

# Perspectives on the **Food-Energy-Water** Nexus in Metro Seattle:



## **A synthesis report based on stakeholder interviews** October 2016

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*Draft for Public Comment*

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# 1. INTRODUCTION

## 1.1. RESEARCH GOALS

In early 2016, an interdisciplinary team of Washington State University researchers came together to study interdependencies among food, energy, and water (FEW) resource systems. As urban areas concentrate both resources and resource needs, the Seattle metropolitan area was selected as a case study to better understand flows of FEW resources into and out of an urban area. The initial project focus is on food production as it relates to energy and water resource use. Ultimately, this work will provide a foundation to assess how food and agriculture policies and programs may impact interactions among FEW resources.

### LONG TERM OBJECTIVES OF THE WSU FOOD-ENERGY-WATER RESEARCH TEAM

- A) Identify FEW stocks and flows into and out-of three nested domains surrounding the Seattle metropolitan area: King County, western Washington, and the State of Washington.
- B) Assess the water and energy sector implications of increasing the amount of Seattle's food that is sourced locally versus importing food to meet urban demand.
- C) Develop a model of FEW resource interdependencies that supports decision-makers in crafting scientifically informed policies to incentivize local versus imported food, energy, and water production and use.

To support these long-term goals, our research team is working to identify information needs among diverse stakeholders and to locate relevant data sources that will be used to define a conceptual model of FEW flows and work toward a quantitative model of physical processes. We interviewed 27 stakeholders from across western Washington who are working on issues related to food, agriculture, land use planning, and energy and water resource management. The goals of interviews were to deepen our understanding of the factors that influence decisions about FEW systems management, and of emerging concerns, conflicts, and evolving food and agricultural policies in the Seattle area.

This draft report is intended to engage Seattle-area citizens who are interested in food systems and agricultural policy in a conversation about complex interactions among food, energy, and water systems and to understand diverse visions for the future of the greater-Seattle regional food system. We are interested in your feedback about the content of this report and your input during the upcoming Seattle Food-Energy-Water Summit.

### SEEKING INPUT FROM OUR STAKEHOLDERS

Please join us on November 18, 2016 @ the Brightwater Center in Woodinville to share your perspectives

See <http://metrocenter.wsu.edu/metrofew-summit2016/> for full conference details

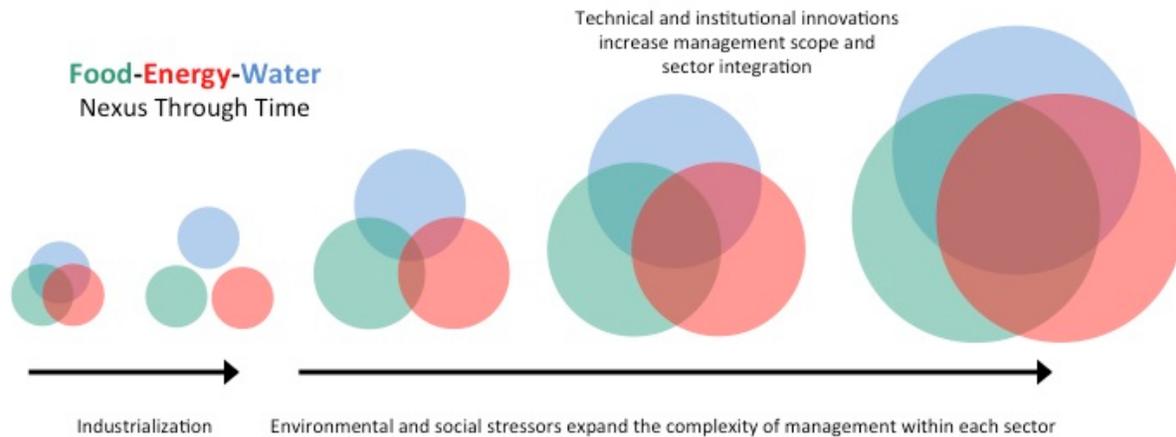
- Would you like to see more or less of the food you buy or consume produced in metro Seattle? In King County? In Washington State?
- To what extent do you value “local food”? How do you define “local”?
- What policies and programs would be impactful in increasing Seattle consumers’ access to locally produced food?
- What do you believe are the largest energy inputs to Seattle’s food system?
- What do you believe are the largest water inputs to Seattle’s food system?
- What local policies and programs could reduce water consumption, energy consumption, and greenhouse gas emissions associated with the food system?
- What local policies and programs could support resilience of the food system in the face of environmental and social change?
- How do you think that increasing local food production would impact energy and water resource uses?

## 1.2. MOTIVATIONS FOR THIS WORK

The past century has seen substantial changes in how society manages food, water, and energy. The pre-industrial and early-industrial economies were inextricably linked to the availability of water and energy to do farm work. If one component of a farm was not managed sustainably, the effects would be immediately apparent. For example, if pumping water to irrigate a crop forced a farmer to spend more on energy costs than the value of their crop the disparity in input costs and profits would quickly become apparent. With both industrial development and increasing urbanization came increasing separation of food, energy, and water resource management.

In our modern context, factors including climate change, population growth, urban development, and international trade agreements have led to increasing complexity of FEW management decisions. Figure 1 illustrates the progression in the coupling of FEW systems over time. As illustrated in the right-most panel of the figure, some decisions lead to short-term benefits in one sector, but ultimately negatively impact other sectors. In order to find “win-win-win” solutions, resource managers must recognize that food, energy and water systems are

tightly coupled, with each sector balancing, offsetting, and absorbing the changes in other sectors. Possible unintended consequences of decisions must be considered and systems must be managed holistically.



**Figure 1.** Tighter coupling of FEW systems over time. Circle size indicates relative complexity of sector management decisions and circle overlaps indicate management interconnections. (Image adapted from Adam, Padowski and Barber, in development.)

### RECOGNIZING FEW SYSTEM INTERCONNECTIONS

Food, energy, and water are deeply intertwined in many of the modern agricultural production systems and in transport, processing/cooking, and consumption, and waste management of modern foodstuffs. Understanding how changes to one sector impact and influence the other two sectors is critical if FEW systems are to be managed sustainably. Examples of these interconnections are:

- Demand for more biofuel production could lead to increased demand for oil seed crops. This “win” in the energy sector might be linked to fertilizer runoff and intensive water use that negatively impacts water quality and quantity and food crops.
- Converting dairy manure to fuel in anaerobic digester systems may reduce methane emissions (a powerful greenhouse gas) and increase the supply of locally produced renewable energy, but waste from such systems may lead to degraded local water quality.
- Growing food crops indoors could be a viable way to expand local food production in urban areas and extend the seasonal availability of fresh local produce while taking advantage of increased water availability out of high summer demand, but could be costly in energy usage to maintain building climate control.
- Expanding water access for food crop irrigation could necessitate curtailment of water for municipal use, hydropower generation, and in-stream ecosystem flows.

Priorities and approaches to managing FEW resources vary across local, state, regional and federal agencies. Urban areas are hot-spots of consumption for FEW resources. When food is imported to feed an urban population it carries with it the “virtual” water and energy resources that were used, elsewhere, to produce, process, and transport it. Increasing local food production could decrease virtual resource flows, but may utilize more energy and water locally for production and processing and may put increased pressure on already over-allocated water supplies in Washington.

Interviews conducted during summer 2016 indicate that connections between water resources and food production are well understood by western Washington stakeholders (access to water for irrigation and flooding risks clearly affect the viability of farming operations). However, connections between energy and food systems in the region are less clearly defined and are typically less at the forefront of decision-makers’ concerns. When stakeholders consider energy and water interconnections they often think in terms of water management for hydroelectric energy generation. Energy costs of treating water and pumping water are less frequently considered.

Consideration of FEW resource interactions is vital in the context of rapid regional change. Washington’s Office of Financial Management estimates that King County’s population will grow from about 1.9 million people in 2010 to about 2.4 million people in 2040 (Seattle Office of Planning and Community Development, 2016). In 2015, the population of the central Puget Sound region grew by 2.2%, the highest growth rate in the past 20 years (Puget Sound Regional Council, 2016). And at the same time, climate change is projected to reduce water availability during peak growing season in the Northwest US due to less water being stored as mountain snow pack and changing precipitation regimes (Luce et al. 2013; Chang et al. 2013).

Global climate change impacts are expected to make western Washington an even more critical agricultural area for feeding the nation as other regions become less suitable for some types of agricultural production (Eigenbrode et al. 2013; Rosenzweig et al. 2014). This transition will bring to the region and state both economic opportunities and serious concerns about energy, water, land use and agricultural pollution. Many interviewees expressed a desire to work toward improved coordination and collaboration across agencies and organizations in terms of setting goals for the future of food production in the region and addressing barriers to meeting those goals.

Through modeling, this research will strengthen understanding of complex interdependencies among FEW resources and enable exploration of policy alternatives. Models cannot tell us which system or policy is “best”, but they can simulate FEW sector interactions and suggest possible outcomes of specific system changes, to then support informed decisions.

### 1.3. STAKEHOLDER GROUPS AND INTERVIEW APPROACH

We are interested to learn from stakeholders with a wide range of professional roles and perspectives on FEW resource management around Seattle and Washington State. We sought to speak with individuals representing each of four general groups: 1) producer representatives, 2) consumer representatives, 3) energy and water policy decision makers, and 4) food policy decision makers. Classifying stakeholders based on their roles is a challenge as many individuals work at the interface of two or more groups. From nearly 200 individuals identified as members of the four stakeholder groups, we invited 50 individuals to be interviewed across a range of areas of expertise. A total of 27 semi-structured phone interviews were conducted during summer 2016, which generated a wealth of information about how Seattle-area stakeholders are thinking about “local food” and what opportunities and challenges there are for local food production, distribution, equitable access, and related policies. See the appendix for the full list of individuals who were interviewed and their professional affiliations.

**Producer representatives (7 individuals):** individuals in western Washington who produce food or work closely with agricultural producers to develop farm management plans or to bring their products to markets focused on challenges that small and mid-size producers face in scaling up their operations and in maintaining viable business models. These stakeholders detailed specific zoning and taxation policy changes that they believe would best support increased food production in western Washington. Access to irrigation water and managing flood risks are central issues that drive producers’ decisions.

**Consumer representatives (5 individuals):** individuals experienced with concerns and priorities driving Seattle area residents’ food purchasing decisions observed a stable, but not necessarily growing, interest in locally produced food and perceived that the public generally has limited awareness of water and energy issues associated with agriculture. Consumers who value locally grown food were perceived to do so because they see community-building and economic benefits of supporting local producers and they appreciate the high quality of local food products.

**Energy and Water Policy Decision Makers (8 individuals):** individuals who make natural resource management policy decisions at municipal, county and statewide scales highlighted management challenges related to frequent flooding that King County farmers face, the tradeoffs between preserving riparian zones for salmon habitat and farmland, and potential impacts of increasing irrigation efficiency. Water managers were hopeful about the potential for residents’ water resource councils to manage water effectively in farming communities. Other key issues raised were the difficulty of creating water markets in the context of recent court decisions about water rights transfers.

**Food Policy Decision Makers (7 individuals):** individuals focused on agricultural policy or, separately, food access policy discussed the importance of programs that support farmers and farmland preservation: a need to balance resource allocation to support farmers currently and

to ensure long-term preservation of agricultural lands and productivity in the region. They identified market forces and federal policies that perpetuate existing agricultural practices. In the context of these market and federal policy forces, crafting appropriate and allowable local food and agricultural policies is a challenge.

## 2. STAKEHOLDER INTERVIEW FINDINGS ABOUT SEATTLE-WASHINGTON FEW NEXUS

### 2.1. MULTIPLE VISIONS OF A SUSTAINABLE FOOD SYSTEM FUTURE

Seattle-area stakeholders hold different visions of an ideal food system for the future. These visions imply different projected patterns of FEW resource interactions. Broadly speaking, the stakeholders interviewed for this project believe that it is a desirable goal to increase food production in King County and western Washington and increase consumption of locally produced food in the Seattle area. Two distinct visions of an ideal regional food production future emerged from among the interviewees: 1) A densely urbanized region should be surrounded by highly productive larger farms, 2) A smaller urban core should be surrounded by green space used for food production interspersed through the residential zones. Many stakeholders don't see these visions of the future as mutually exclusive, stating that they would like to see more opportunities for farms of all sizes throughout the region. Different patterns may also be appropriate for cities of different sizes and environmental settings. At the same time, several stakeholders expressed frustration that agencies and organizations are occasionally working at cross-purposes by supporting different visions, as expressed in zoning, farmland preservation policies, taxation structures, and infrastructure investments.

Advocates for the **sharp urban-agricultural boundary model** feel that sprawl is a serious concern and would like to maximize the efficiency of local food production by scaling up farming operations to meet a higher proportion of local food demand. These stakeholders expect that larger farms may be able to effectively implement technologies that ensure more efficient use of irrigation water and energy. Some stakeholders see larger local farms as a pathway toward decreasing reliance on agricultural products from outside of the region. They expect that larger farms would have greater capacity to supply grocery chains and distribution companies with local produce and that economies of scale could support increased local food processing for out-of-season consumption. Increasing local food processing could increase local energy and water use while reducing transportation energy use.

Advocates for the **mixed urban-agricultural model** focus on the social and cultural benefits of urban and local food production. These stakeholders state that it is important for consumers to strengthen their connection to the people who grow their food and to better understand the environmental considerations associated with agriculture. Stakeholders in favor of mixed urban-agricultural development emphasize the value of policies that support small- and mid-

size producers in processing and selling products locally and generally focus less on the amount of local production than on supporting practices that conserve soil and water resources.

Some stakeholders support a mixture of several land use policies and local food policies. Focusing on different values, and emphasizing those values in different combinations, leads to different policy alternatives, which influence how FEW resources are allocated, used, and how they flow across regional boundaries. Detailed exploration of these many possible policy options is the ideal use of a FEW-system model.

In response, we are interested in compiling examples of different zoning approaches in Washington counties and in other states, including how urban growth boundaries and agricultural zones are defined and how different agricultural uses are incentivized. We are also interested in the perceived or realized opportunities and consequences associated with emerging practices such as indoor vegetable cultivation and the use of reclaimed wastewater for irrigation. It is these types of policy decisions and their associated impact on FEW resource utilization that our model will ultimately help test; allowing policy makers to make informed decisions.

#### **Interviewees' Most Frequently Expressed Policy Goals**

- Expand public and private farmland preservation programs; focus on maintaining urban density and fighting sprawl.
- Preserve green space and utilize open space for food production, preserve soil quality on farmland for drainage and carbon storage benefits.
- Reward food production in urban spaces, residential spaces, and on farmland.
- Maximize the efficiency of food production, while pursuing neutral or positive impacts on soil quality, water quality, and air quality.
- Preferentially support certain types of agricultural production (e.g., incentivize fruits and vegetables over forage production, use of grain as a cover crop, and promote local wheat or organic meat).
- Designate land currently zoned for agriculture as “working land” in the Washington State Growth Management Act, so that agricultural lands are protected under state, as well as county, laws.
- Expand institutional markets for local food, including hospitals, universities, businesses, and large restaurant chains.

## 2.2. ON SUSTAINING REGIONAL FOOD, ENERGY AND WATER

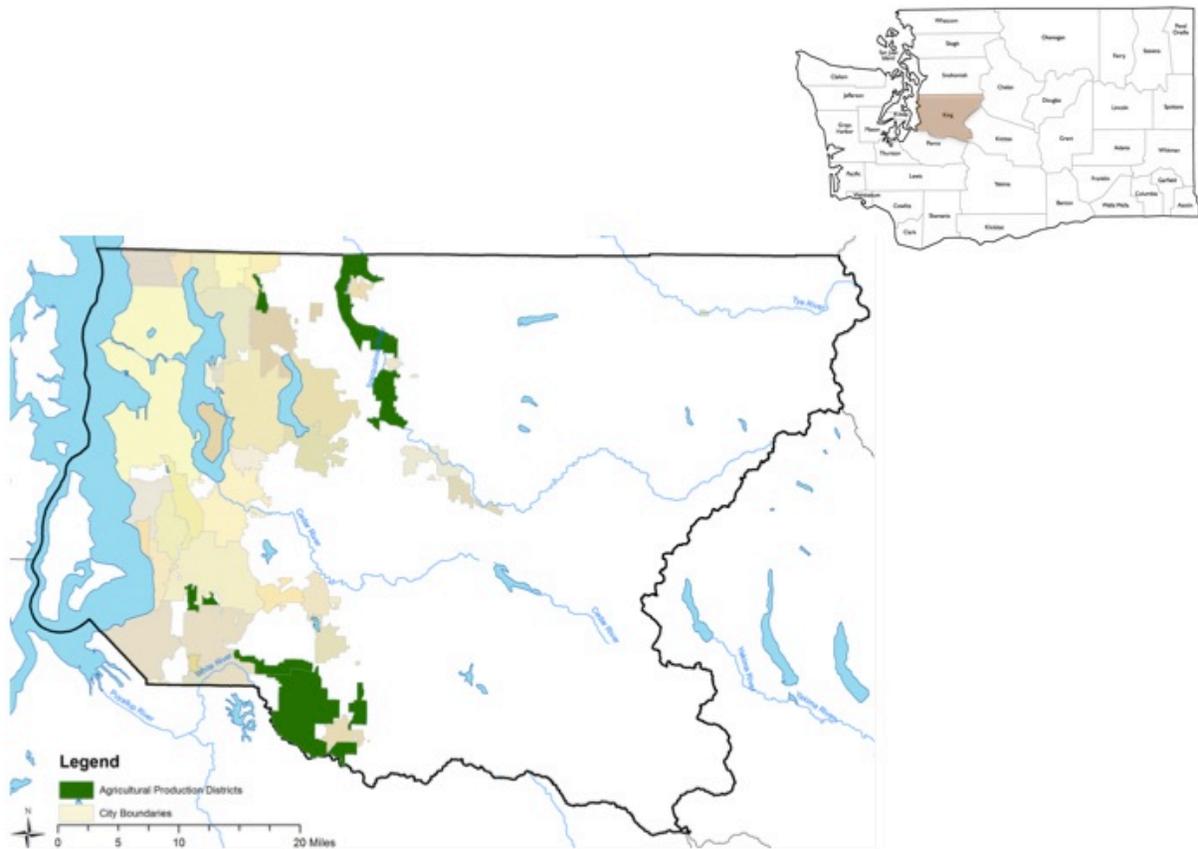
### DIVERSITY OF REGIONAL AGRICULTURE

Stakeholders emphasized that the challenges of most concern to Washington state producers are highly variable depending on their specific local climate, topography, zoning, and natural resource policies, as well as their personal background, values, and business model. Depending on the kinds of agricultural operations stakeholders work most closely with, their perspectives on the most impactful policies and most significant challenges differ.

For each agricultural commodity produced in Washington, a few counties dominate production. Wheat production is concentrated in southeast counties, while milk production is greatest in Yakima county and northern Puget Sound (Whatcom, Skagit and Snohomish counties) (USDA NASS, 2012). Apples are grown throughout the state, but more than half of Washington's apple acres are planted in Yakima and Grant counties (USDA NASS, 2012). Vegetable production is concentrated in Grant, Benton, and Franklin counties. Average farm size varies greatly among counties.

Diversity in farming operations exists even at the county scale. King County has five agricultural production districts (APDs), which encompass 42,000 acres of prime farmland (Figure 2). Agriculture is supported within the APDs through the protection of agricultural soils and strict limitations regarding development (King County Local Food Initiative, 2015). In King County, farm sizes range from several-acre organic vegetable growing operations to large commercial forage producers. Stakeholders noted that nearly 80% of the actively farmed land in King County is used for livestock production in some form (e.g., dairies, pasture, or forage production). Land growing market crops (non-irrigated flowers, irrigated specialty and organic vegetables, berries, orchard fruits, and wine grapes) accounts for 5% of the APD area. With 245 vegetable farms, King County has the largest number of vegetable farms of any Washington county. However, the total acreage plan ted to vegetables in 2012 was just 984 acres, for an average farm size of 4 acres (USDA NASS, 2012). The gross saleable market value of fruit and vegetable production in King County is estimated at \$20 million (King County Local Food Initiative, 2015).





**Figure 2.** Locations of King County Agricultural Production Districts.

### **THREATS TO REGIONAL FOOD SYSTEM SUSTAINABILITY**

**Climate change** is an increasingly prominent topic in stakeholders’ discussions of challenges for the regional food and agriculture system. Higher temperatures have many possible consequences for producers, including increased water demand, less reliable summer water availability because of reduced snowpack, early season flooding, earlier harvest dates, and changes in pest and disease pressures. There are concerns about increased incidence of extreme weather events, droughts, and flooding. These changes add uncertainties to what is already a very high-risk business. Consumers generally have less awareness about the impacts of climate change on the agricultural systems that support their food supply.

**Access to water** for irrigation is an ongoing concern for many stakeholders. Interviewees noted that King County underwent a shift in the late 70s and early 80s when many dairies closed and the number of small fruit and vegetable producers began to expand. As traditional livestock agriculture farms converted to crop production, some farms came with historic water rights,

but many did not. In navigating the water rights system some farmers have been able to lease water, while other shifted to growing un-irrigated flowers or are using exempt wells. Interviewees noted that in typical summer conditions farmers without access to groundwater are still able to grow flowers and some other crops if they are located close to a river where soil holds sufficient moisture, but in drought conditions those farms are at risk of substantial losses. Climate change is expected to intensify challenges for unirrigated farms.

**Flooding** is a serious management challenge for King County producers in particular. Federal Food and Drug Administration regulations prevent food crops that have been touched by floodwaters from being harvested. Also, some cropping insurance options are not available to growers in floodplains. Somewhat ironically, at the same time, floodplain soils are rich, hold water well, and have a shallow water table that can be useful to the crops. Being in a floodplain limits where farm infrastructure can be built and where homes for farmers can be built. As local food demand increases for shoulder season and year-round production, early spring or late fall flooding is an even more significant concern.

## 2.3. ON PROMOTING LOCALLY PRODUCED FOOD

### **DEFINING “LOCAL”**

Increasing the proportion of the Seattle-area food supply that is locally produced is a desirable goal according to many. Most stakeholders placed emphasis on the concept of sourcing food products “as close as is reasonable”, stating that sustainable production is a more important value than hyper-local production. Variations of this statement were frequently heard: “Food should be produced as close to where it's consumed as possible, but that will be different for every type of food”. There was a widespread view that policy makers and consumers should focus on supporting efficient food sourcing; making decisions based on “what each region does best”. Stakeholders in all sectors interviewed tended to have flexible definitions for what makes food local.

Interviewees recognized that sourcing all Seattle’s food from within King County-- or even within Washington State-- is not realistic in the foreseeable future based on consumers’ desire for products that cannot readily be grown in Washington (e.g. avocados and bananas). Several stakeholders stated that they thought of concentric circles when defining which products are local—giving preference to crops grown in the immediate area in season, but considering, for example, a product grown in Oregon to be more local, and hence preferable, to the same product grown in California. Themes in perspectives on local food production from different stakeholder groups are outlined below on the following page.

### **Producer representatives:**

- *Business and land first:* Producers tend to prioritize whether food production is environmentally responsible and economically practical, selling locally is generally not a top priority.
- *Diverse distance:* Many producers who sell at Seattle area farmers' markets are farming on the urban fringe, but some producers come from as far away as central and eastern Washington.
- *Cooperative...or not?:* For producers' cooperatives, a connection to a specific agricultural place name may be seen as an opportunity to tap into customer recognition. Cooperative members may disagree about which farms should benefit from that "local" branding, depending on their actual location and the production practices that they employ.

### **Consumer representatives:**

- *Local is not "local":* Some Seattle customers may say that within 150 miles of the city is local, but that definition eliminates most of Washington's apple production, which they also consider "local".
- *Freshness counts:* When consumers place a high value on local food production it is often because locally produced foods tend to be fresh, high quality and assumed to be sustainably produced. Definitions of local may change with seasons; it is easier to eat locally during harvest season. Many consumers lack knowledge about what foods can be grown locally and during what seasons they are available.
- *Food-type matters:* Local produce, meat, dairy products are higher priorities for consumers than are locally produced grains and packaged foods.

### **Energy and Water Policy Decision Makers:**

- *Prior appropriations:* Law governs water access in Washington. There currently are no legal mechanisms for giving preference to water use for local food production.
- *Transportation costs:* The energy costs associated with transporting food are an important consideration; the largest energy cost in the food system may be consumers driving their personal vehicles to grocery stores.

### **Food Policy Decision Makers:**

- *Local is not everything:* Focusing on definitions of "local" may distract from more critical food and agriculture policy issues including food access, energy and water use, and general sustainability of farming operations.
- *Local differs by crop:* What constitutes local varies for different crops; for example, many feel that sourcing Seattle's wheat from eastern WA is an important goal.
- *Influences of trade:* Many feel that systems should adapt so more Washington-grown products stay within the region rather than being shipped internationally.
- *Intersecting values:* For many policy makers, supporting local food is an important value because it is linked to the objectives of preserving open space and preserving the livelihood of farmers in rural communities.

Stakeholders recognize that the majority of food consumed in the Seattle metro area comes from large national grocery chains and restaurant chains. While the region has a robust network of producers, processors, and innovative food companies, stakeholders frequently notes that farmers' markets, Community Supported Agriculture (CSA) shares, and direct farm sales are the exception to the rule of where most of the urban population purchases food. Currently less than 2% of the nearly \$6 billion King County residents spend annually on food and drink is grown within King County (King County Local Food Initiative, 2015). Still, interviewees perceive Seattle residents to be among the nation's leaders in their interest and support for a local food culture. Organic and sustainably produced foods are important to many area consumers and supporting local farmers is a priority for some shoppers. Interviewees were divided as to whether Seattle's market for locally produced food is saturated or growing.

### **TRADEOFFS RELATED TO INCREASING LOCAL FOOD PRODUCTION**

Interviewees were asked, "What do you see as potential drawbacks, if any, to increasing food production for local markets?" Stakeholders tended not to think in terms of "negative aspects of local production". Instead, while recognizing that supporting local food production could be linked to tradeoffs for water use, energy use, habitat protection for native species, and other social and environmental goals, stakeholders tended to believe that reducing virtual water and energy flows from outside the region was a desirable goal for metro Seattle. In part this is based on a socially responsible viewpoint of wanting to localize some of the "externalities" of food production (e.g. water use and energy consumption) instead of externalizing them to other communities. Additionally, stakeholders pointed out that farmland fulfills important social, cultural and environmental services, such as carbon storage and flood control. In this section we explore some of the tradeoffs stakeholders identified as potentially associated with increasing local food production for the Seattle population.

***Food-Water tradeoffs:*** Increasing local food production is assumed to require increased water usage for irrigation unless substantial increases in efficiency are incentivized and implemented. At the same time, the region continues to experience rapid population and industrial growth. Regional decision-makers must account for, and contend with, projections for a water-scare future. Existing water allocation laws and conservation of endangered fish are at the core of many concerns for a water-scarce future; policies cannot necessarily preserve in-stream water flows for fish habitat and intensive irrigation at the same time. Choosing to increase local food production may necessitate tradeoffs with water use in other sectors and may require water conservation policies, such as: not watering lawns so water can go to local food, avoiding home gardens to prioritize commercial food production over personal uses, using reclaimed wastewater for food production, and incentivizing grey water household systems to reduce potable water use. Stakeholders explained that recent court cases have set standards that make it difficult to transfer water rights from one use to another, for example to re-allocate municipal water for agriculture. Watershed Improvement Districts are a policy mechanism that has been in place since early in Washington State history but are only recently coming into use

again for groups of producers seeking to collectively manage water resources. Some stakeholders viewed these Districts as an aspect of a hopeful future.

Stakeholders expressed a range of perspectives about the potential use of reclaimed wastewater for irrigation. Some described current pilot projects now underway in King County using reclaimed wastewater to irrigate non-food crops and playing fields. The concept raised some concerns from stakeholders thinking about it from a public health and safety standpoint. Many stakeholders explained that they did not yet have enough information about the potential benefits and concerns of irrigating crops in western Washington with reclaimed wastewater to evaluate the option.

**Food-Energy tradeoffs:** For many stakeholders, the connection between food production and energy resources was somewhat less tangible and less clearly defined than the connection between food and local water resources. The possibility of expanding indoor food production does raise questions about energy needs and what the relative costs and benefits are of growing locally in a climate controlled environment with municipal water compared to less locally, outdoors, with stream or ground water. Stakeholders described interest in test projects, uncertainty about building and energy costs, and uncertainty whether indoor urban production can be profitable enough to justify the costs. There are examples of successful microgreens indoor cultivation in the Seattle area, which some stakeholders referenced as an example of indoor growing that may be environmentally sound and economically profitable. Questions around the future of indoor growing also arose regarding new Washington State laws that legalize growing marijuana; there are remaining questions about where marijuana cultivation is allowed and how to balance water and energy resources needed to grow marijuana against water and energy resources needed for less profitable crops. Intensifying production and intensifying processing infrastructure could intensify energy and water resource use for this new regulated-market commodity.

## 2.4. ON POLICIES AND DECISION MAKING

### RECENT FOOD POLICY INITIATIVES

The Seattle City Council passed the Local Food Action Initiative in 2008, aiming to support the local and regional food system. Specific goals of the Local Food Action Initiative include preventing food waste and increasing composting of non-edible food, supporting small businesses that grow, process and distribute local and healthy food, prioritizing food production as a use of land, and working to increase the affordability and accessibility of healthy food for all Seattle residents (City of Seattle, 2012). The King County Executive's Local Food Initiative was introduced in 2014 to connect local farmers and consumers, increase access to healthy, affordable foods in underserved areas, protect farmland and implement strategies to improve resilience to the effects of climate change (King County Local Food Initiative 2015).

Specific 10-year targets put forth in the 2015 Local Food Initiative Kitchen Cabinet’s Local Food Report include adding 400 net new acres in food production per year in King County (2% per year), increasing the number of new and beginning farmers in King County by 25 new farmers per year, doubling demand for locally produced, healthy food from \$93 million to \$186 million, reducing the amount of wholesome food loss by 25%, and increasing consumption of fruits and vegetables among both youth and adults (Local Food Initiative, 2015).

## **PRODUCERS’ DECISION-MAKING CONSIDERATIONS**

**Farm management decisions must be site specific.** Producers’ values and the political, social, environmental, and economic landscape in which they are operating influence their production and management decisions. These fundamental decisions are affected by or affect how FEW resources are utilized locally and how those resources flow across regions. Overall, there is a widespread perception amongst interviewees that farmers want to be good stewards of the land and thus may be amenable to changes to policies or practices that promote a sustainable FEW environment. However, farm management decisions are site specific and producers vary in their approaches to manure management, dealing with mud in the winter months, rotational grazing, stream bank protection, pollinator habitat preservation, pesticide use, and more.

**Farming in Washington is tied to rich cultural traditions.** Some farms have been in a family for over five generations. King County also has many immigrant farmers for whom agriculture is a link to their country of origin and to their local community. For these and other producers, staying in business is important economically as well as socially and culturally. Farming practices directly affect how FEW resources are utilized locally and how those resources flow across regions. Therefore, cultural heritage can be considered a variable that needs to be incorporated in scenario development to understand local and regional trade-offs in FEW resource management. This will be particularly important where preserving a cultural practice is either at odds with physical resource use efficiency or enhances resource use efficiency.

**Consumer demand plays a role in shaping production practices.** In the past decade consumer demand for organic products and the higher market value of organic produce have influenced many producers in the region to pursue organic certification. Some farmers look at their annual sales and make adjustments to what they will grow based on that information. Crops and production systems utilize water and energy differently, so these consumer driven demands shape how FEW resources are utilized locally and how those resources flow across regions. Producers may move away from what is best grown in the PNW to favor what the demand is regardless of the FEW implications. A farmers’ market manager observed that many producers are pursuing a business model with a roughly balanced combination of restaurant sales, wholesale, and farmers’ market sales. Stakeholders noted that, as in any business, success in agriculture depends on finding your niche and building an actionable business plan. Lack of marketing skills and lack of time to pursue marketing strategies are common challenges for producers. There may be more opportunities for entrepreneurial education for Washington producers that would support them in increasing the size of their farms and increasing sales. A

shift in crop selection away from “resource efficient” crops would change the balance of FEW resources, but could potentially be economically beneficial for producers.

**Producers are concerned about a lack of access to food packing, processing, and storage facilities.** Increasing the number and accessibility of such facilities for producers could increase the quantity of food that can be produced and consumed in the Seattle area. At the same time, food-processing operations could demand increased local energy and water inputs. Some stakeholders noted that lack of access to processing facilities may be less of a barrier than it is commonly cited to be, noting that some underutilized facilities exist and that more significant barriers may be producers’ lack of time and lack of relevant skill sets to add value to raw products. Other gaps in infrastructure were also cited as barriers for Washington producers. For example, lack of funding for railway and road maintenance is a challenge for producers in rural parts of the state who could otherwise perhaps participate in the market for locally produced foods.

**The cost of land in western Washington is high.** Several stakeholders asserted that King County land prices are typically too high to purchase and profitably farm. Farmland preservation programs and land trusts are important tools for supporting farming. Some stakeholders stated that there are more potential farmers than there is available land. Sometimes the issue is simply finding sufficient acreage for sale in the area in which a farmer wants to buy. Being able to scale up a farm has to do with the cost of land, but it can also be a challenge if a potential buyer lacks understanding of lending options and how to craft a niche business plan. Some potential properties may also pose concerns with past over use, contamination, or endangered species impacts. Many producers lease land on short-term leases and cannot secure capital to make long term investments in their farmland, for example, efficient irrigation systems. Land price and land tenure are impacted by policies and in turn shape patterns of FEW resource use. One stakeholder noted that it is difficult for counties to support agriculture at the policy level because it does not generate as much money from property taxes as other land uses.

**Labor and economic concerns affect agricultural practices.** A number of factors currently contribute to limits on available labor including labor shortage (immigration restrictions have reduced the number of seasonal agricultural workers coming to Washington state), finding and retaining qualified employees (some stakeholders note a shortage of workers with necessary skills for specialized agricultural labor), and paying a decent wage (the cost of living in Western Washington is high and paying a living wage that will attract and retain employees may mean paying more than minimum wage). Mid-size producers in particular face challenges to obtaining economic stability. Tax structures don’t necessarily reward food production, for example, stakeholders noted that many landowners elect to use farmland for horses or forage, rather than cultivating land for food crops. Several stakeholders who work closely with producers were concerned that new King County health department regulations and the federal Food Safety Act are a burden for local producers and represent a significant barrier to small-scale producers because they require training and certification that is costly and time

consuming to obtain. In general, the growing season and labor conditions in Washington lead to more expensive production than other parts of the US and world. One stakeholder noted that the cost of production in Washington can be up to three times that in California; for example a vegetable producer in California's central valley may be able to harvest broccoli 2-3 times a year, but Washington's shorter growing season limits broccoli production to one crop per year.

## **CONSUMERS' DECISION-MAKING CONSIDERATIONS**

**Consumers have increasingly sophisticated knowledge** about their food purchasing options, which is a function of a wealth of readily accessible information online. Stakeholders observed a generational trend toward consumers purchasing more prepared foods and less fresh fruits, vegetables and raw ingredients. In general, modern consumers were perceived to have or choose to spend less time to cook at home than they did in past decades. Stakeholders noted that interesting demographic trends emerge in comparing farmers' market sales in different parts of Seattle. For example, stakeholders noted a tendency for older consumers to value organic, fresh produce while younger consumers seem more likely to shop at farmers markets for the social experience and to buy prepared foods. Preparing and packaging foods can involve significant water and energy use. These shifts in consumer preferences may significantly alter the embedded energy and water associated with food production, processing, transportation, and ultimately consumption. Policy decisions on what is allowed to be sold at farmers markets can impact those FEW resource allocations.

**Seattle is perceived to be a national leader in food trends**, with a robust farmers market culture and strong interest in organically produced products. While a desire for fresh high quality produce and interest in supporting the local economy are said to motivate consumers' interest in locally produced foods, stakeholders observed that Seattle consumers have come to expect access to all foods year round. The concept of eating seasonally is perceived to be too limiting by the vast majority consumers. Stakeholders' opinions varied widely on whether marketing campaigns for local food work; some believed that promoting local products was a key component of supporting the regional local economy, while others felt that marketing campaigns do very little to influence consumer behavior. Clearly these policies and consumer choices affect how and "who's" water and energy are used.

**Access to high quality, nutritious, affordable food** for the diverse urban population is a critical component of any discussion about food policy. Stakeholders expressed enthusiastic support for the Fresh Bucks program, which matches food stamp dollars at area farmers markets. There is recognition that ultimately the price of food and access to purchasing options determines most of the Seattle population's food purchasing decisions. Any policies or behaviors that shift the allocation of where food is produced will alter the allocation and flows of energy and water across regions.

### 3. Next Steps

Recognizing that there is a wealth of recent reports and data about Seattle area food systems, we are in the process of learning from previous research in the region. At the Urban Food-Energy-Water Stakeholder Summit we will delve deeper into a discussion about intersecting food, energy and water resource management issues and potential implications of policy decisions in region. Our research team will present a conceptual model of FEW systems at nested city-local-regional scales and will modify and develop that model based on stakeholder input, to form the basis of a modeling-based decision-support and analysis tool.

We hope that this project builds on the strong tradition of collaboration around food and agriculture research, planning, and policy-making in the region and provides decision-makers with useful tools that generate new insight into system interactions.

#### **Urban Food-Energy-Water Summit**

<http://metrocenter.wsu.edu/metrofew-summit2016/>

**Who:** You are invited! Local policy decision makers, agricultural producers, government agency personnel, NGO representatives, industry representatives, researchers and members of the public interested in the future of local food systems should all participate.

**Where:** The Brightwater Convention Center, 22505 State Route 9 SE Woodinville, WA 98072

**When:** Friday November 18, 2016, *Public morning session 8:30-11:00am*

Sign-up here: <http://urbanfew.brownpapertickets.com>

*(Note: A by-invitation afternoon breakout session and luncheon will be held after the public portion of the Summit from 11:00-4:30pm. Please contact Liz Allen, [lizb.allen@wsu.edu](mailto:lizb.allen@wsu.edu), if you would like an invitation to the afternoon session.)*



## 4. Acknowledgements

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Thank you all of the stakeholders who participated in this work thus far! This report would not be possible without the following individuals who generously gave their time to be interviewed.

<b>Stakeholder Group</b>	<b>Name</b>	<b>Affiliation</b>
<b>Producers and Producer Affiliates</b>	Jay Mirro	Senior Resource Planner, King County Conservation District
	Josh Monaghan	Senior Program Manager Planning and Strategic Initiatives, King County Conservation District
	Mary Embleton	KCD Regional Food System Grant Program Manager, King County Conservation District
	Colin McCrate	Co-Founder, Seattle Urban Farm County
	Siri Erikson-Brown	Fruit and vegetable producer, Local Roots Farm and Snoqualmie Watershed Improvement District
	Leigh Newman-Bell	Farm Incubator Outreach Coordinator, Pike Place Market Foundation
	Hannah Cavendish Palmer	Director, Snoqualmie Valley Farmers Cooperative
<b>Consumer sector Representatives</b>	Chris Curtis	Executive Director, Seattle Neighborhood Farmers Markets
	Zack Cook	Market Manager, Pike Place Market
	Dana Gould	Food Access Project Coordinator, Pike Place Market Foundation
	Scott Owen	Grocery Merchandiser, PCC Natural Markets
	Diane Dempster	Grower Liaison, Charlie's Produce
<b>Energy and water policy decision makers</b>	Joanna Richey	Former Assistant Director (retired), King County Water and Land Resources Division
	Richard Martin	Managing Supervisor, King County Water and Land Resources Division
	Ted Sullivan	Farmland Preservation Program Manager, King County Water and Land Resources Division
	Patrice Barrentine	Ag Policy Project/Program Manager, King County Water and Land Resources Division
	Steve Evans	Farm Specialist, King County Water and Land Resources Division
	Scott Powell	Environmental Analyst, Seattle City Light Environmental Affairs
	Laura Berg	Policy Director, Washington Association of Counties
	Dave Christenson	Policy Unit Supervisor, Washington Department of Ecology
<b>Food policy decision makers</b>	Michael Lufkin	Local Food Economy Manager, King County Local Food Initiative
	Melissa Campbell	Associate Director, PCC Farmland Trust
	Liz Underwood-Bultmann	Senior Planner, Puget Sound Regional Council, Regional Food Policy Council
	Phyllis Shulman	Founding Member, Regional Food Policy Council
	Sharon Lerman	Food Policy Advisor, Seattle Food Action Plan
	Russell Lehman	Director, Washington Sustainable Food & Farming Network
	Leif Fixen	PNW Conservation Program Manager, American Farmland Trust

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## 6. Appendix: Information and data resources

Many previous and ongoing research efforts have addressed questions about the capacity of regional agriculture to meet Seattle-area food demand. Our research team is in the process of locating and analyzing existing data and resources. We welcome further suggestions about resources for learning about regional land use, water and energy policies, agricultural production, processing, transportation, sales, and trends in consumer behavior. The following is a list of informational resources we have collected thus far.

<i>Data Type</i>	<i>Potential Resources</i>
County Land Use Designations	Washington State Department of Commerce, Farm Bureau
Documentation of Washington State ordinances and regulations	Washington Municipal Research Center
Data about where producers are selling & agritourism operations	Puget Sound Fresh
Food system facilities in King County	King Conservation District Infrastructure Mapping Tool
Agricultural land uses in King County, by crop and acreage	King County WLRD; National Agricultural Statistics Service
Consumer Demand for local products	Hartman Group
Seattle Farmers market sales	Seattle Neighborhood Farmers Markets; Pike Place Farmers Markets
Fate of food produced in King County	Northwest Agribusiness Council
Status and allocation of water rights	Washington Dept. of Ecology Washington Water Resource Tracking System

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