity. This would not only benefit the immediate area but the surrounding neighborhood as well.

Methods

Determine Site Specifications

Based on specifications of the residential lot being used for this project and the conditions of the lot, a site was chosen to establish the food forest. Once the site had been established, the slope, aspect, soil characteristics, sun and shade exposure and accessibility were determined.

A compass was used to determine the aspect of the site. From the back of the garden the site has a southwest aspect. Next I determined where the sun would be during the majority of the growing

season. There is approximately 2200 hours of measurable sunshine per year in Victoria (Victoria Climate) and there is approximately 200 frost free days (Frost Chart for Canada). There is some partial shade along the east side caused by the fence but the majority of the area receives full sunlight during the daytime. The site has a very gradual slope, less than 1%.

A soil pit was dug to examine the soil. We dug a hole until we hit a solid layer of clay. Using a shovel laying across the hole and a tape measure, we were able to measure the hole as being 0.35 meters deep before reaching the clay layer. By using the Key to Relative Soil Moisture Regime and the Key to Soil Nutrient Regime, from the RNS ER312B Course Manual, I determined the Soil Nutrient Regime and the Soil Moisture Regime. The Soil Nutrient Regime (SNR) was determined to be rich (R). The area had recently received heavier rainfall than typical for the time of year. The soil was quite wet at this location due to the slope and run off of the land in this section of the yard. The Soil Moisture Regime (SMR) was determined to be a 5 in this area. Based on the Soil Nutrient Regime and the Soil Moisture Regime, the site series for this area was determined to be 06 CwBg – Foamflower. There are also a high number of worms in the soil indicating that the soil is healthy and contains enough organic material.

Materials and Tools Required

- Shovel
- Fork
- Trowel
- Tape measure
- Plants
- Soil
- Large rocks
- Notebook
- Plant Identification Book

Creating the Food Forest

Once the site was chosen and the specifications for the food forest location had been determined I removed all the weeds and plants that would not suite the food forest. Some of the plants that were removed were blue iris and bell flower. There were some existing plants that could be reused which include raspberry plants and strawberries. These were carefully removed and preserved to ensure they were not damaged. New soil was mixed into the existing soil to make sure there were sufficient nutrients for the new plants.

Figure 4 Existing Site Conditions

A site plan was drawn up to include fruit trees, vegetables, herbs and pollinators. See Appendix for Site Plan. This was done using the Seven Level Beneficial Guild method (Page, 2012). Using this method, plants were selected at the following levels:

1. Canopy
2. Low Tree Layer
3. Shrub Layer
4. Herbaceous
5. Rhizosphere
6. Soil Surface
7. Vertical Layer

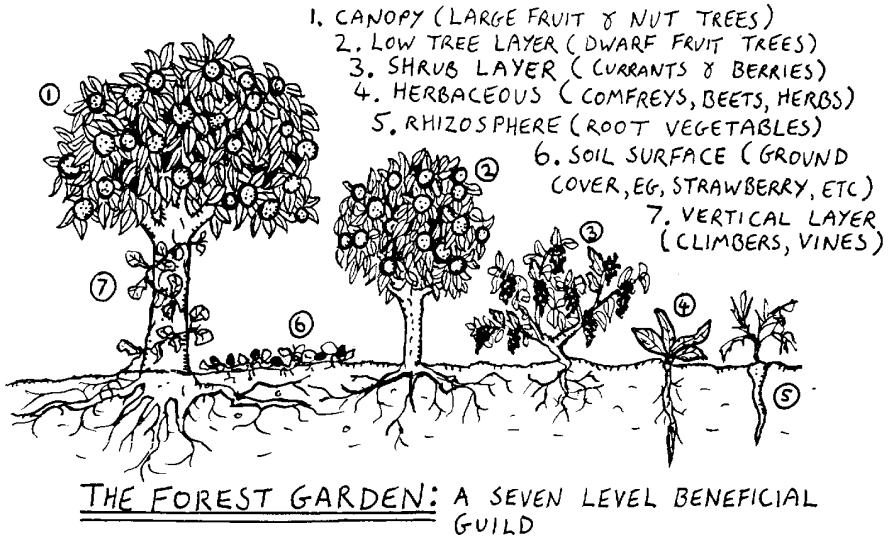


Figure 5 Seven Level Benefical Guild

There are many options for the Seven Level Beneficial Guild. Following is a list of potential plants that can be used for each level of the guild.

Table 1

Level	Plant Types and Variety
Canopy	Chestnut (Castanea dentate) Apple Tree – McIntosh (Malus domestica 'McIntosh') Apple – Gala (Malus domestica 'Gala') Apple – Braeburn (Malus domestica 'Braeburn') Plum Tree – Green Gage (Reine claudes) Fig (Ficus carica)
Lower Tree Layer	Apple – Fuji Dwarf (Malus domestica 'Fuji') Apple - Gravenstein Dwarf (Malus domestica 'Gravenstein' Cherry – Bing Gisela Dwarf (sp.) Cherry – Rainer Gisela Dwarf (Prunus avium) Nectarine – Golden Prolific Dwarf (Prunus persica 'Golden Prolific') Peach – Empress Dwarf (Dinter Nursery) (Prunus persica 'Empress') Goji Berry (Lycium barbarum) Pear – Bartlett Dwarf (pyrus communis)
Shrub Layer	Raspberry (Rubus Subgenus Idaeobatus) Blueberry (Vaccinium corymbosum)

	Currents (Ribes rubrum) Gooseberry (Ribes uva-crispa)
Herbaceous	Rosemary (Rosemaryinus officinalis) Thyme (Thymus vulgaris) Parsley (Petroselinim crispum) Chives (Allium schoenoprasum) Oregano (Origanum vulgare) Comfreys (Symphytum officinale) Sage (Salvia officinalis) Sweet Basil (Ocimum basilicum) Camomile (Chamaemelum nobile) Cilantro (Coriandrum sativum) Dill (Anethum graveolens) Cumin (Cuminum cyminum) Fennel (Foeniculum vulgare) Lavender (Lavandula angustifolia) Spearmint (Mentha spicata) Peppermint (Mentha x piperita) Lemon Balm (Melissa officinalis)
Rhizosphere	Carrots (Daucus carota) Horseradish (Armoracia rusticana) Parsnip (Pastinaca sativa) Radish (Raphanus sativus) Beet (Beta vulgaris) Rutabaga (Brassica napobrassica) Turnip (Brassica rapa rapa)
Soil Surface Layer	Strawberry (Fragaria ananassa) Mint (sp.) Kinnikinnick (Arctostaphylos uva-ursi)
Vertical Layer	Grapes (Vitis labrusca) Kiwi (Actinidia deliciosa)

This section of the food forest already includes a narrow Brandon Cedar hedge (*Thuja occidentalis*) approximately 3 meters high along the north lot boundary. This protects the chosen area from wind, an ornamental cherry tree and a purple plum along the fence on the east side. One apple tree will be selected for the Low Tree layer. The shrub layer will consist of raspberry and blueberry plants. The herbaceous layer will include a variety of different culinary herbs. For the rhizosphere layer a variety of carrots, beetroot, turnips, and rutabaga will be planted. Along the soil surface strawberries will be the main ground cover plant for this section.

Once the site was clear and ready for planting, we created a herb spiral with existing rocks from around the garden. The rocks ranged in size from 10-30cm in diameter. A herb spiral is a convenient design that allows for spiral stacking of plants to allow for different shade and moisture requirements.

(Shein & Thompson, 2013) The herb spiral was completed by adding new soil to the spiral. The plants purchased for this section of the garden were bought at Garden Works on Blenkinsop Road. Included in our herb spiral are peppermint, oregano, sage, and chives, with a purple hyacinth at the top and a yellow Ranunculus asiaticus to the side for attracting pollinators and hummingbirds. The following chart lists what was planted in the herb spiral.

Table 2

Plant Name	Layer
Chives (Allium schoenoprasum)	Herbaceous
Peppermint (Mentha x piperita)	Herbaceous
Oregano (Origanum vulgare)	Herbaceous
Sage (Salvia officinalis)	Herbaceous
Purple hyacinth (Hyacinthus orientalis)	Ground Cover
Strawberry (Fragaria ananassa)	Ground Cover
Yellow Ranunculus asiaticus	Ground Cover

Figure 6 Herb Spiral

After the herb spiral was planted and completed, the next step was to fill in the surrounding area with plants. We planted the raspberries, which were set aside at the start, on the West side of the herb spiral next to the fence enclosing the garden. On the East side of the herb spiral we planted the blueberry bush that was purchased to go with the existing blueberry bush that was already in place.

Next we dug the hole for the apple tree. The site originally chosen for the apple tree had to be relocated due to rocks, approximately 10-20cm in diameter, below the soil surface that we were unable to remove. The final location was about 1 meter over from the originally chosen location. This site is far enough away from the existing cedar trees and cherry tree but close enough to include it in this section of the food forest. The following table shows the final list of all plants located for this section of the food forest.

Table 3

Plant Name	Layer
Cherry Tree (sp.)	Canopy
Plum Tree Purple Gage (Prunus domestica)	Canopy
Apple Tree (sp.)	Lower Tree
Raspberry (Rubus Subgenus Idaeobatus)	Shrub
Blueberry (Vaccinium corymbosum)	Shrub
Chives (Allium schoenoprasum)	Herbaceous
Peppermint (Mentha x piperita)	Herbaceous
Oregano (Origanum vulgare)	Herbaceous
Sage (Salvia officinalis)	Herbaceous
Purple hyacinth (Hyacinthus orientalis)	Ground Cover
Strawberry (Fragaria ananassa)	Ground Cover
Yellow Ranunculus asiaticus	Ground Cover
Yellow Primrose (Primula acaulis Hethor)	Ground Cover
Red Primrose (Primula acaulis Hethor)	Ground Cover

Creating Healthy Soil

To maintain a healthy soil, four basic elements are needed. (Shein & Thompson, 2013) The following tables show what materials make up the green and brown material that you could use for your compost.

Table 4

4 Basic Elements	Materials
green (wet) material	Animal bedding, coffee grounds, compost crops like comfrey, cover crops, crop residues such as spent tomato vines, grass clippings, juice pulp, kitchen

	scraps, manure, seaweed, tea bags and leaves
brown (dry) material	Cardboard, Dried crop residues like sunflower stalks, Dried leaves, Newspaper, Office paper, straw, wood shavings and wood chips
Air	
Water	

To ensure that your materials are properly breaking down it is important to maintain a proper carbon to nitrogen ratio. This helps kitchen scraps and vegetation to breakdown. The carbon is often lacking from compost materials. The ratio of carbon to nitrogen (C:N) should be about 30 to 1. (Shein & Thompson, 2013)

Native Plants

There are many native plant species that would work well in an Urban Food Forest that naturally thrive in Victoria BC. They have been used by First Nations in various ways. An example of this is the Kinnikinnick. The bright red berries are used by bear, birds and other wildlife. The herb is used in traditional medicine. The leaves are gathered, dried and crushed for storage in air tight containers and used for medicinal tea. While not all native plant varieties are edible, the following list shows potential plant species that can be added to your Food Forest. (Kinnikinnick Native Plant Society)

Table 5

	Native Plant Species
Trees	Chokecherry (Prunus virginiana) Hawthorn (Crataegus) Paper Birch (Betula papyrifera) Ponderosa Pine (Pinus ponderosa) Quaking Aspen (Populus tremuloides) Rocky Mt Maple (Acer glabrum) Western Hemlock (Tsuga heterophylla) Western Larch (Larix occidentalis) Western Mountain-Ash (Sorbus scopulina) Western Redcedar (Thuja picata Donn) Western White Pine (Pinus monticola)
Shrubs/Vines/Bushes	Douglas Spirea (Spiraea douglasii) Ocean Spray (Holodiscus discolor) Oregon Grape (Majonia repens) Saskatoon Serviceberry (Amelanchier alnifolia Nutt.)

	Orange Honeysuckle (Lonicera ciliosa) Western Mountain-Ash (Sorbus scopulina)
Herbs	Bunchberry Dogwood (Cornus canadensis Devil's Club (Oplopanax horridum) Kinnikinnick (Artostaphylos uva-ursi) Lupine Lupinus) Sandberg Desert-parsley (Lomatium sandbergii) Mountain Lady's Slipper (Cypripedium montanum) Pearly Everlasting (Anaphalis margaritacea) Queen's Cup Bead Lily (Clintonia uniflora) Red Baneberry (Actaea rubra) Spreading Dogbane (Apocynum androsaemifolium) White Hawkweed (Hiericium albiflorum) Wild Blue Flax (Liaum perenne var lewisii) Yarrow (Achillea millefolium)

Creating a Hummingbird Garden

Hummingbirds are natural pollinators, therefore an important part of an urban food forest and a healthy ecosystem. As there is often a presence of Hummingbirds in the garden, plants are also going to be chosen to create a Hummingbird garden. The species that visits this area frequently is the Anna's Hummingbird (*Calypte anna*). A benefit to including a hummingbird garden within your food forest is that they help to control pests. Hummingbirds rely on small insects for protein; for example the mosquito. By having them in your garden, you are eliminating the need for pesticide use. (Hummingbird.net) Hummingbirds have little sense of smell and are attracted to dark red, purple, and pink flowers. By implementing these types of plants into your garden you will increase the presence of these tiny birds.

There are many plants that can be chosen to attract hummingbirds to a garden. Listed below are some of the many varieties of perennials and other plants preferred to Hummingbirds. (Hummingbird.net)

Table 6

Perennials	
Bee Balm (Monarda)	Hosta (Hosta)
Canna (Canna)	Hummingbird mint (Agastache cana)
Cardinal Flower (Lobelia cardinalis)	Little cigar (Cuphea ignea
Columbine (Aquilegia)	Lupine (Lupinus perennis)
Coral Bells (Heuchera)	Penstemon (Penstemon plameri)
Four O' Clocks (Mirabilis jalapa)	Yucca (Yucca filamentosa)
Fox Glove (digitalis)	

Table 7

Other Preferred Plants	
Apple Blossom (Malus)	Bubble Gum Mint (Agastache cana)
Azalea (Rhododendrom)	Hollyhock (Alcea)
Bottlebrush (Callistemon)	Red Hot Poker (Kniphofia)
Snapdragon (Antirrhinum)	Trumpet Vines (Campsis radicans)

Hummingbirds are also attracted to tubular or trumpet flowers (Garden). When purchasing new plants for a hummingbird garden it is important to make sure that hybrid flowers are not used as they produce less nectar than natural varieties. (Garden) Selecting a variety of flowers that bloom at different times throughout the year will also ensure that hummingbirds visit the garden year round.

Tree Inventory

The tree inventory was conducted on Denrob Place and the immediate surrounding area. This area is approximately 1.77 hectares. There is a major power line that follows the road; therefore, there are some height restrictions along this site for trees located in the front yards or houses. Because of this height restriction there are a lot of shrubs and hedges in this area under the powerlines. A site survey was done to determine the tree inventory of the area. As you leave the Denrob Place area you begin to see an increase in tree heights and the species change. There are a high number of large Garry Oak (*Quercus garryana*) trees in the surrounding neighborhood with a few large cedars. This indicates that this area is part of a Garry Oak Ecosystem.

Figure 7 Boundary Area

A Questionnaire was distributed to the home owners of Denrob Place to gather the data for the tree inventory and to determine if they have vegetable gardens. The following list shows the data received from the study area. Only 2 homes had a current vegetable garden. See Appendix for Survey.

Table 8

Common Name	Scientific Name	Number of Trees
Schurbert Chokecherry	Prunus virginiana	2
Garry Oak	Quercus garryana	3
Western Red Cedar	Thuja plicata	5
Apple Tree	Sp.	5
Columnar Aspen	Populus temula	1
Crab Apple	Sp.	1
Brandon Cedar Hedges	Thuja occidentalis	2
Scotch Pine	Pinus sylvestris	1
Mountain Ash	Sorbus Scopulina	1
Red Osia Dogwood	Cornus sericea	1
Fig	Sp.	3
Plum	Sp.	1
Purple Gage (plum)	Prunus domestica	1

Potential Contribution to Victoria's Food Forest

Urban food forests not only create a green city but it also provides a means for utilizing organic waste products from the city, reduces pollution, minimizes the urban heat island effect and helps to improve air quality. (McLeod, 2009) Local food promotes sustainability, increases local food security, preserves and increases green space and creates a healthy ecosystem.

The lifespan of a typical tree throughout Victoria usually consists of about 50 years. There are many trees throughout Victoria that are coming to the end of their lifespan. This presents Victoria with the opportunity to replace these trees, as needed, with trees that are more sustainable and able to contribute to the urban food forest. These replacement trees can include both fruit and nut trees with an example of this being the chestnut tree which has a lifespan of 100 years and would produce food for that length of time as well as providing homes for much wildlife.

The lack of fruit and nut trees in the study area of Denrob place makes it difficult for it to contribute to Victoria's urban food forest in its current state. However, due to the fact that there are few trees in the study area, this increases its potential contribution to the Greater Victoria food forest with promotion and community support. There is a lot of land available for food growth that not only feeds the community but also creates a healthy ecosystem by increasing soil health, providing homes for wildlife and also to increase the bee population by allowing them to pollinate. There are many

possibilities for incorporating fruit and nut trees into the yards of this neighborhood, which would significantly influence the contribution to the urban food forest.

Many residents in Victoria and the surrounding area do not have yards. All individuals have the opportunity to add to the urban food forest whether they have a home with a yard or an apartment with a balcony. Balconies are just as beneficial for creating a food forest on a smaller scale. Just a 45 square foot balcony can produce enough food for a small family. Through container gardening this can be made possible. Below is a list of a potential balcony garden (Shein & Thompson, 2013).

Table 9

Balcony Garden Plant List
Patio Fig tree
Columnar "pole" Apple tree
Raspberry
Blueberry
Tomatoes
Cherry tomatoes
Beans
spinach
Oregano
Rosemary
Basil
Cilantro
garlic
Lettuce
Swiss chard

Figure 8 Columnar Apple Tree
(Fern, 2009)

It is possible to grow fruit trees on a balcony or small patio by purchasing a variety of fruit trees that are dwarfed for this purpose. An example would be a Columnar Apple Tree which doesn't grow beyond 1.2 meters in height. The Sunshine Blue Blueberry plant also grows to 1.2 meters in height and provides a lot of fruit. These trees should be planted in pairs as they need to cross pollinate (Fern, 2009). These examples show that it is possible to grow sustainable food in any location.

How Does Victoria Stand up to Other Places around the World?

To determine how well Victoria is doing with its food forest we need to look at other cities and countries around the world to see what they are doing. We can also learn about methods used or challenges they had in creating their food forests. Some examples of increasing the urban food forest can be seen by looking at Spring Ridge Commons in Victoria, Vancouver, Seattle and Cuba. All of these

locations are taking different methods to get to the same goal of increasing its urban food forest and create local sustainable food.

Spring Ridge Commons, located in the Fernwood neighborhood of Victoria, BC, is Victoria's oldest public food forest (Spring Ridge Commons). This half acre lot that was once a gravel parking lot currently contains over 100 species of plants using all the layers of a food forest. These plants provide food and medicinal value and provide homes for birds and insects. This small piece of land is an excellent example of Victoria's urban food forest potential. If more of these plots of land existed, Victoria would be well on its way to providing sustainable, healthy food for its residents and also create a healthy ecosystem. This site is also used for education and allows the community to learn about local food production through the Fernwood community center.

Vancouver, BC currently has approximately 600 fruit and nut trees along city streets and with 425 other trees in city parks, community gardens, and pocket orchards (Bedard, Food, 2012). In the next eight years, Vancouver plans on planting food forests across the city in parks, streets and city owned land, which will consist of over 150,000 trees. Vancouver's goals in adding these food forests hope to help the city adapt to climate change, manage storm runoff, support biodiversity, and provide food (Bedard, Food, 2012). When providing this amount of fruit trees, there has to be a way of managing them. Vancouver hopes to attract stewards that will help with the long term care of these trees including watering, pruning and harvesting. This is something that Victoria will also have to consider when planting more fruit and nut trees and creating food forests. Victoria can do this by hiring people to look after the trees and food forests that it grows.

Two and a half miles from downtown Seattle, Washington lays the Beacon Food Forest. This once sloped area covered in grass has been chosen to establish Seattle's first food forest. The area provides excellent sun exposure and with the slope of the land it allows for a variety of plants be to grown, some that are from other climate zones. (Beacon Food Forest) A team was established to design the food forest and allowed for public to help in the design. Phase one was established in 2012 with the full seven acres of land to be developed over the next few years. The food forest will include an edible arboretum with berries from around the world, a berry patch for canning and eating right off the bush, a nut grove, a community garden and a kid's area (Beacon Food Forest). As Seattle has a very similar climate to Victoria, it should be used as a prime example of how Victoria can incorporate food forests into the city. This example in particular shows how you can involve the community and apply many different views and uses for growing food in one area.

Figure 9 Beacon Food Forest Schematic Site Plan

Finally we will look at Cuba. In the early 1900's Cuba lost its trading network and faced a crisis of survival (Koont, 2011). With no access to petroleum, fertilizers, pesticides or agricultural machinery, Cuba had to quickly become self sustaining; this included growing their food. Within a few short years Cuba completely reorganized its agricultural system to focus on human labor using small scale agriculture. This was the start of 'urban agriculture' in Cuba. They went from importing 60% of their food to being able to feed 8 million people. Cuba used every bit of space to create gardens; the most popular size of the garden was between 2-3 square meters to 3 hectares (DAC and Cities). On average 1 to 7 people shared a garden. Produce grown was chosen to be sustainable by choosing the produce that best suited the soil type and location. Multilayer crops similar to the Seven Level Beneficial Guild, allowed people to maximize the growing space. For example, cassava provides shade, sweet potatoes provided ground cover, and beans are used for fixating the soil with nitrogen. Though Cuba is a different growing climate the basic principles they used to establish their local food production allowed the country to be relatively self sufficient. Because Victoria is an island, it should be prepared to be self sufficient in the event that food could not be shipped from the main land. By increasing its urban food forest, Victoria could be well on its way to doing this.

Discussion and recommendations

With the increasing desire for sustainable local food, there are many options that can allow for people to grow their own food. There is no limit to the size of land you can grow food on and even on balconies if land is not available. Neighborhood support is important for a community to become a

success in creating its own urban food forest. Creating a neighborhood assessment is the first step in determining what neighborhoods resources are already available to help create a community based on food sharing (Shein & Thompson, 2013). The neighborhood assessment helps to identify resources and allows you to connect with your community and share the knowledge that already exists within it. The community not only benefits but wildlife and the surrounding ecosystem will also thrive.

Acknowledgements

I would like to thank the staff at Garden Works for their help in choosing plants for the Hummingbird Garden as well as Petri Heiskanen for his help with creating the backyard food forest.

Works Cited

Beacon Food Forest. (n.d.). Retrieved March 27, 2013, from Beacon Food Forest: http://beaconfoodforest.weebly.com/

Bedard, M. (2012, October 8). *Food*. Retrieved March 27, 2013, from Take Part: http://www.takepart.com/article/2012/10/08/grow-it-yourself-trends-sprouts-feed-masses

Bedard, M. (2012, October 8). *Food Forests: All-You-Can-Eat and Coming to a City Near You*. Retrieved March 25, 2013, from Take Part: http://www.takepart.com/article/2012/10/08/grow-it-yourself-trends-sprouts-feed-masses

CRD. (n.d.). *Growing Solutions*. Retrieved March 7, 2013, from Sustainable U: http://www.sustainableu.ca/courses/growing-solutions.aspx

DAC and Cities. (n.d.). *Havana: Feeding the City on Urban Agriculture*. Retrieved March 31, 2013, from DAC and Cities: http://www.dac.dk/en/dac-cities/sustainable-cities-2/all-cases/food/havana-feeding-the-city-on-urban-agriculture/?bbredirect=true

Dinter Nursery. (n.d.). *Fruit Trees for Southern Vancouver Island*. Retrieved March 25, 2013, from Dinter Nursery: http://www.dinternursery.ca/fruit-trees.htm

Doody, B. J., Sullivan, J. J., Meurk, C. D., Stewart, G. H., & Perkins, H. C. (2009). Urban Realities: The Contribution of Residential Gardens to the Conservation of Urban Forest Remnants. *Biodivers Conserv* , 1385-1400.

Fern. (2009, July 31). *Dwarf Fruit Trees Perfect for the Apartment Garden.* Retrieved April 1, 2013, from Life on the Balcony: http://lifeonthebalcony.com/dwarf-fruit-trees-perfect-for-the-apartment-garden/

Frost Chart for Canada. (n.d.). Retrieved April 1, 2013, from The Old Farmers Almanac: http://www.almanac.com/content/frost-chart-canada

Garden. (n.d.). Retrieved March 26, 2013, from World of Hummingbirds: http://www.worldofhummingbirds.com/garden.php

Heiman, C. (2008, August 17). The Urban Forest; Greater Victoria's Tree Canopy is Shrinking - down 8.3 per cent in two decades. *Times Colonist* .

Hummingbird.net. (n.d.). *Attracting Hummingbirds*. Retrieved March 26, 2013, from http://hummingbirds.net/attract.html

Keepers Nursery. (n.d.). *Fruit Trees*. Retrieved March 20, 2013, from Keepers Nursery: http://www.keepers-nursery.co.uk/reine-claude-violette-plum-fruit-trees.aspx

Kinnikinnick Native Plant Society. (n.d.). *Species Profiles*. Retrieved from Kinnikinnick Native Plant Society: http://www.nativeplantsociety.org/speciesprofiles.htm

Koont, S. (2011). *Sustainable Urban Agriculture in Cuba.* Florida: University Press of Florida.

McLeod, H. (2009). *The challenges and opportunities of urban food production: A case study from Victoria, British Columbia.* Toronto: University of Toronto.

Page, S. (2012, September 19). *Permaculture Blog: Session 9: Forest Gardening*. Retrieved March 19, 2013, from Transition Marlborough: http://www.transitionmarlborough.org/blogpost115

Shein, C., & Thompson, J. (2013). Chapters 2 to 5. In C. Shein, *The Vegetable Gardener's Guide to Permaculture: Creating an Edible Ecosystem* (p. 199). Portland: Timber Press Inc.

Spring Ridge Commons. (n.d.). *About*. Retrieved March 27, 2013, from Spring Ridge Commons: http://sc.conscious-choices.ca/?page_id=2

Victoria Climate. (n.d.). Retrieved April 1, 2013, from Wikipedia: http://en.wikipedia.org/wiki/Victoria,_British_Columbia

Wild Orchard: A Food Forest Grows in Seattle. (n.d.). Retrieved March 7, 2013, from Mother Nature Network: http://www.mnn.com/your-home/organic-farming-gardening/blogs/wild-orchard-a-food-forest-grows-in-seattle

Appendix

Tree Inventory Survey

Urban Food Forest Survey

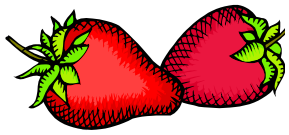
My name is Helen King; I'm a Geography student at the University of Victoria completing my degree this spring with a diploma in the Restoration of Natural Systems. For my final project I am working on creating an Urban Food Forest and am looking to inventory the trees on Denrob Place as a sample of the trees in this area of Saanich.

Background

Fifty years ago Vancouver Island used to produce 85% of its food locally. Today it only produces 5%. Local Food security is becoming more important today as costs increase from processing, shipping and producing as well as the environmental impacts. Southern Vancouver Island has great potential to growing its own urban food forest.

A Food Forest is a gardening technique or land management system that mimics a woodland ecosystem but substitutes in edible trees, shrubs, perennials and annuals. Fruit and nut trees are the upper level, while below are berry shrubs, edible perennials and annuals. Companions or beneficial plants are included to attract insects for natural pest management while some plants are soil amenders providing nitrogen and mulch. Together they create relationships to form a forest garden ecosystem able to produce high yields of food with less maintenance.

Please fill out this short survey and return to the mailbox at ---- Your input will provide valuable information towards researching food security for Vancouver Island.



Survey

Please Identity the species of trees on your property and how many of each.

Do you have fruit or nut trees on your property? If so what type?

Do you currently have a vegetable garden or grow any of your own food?

Thank you for your time. Your input is appreciated!

Please return to the mailbox at ----.

If you are interested in the results please leave your contact information below.

(Names will NOT be used in my project)

Site Plan Drawing