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## Okanagan Bioregion Food System Design Project

Institute for Sustainable Food Systems

# Delineating the Okanagan Bioregion for Food System Study


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## Abstract

Bioregions are areas that share distinct human and ecological character, reflecting the importance of ecosystems in supporting social and economic activity within a region. As such we believe that bioregions are an appropriate and replicable scale to analyze the dynamics of, and plan for, food systems. This research brief describes the process for outlining the Okanagan Bioregion. Similar to the Southwest BC Bioregion Food System Design Project, we used a map layering approach to outline the anthropogenic and ecological attributes of the region. We then assessed the overlap and continuity of these in order to define a region with contiguous environmental and human characteristics. The Okanagan Bioregion was identified as the area consistent with the Okanagan-Similkameen, Central Okanagan, and North Okanagan Regional Districts. Delineating the Okanagan Bioregion was the first step in the Okanagan Bioregion Food System Design Project.

# Introduction & Process

## What is the Scale of a Local-Regional Food System?

A significant amount of work has been done to understand the potential of "local" and "regional" food systems to improve the economic, environmental and social outcomes of the dominant globalized food supply chain (Dumont et al., 2017; International Panel of Experts of Sustainable Food Systems [IPES Food], 2017; Nestle, 2002; Patel, 2008). However, the appropriate scale for local-regional food systems is often arbitrarily defined, based on parameters such as political boundaries (Galzki, Mulla, & Peters 2015; others) or population centers (Grewal & Grewal, 2012).

Food system localization has been critiqued for oversimplifying the relationship between scale and food system sustainability (Born & Purcell, 2016). Alternatively, it is recognized that a 'place-based' food system – one that operates within the constraints and as per the demand of the region in which it functions- can better address the environmental, social and economic externalities of a globalized food system (Klassen & Wittman, 2017; Mullinix et al., 2016). As such, we propose bioregional assessments as a more holistic approach to defining regional food systems.

## Bioregional Food Systems

A bioregion is an area that shares distinct human and ecological character – an area of common climate, hydrology, topography, vegetation etc. that supports a unique human and non-human community (Thayer, 2003). Bioregions therefore integrate both human and non-human dimensions of place. They highlight the interdependence of economic and social activity with the ecosystems that sustain them (Harris et al., 2016). Therefore we submit that a bioregion is an appropriate level to delineate the food system and adopt a bioregional approach to the Okanagan Food System Design Project.

## Process for Defining a Bioregion

We used a map layering approach to define the Okanagan Bioregion boundary (Harris, Dorward and Mullinix, 2016). This process included four steps;

1. Selection of base map to illustrate a study region.
2. Creation of map layers representing the human and ecological characteristics of the region.
3. Preliminary definition of the bioregion boundary based on overall uniformity of map layers.
4. Final definition of the bioregion boundary based on both human and ecological characteristics and dimensions.

As illustrated by Harris, Dorward and Mullinix (2016), the identification and prioritization of map layers is subjective. As such the definition of a bioregion is inherently subjective, and designed to adapt to the priorities for residents, which will differ from one region to another.

Using a geographic information system (ArcGIS) we selected a basemap illustrating the land mass of Southern BC from the Salish Sea to the Alberta border and Northern Washington (Esri, 2018). Additional map layers were overlaid to illustrate the anthropogenic and ecological characteristics of the region. These included regional district boundaries (Ministry of Municipal Affairs and Housing [MMAH a] , 2016) and member municipalities (MMAH b, 2016), major roads and transport routes (Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRO], 2013), Ecoregions (National Ecological Framework for Canada, 2017), agricultural land (Provincial Agricultural Land Commission, 2017) and hydrology (FLNRO, 2011). We believe that the combination of these attributes reflect critical natural and anthropogenic elements of the study area.

# The Okanagan Bioregion

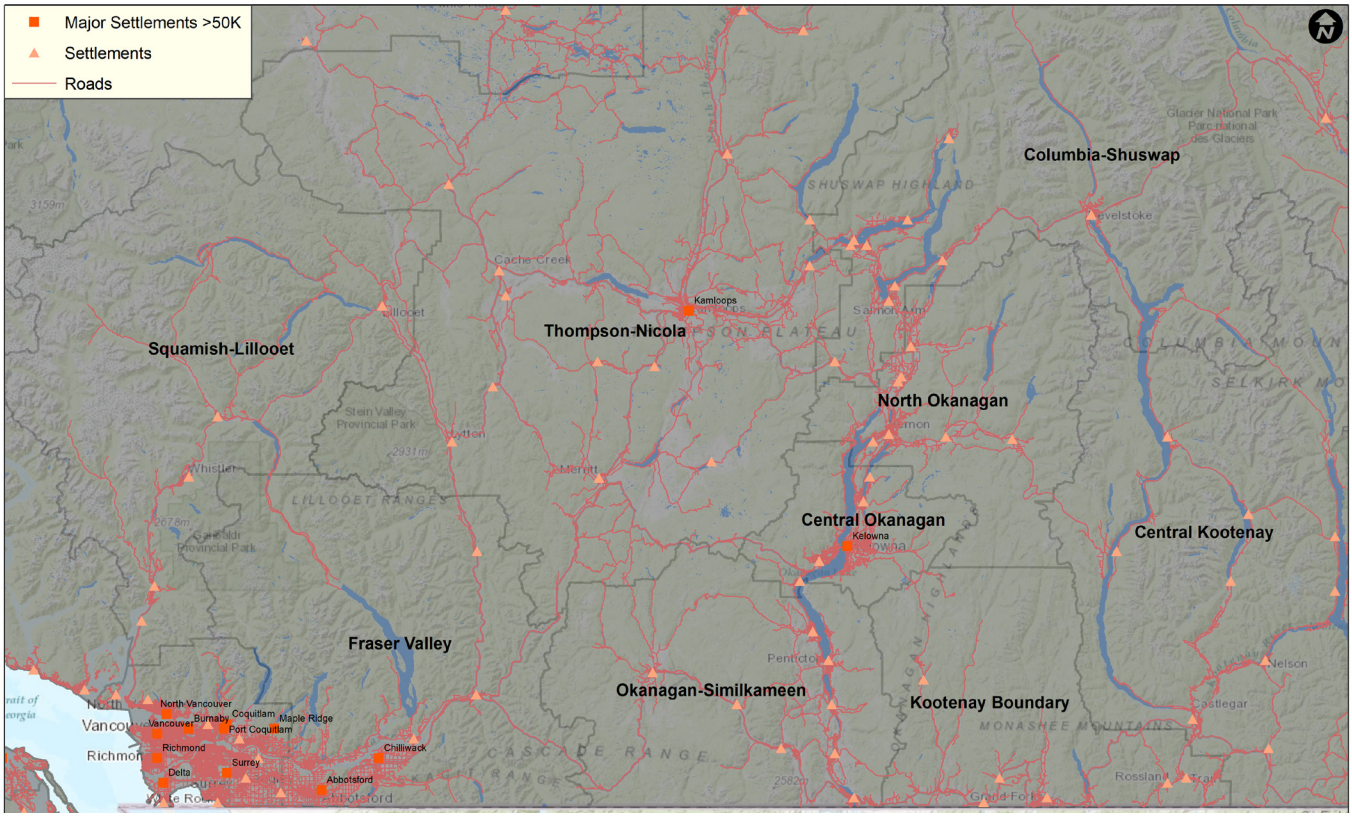
## Climate

Located in the southern interior of BC, east of the Coast and Cascade Mountains and west of the Columbia Mountains, the Okanagan region is characterized by a semi-arid steppe climate (Demarchi, 2001). Westerly air currents moving into the region lose most of their moisture as they rise over the Coast and Cascade Ranges. As a result, the Okanagan experiences some of the hottest and driest summers in the province. A number of north-south oriented valleys facilitate the movement of warm air from the Columbia Basin into the Okanagan, contributing to warm, dry summer conditions. Valley bottoms are characterized by sagebrush steppe vegetation, while Ponderosa Pine and Douglas Fir communities are prominent at higher elevations (Demarchi, 2001).

## Hydrology

The Okanagan Basin is drained by Okanagan Lake and its tributaries. The long and narrow Okanagan Lake, running approximately 130 km between the City of Vernon and Penticton, is the largest surface water feature in the region. Most contemporary human settlements are located along the shores of Okanagan Lake, which was historically the primary corridor for travel and the movement of goods. Modern transportation networks remain focused around the lake which, as the primary source of water in the hottest and driest region of the province, represents the lifeline for ecological integrity and the human economy.

Figure 1. Major settlements, roadways and regional district boundaries in Southern British Columbia. Settlements and transportation networks in the Okanagan are concentrated within the north-south corridor of Okanagan Lake.



## Culture

The Okanagan is the most populous region in the province's interior, with approximately 366,170 inhabitants. This number is expected to increase 77% (641,176 inhabitants) by 2031 (Statistics Canada, 2018a).

The region is one of the largest producers of fruit trees and wine in Canada. Next to the Fraser River Lowlands, it is the most important agricultural region in British Columbia (AgriService BC, n.d.). Hay production and cattle ranching is also economically important (Regional District of North Okanagan, 2015). The Regional District of the North Okanagan, with expansive grassland soils, produces over 40% of the total hay in the area and leads beef cattle ranching and dairy production for the region (Regional District of North Okanagan, 2015).

The Okanagan is the traditional territory of the Syilx/ Okanagan Nation, and the northernmost portion of the region includes the traditional territory of the S'Platsin Band of the Secwepemc Nation.

## Bioregion Boundaries

### Ecological Boundaries

We identified four ecoregions within the hot dry southern interior of the province – i.e. in the rain shadow of the Coast and Cascade Mountains and west of the Columbia Mountains. These ecoregions include the Interior Transitions Ranges Ecoregion, the Northern Cascade Ranges Ecoregion, the Okanogan Highland Ecoregion (American spelling as majority of ecoregion is in the USA) and the Okanagan Plateau Ecoregion (Demarchi, 2001). The most northwest of these ecoregions, the Interior Transitions Ranges, while on the leeward side of the Coast Mountains, is still strongly influenced by moist coastal air and is a transition zone between coastal and interior climates. As such, the Interior Transitions Ranges Ecoregion was excluded from the Okanagan Bioregion and the three remaining ecoregions were considered climatically similar enough to be included within the same bioregion.

*Bioregions are areas that share distinct human and ecological character, reflecting the importance of ecosystems in supporting social and economic activity within a region.*

### Anthropogenic Boundaries

International Borders: While the Canada-USA border does not conform to any biophysical boundary, it is an important political boundary. Differences in planning processes, governance, regulations and cultural perspectives pose significant challenges to the execution of such a project in an international context. A number of the ecoregions mentioned above, in addition to the Syilx traditional territory, extend into the USA, however the Canada-USA border limits these ecoregions to north of the 49th parallel. As such, we established the international border as the southern border of the bioregion.

Regional Districts: The ecological boundary of the three ecoregions (described above) comprised at least a portion of eight regional districts: The Fraser Valley, Okanagan-Similkameen, Kootenay Boundary, Central Okanagan, North Okanagan, Columbia Shuswap, Thompson Nicola and Cariboo. Regional districts with minimal overlap with the Okanagan ecoregions were excluded from the study, as described below.

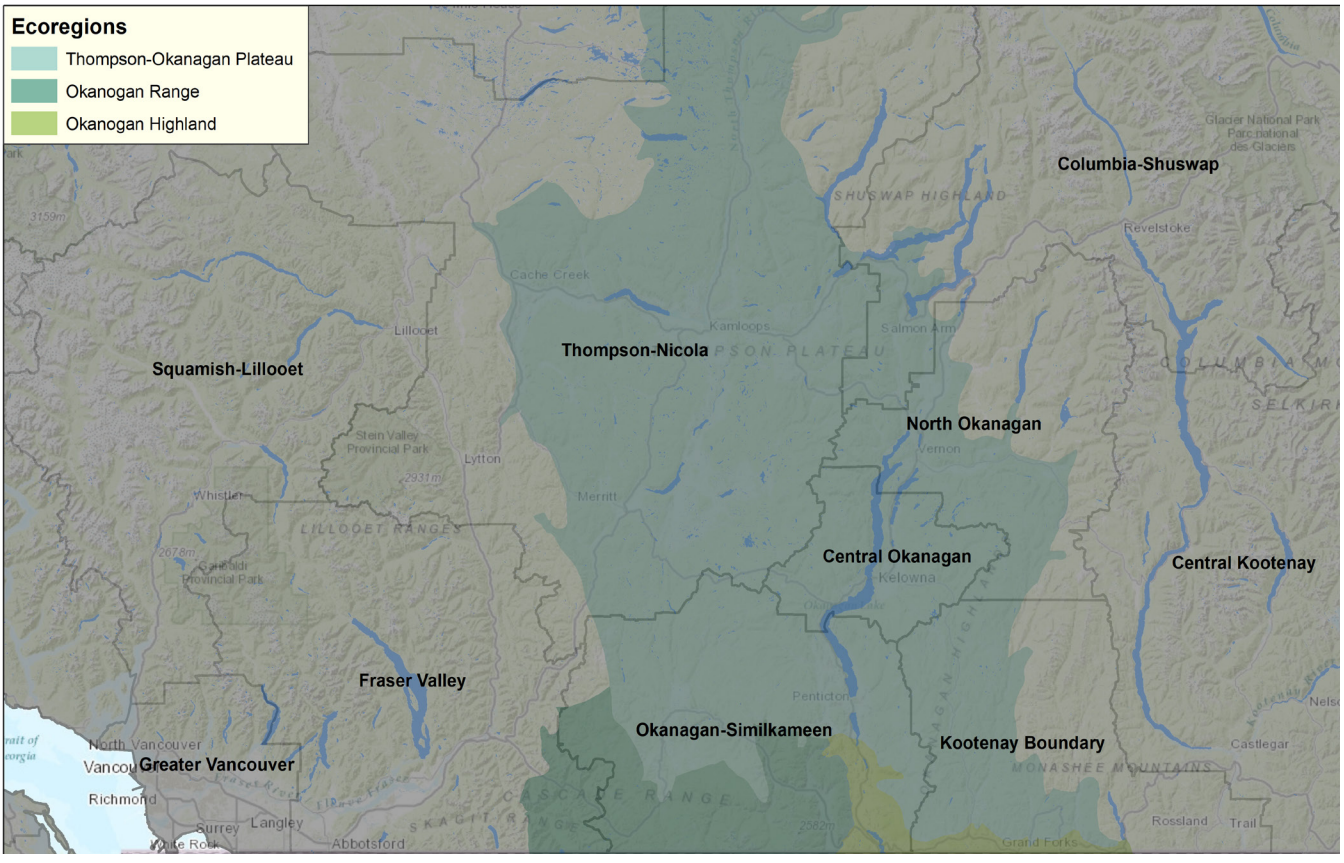
Only very small portions of the Fraser Valley and Cariboo Regional Districts extended into the ecoregion, as the majority of these districts do not share the characteristic climate. Similarly, the Thompson Nicola Regional District and Columbia Shuswap Regional District had large areas outside of the ecoregion. We required that a bioregion have relatively similar climate throughout in order for there to be continuity among and between the human and natural elements (e.g. agricultural practices, cultural identity, resources, etc.) As such these four regional districts were excluded from the bioregion.

An additional important consideration during this process was that the relevant data is most consistently

aggregated and made available at the regional district level. Therefore, for practical reasons, we avoided the inclusion of portions of regional districts and elected to include or exclude regional districts in their entirety as follows:

Of the remaining regional districts, the Okanagan-Similkameen and Central Okanagan were contained entirely in the identified ecoregion. Approximately 50% of the North Okanagan and Kootenay Boundary Regional Districts lay in adjacent ecoregions. We determined the inclusion of these districts based on the following cultural, governance and practical factors. Regional collaboration within the Okanagan most frequently includes the three Regional Districts of the Okangan-Similkameen and the Central and North Okanagan. Similarly, cultural identity usually coincides with these three contiguous districts, but not the Kootenay Boundary Regional District. For example, residents of the Regional District of the North Okanagan would most frequently identify as within the "Okanagan", whereas those in the Kootenay Boundary Regional District would more frequently identify as residing in the "Kootenays". Considering both biophysical, practical, cultural, political and logistic constraints, the Koontenay Boundary Regional District was excluded and the Okanagan Bioregion was therefore defined as the three contiguous regional districts of the Okanangan-Similkameen, Central Okanagan and the North Okanagan. In addition to sharing similar climate, this region comprises major settlements and

Figure 2. Grouping of 3 climatically similar ecoregions of the Okanagan (Northern Cascade Ranges Ecoregion, Okanogan Highland Ecoregion, Okanagan Plateau Ecoregion) are shaded in green. Regional districts that had either substantial land area outside, or minimal land area inside, these 3 Okanagan ecoregions were excluded from the study. The Kootenay Boundary and North Okanagan Regional Districts had approximately 50% of their land area within the ecoregions. The inclusion of these districts was therefore determined based on political, governance and practical considerations.



transportation corridors within the area as well key hydrological features in the basin upon which the ecological integrity and human well-being depend.

## Conclusion

Food system studies have relied heavily, and often exclusively, on political borders to define the boundaries of study. Analyzing food systems on the level of bioregions allows for the consideration of both natural and anthropogenic elements. Given that food systems operate within both the social and ecological backdrop of a region, we believe that this methodology provides a reasonable and replicable framework to assess food system dynamics. We employed a map layering methodology to define the bioregion based on the unique ecosystem and culture of the area, while considering both practical and logistic constraints of executing the Okanagan Bioregion Food System Design Project. While the final bioregion boundary is consistent with political borders, the process described here allows for the inclusion of both human and ecological characteristics in the delineation of the Okanagan Bioregion.

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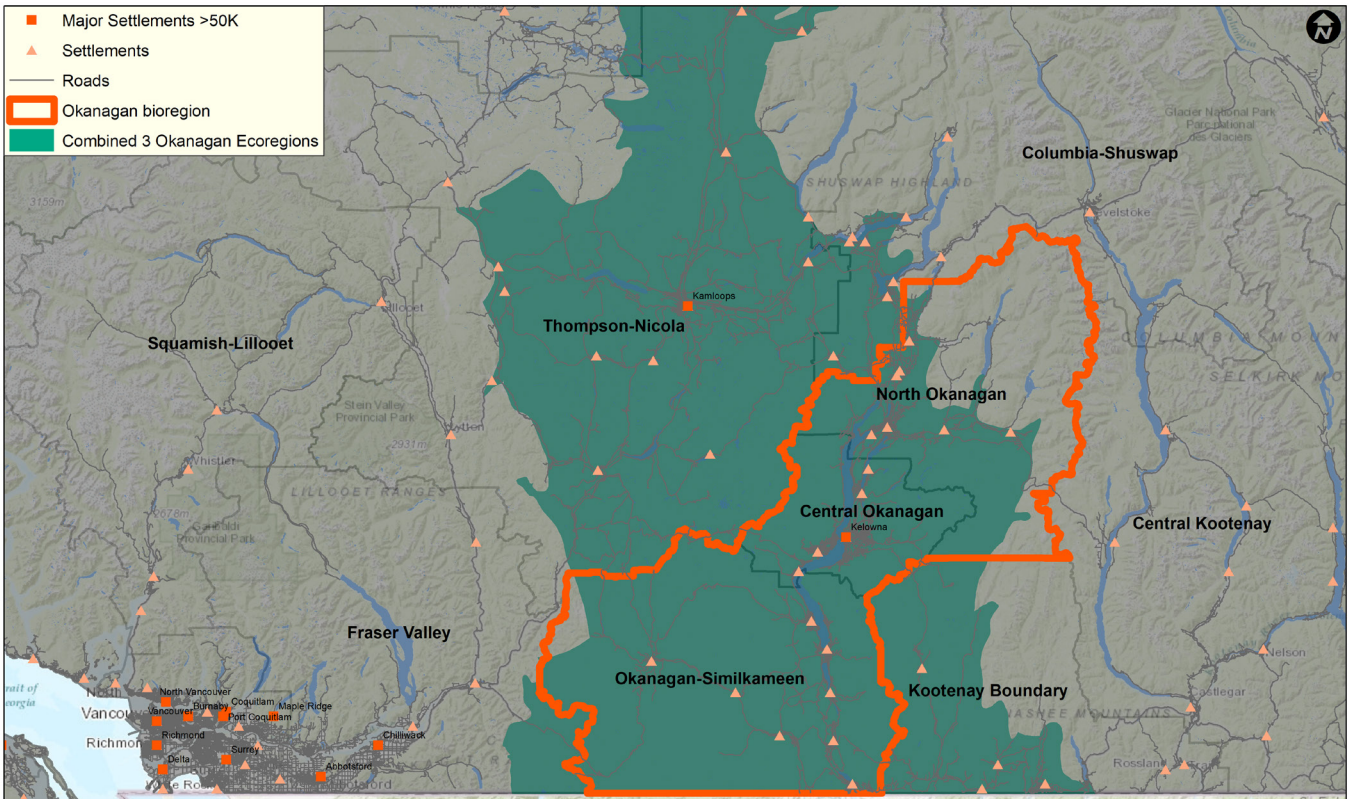
Figure 3. Final Okanagan Bioregion in relation to major settlements, roads, regional districts and climatically similar ecoregions of the Okanagan (comprising the Northern Cascade Ranges Ecoregion, Okanogan Highland Ecoregion, Okanagan Plateau Ecoregion).



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## The Okanagan Bioregion Food System Design Project

The Okanagan Bioregion Food System Design Project is a two year, multi-disciplinary research project initiated by ISFS and regional partners to provide regionally specific, data-driven information about:

- The potential to increase food production and processing for local markets in the Okanagan and Similkameen regions;
- Whether and to what extent increasing local food production could improve food self-reliance, benefit the economy, and create jobs;
- The potential to reduce some detrimental environmental impacts from food production in the Okanagan and Similkameen regions;
- The current policy gaps that hinder such a food system, and proposed policy changes to address these gaps.

## The Institute for Sustainable Food Systems

The Institute for Sustainable Food Systems (ISFS) is an applied research and extension unit at Kwantlen Polytechnic University that investigates and supports regional food systems as key elements of sustainable communities.

More information: www.kpu.ca/isfs

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