

# Research Brief

From the Southwest BC Bioregion Food System Design Project

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## Delineating the Southwest British Columbia Bioregion for Food System Study and Design

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### Abstract

Delineating our bioregion was the first task we undertook for the Southwest BC Bioregional Food System Design project. Bioregions represent an appropriate and consistently applicable scale and framework for sustainable food system analysis, design and planning, and bring to the forefront the interdependency between community, our economy and the environment. Bioregions are generally defined as areas that share similar topography, plant and animal life, and human culture. Though based largely on ecological parameters (e.g. watersheds and ecoregions) bioregion delineation is ultimately up to us and is therefore somewhat subjective. Southwest BC's landscape is complex and includes mountains, a major river system and delta, and a marine ecosystem. Its multicultural and mixed urban, suburban, and rural character, its proximity to Vancouver Island, as well as an international border with the United States all represented important considerations in the delineation of the bioregion.

In this Research Brief we present the method we used to determine the boundaries of the Southwest BC Bioregion. We also discuss important considerations and the basis for our bioregion boundary decisions. We believe the methodology presented has potential for application throughout British Columbia.

*Note: This research brief draws largely from "Delineating the Southwest British Columbia Bioregion for Food System Design and Planning: A Practical Approach" (Harris et al, 2016), published in the Journal of Agriculture, Food Systems, and Community Development.*

## Bioregionalism and Food System Study and Planning



*Sustainable food systems should be linked to and reflective of the ecology and environmental capacity of where they occur.*

There is increasing recognition that sustainable food system planning may be approached locally or regionally. The definitions of “local” and “regional”, however, are inherently value laden, can be arbitrarily determined (Ackerman-Leist, 2013) and are therefore debatable. Most often, food systems are studied at a scale and boundary that is motivated by or aligned with some political jurisdiction (Cowell and Parkinson, 2003; Galzki et al., 2014; Griffin et al., 2014; Pradham et al., 2014; Zumkehr and Campbell, 2015), but this is not always the case. In British Columbia, for example, local has been defined as ranging from a 160 km radius (Smith and MacKinnon, 2007), to the entire 944,735 km<sup>2</sup> province (British Columbia Ministry of Agriculture and Lands, 2006). The lack of an appropriately consistent convention and protocol to define or delineate “local” and “regional” hampers comparative and cumulative food system study, analysis and planning (Horst and Gaolach, 2014; Peters et al. 2009b).

Ultimately, sustainable food systems should be linked to and reflective of the ecology and environmental capacity of where they occur (Berry, 1997; Thackara, 2015; Thayer, 2003). The geographic concept of a “bioregion”, which is generally defined as an area that shares similar topography, plant and animal life, and human culture, brings to the forefront the interdependence of social and economic activity and the biophysical landscapes or environments in which they function. Bioregionalism embraces the notion that human settlement and land use patterns must be viewed as integral, functional components of ecosystems rather than as separate unrelated entities (Leitao and Ahern, 2002). It offers a framework with which to marry ecological and human components of the landscape and an appropriate biogeographic context to restore and maintain natural systems, to practice sustainable ways to satisfy basic human needs, and to address regional issues of sustainability

(Berg, 2002; Eaton et al., 2007; Hutchinson and Hutchinson, 1996). Accordingly, a food system organized around bioregional boundaries would provide an ecological context to align this foundational dimension of the human economy with ‘life place’.

As such, bioregions represent an appropriate, consistently applicable scale and framework for sustainable food system analysis, design and planning. For these reasons we were motivated to adopt a bioregional framework for our food system study in SWBC, Canada.

## A Method for Delineating a Bioregion

To determine the boundary of the Southwest British Columbia bioregion we used a map layering process that incorporated natural as well as human elements (e.g. roads, census districts, regional districts) of the landscape based on that put forth by Aberley (1993). The process included the following five steps:

1. Select a suitable base map to provide a foundational context to visualize the bioregion.
2. Create separate map layers for characteristics such as historic and current political boundaries, internal boundaries used by various government agencies, Indigenous territories, watersheds, ecoregions and other natural boundaries.
3. Overlay map layers to reveal congruence and divergence.
4. Determine a soft boundary (the general conformance of all map layer boundaries).
5. Determine the final single hard boundary.

Identification and prioritization of the various layers is subjective, thus providing a flexible and practical approach to bioregion boundary delineation since the priorities considered important to residents of one bioregion may not be pertinent to others.

## The Southwest British Columbia Bioregion

Southwest British Columbia (Southwest BC) presents a challenging landscape in which to delineate a bioregion. The proximity of both an international border and a large island with the provincial capital, were of particular interest to the deliberations regarding the size and extent of the bioregion. Additionally Southwest BC is the traditional territory of the Coast Salish peoples comprised of over 50 tribes and/or Nations (Thom, 2005), and within Southwest BC there are five Regional Districts and 34 municipalities with a combined population of more than 3 million people (Statistics Canada, 2014).

To delineate and map the Southwest BC bioregion we followed the process described above. Using a Geographic Information System (ArcGIS) we first selected a base map of the Southwest BC region that included the Southwest BC mainland, Northwest Washington State, Vancouver Island and the Salish Sea. The base map consisting of a simple coastal outline was established from the GIS Ecoregion dataset from the National Ecological Framework for Canada (Agriculture and Agri-Food Canada, 2013).

Separate map layers were then sourced and overlaid on the base map. These included layers showing major settlements and transport routes (Natural Resources Canada, 2015), Level 3 Ecoregion dataset to reveal areas with similar ecological communities and reflecting similar climate (Agriculture and Agri-Food Canada, 2013); major water drainage areas, and geopolitical boundaries representing regional districts and their component municipalities (BC Statistics, 2011). Together, these layers represent the major attributes of both the natural and human elements of the landscape as key bioregional indicators. They were considered to collectively represent a sufficient number of natural and human elements of the landscape important for delineating the bioregion.

After overlaying the map layers onto the base map, we began a qualitative assessment of the spatial relationships between the various map components. The merits of including various components of the landscape were then discussed and evaluated in relation to project goals and practical considerations.

The proximity of Vancouver Island and the Gulf Islands to the mainland raised the question of whether to include them as part of the Southwest BC bioregion. From an ecological perspective, the presence of a large land mass such as Vancouver Island, in close proximity to the BC mainland, has manifested climatic modifications resulting in differences in the structure and species composition of biological communities found on the island and the mainland. As a consequence, the ecoregional classification system of Canada (Agriculture and Agri-Food Canada, 2013) recognizes that Vancouver Island is comprised of two ecoregions (Western Vancouver Island and Eastern Vancouver Island), both of which are distinguished, on the basis of climatic and biogeographic differences, from those found on the coastal mainland (Lower Mainland and Pacific Ranges ecoregions).

In addition to the differences in the ecological characteristics of the mainland and Vancouver Island, the Salish Sea acts as a biogeographic barrier that limits the connectivity between the ecological communities in these two terrestrial regions. Therefore the Salish Sea serves to isolate the terrestrial ecosystems on the island which, to a large extent, function independently from those on the mainland.

Furthermore, these regions rarely interact for planning and governance objectives, which combined with their physical separation by the Salish Sea, supported excluding Vancouver Island and the Gulf Islands from the Southwest BC bioregion.

The Salish Sea itself is recognized as an important element of the 'life place' for the inhabitants of the Southwest BC bioregion (Barnett, 1955). While the Salish Sea was considered for inclusion in the bioregion,



*Natural divisions in the landscape were combined to form the initial natural boundary of the Southwest BC bioregion.*

the sheer magnitude of the Project and the complex interrelationships between land and sea, made it prudent to limit the scope to an analysis of terrestrial landscapes. Consequently, the Salish Sea was excluded for the purposes of our study.

Another issue to contend with was the international (Canada/USA) border. While this latitudinal boundary does not coincide with any natural demarcation, it represents a human 'life place' distinction imposed by political institutions that cannot be ignored. Despite the existence of international agreements such as the North American Free Trade Agreement (NAFTA) and the Pacific Salmon Treaty, which promote trans-border trade and collaborative environmental stewardship respectively, the preponderance of different laws, planning policies, trade and management practices as well as cultural viewpoints and practices on either side of this boundary make trans-border bioregional food system planning particularly challenging if not practically impossible at this juncture.

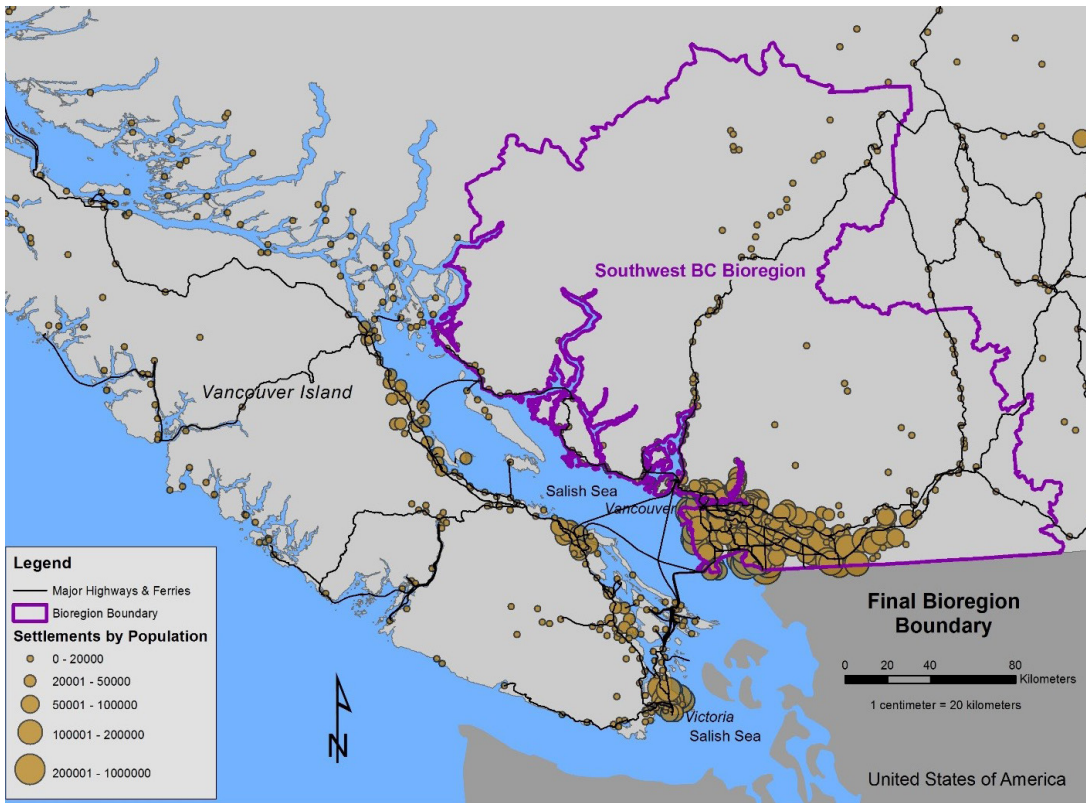
Owing to these political jurisdictional complications, we concluded that it would be unrealistic to attempt to incorporate elements of the USA into our bioregional food system study. Consequently, it was decided that the southern boundary of the Southwest BC bioregion will be marked by the international border separating Canada (Province of British Columbia) from USA (State of Washington).

Having established exclusive terrestrial and Canadian demarcation, decisions then had to be made about the ecological dimensions of the bioregion. By overlaying maps showing the major population centres, water drainage areas and ecoregions, we identified three ecoregions occupied by these communities: the Lower Mainland, Pacific Ranges and to a lesser extent the Cascade Ranges. The northern extent of the Lower Mainland Ecoregion represented a natural boundary coinciding with local water drainage areas and with the northern limit of the Sunshine Coast Highway. For these reasons it was selected as the northern limit of the bioregion. To the

east, the ecoregion demarcation between the Pacific Ranges and the Interior Transition Ranges is associated with marked changes in climate, topography and vegetation and in many places it is closely aligned with water drainage areas. This natural division also separates major communities influenced by their proximity to the coast versus those influenced by other factors (and considered 'interior') and as such was considered to represent the most appropriate eastward extent of the bioregion. These natural divisions in the landscape were combined to form the initial natural boundary of the Southwest BC bioregion.

Turning our attention to the human communities occupying this landscape, an additional map overlay showing geopolitical boundaries revealed that the bioregion as thus far identified contained all but a small component of, and roughly approximated, five contiguous Regional Districts i.e., Greater Vancouver, Fraser Valley, Sunshine Coast, Powell River, and Squamish-Lillooet. We also noted that, in many cases, regional district boundaries conformed closely to water drainage areas. Upon conducting preliminary research to obtain data on the characteristics and agri-food potential of the proposed bioregion, we came to realize that all available data (soil types, arable lands, crops, yields, population, etc.) were configured to census divisions, corresponding to regional district boundaries and other geopolitical divisions. Given that all data necessary for the larger project were available only on a regional district basis, and knowing that regional residents recognize the five districts as the 'lower mainland', their 'life place' (thus providing 'cultural familiarity'), we decided to align the bioregional boundary with that of the five regional districts. Using the five contiguous regional district boundaries did not eliminate any agricultural land (food production capacity) from our study area.

Therefore to make this bioregion food system design and planning project feasible, its initial scope was limited to the five contiguous regional districts on



*Figure 1: Southwest BC Bioregion's final boundary in relation to major settlements and transportation routes.*

the Southwest BC mainland; Greater Vancouver, Fraser Valley, Sunshine Coast, Powell River and Squamish-Lillooet (Figure1). This approximates the terrestrial dimensions of the ecoregions and water drainage areas that would otherwise have formed the natural boundaries of the bioregion. We also felt that the bioregion was comprised of a substantial but reasonable number (39) of municipal and Regional District governments to work with.

Having delineated the Southwest BC bioregion and considering constraints on project resources, it was further decided that the study would be limited to the

Agricultural Land Reserve (ALR) and some Crown grazing land contained within the bioregion. In Southwest BC, the designation of land as part of the ALR (Agricultural Land Commission Act, 2002.) represents provincial legislation which identifies the preponderance of agriculturally suitable lands, protects them from non-agricultural use and therefore essentially delimits the potential future extent of agriculture in this bioregion. While our approach reflected a bioregional mapping process used by Aberly (1993), the final bioregional boundary was based on practical as well as logistical considerations.

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## About ISFS

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. We focus predominantly on British Columbia but also extend our programming to other regions.

## About the Southwest BC Bioregion Food System Design Project

The Southwest BC Bioregion Food System Design project was conceptualized at ISFS in 2012 and concluded in 2016. The project was conceived as a “research project within a research project,” with the broad goals of developing a method to delineate the interconnected economic, food self-reliance, and environmental stewardship potentials of a bioregional food system and applying the method to the Southwest BC bioregion. To our knowledge, this project is the first of its kind. Project research briefs are one means used to present project findings. They are intended to report detailed, topic specific project methods and results. For other research briefs from the project, as well as the project report and summary, and peer-reviewed publications, please visit [kpu.ca/isfs](http://kpu.ca/isfs).

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