



Growing Knowledge



Ministry of
Agriculture

Agricultural Land Use Inventory

Reference Number: 800.510-14.2014

City of Kelowna Regional District of Central Okanagan Summer 2014



Strengthening Farming Program

Ministry of Agriculture

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- Partnership for Water Sustainability,
- Agriculture and Agri-food Canada (AAFC), and
- British Columbia Ministry of Agriculture.

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Acronyms

AUE	Animal Unit Equivalent
AGRI	BC Ministry of Agriculture
ALR	Agricultural Land Reserve
ALUI	Agricultural Land Use Inventory
RDCO	Regional District of Central Okanagan
GIS	Geographic Information Systems

Executive Summary

In the summer of 2014, the BC Ministry of Agriculture and its partners conducted an Agricultural Land Use Inventory (ALUI) in the City of Kelowna. This inventory is part of a larger ALUI project in the Okanagan Basin. Project funding was provided by the Okanagan Basin Water Board. In-kind contributions were provided by the Partnership for Water Sustainability, Agriculture-Agri Foods Canada, BC Ministry of Agriculture, and the Okanagan-Kootenay Sterile Insect Release Program (OKSIR).

ALUIs can be used to understand the type and extent of agricultural activities within the ALR. The ALUI data quantifies how much land is currently used for agriculture, how much land is unavailable for agriculture, and how much land may have potential for agricultural expansion. The data provides baseline information that can be used to track trends in agricultural land use and to measure changes over time. The data also enables the estimation of agricultural water demand with the use of an irrigation water demand model.

Area of Interest and Methodology

Included in the inventory were all parcels:

- completely or partially within the ALR, or
- classified by BC Assessment as having “Farm” status for tax assessment, or
- containing an active water licence for farming or irrigation purposes, or
- zoned by local government bylaws to permit agriculture, and greater than 1 acre (approximately 0.4 ha) and showing signs of agriculture on aerial photography

The ALR in Kelowna consists of 8,686 ha. Of this area:

- 94% or 8,146 ha met one of the inventory criteria and was included in the survey
- 5% or 402 ha was outside of legally surveyed parcels in rights-of-way or water
- 1% or 138 ha was in Indian reserves.

This report focuses on the 94% or 8,146 ha of ALR that is within legally surveyed parcels and outside Indian reserves. This 94% is considered the “effective ALR” as local and provincial governments may have an opportunity to influence land use decisions on this land.

The ALUI was conducted using visual interpretation of aerial imagery combined with a drive-by “windshield” survey to capture a snapshot in time of land use and land cover. Land cover is defined as the biophysical material at the surface of the earth while land use is defined as how people utilize the land.

Land Cover and Farming Activities

In the ALR by land cover, 48% of the effective ALR was farmed (3,920 ha), 18% of the effective ALR (1,442 ha) was anthropogenically modified in vegetation, waterbodies, buildings, and roads, and 34% of the effective ALR (2,784 ha) was in a natural or semi-natural state. An additional 135 ha of land outside the ALR was farmed.

There are 3,853 ha of cultivated field crops in Kelowna (3,741 ha in the ALR and 113 ha outside the ALR). Tree fruits were the most common crop type accounting for 41% of all cultivated land. Forage & pasture was the next most common crop with 37% of the cultivated land, followed by vines (grapes) with 9% and cereals (rye) with 4%.

A total of 1,578 ha of tree fruits were recorded in Kelowna. The top tree fruit types included apples with 1,045 ha, cherries with 395 ha, and pears with 95 ha.

A total of 1,423 ha of forage and pasture crops were recorded in Kelowna: 656 ha were used for forage (17% of all cultivated crops), 389 ha were used for pasture (10% of all cultivated crops), 224 ha were used for both forage and pasture and 154 ha were unused or unmaintained.

In addition to the cultivated crops, there were 44,700 m² (4.5 ha) in greenhouses; 39,300 m² (3.9 ha) were in poly greenhouses and 5,400 m² (0.5 ha) were in glass greenhouses.

Irrigation use was captured by crop type and irrigation system type to aid in developing a water demand model for agriculture. Irrigation is a critical component for many high value crops in the Okanagan. In total, 86% of Kelowna's cultivated crops utilize irrigation (3,326 ha). Sprinkler systems were the most common and were found across all main crop categories. Sprinkler systems include handline, wheeline, solid set, and micorsprinkler irrigation systems. Trickle systems were the second most commonly used system and were found primarily on tree fruit, vine, and nursery crops.

Livestock

Livestock activities were recorded, but were difficult to measure using a windshield survey. Livestock may not be visible if they are housed in barns, or are on another land parcel. The inventory data does not identify animal movement between parcels that make up a farm unit, but reports livestock at the parcel where the animals or related structures were observed. No actual livestock numbers were obtainable through the survey, so the results are reported as a range in terms of animal unit equivalents for each parcel.

Equine and beef are the most common types of livestock in Kelowna. Equine accounts for 68% of the estimated animal unit equivalents (AUEs) while beef accounts for 21%. Equines had the greatest number of AUEs and the greatest number of individual occurrences, however, most equine operations had less than 25 animals. Intensive activities utilize specialized structures for confined feeding at higher stocking densities. Beef was the only livestock type to utilize intensive facilities.

Equines account for 64% of all livestock occurrences (230 out of 357 activities). Poultry accounts for 16% of all livestock activities, beef accounts for 9%, and sheep/ lamb/ goat accounts for 6%. Also recorded were llama/ alpaca, swine, dairy, and ratite activities.

ALR Utilization

Land use was applied on a parcel basis. To determine land use, the entire parcel was examined and a "Used for farming" or "Not used for farming" category was assigned based on the percentage of the parcel in cultivated crops, farm infrastructure, and/or the scale of livestock production. Refer to the glossary for the "Used for farming" definition.

In the ALR by land use, 46% of the parcels were "Used for farming" (815 parcels) and 54% of the parcels were "Not used for farming" (959 parcels). Another 9 ALR parcels are "Used for grazing". The average "Used for farming" parcel size is 6 ha while the average "Not used for farming" parcel size is smaller at 4 ha. Of the "Not used for farming" ALR parcels, 71% have a residential use. Many of these "Not used for farming", residential parcels are relatively small with an average parcel size of 2 ha and a median parcel size of 0.8 ha.

ALR Availability

Land cover, land use, and physical site limitations (topography, flooding, etc.) were used to assess how much land is available and may have potential for farming in the future. Of the effective ALR (8,146 ha), 49% was actively farmed or supporting farming (e.g. crops, barns, farm houses, farm roads, farm buildings, etc.). Another 14% was unavailable for farming due to an existing land use or land cover (golf courses, parks, wetlands, non-farm residences, etc.) and 18% had limited potential for farming due to physical site limitations such as topography, soils or drainage. That leaves 19% of the “effective ALR” (1,535 ha) that is available and may have the potential to be developed for agriculture.

Despite there being 19% (1,535 ha) of the ALR that may be available for farming, most of this land is comprised of relatively small areas and does not offer realistic opportunities for farming. Over a quarter (26%) of the available land cover occurs on parcels that are already “Used for farming” and offers little opportunity to new farming entrants.

In total, there are 317 ALR parcels that are not currently farmed and are available for farming. A parcel is considered to be available for farming if it is not already “Used for farming” and it has at least 50% of its area and at least 0.4 ha in land that is available for farming. Ownership and parcel price are not considered when assessing parcel availability. Of the available parcels,

- 44 parcels (14%) are less than 1 ha in size
- 205 parcels (65%) are less than 4 ha in size
- 77 parcels (24%) are between 4 – 8 ha in size
- 35 parcels (11%) are greater than 8 ha in size

There is evidence that small parcels are less likely than larger parcels to be utilized for farming. In Kelowna, there are 524 parcels less than 1 ha. Of these parcels, 87% (428 parcels) are “Not used for farming”. Furthermore, parcels less than 1 ha comprise 64% of all parcels considered unavailable for farming.

Agrologist Comments

Tree fruits have been the largest agriculture commodity for over 100 years in the Central Okanagan. They continue to be the main crop type produced in the area, with apples being the most abundant crop type in Kelowna. Cherries and grapes are also important crops in the region. The export of soft fruits, particularly cherries, is relatively new but is proving to be extremely lucrative.

The first commercial grapes in the region were planted in 1926. Historically, the wine and grape industry was focused in areas south of Kelowna. However, new plant varieties and irrigation methods are now supporting the industry and enabling success across a broader area. The wine industry is still expanding in Kelowna.

The agricultural profile in Kelowna has changed over the last 100 years. The climate and soils of the region have historically supported dairy, sheep, tobacco, and ginseng production. These industries are essentially non-existent in the current agricultural landscape.

There is significant support for the agricultural industry in the region. Local institutions that support agriculture through education, innovation, technology and horticulture research include UBC Okanagan, Okanagan College, and Summerland Research & Development Centre. There are also active provincial and Okanagan producer and industry associations that provide support and education. These include BC Tree Fruits, BC Cherry Growers, BC Livestock Producers, the Farm to Table program, Certified Organic Associations etc.

Although Kelowna has excellent conditions and high potential for agricultural success, producers face a number challenges including:

- High production costs that include land, water and labour
- Land fragmentation, small lots, and road corridors through agriculture lands.
- The presence of invasive species on pasture, rangelands, orchards & vineyards
- Damage from wildlife (deer, starlings, wolves) Fence construction and maintenance is also costly.

Farm labour and the need for seasonal accommodation creates limitations, particularly in the tree fruit industry. Housing for 100-200 workers on agriculture land can be challenging to accommodate. Local & provincial governments are working together to establish guidelines to protect ALR.

Urban expansion within the City of Kelowna has created need for transition buffers and edge planning. Farming practices are under increased scrutiny.

Managing water quantity & quality has been an issue since agriculture began in the Okanagan area with irrigation ponds & canals dating pre-1900's. It is expected climate change will require some new ideas & processes for minimizing water use.

In addition to active Farmers Markets there continues to be an increase in farm gate sales. Growing interest in small scale/small parcel & organic farming collectively may be significant in future.

1. Introduction

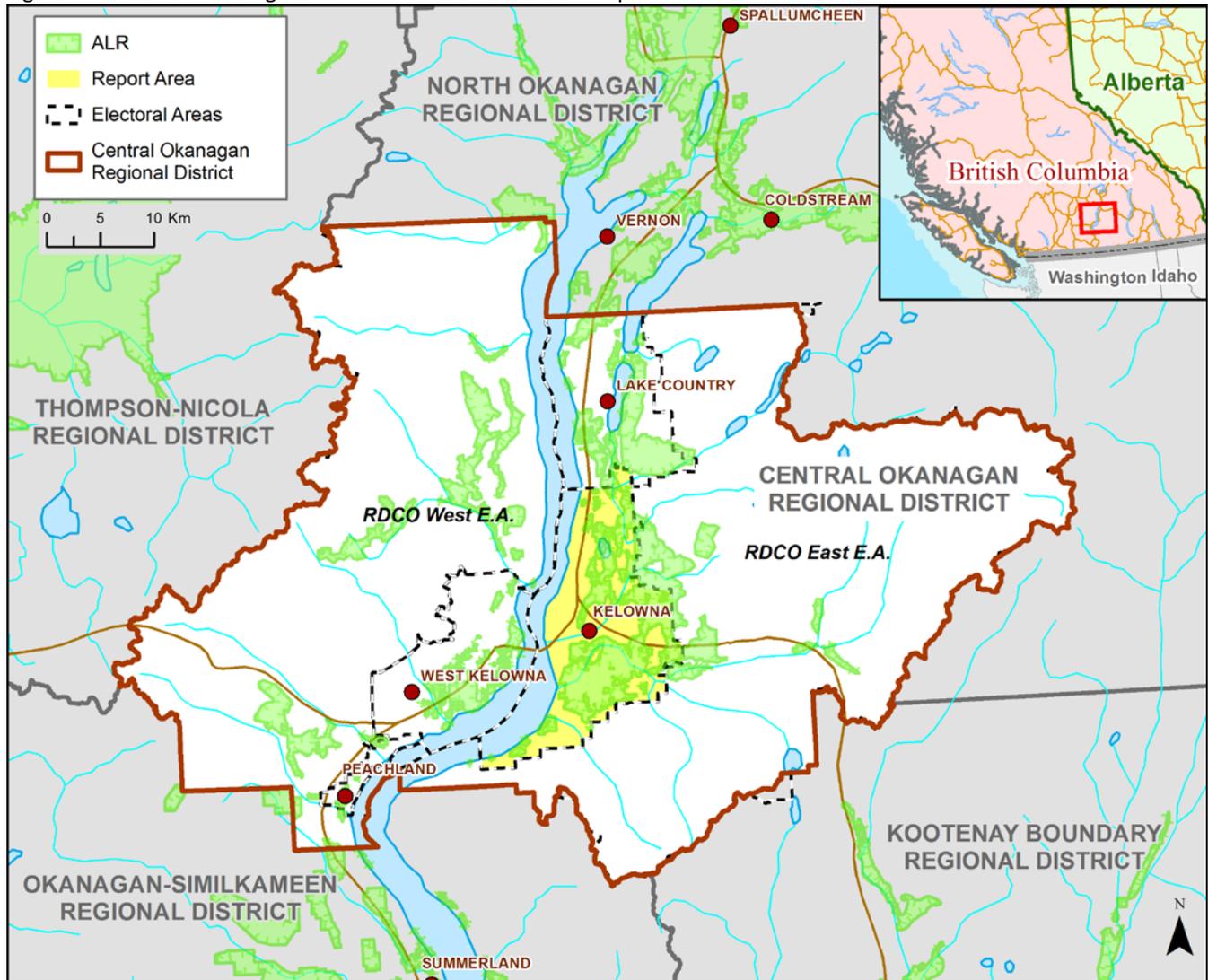
GENERAL INFORMATION

The City of Kelowna is located in the Okanagan Valley in the southern interior of BC. The city is situated on the eastern side of Okanagan Lake and is part of the Regional District of Central Okanagan (RDCO). Nearby municipalities include Lake Country and Vernon to the north, West Kelowna and Peachland to the west, and Summerland to the South.

Kelowna is renowned for its multi-season tourism opportunities including wine touring, golfing, and outdoor recreation activities such as hiking, biking, boating, and skiing at nearby mountain resorts.

In 2011, Kelowna had a population of 117,310¹ making it the seventh largest municipality in BC. Kelowna is growing quickly and experienced a population growth rate of 9.6% between the 2006 and 2011¹ census years. This growth is significantly higher than the provincial growth rate of 7% during the same time period.

Figure 1. General and Agricultural Land Reserve location map



¹ Statistics Canada, 2011 Census. <https://www12.statcan.gc.ca>

AGRICULTURAL LAND RESERVE

The Agricultural Land Reserve (ALR) is a provincial land use zone that was designated in 1973 in which agriculture is recognized as the priority use. Within the ALR, farming is encouraged and non-agricultural uses are controlled.

There are 27,243 ha² of ALR land within the Regional District of Central Okanagan (see Figure 1); 8,686 ha³ or 32% is within Kelowna.

Kelowna has a total area of 26,298 ha⁴ (21,235 ha in land and 5,063 ha in water). Forty-one percent (41%) of Kelowna's total land area is within the ALR (8,686 ha). This area includes:

- 8,146 ha in inventoried parcels
- 401 ha outside legally surveyed parcels in rights-of-way and water (not inventoried)
- 1 ha in parcels with less than 500 m² in the ALR (not inventoried)
- 138 ha in Indian reserves

Figure 2. Proportion of ALR land by category

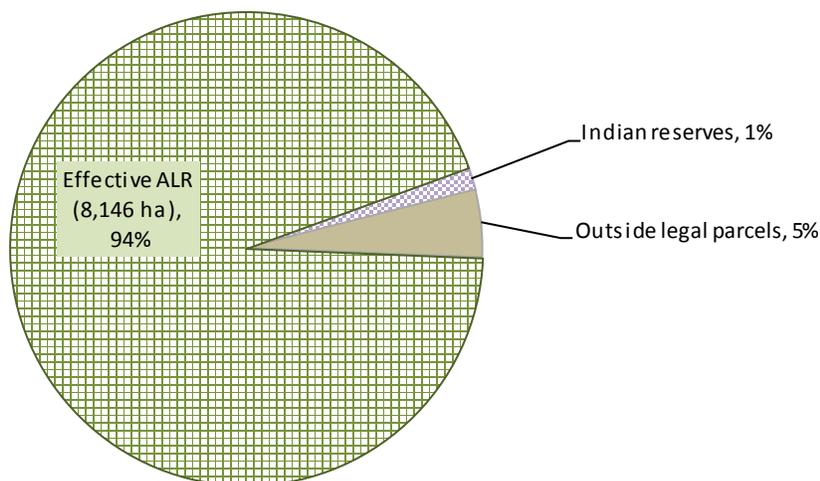


Figure 2 shows the proportion of different categories of ALR land

Of Kelowna's ALR, 94% (8,146 ha) is considered the "effective ALR". Local and provincial governments may have the opportunity to influence land use decisions on these areas. The "effective ALR" is basis of this report.

The remaining ALR areas are on Indian reserves or are outside of legally surveyed parcels in rights-of-ways and water.

² Provincial Agricultural Land Commission (ALC), Library, ALC Reports, Annual Report 2012/13. Pg 31. <http://www.alc.gov.bc.ca>

³ Agricultural Land Commission, ALR mapping, Land and Resource Data Warehouse, 2013-07-31 (area calculated in GIS).

⁴ Government of British Columbia; Ministry of Community, Sport & Cultural Development, Local Government Statistics http://www.cscd.gov.bc.ca/lgd/infra/library/regional_stats14_summary.pdf

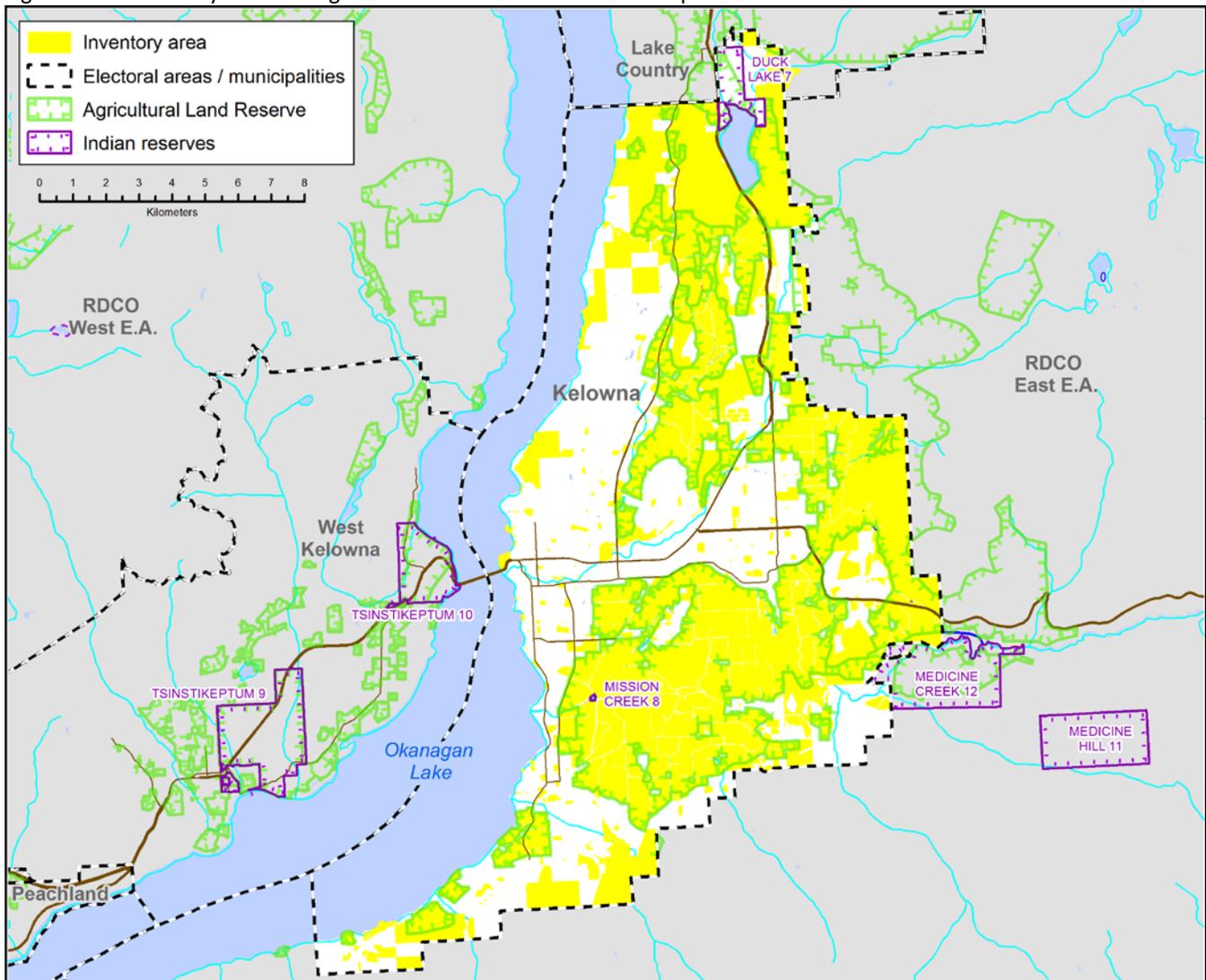
INVENTORY AREA

The total inventory area (excluding Indian reserves) encompasses 2,406 parcels with a combined area of 12,215 ha, or 57% of the land area in Kelowna. Included are all parcels:

- completely or partially within the Agricultural Land Reserve, or
- classified by BC Assessment as having “Farm” status for property tax assessment, or
- containing an active water licence for farming or irrigation purposes, or
- zoned by local government bylaws to permit agriculture. These parcels must be greater than 1 acre and exhibit signs of agriculture on aerial photography

The amount of ALR land included in the inventory area is 8,146 hectares located on 1,853 parcels. The remaining inventoried parcels (553) were completely outside the ALR but either had farm status, an active water licence, or signs of agriculture.

Figure 3. Inventory area and Agricultural Land Reserve location map



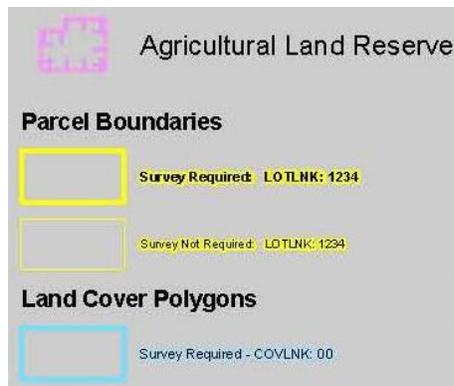
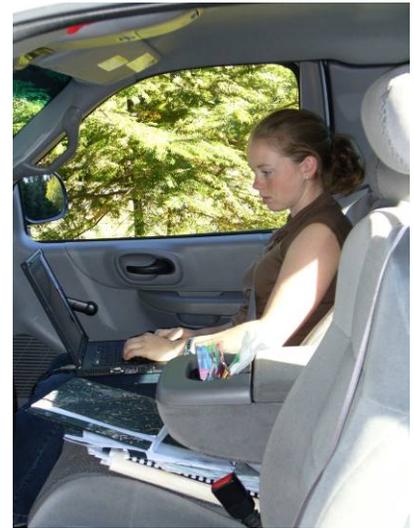
2. Methodology

INVENTORY METHODOLOGY

AgFocus is an Agricultural Land Use Inventory System developed by BC Ministry of Agriculture's Strengthening Farming Program. AgFocus employs a "windshield" survey method designed to capture a snapshot in time of land use and land cover on legal parcels. For more information on AgFocus, please refer to these documents available from the Strengthening Farming Program:

- AgFocus – A Surveyor's Guide to Conducting an Agricultural Land Use Inventory
- AgFocus – Field Guide to Conducting an Agricultural Land Use Inventory
- AgFocus – A GIS Analyst's Guide to Agricultural Land Use Inventory Data

The Kelowna Agricultural Land Use Inventory was conducted in the summer of 2011 by a professional agrologist and a GIS technician. The survey crew visited each property and observed land use, land cover, and agriculture activity from the road. Where visibility was limited, data was interpreted from aerial photography in combination with local knowledge. The technician entered the survey data into a database on a laptop computer.



Field survey maps provided the basis for the survey and included:

- The legal parcel boundaries (cadastre)⁵
- Unique identifier for each legal parcel
- The preliminary land cover polygon boundaries (digitized prior to field survey using aerial photography)
- Unique identifier for each preliminary land cover polygon
- The boundary of the Agricultural Land Reserve (ALR)
- Base features such as streets, street names, watercourses and contours
- Aerial photography



⁵ Cadastre mapping (2013) was provided through the Integrated Cadastral Information Society.

DESCRIPTION OF THE DATA

For each property in the study area, data was collected on general land use and land cover. For properties with agriculture present, data was collected on agricultural practices, irrigation, crop production methods, livestock, agricultural support (storage, compost, waste), and activities which add value to raw agricultural products.

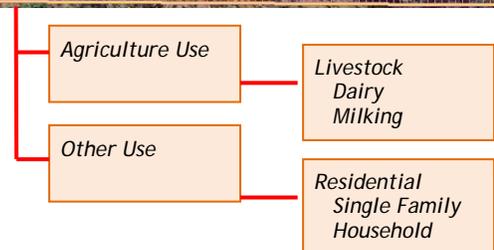
Once acquired through the survey, the data was brought into a Geographic Information System (GIS) to facilitate analysis and mapping. Digital data, in the form of a tabular database and GIS spatial layers (for maps), may be available with certain restrictions through a terms of use agreement.

General land use:

Up to two general land uses (e.g. residential, commercial) were recorded for each property based on an assessment of overall economic importance, the property's tax status, and/or the extent of the land use. The survey for general land use focuses solely on human use and considers:

- The actual human use of land and related structures and modifications to the landscape
- Use-related land cover (where land cover implies a use or is important to interpreting patterns of use)
- Declared interests in the land (which may limit use) such as parks

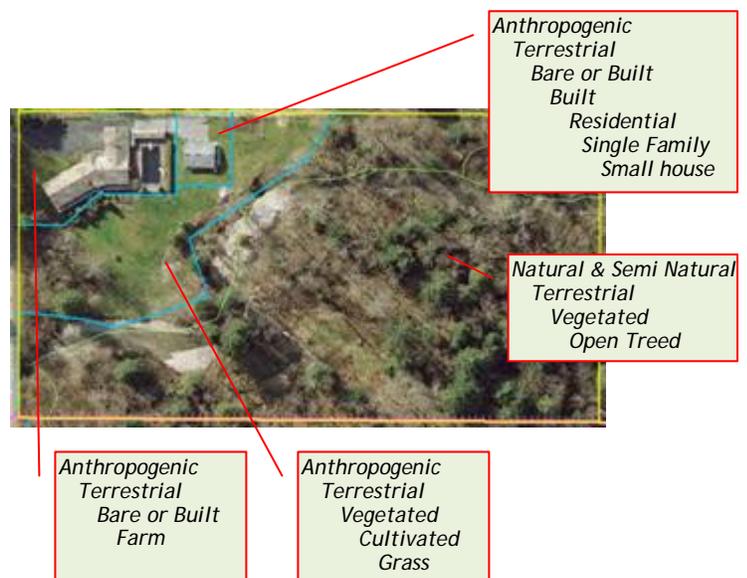
In addition, the availability of non-farm use properties for future farming was assessed based on the amount of potential land for farming on the property and the compatibility of existing uses with future farming activities.



Land cover:

Land cover refers to the biophysical features of the land (e.g. crops, buildings, forested areas, woodlots, streams). Land cover was surveyed by separating the parcel into homogeneous components and assigning each a description. Prior to field survey, polygons were delineated in the office using orthophotography. Further delineation occurred during the field survey until one of the following was achieved:

- Minimum polygon size (500 sq m ~5400 sq ft) or minimum polygon width (10 m ~33 ft)
- Polygon is homogeneous in physical cover and homogeneous in irrigation method
- Maximum level of detail required was reached



In most cases, more than one land cover was recorded for each parcel surveyed.

Agricultural practices: Surveyors recorded agricultural practices associated with crops or livestock activities. For example, if a forage crop was being harvested for hay, it was recorded. Irrigation was also recorded, including the type of system used.

Agricultural crop production: Crop production and crop protection methods observed on the parcel were recorded such as wildlife scare devices, temperature or light control, or organic production. Organic production is not always visible and may have been recorded based on local knowledge or farmer interviews.

Livestock: Livestock operations and confinement methods along with the scale of the activity were estimated and recorded. Livestock not visible at the time of survey may have been inferred based on grazed pastures, manure storage, size of barn and other evidence.

Agricultural support: Ancillary agricultural activities, such as storage, compost or waste, supporting the production of a raw commodity on a farm unit were recorded.

Agricultural value added: Activities that add value to a raw commodity where at least 50% of the raw commodity is produced on the farm unit were recorded. This value-added activity included processing, direct sales and agri-tourism activities.

PRESENTATION OF THE DATA

The data is presented in the form of summarized tables and charts. In the final formatting of the tables and charts, data values are rounded to the nearest whole number. As a result, the data may not appear to add up correctly.

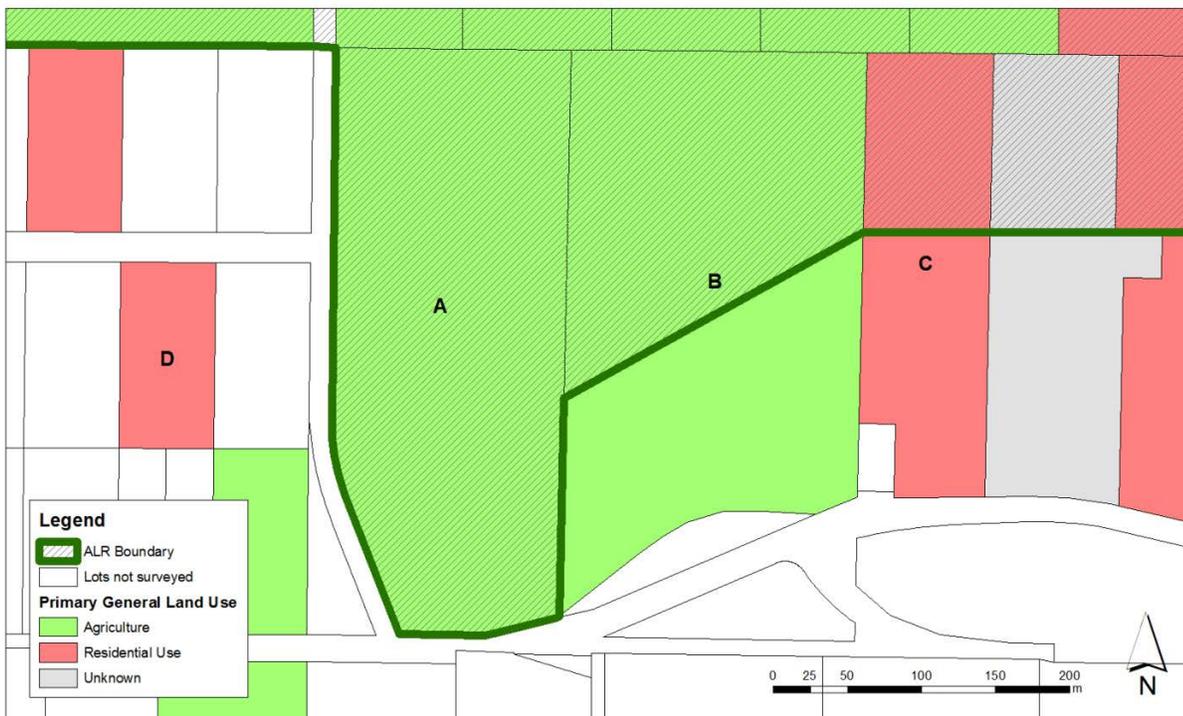
DETERMINATION OF PARCELS WITHIN THE ALR

Since much of the following analysis is parcel based, it is important to note that the ALR boundaries do not always align with parcel boundaries. As a result, many parcels have only a portion of their area in the ALR.

Figure 4 illustrates the frequent misalignment between parcel boundaries and the ALR boundary. Given that the dark green line represents the ALR boundary, Lot A is completely in the ALR and Lots B and C have a portion of their area in the ALR. Lot D is completely outside the ALR.

Many of the results presented in this report include three separate totals: the total parcel area, the portion of the parcel inside the ALR, and the portion of the parcel outside the ALR.

Figure 4. Parcel inclusion in the ALR



3. Land Cover and Farmed Area

Land cover describes the biophysical material at the surface of the earth and is distinct from land use which describes how people utilize the land. Refer to Section 5 (ALR Utilization) for more information on land use.

Land cover is surveyed by separating the parcel into homogeneous components and assigning each a description such as landscape lawn, natural open treed, natural waterbody, blueberries, road, or small single family house. Most surveyed parcels have numerous different land cover types with each describing a different area of the parcel. Land cover more closely approximates the actual area of land in agricultural production than land use.

Four land cover types are considered “Farmed”:

- **Cultivated field crops:** vegetation under cultivation for harvest or pasture including land temporarily set aside from farming and perennial crops that were not harvested or grazed in the current growing season
- **Farm infrastructure:** built structures associated with farming such as barns, stables, corrals, riding rings, and their associated yards
- **Greenhouses:** permanent enclosed glass or poly structures with or without climate control facilities for growing plants and vegetation under controlled environments
- **Crop barns:** permanent enclosed structures with non-translucent walls for growing crops such as mushrooms or bean sprouts

Forage and pasture field crops which have not been cut or grazed during the current growing season (unused), unmaintained field crops, and unmaintained greenhouses are considered “Farmed” land covers but are considered inactive.

Natural pasture or rangeland are fenced areas with uncultivated (not sown) natural or semi-natural vegetation used for grazing domestic livestock. These areas are considered “Grazed” rather than “Farmed” although these areas are usually extensions of more intensive farming areas.

Land cover types which may support farming, such as farm residences, vegetative buffers and farm road access, are not considered “Farmed”.

Table 1. Land cover and farmed area

Land cover*		In ALR (ha)	% of effective ALR	Outside ALR (ha)	Total area (ha)
Actively farmed	Cultivated field crops	3,591	44%	90	3,682
	Farm infrastructure	174	2%	22	196
	Greenhouses	5	< 1%	<1	5
Inactively farmed	Unmaintained field crops	150	2%	22	172
FARMED SUBTOTAL		3,920	48%	135	4,055
Anthropogenic (not farmed)	Managed vegetation	799	10%		
	Residential footprint	337	4%		
	Non Built or Bare	174	2%		
	Settlement	57	1%		
	Transportation	50	< 1%		
	Waterbodies	24	< 1%		
	Utilities	<1	< 1%		
ANTHROPOGENIC SUBTOTAL		1,442	18%		
Natural & Semi-natural	Vegetated	2,412	30%		
	Natural pasture or rangeland	261	3%		
	Wetlands & waterbodies	111	1%		
NATURAL & SEMI-NATURAL SUBTOTAL		2,784	34%		
TOTAL		8,146	100%		

* Refer to the glossary for terms used in this table.

Table 1 shows the extent of different land cover types across the ALR in Kelowna.

There are 3,920 ha of “Farmed” land cover in the ALR. Of the “Farmed” land cover, 3,591 ha is in cultivated field crops, 174 ha is in farm infrastructure, and 5 ha is in greenhouses.

An additional 135 ha of “Farmed” land cover was identified outside of the ALR.

Figure 5. Land cover and farmed area in the effective ALR

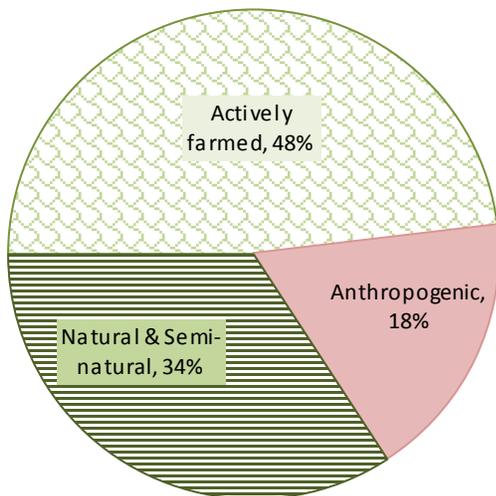


Figure 5 shows the proportion of different land cover categories across Kelowna’s effective ALR.

Forty-eight percent (48%) of effective ALR is in “Farmed” land cover.

Land used in support of farming such as natural pasture, farm residences, vegetative buffers or roadways is not included as farmed land cover.

STATUS OF THE EFFECTIVE ALR

Land cover, land use and physical site limitations (e.g. topography, soils, flooding) were used to assess how much land is available and may have potential for farming in the future.

Farmed or supporting farming: includes “**actively farmed**” land cover as well as farm houses, farm roads, and other built structures on farmed parcels. Actively farmed land cover includes cultivated crops, farm infrastructure, greenhouses and crops barns, but excludes unused / unmaintained crops and greenhouses.

Not farmed – **unavailable for farming**: areas where future agricultural development is improbable due to a conflicting land use or land cover. Examples of unavailable for farming land uses include golf courses, parks, and small lot residential. Examples of unavailable for farming land covers include wetlands, waterbodies, and industrial or commercial buildings.

Not farmed – **limited potential for farming**: land with significant physical or operational constraints to farming. Included are areas with steep terrain, rocky soils, riparian areas, or a very small (less than 0.4 ha) or awkward shape.

Not farmed – **available for farming**: areas that can be used for agriculture without displacing a current use. Includes natural and semi natural land cover, managed vegetation (managed for landscaping, dust or soil control), and non-built or bare areas. These areas must be free from physical and operational constraints.

Figure 6. Status of the effective ALR in relation to farming

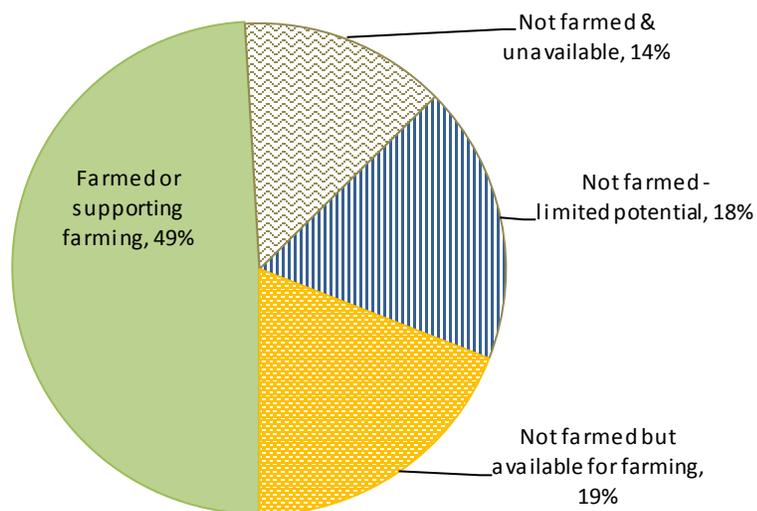


Figure 6 illustrates the status of the effective ALR in relation to farming in Kelowna.

Forty-nine percent (49%) of the effective ALR is actively farmed or is supporting farming.

Another 14% is not farmed and is unavailable for farming due to an existing land cover or land use. Eighteen percent (18%) has limited potential for farming due to a physical site limitation such as topography, drainage, or a very small size.

The remaining 19% is not farmed, but may be available to be brought into agricultural production.

Available for farming land cover is further described in Section 6: Availability of Land for Farming.

4. Farming Activities

CULTIVATED FIELD CROPS

Cultivated field crops are captured in a geographical information system (GIS) at the field or land cover polygon level by crop type (vegetables, forage or pasture, berries, etc.). The total land area for each crop is then evaluated.

Included with cultivated field crops is fallow farmland, inactively farmed land (i.e. forage or pasture crops which have not been harvested or grazed this season) and land temporarily set aside for wildlife or other purposes. Also included is bare cultivated land or land under preparation for planting as it is assumed these lands will be planted during the survey season. Excluded are crops grown in crop cover structures such as greenhouses or mushroom barns.

Cultivated field crops in Kelowna are described by 13 crop groupings:

- **Tree fruits:** apples, cherries, pears, peaches, mixed tree fruits, plums, apricots
- **Forage & pasture:** grass, mixed grass / legume, alfalfa, forage cereal / peas, forage corn
- **Vines:** grapes
- **Cereals:** rye
- **Nursery:** ornamentals & shrubs, cedar hedges, forestry stock, mixed
- **Vegetables:** mixed vegetables, pumpkins, sweet corn, misc. vegetables
- **Other :** bare cultivated land, fallow land (cultivated land that has not been seeded / planted for one or more growing sessions that will be brought back into rotation), crop transition, cover grass (to manage soil moisture / erosion associated with a crop)
- **Tree plantations:** Christmas trees
- **Turf**
- **Berries:** strawberries, blueberries, raspberries, mixed berries
- **Specialty:** Echinacea, hops
- **Floriculture**
- **Nut trees**

Table 2. Crop types by area

Type	ALR		Outside ALR (ha)	Total area (ha)	% of cultivated land
	In ALR (ha)	% of effective ALR			
Tree fruits	1,566	19%	12	1,578	41%
Forage & pasture	1,336	16%	88	1,423	37%
Vines	348	4%	8	356	9%
Cereals	157	2%	< 1	157	4%
Nursery	97	1%	< 1	97	3%
Vegetables	68	< 1%	< 1	69	2%
Other*	61	< 1%	< 1	62	2%
Trees (plantation)	38	< 1%	2	40	1%
Turf	23	< 1%	-	23	< 1%
Berries	22	< 1%	< 1	23	< 1%
Specialty	14	< 1%	-	14	< 1%
Nut trees	6	< 1%	< 1	6	< 1%
Floriculture	5	< 1%	< 1	5	< 1%
TOTAL	3,741	46%	113	3,853	100%

Table 2 shows the general crop types produced on the 3,853 ha of cultivated land in Kelowna.

Tree fruits are the most common crop type accounting for 41% of all cultivated land and 19% of the effective ALR.

Forage & pasture is the second most common crop type accounting for 37% of all cultivated land.

Vines are the third most abundant crop type in Kelowna and account for 9% of all cultivated land.

* Other. Includes bare cultivated land, fallow land (cultivated land that has not been seeded or planted for one or more growing seasons), land in crop transition, and land planted in cover grass to manage soil moisture/erosion associated with a cultivated crop.

Figure 7. Crop types by percentage

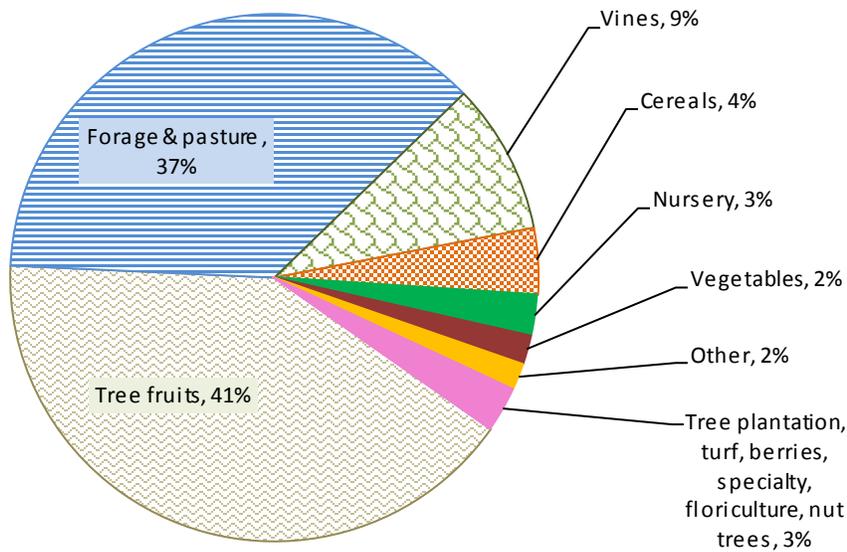


Figure 7 shows the proportion of the general crop types across Kelowna’s cultivated land.

“Tree fruits” combined with “forage & pasture” comprise 78% of all cultivated crops.

Figure 8. Parcel size distribution of parcels with cultivated field crops

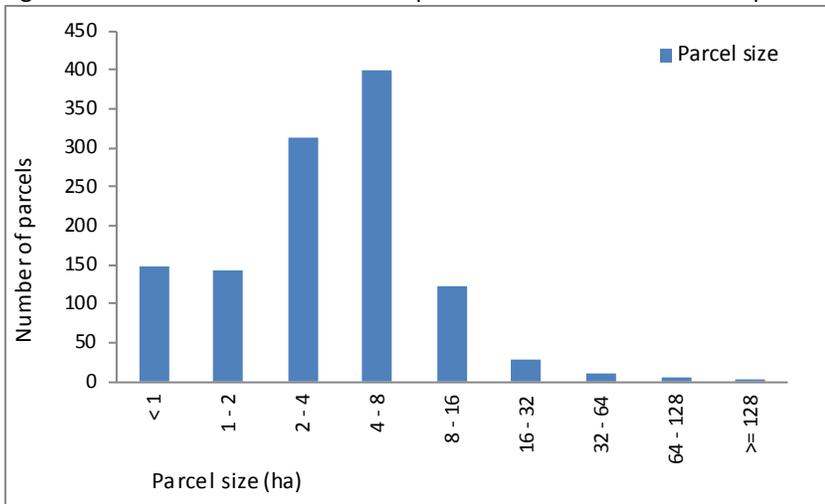


Figure 8 illustrates the size distribution of parcels that have cultivated field crops.

In total, cultivated crops occur on 1,171 individual parcels. These parcels have an average parcel size of 6 ha and a median parcel size of 4 ha.

Tree Fruits

Tree fruits are the most abundant crop type in Kelowna. Tree fruit production requires investment in the land as tree maturation and peak fruit production can take between 2 - 6 years depending on the fruit type and variety. Irrigation is required for most tree fruits to thrive.

Table 3. Tree fruits by area

Tree fruits	ALR		Outside ALR (ha)	Total area (ha)	% of cultivated land
	In ALR (ha)	% of effective ALR			
Apples	1,041	13%	3	1,045	27%
Cherries	390	5%	5	395	10%
Pears	93	1%	1	95	2%
Peaches	23	< 1%	< 1	23	< 1%
Mixed fruits	14	< 1%	2	16	< 1%
Plums	3	< 1%	-	3	< 1%
Apricots	2	< 1%	-	2	< 1%
TOTAL	1,566	19%	12	1,578	41%

Table 3 details the types of tree fruits in Kelowna.

Apples are the main tree fruit with 1,045 ha, followed by cherries with 395 ha.

Figure 9. Tree fruit types by percentage

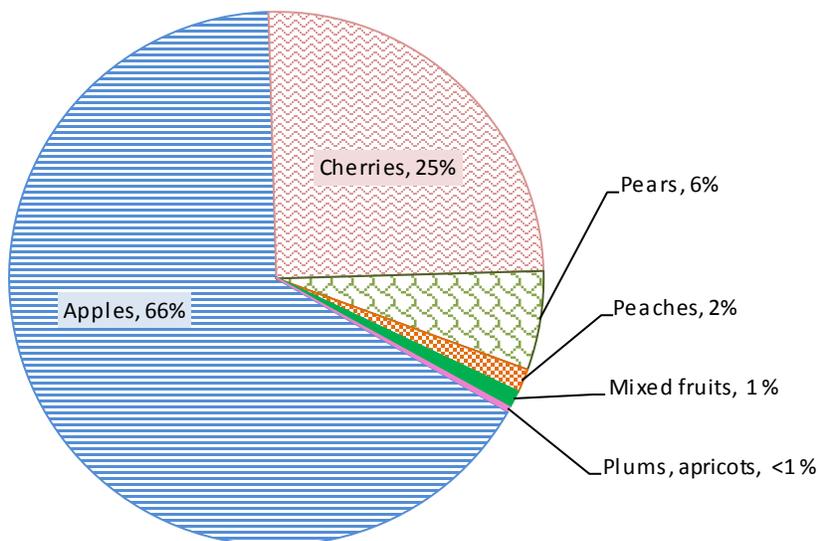


Figure 9 shows the proportion of tree fruit types in Kelowna.

Apples combined with cherries comprise 91% of all recorded tree fruits in the city.

Figure 10. Tree fruit fields by size

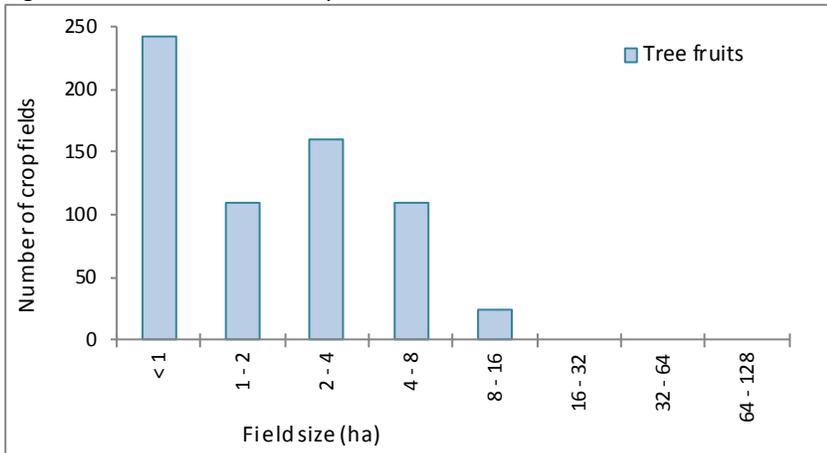


Figure 10 illustrates the field size distribution of tree fruits in Kelowna.

There are 645 individual tree fruit fields with an average crop area of 2.4 ha and a median crop area of 1.6 ha.

The average parcel size where tree fruits are grown is 5 ha.

Figure 11. Apple, cherry, and pear orchards by size

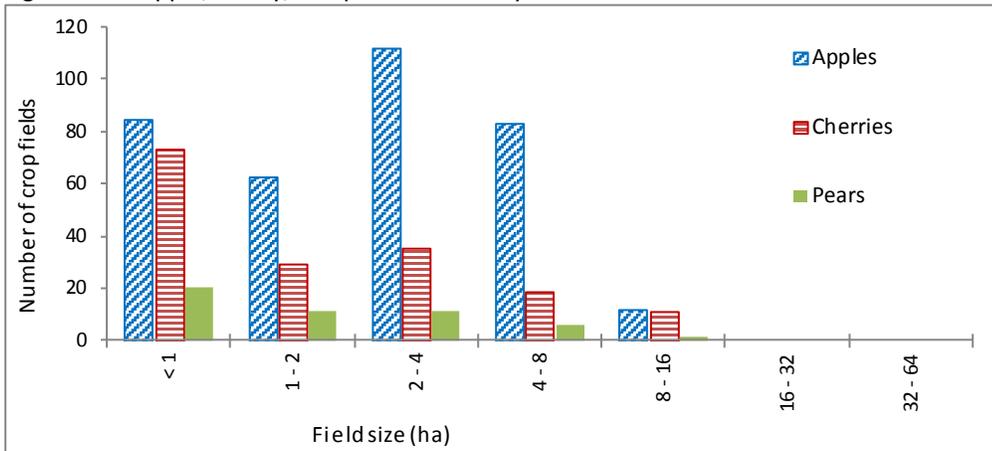


Figure 11 shows the field size distribution of the top 3 tree fruits. Apples and cherries occur across all field sizes with tree fruits.

Forage and pasture crops

Forage and pasture is the second most abundant crop type in Kelowna.

- Forage is a cultivated crop that is cut and made into silage or hay for livestock feed.
- Pasture is a cultivated crop that is used for grazing only and is not cut.
- Forage & pasture is grazed for 1-3 months and is cut for silage or hay.
- Unused forage or pasture has not been cut or grazed during the current growing season, but is in good condition. Unused crops are considered “inactively farmed”.
- Unmaintained forage or pasture has not been cut or grazed during the current growing season, has not been maintained for several years, and probably would not warrant harvest. Unmaintained crops are considered “inactively farmed”.

Table 4. Forage & pasture crops by area

Forage & pasture crops		ALR		Outside ALR (ha)	Total area (ha)	% of cultivated land
		In ALR (ha)	% of effective ALR			
Forage	Grass	271	3%	6	277	7%
	Mixed grass / legume	265	3%	4	268	7%
	Alfalfa	104	1%	5	108	3%
	Forage cereal / peas	2	< 1%	-	2	< 1%
	Forage corn	< 1	< 1%	-	< 1	< 1%
Subtotal		642	8%	14	656	17%
Forage & pasture	Mixed grass / legume	166	2%	3	169	4%
	Grass	55	< 1%	< 1	55	1%
Subtotal		221	3%	3	224	6%
Pasture	Grass	269	3%	46	315	8%
	Mixed grass / legume	53	< 1%	3	56	1%
	Alfalfa	17	< 1%	< 1	18	< 1%
Subtotal		340	4%	49	389	10%
Unmaintained	Grass &/or legume	90	1%	13	104	3%
Unused	Grass &/or legume	42	< 1%	8	50	1%
Subtotal		133	10%	21	154	4%
TOTAL		1,336	25%	88	1,423	37%

Table 4 details the amount of forage and pasture in Kelowna. In total, there are 656 ha in forage production, 389 ha in pasture and 224 ha in both forage and pasture.

Refer to Map 4 for more information.

Figure 12. Forage & pasture fields by size and type

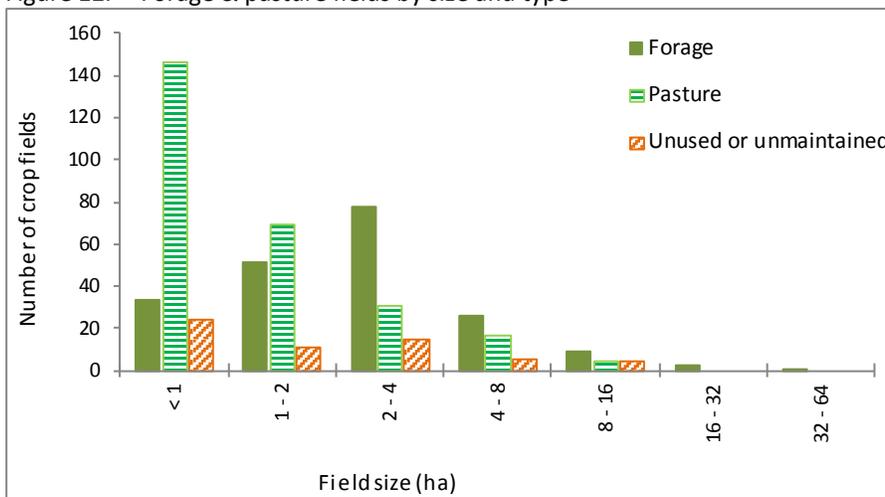


Figure 12 compares the field sizes of forage and pasture crops.

Most pasture fields are less than 1 ha (146 out of 268 or 55%). In total, there are 268 pasture fields with an average crop area of 1.4 ha and a median crop area of 0.8 ha.

In comparison, there are 201 forage fields with an average crop area of 3 ha and a median crop area of 2 ha.

Forage fields generally need to be larger than pasture fields in order to accommodate large equipment.

Top Individual Crops

Table 5. Top 20 crop types by area

Cultivated field crop	In ALR (ha)	% of effective ALR	Outside ALR (ha)	Total area (ha)	% of cultivated land
Apples	1,038	13%	3	1,042	27%
Forage*	836	10%	15	851	22%
Pasture	340	4%	49	389	10%
Cherries	370	5%	5	375	10%
Grapes	342	4%	8	350	9%
Rye	157	2%	< 1	157	4%
Unmaintained forage/pasture	90	1%	13	104	3%
Pears	93	1%	1	95	2%
Ornamentals and shrubs	93	1%	< 1	93	2%
Unused forage/pasture	42	< 1%	8	50	1%
Mixed vegetables	47	< 1%	1	48	1%
Fallow land	37	< 1%	1	38	1%
Forage & pasture	27	< 1%	2	29	1%
Christmas trees	28	< 1%	< 1	28	1%
Turf	23	< 1%	-	23	< 1%
Peaches	23	< 1%	< 1	23	< 1%
Sour cherries	20	< 1%	< 1	20	< 1%
Bare cultivated land	17	< 1%	< 1	17	< 1%
Mixed tree fruits	14	< 1%	2	16	< 1%
Echinacea	13	< 1%	-	13	< 1%
TOTAL	3,651	45%	109	3,760	98%

* Includes fields used exclusively for forage as well as fields used for both forage and pasture.

Table 5 lists the top 20 individual crops that account for 98% of the cultivated land in Kelowna.

Apples, forage, pasture, cherries, and grapes are the top individual crops in terms of area.

These five crop types account for 78% of all cultivated land.

Figure 13. Top 10 crop types by area

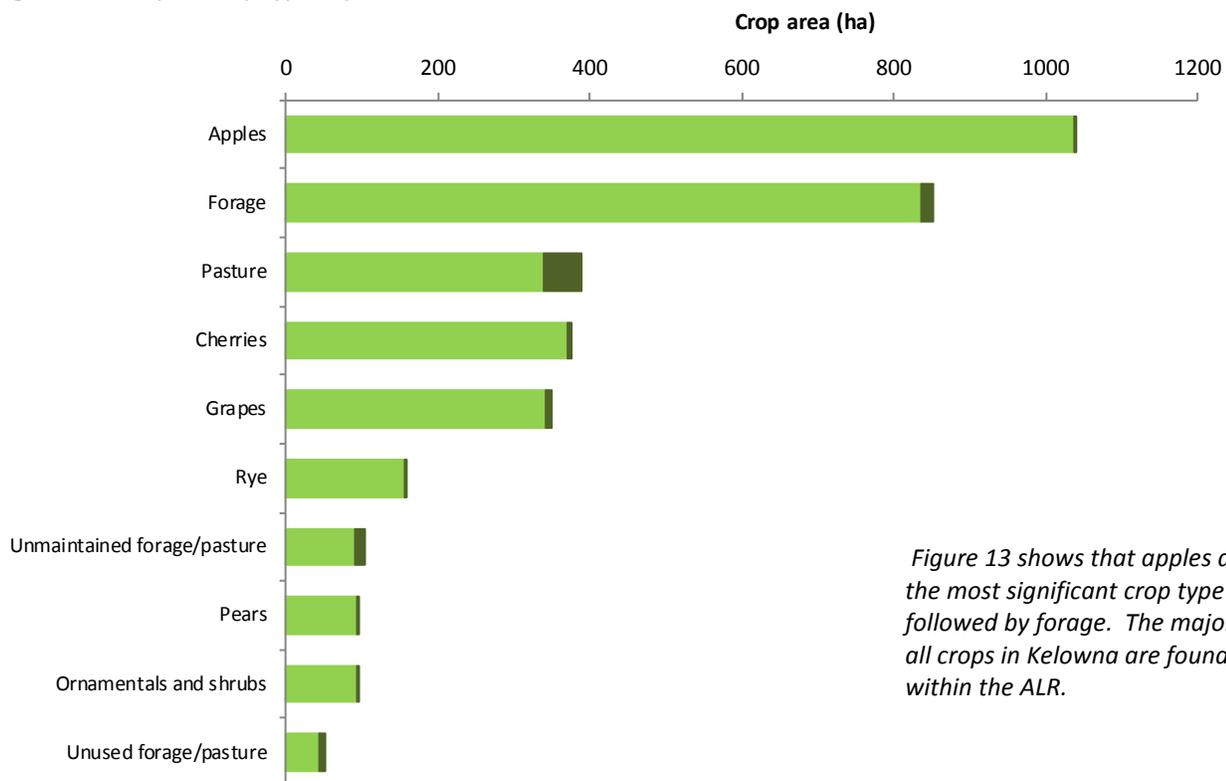


Figure 13 shows that apples are the most significant crop type followed by forage. The majority of all crops in Kelowna are found within the ALR.

GREENHOUSES

Greenhouses are structures covered with translucent material and of sufficient size for a person to work inside⁶. They are permanent enclosed glass or polyethylene (poly) structures with or without climate control facilities for growing plants under controlled environments. Non permanent structures such as hoop covers are considered an agricultural practice and are not included here.

Greenhouse activities are delineated to the exact footprint to enable agricultural water demand calculations. A single greenhouse activity may have more than one greenhouse of the same type (e.g. poly or glass) if the buildings are adjacent to one another.

Table 6. Greenhouses by area⁷

Greenhouses		ALR		Outside ALR (sq m)	Total area (sq m)	% of greenhouse area
		In ALR (sq m)	% of ALR			
Glass greenhouse - Mixed		4,500	<0.1%	900	5,400	12%
Subtotal		4,500	<0.1%	900	5,400	12%
Poly greenhouse	Nursery	18,200	<0.1%	-	18,200	41%
	Mixed	14,200	<0.1%	-	14,200	32%
	Vegetables	5,400	<0.1%	-	5,400	12%
	Empty	1,200	<0.1%	-	1,200	3%
	Unknown	300	<0.1%	-	300	1%
Subtotal		39,300	<0.1%	-	39,300	88%
TOTAL		43,800	<0.1%	900	44,700	100%

Table 6 shows that Kelowna has 44,700 m² (4.5 ha) in greenhouse footprints.

There are 5,400 m² in glass greenhouses, and 39,300 m² in poly greenhouses.

Nursery plants are the main products produced in poly greenhouses. Mixed products are also common.

Figure 14. Greenhouse activities by building type and greenhouse footprint⁸

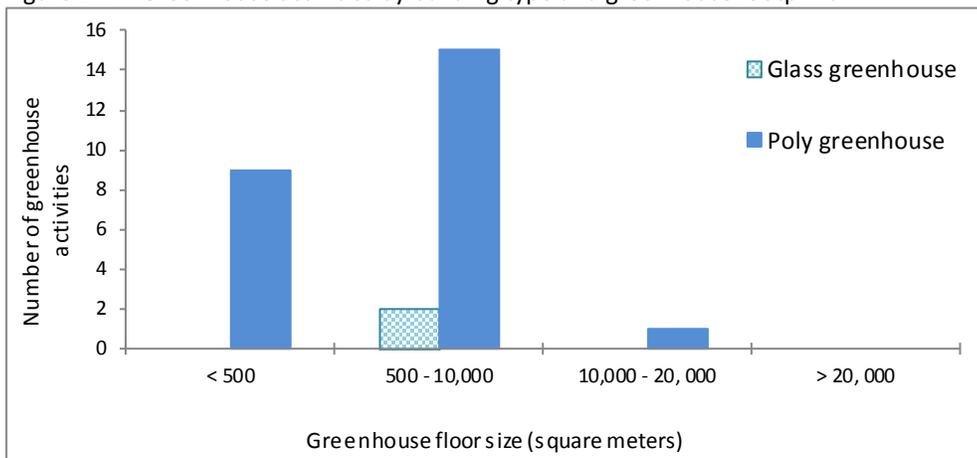


Figure 14 shows that most greenhouse activities are less than 10,000 square meters (1 ha) in size.

In total, there are 25 poly greenhouses and 2 glass greenhouse activities.

Of all recorded greenhouse activities one third (9 out of 27) are less than 500 square meters.

⁶ Source: *Guide for Bylaw Development in Farming Areas*, 2013. Ministry of Agriculture.

⁷ The areas reported in this table exclude external yards, parking, warehouses and other infrastructure related to the greenhouse operation. Poly refers to polyethylene.

⁸ Each distinct greenhouse building type on one parcel is counted as one activity. Each activity will include at least one and perhaps more greenhouse structures of the same building type if the buildings edges are adjacent to one another.

IRRIGATION

Irrigation is the artificial application of water to the land or soil and may be used to assist in the growing of agricultural crops, the maintenance of managed vegetation and the control of soil erosion or dust. The availability of water delivery infrastructure and good quality water for irrigation are often requirements for growing high-value crops. Insufficient water sources or water delivery infrastructure can limit the potential to increase agricultural production through irrigation.

Irrigation is captured at the field or land cover level by system type (e.g. sprinkler, trickle, giant gun, centre pivot) and then summarized by crop type to the total land area under irrigation. Irrigated land includes all irrigated field crops and may also include irrigated fallow farmland, land temporarily set aside for wildlife or other purposes, and land under preparation for planting. Also included are crops grown in greenhouses and crop barns. In addition, individual cultivated field crops are evaluated for percent of crop area under irrigation.

An Agricultural Water Demand Model (AWDM) is currently being created for the Okanagan Water Basin. The AWDM is a water management planning tool that estimates current and future agricultural water needs. The model utilizes Agricultural Land Use Inventory crop and irrigation data, as well as soil and climate data from external sources. The Okanagan Water Basin AWDM Report will highlight the results from several climate change scenarios and water management practices.

Table 7. Main crop types and irrigation

Cultivated field crop	Irrigation system in use (ha)				Total area irrigated (ha)	% of crop area irrigated
	Sprinkler	Trickle	Giant gun	Centre pivot		
Tree fruits	1,317	259	< 1	-	1,576	100%
Forage & pasture	956	-	70	66	1,092	77%
Grapes	115	240	-	-	356	100%
Nursery	20	72	3	-	95	98%
Vegetables	63	5	-	-	68	99%
Trees (plantation)	35	< 1	-	-	35	88%
Other*	30	-	-	-	30	48%
Turf	23	-	-	-	23	100%
Berries	15	6	-	-	20	89%
Specialty	13	1	-	-	14	100%
Nut trees	6	-	-	-	6	100%
Cereals	5	-	-	-	5	3%
Floriculture	5	< 1	-	-	5	100%
TOTAL CROP AREA IRRIGATED	2,603	583	73	66	3,326	86%
Greenhouses	Flood and trickle irrigation				4	100%

* Other. Includes bare cultivated land, fallow land (cultivated land that has not been seeded or planted for one or more growing season), land in crop transition, land planted in cover grass or under mulch to manage soil moisture/erosion associated with a cultivated crop.

Table 7 outlines the types of irrigation systems used on cultivated field crops in Kelowna. Irrigation is important for crop production in the region and 86% of all cultivated fields are irrigated (3,326 ha out of 3,853 ha)

Sprinkler systems are the most common type of irrigation and include handline, wheelline, solid set and microsprinkler systems.

Figure 15. Irrigation systems by percentage of cultivated land

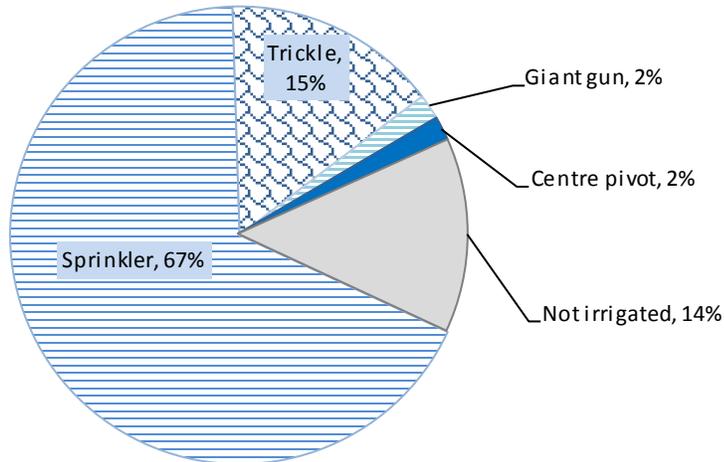


Figure 15 shows that 86% of the cultivated land in Kelowna is irrigated.

Table 8. Top 20 individual crops using irrigation

Cultivated field crop	Total area irrigated (ha)	% crop area irrigated
Apples	1,042	100%
Forage*	734	86%
Pasture	312	80%
Cherries	375	100%
Grapes	350	100%
Rye	5	3%
Unmaintained forage/pasture	4	4%
Pears	95	100%
Ornamentals and shrubs	93	100%
Unused forage/pasture	13	25%
Mixed vegetables	48	100%
Fallow land	9	23%
Forage & pasture	29	100%
Christmas trees	26	93%
Turf	23	100%
Peaches	23	100%
Sour cherries	20	100%
Cultivated land	15	89%
Mixed fruits	16	100%
Echinacea	13	100%
TOTAL	3,244	

* Includes fields used exclusively for forage as well as fields used for both forage and pasture.

Table 8 shows the amount of land under irrigation for the top 20 crops in terms of area (refer to Table 5).

Apples are the most abundant crop in Kelowna and 100% of the crop area is irrigated.

Forage is the second most common crop type, and has 86% of its total area under irrigation.

LIVESTOCK

Livestock activities are difficult to measure using a windshield survey. Livestock are often confined to structures making it difficult to see the animals. Local knowledge and other indicators such as animal confinement type (barn type), feeder system type, manure handling system type, and other visible elements may be used to infer the type of livestock and scale of activity that exist on a parcel. In addition, livestock are mobile and may utilize more than one land parcel. Livestock visible on a certain parcel one day may be visible on a different parcel the next day. This inventory reports livestock on the parcel where the animals or related structures were observed.

"**Intensive**" livestock activities utilize specialized structures such as barns, feedlots and stockyards designed for confined feeding at higher stocking densities. "**non-intensive**" livestock activities allow animals to graze on a pasture and often utilize non intensive barns and corrals / paddocks.

The scale system used to describe livestock operations relies on animal unit equivalents which is a standard measure used to compare different livestock types. One animal unit equivalent is equal to approximately one adult cow or horse. The scale system includes 4 levels:

- "**Very Small**" Approximately 1 cow or horse or bison, 3 hogs, 5 goats or deer, 10 sheep, 50 turkeys, 100 chickens (1 animal unit equivalent). Estimated AUE: 1
- "**Small**" LESS THAN 25 cows or horses or bison, 75 hogs, 125 goats or deer, 250 sheep, 1250 turkeys, 2500 chickens (2 - 25 animal unit equivalents). Estimated AUE: 13
- "**Medium**" LESS THAN 100 cows or horses or bison, 300 hogs, 500 goats or deer, 1000 sheep, 5000 turkeys, 10,000 chickens (25 - 100 animal unit equivalents). Estimated AUE: 63
- "**Large**" MORE THAN 100 cows or horses or bison, 300 hogs, 500 goats or deer, 1000 sheep, 5000 turkeys, 10,000 chickens (over 100 animal unit equivalents). Estimated AUE: 150

Estimated animal unit equivalents are calculated using the midpoint of each above described scale range. This number can be used to rank the relative importance and impact of each type of livestock. The actual number of livestock may be under estimated, especially for large operations.

Number of activities. Each occurrence of livestock on a parcel is counted on one activity. A small mixed farm with 1-2 cows and a large commercial milking operation are each counted as one activity.

Table 9. Livestock homesite activities

Livestock group	Estimated animal unit equivalents	Count of activities
Equine	2,510	230
Beef	800	33
Poultry	140	56
Sheep / lamb / goat	120	22
Llama / alpaca	110	12
Swine	10	2
Dairy	10	1
Ratite	10	1
TOTAL	3,710	357

Table 9 details the number of estimated animal unit equivalents by livestock type.

Equine activities have the greatest number of activities and the greatest number of estimated animal unit equivalents.

Figure 16. Livestock type by proportion of estimated animal unit equivalents

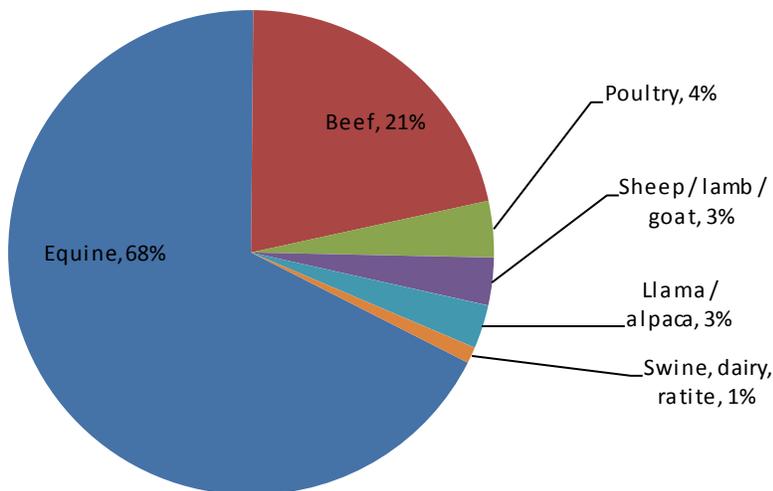


Figure 16 illustrates the proportion of livestock types by all estimated animal unit equivalents.

Equine accounts for 68% of all AUEs and beef accounts for 21%.

Estimated Animal Unit Equivalents

Figure 17. Estimated animal unit equivalents by livestock intensity

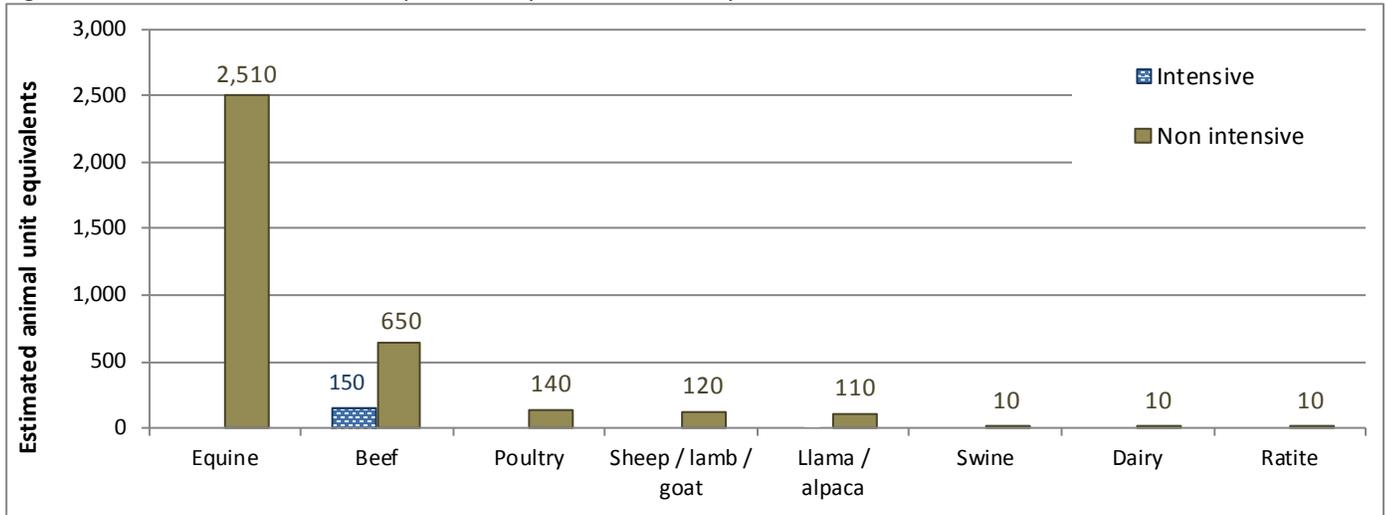


Figure 17 illustrates the number of estimated animal unit equivalents by type and intensity in Kelowna. Beef is the only livestock type with “intensive” facilities designed for confined feeding at higher stocking densities.

All other livestock types occur in “non-intensive” facilities.

Figure 18. Estimated animal unit equivalents by scale

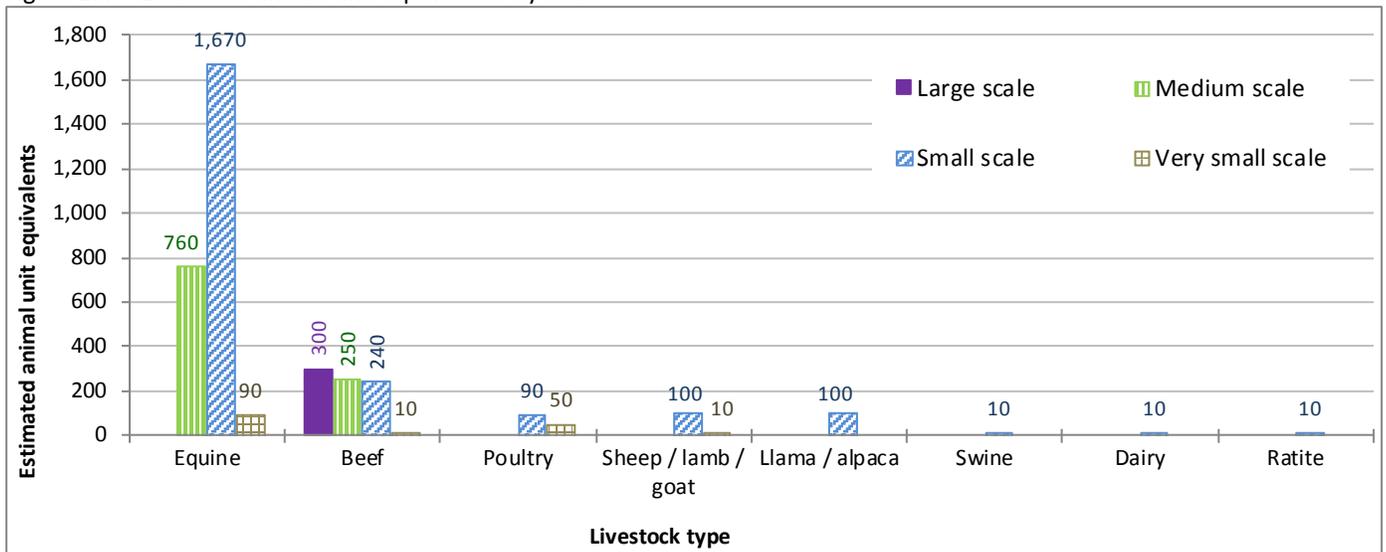


Figure 18 illustrates the number of estimated animal unit equivalents by scale and livestock type in Kelowna.

Beef is the only livestock types to occur on a “large” scale (>100 AUE) with an estimated 300 beef AUE associated with large scale operations. Only 150 of these estimated AUE utilize intensive facilities (refer to Figure 17).

Equine and beef are the only livestock types to occur on a “medium” scale (25 – 100 AUE). All other livestock types occur on a “small” or “very small” scale.

Number of livestock activities (count of occurrences)

Figure 19. Number of livestock activities by intensity

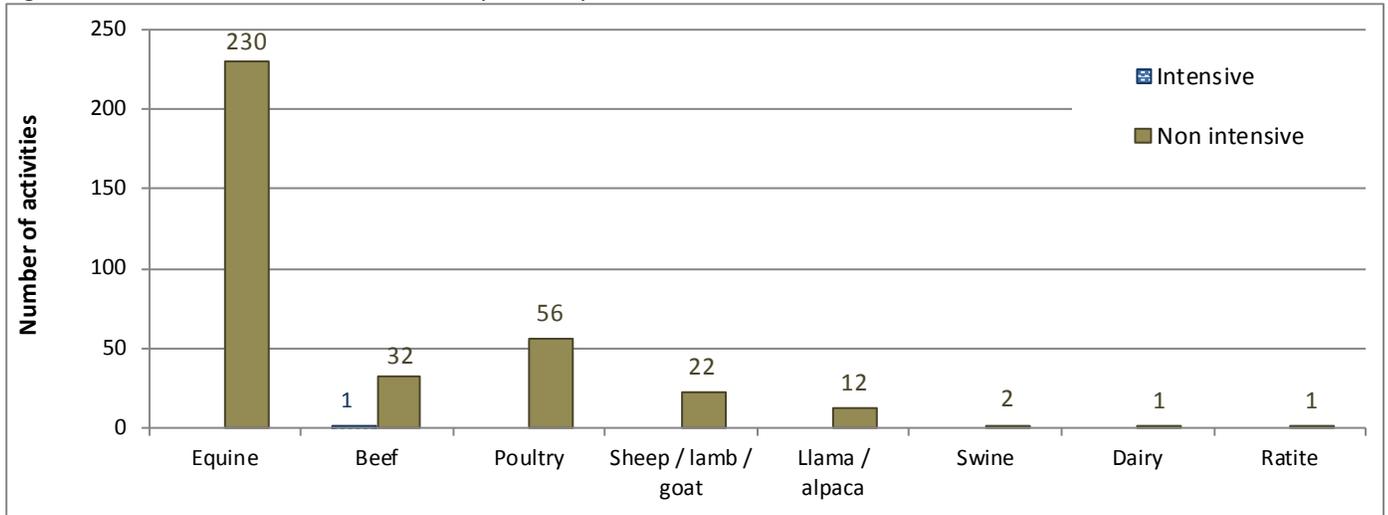


Figure 19 illustrates the number of livestock activities by intensity. Only 1 “intensive” livestock facility was recorded in Kelowna; this was a beef operation.

All other livestock types occur in “non-intensive” facilities.

Figure 20. Number of livestock activities by scale

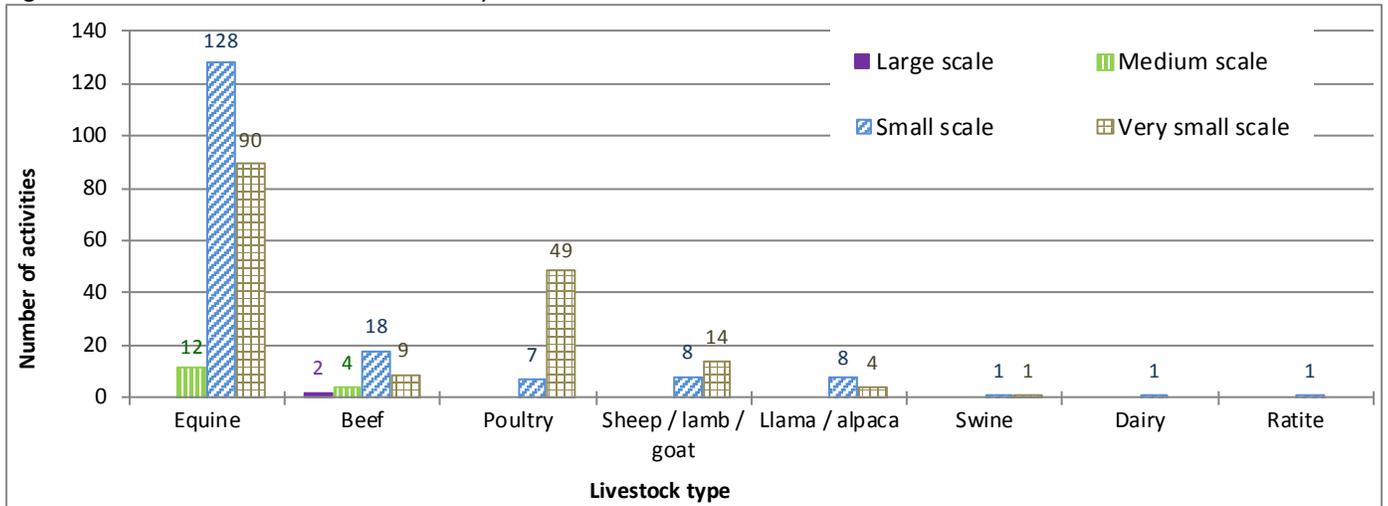


Figure 20 illustrates the number of livestock activities by scale and livestock type in Kelowna. The majority of all activities are “small” or “very small” scale.

5. ALR Utilization

PARCEL INCLUSION IN THE ALR

The inventory area included 8,146 ha of ALR on 1,853 parcels which is 94% of the total ALR area and 100% of the “effective ALR” within Kelowna.

ALR boundaries do not always align with parcel boundaries which results in many parcels having only a portion of their area in the ALR. To achieve an accurate picture of the ALR land within Kelowna, only parcels that meet the following criteria are included in this section of the report:

- parcels > 0.05 hectares in size with at least half their area ($\geq 50\%$) in the ALR, or
- parcels with at least 10 hectares (≥ 10 hectares) of ALR land.

In total, 1,783 parcels, with 8,048 ha or 96% of the effective ALR, met the above criteria and are included in the ALR utilization analysis.

Figure 21. Parcel inclusion in the ALR



Figure 21 illustrates the distinction between parcels considered to be within or outside the ALR:

Considered to be within the ALR:

- lot A is completely in the ALR
- lot B has 50% or more of its area in the ALR.

Considered to be outside the ALR:

- lot C has less than 50% of its area and less than 10 ha in the ALR
- lot D is completely outside the ALR.

LAND USE AND FARM USE

Land use focuses solely on human use and describes the economic function or type of establishment using the parcel. A parcel can have a variety of activities on the land, yet serve a single use. For example, two parcels are said to be “Used for farming”, even if one is a dairy farm and the other is in blueberries. Another example is “Commercial” land use; if one parcel is a hotel, another is a retail store, and a third is a gas station, all are considered to have a “Commercial” land use.

Up to two general land uses (e.g. residential, commercial, protected area) are recorded for each parcel. Evaluation of land uses are based on the overall economic importance, the property’s tax status, and/or the extent of the land use.

Parcels where the majority of the parcel area is utilized for farming or parcels which exhibit significant evidence of intensive farming are considered “**Used for farming**” (refer to the glossary for a complete definition). Many “Used for farming” parcels are also used for other purposes such as “Residential” or “Commercial”. This report does not attempt to determine which use is primary.

Parcels that do not meet the “**Used for farming**” criteria, but have a significant portion of their area in natural pasture or rangeland and have evidence of active domestic livestock grazing are considered “**Used for grazing**”.

Table 10. Land use and farming use in the ALR

Parcel land use*		Number of ALR parcels	% of ALR parcels	Average parcel size	Median parcel size (ha)
Used only for farming - no other use		145	8 %	6	4.0
Used for farming - Mixed use	Residential	661	37 %	5	4.1
	Commercial & service	5	<1 %	9	8.0
	Transportation & utilities	1	<1 %	5	5.3
	Recreation & leisure	1	<1 %	12	11.7
	Gravel extraction	1	<1 %	121	121.5
	Garbage dumps	1	<1 %	42	42.2
USED FOR FARMING SUBTOTAL		815	46 %	6	4.1
Used for grazing - no other use		9	<1 %	51	52.3
USED FOR GRAZING SUBTOTAL		9	<1 %	51	52.3
Not used for farming	Residential	680	38 %	2	0.8
	No apparent use	126	7 %	8	3.2
	Protected area / park / reserve	46	3 %	4	1.7
	Transportation & utilities	27	2 %	9	0.8
	Recreation & leisure - golf	18	1 %	28	15.0
	Recreation & leisure	18	1 %	5	2.2
	Institutional & community	13	1 %	2	0.6
	Commercial & service	10	<1 %	2	1.3
	Gravel extraction	9	<1 %	16	8.4
	Garbage dumps	6	<1 %	14	3.9
	Industrial	4	<1 %	2	1.6
	Water management	2	<1 %	< 1	0.3
NOT USED FOR FARMING SUBTOTAL		959	54 %	4	1.1
TOTAL		1,783	100 %	5	2.7

* See "Land Use" in the glossary for terms used in this table.

Table 10 shows the number of ALR parcels that are “Used for farming” and “Not used for farming” by land use.

In total, 46% of the ALR parcels (815 parcels) are “Used for farming” and 54% (959 parcels) are “Not used for farming”.

The “Used for farming” parcels have an average parcel size of 6 ha and a median parcel size of 4.1 ha. The “Not used for farming” parcels are statistically smaller with an average parcel size of 4 ha and a median parcel size of only 1.1 ha.

Figure 22 provides more information on “Used for farming” parcels and Figure 23 provides more information on “Not used for farming” parcels.

Figure 22. Proportion of “Used for farming” ALR parcels by land use

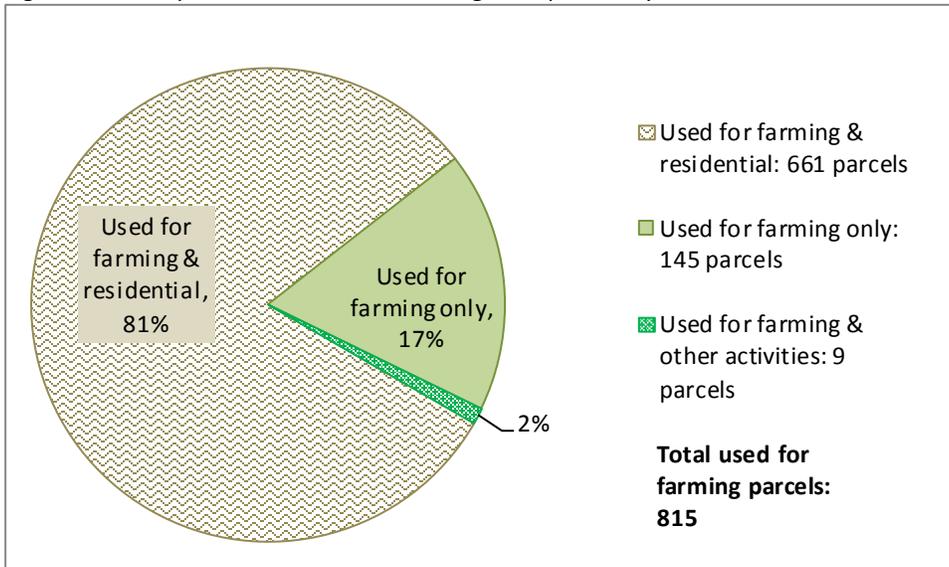


Figure 22 illustrates the proportion of “Used for farming” ALR parcels by their land use.

Eighty-one (81%) of the “Used for farming” ALR parcels are also used for residential purposes.

Another 17% are exclusively used for agriculture with no other uses.

Figure 23. Proportion of “Not used for farming” ALR parcels by land use

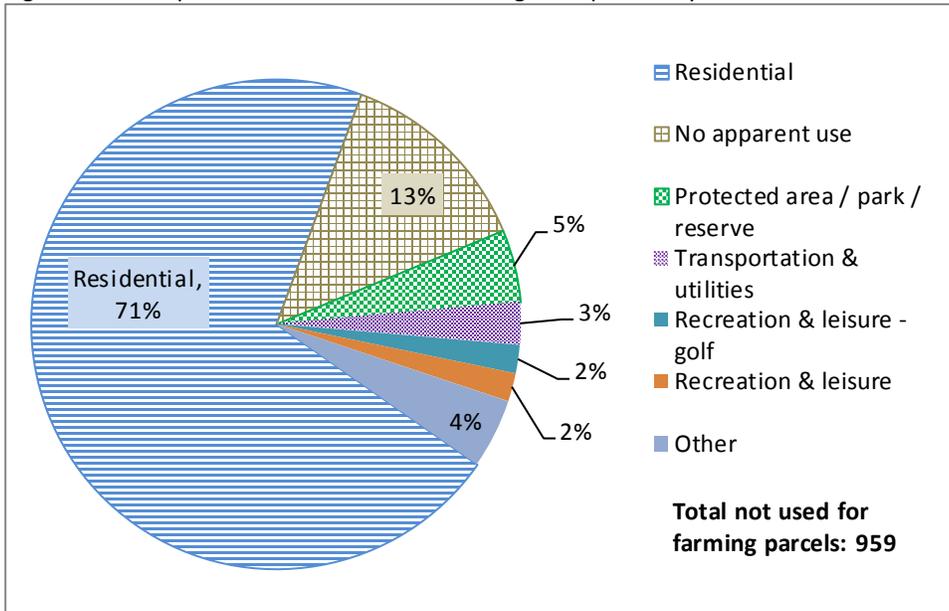


Figure 23 illustrates the proportion of “Not used for farming” ALR parcels by their land use.

The largest proportion of all “Not used for farming” ALR parcels (71%) have a residential use. Many of these parcels are small with an average area of 2 ha and a median area of 0.8 ha (refer to Table 10)

RESIDENTIAL USE

The ALR is a provincial zone in which agriculture is the priority use and some “Residential” use is considered a necessary accessory to the agricultural use of a property. However, “Residential” use which is not an accessory to agriculture can effectively limit the ability of agriculture to grow, intensify and respond to market demands. When the primary motivation for ownership of ALR land is residential use, the residence is often placed to maximize privacy and views, with little consideration for agricultural opportunities on the parcel. Houses that are not adjacent to the frontage road alienate portions of land from future agricultural use. If the occupants are non-farmers, they are more likely to be affected by noise, odour, or dust from neighbouring farm operations.

The size of the residence may be another factor to consider. Properties with larger residences usually have higher property values making it more difficult for a farmer to acquire and convert the land to farmland.

In the following analysis cabins/cottages, mobile homes, single-family houses, duplexes, townhouses, apartments, motels, dormitories, and institutional living buildings are included. Single-family houses are further described by the estimated size of the building:

- Small single-family house < 1,500 sq. ft.
- Medium single-family house 1,500 – 3,500 sq. ft.
- Large single-family house 3,500 – 5,000 sq. ft.
- Estate (very large) single-family house > 5,000 sq. ft.

Average land improvement values of Kelowna properties with residences in the ALR were as follows:

- estate single family house \$1,113,150
- large single family house \$491,640
- medium single family house \$250,835
- small single family house \$141,820

(Calculated using 2012 BC Assessment database - last improvement value)

Figure 24. Residential land use on parcels in the ALR

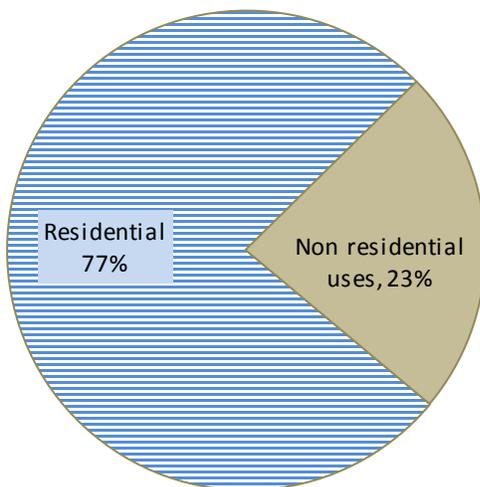


Figure 24 shows that over three quarters (77%) of all ALR parcels are used for residential purposes. These parcels may also have other land uses and/or farming activities on them.

The size and placement of the residential footprint can impact the potential of the remaining parcel area to be used for farming purposes.

Figure 25. Farming status of parcels in the ALR with residential land use

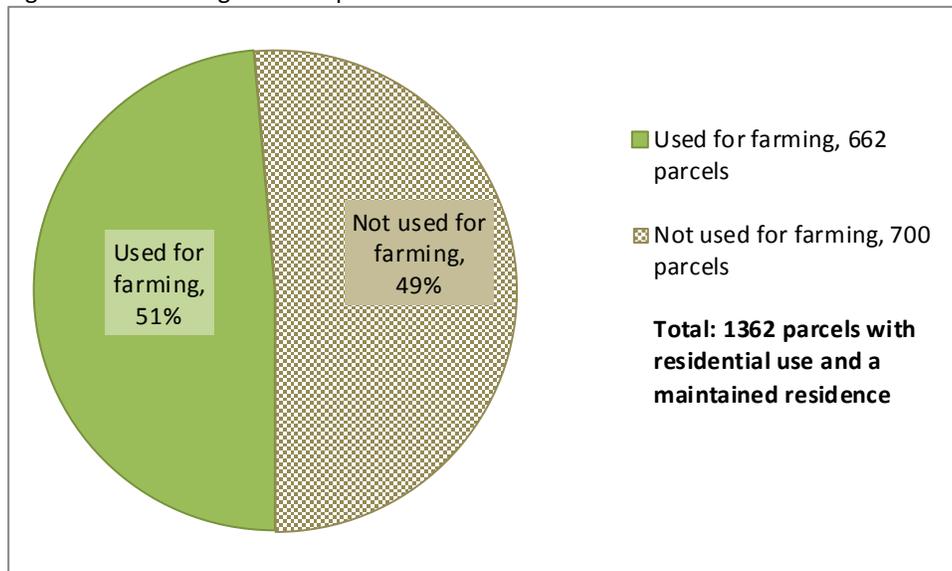


Figure 25 illustrates the farm status of parcels with a maintained residence.

In total, 51% of all ALR parcels with a residence are “Used for farming”.

Forty-nine percent of the ALR parcels with a residence are “Not used for farming”. If it is assumed that most farmers do not leave agricultural land idle, this could indicate that there is a significant proportion of non-farming land owners living in the ALR.

Residential Footprint

Residential footprint includes the main residence plus its associated yard, driveway, parking and any auxiliary buildings or structures. When two residences are on a property, areas associated to both (such as shared driveways, parking or yard), are assigned to the closest residence.

Figure 26. Average percent of parcel area in residential footprint by parcel size

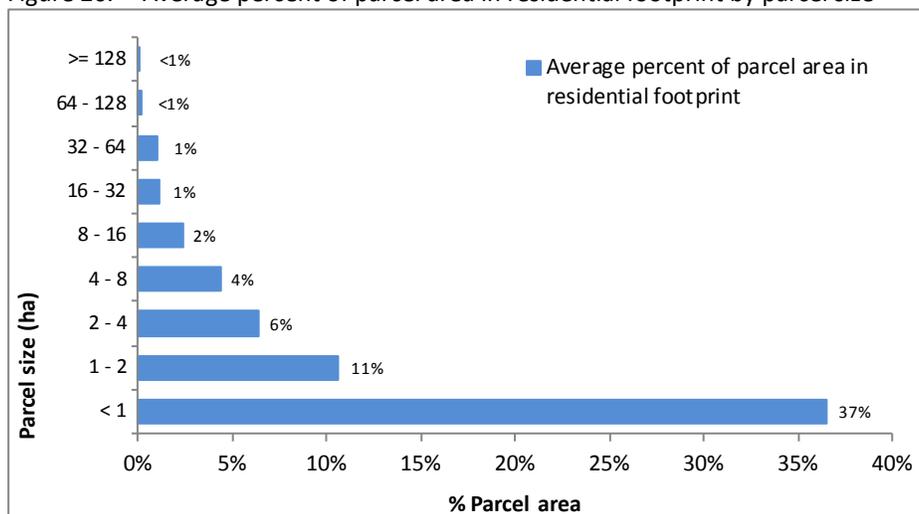


Figure 26 demonstrates that residential footprints on smaller parcels use a much greater proportion of the parcel area than residential footprints on larger parcels.

PARCEL SIZE & FARMING

Parcel size must be considered when determining the agricultural potential of a parcel. Larger parcels usually allow farmers greater flexibility to expand or change their type of operation as the economy and markets change. Although some types of agriculture can be successful on small parcels, (e.g. intensive market gardens, nurseries), the number of viable farming options generally decreases with a reduced parcel size.

A farming operation may utilize more than one parcel as a farm unit⁹, however, it is generally more efficient to run a farm on fewer larger parcels than on many smaller parcels. Smaller parcels are generally more costly per hectare than larger parcels, and can easily be disassembled from larger farm units and sold. Larger parcels accommodate equipment more efficiently and reduce the need to move farm equipment on public roads. Furthermore, smaller parcels are also more impacted by bylaws designed to reduce potential land use conflicts, such as setbacks from lot lines and road allowances.

Figure 27. Number of parcels in the ALR by parcel size

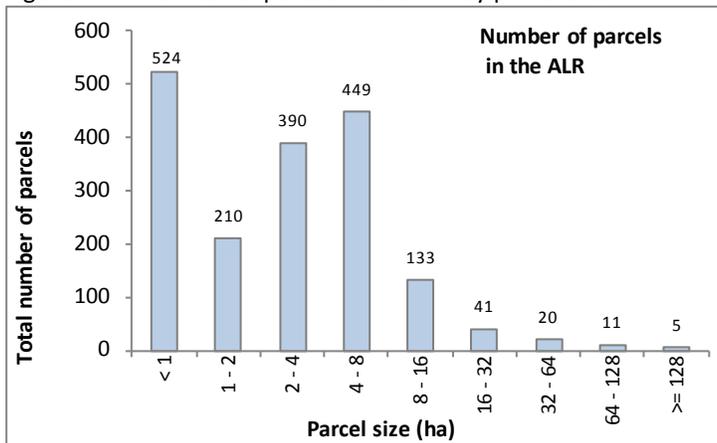


Figure 27 illustrates the number of ALR parcels by parcel size category. Of the 1,783 ALR parcels:

- 29% (524 parcels) are less than 1 ha.
- 63% (1,124 parcels) are less than 4 ha.
- 25% (449 parcels) are between 4 and 8 ha.
- 8% (133 parcels) are between 8 and 16 ha.
- 4% (77 parcels) are greater than 16 ha.

Figure 28. Number of farmed and not farmed parcels in the ALR by parcel size

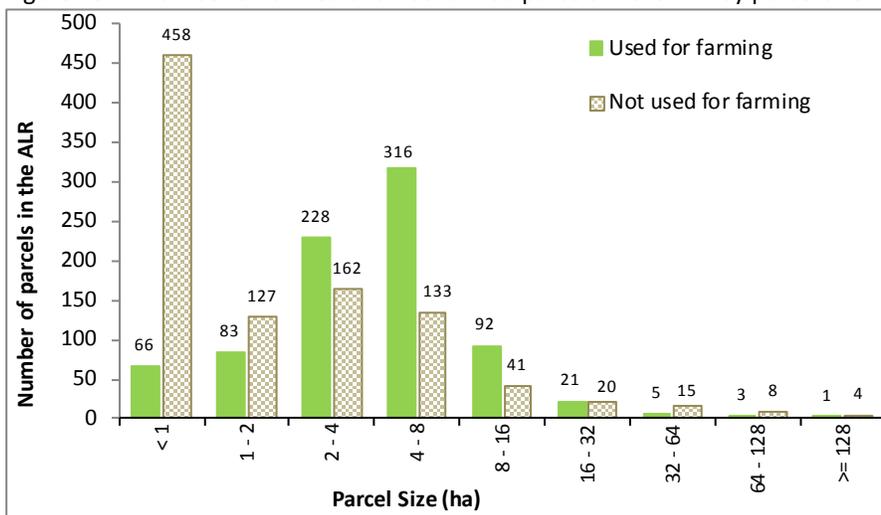


Figure 28 compares the parcel size distribution of “Used for farming” parcels with other parcels in the ALR.

The largest proportion of “Not used for farming” parcels occurs on parcels less than 1 ha. Of the 968 parcels in the ALR and “Not used for farming”:

- (47%) are less than 1 ha,
- 747 (77%) are less than 4 ha

There are 5 parcels larger than 128 ha in Kelowna’s ALR; 4 of which are “Not used for farming”. One has no apparent use (with topography limitations), 1 is associated with a golf course, 1 is associated with the airport, and 1 is used for grazing (with topography limitations).

⁹ Farm Unit – An area of land used for a farm operation consisting of one or more contiguous or non-contiguous parcels, that may be owned, rented or leased, which form and are managed as a single farm.

Figure 29. Proportion of parcels farmed and not farmed by parcel size in the ALR

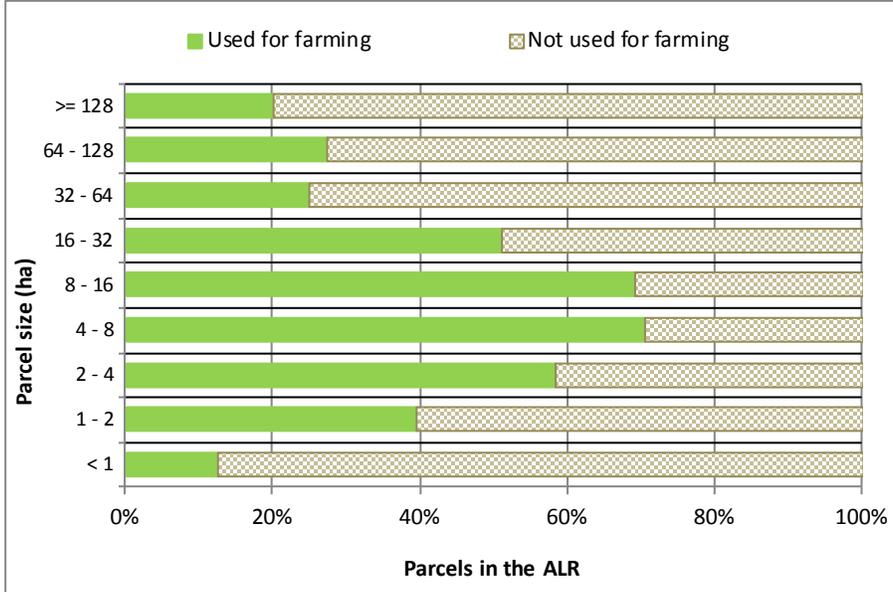


Figure 29 shows the proportion of parcels “Used for farming” across all parcel size categories.

On parcel size categories less than 16 ha, the number of parcels “Used for farming” generally increases with parcel size. There are few parcels greater than 16 ha in Kelowna (refer to Figure 27).

Only 13% of the ALR parcels less than 1 ha are “Used for farming”.

Figure 30. Proportion of land cover by parcel size in the ALR

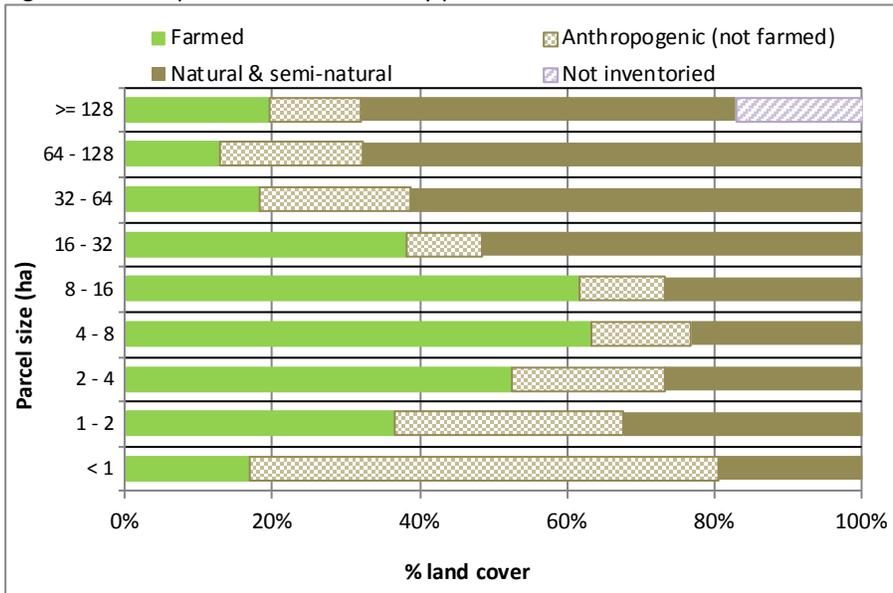


Figure 30 shows the proportion of land cover types across parcel size categories in the ALR.

The largest proportion of anthropogenic (not farmed) land cover occurs on parcels less than 1 ha.

All parcel size categories greater than 16 ha have a large proportion of land in natural & semi-natural land cover.

6. Availability of Land for Farming

There is a strong demand for agricultural products produced in British Columbia. This demand is expected to increase with population growth¹⁰. Agricultural growth may have to take place on a fixed land base as lands that are suitable to increase output may not be available. Agricultural sectors that require large land bases, such as dairy or berry, may find it difficult to access land for farm expansion or for starting new operations. Future agriculture growth may come from new commodity types and intensifying land use rather than finding new land for development.

The analysis in this section examines the number of parcels that are:

- used for farming,
- available for farming, and
- unavailable for farming.

The proportion of land available for farming on these parcels, and the characteristics of this land is also examined.

Properties currently “Not used for farming” but with an existing land use compatible with agriculture, such as residential, are considered available for farming. It is assumed that any existing non-farm land uses will be maintained and will not be displaced by agriculture expansion.

Properties that are currently “Not used for farming” and with an established non-farm use that is incompatible with agriculture (e.g. a golf course, a school, a park, or small lot residential) are considered to be unavailable for farming. These properties may be altered in a way that is incompatible with agriculture, may have little land available, and/or tend to have very high land values. It is usually uneconomical for a farmer to lease or to acquire and convert these properties to farmland given the limited potential for farming.

In order for a parcel to be considered “available for farming”, it must have at least 0.4 ha and at least 50% of the parcel area in land cover that is available and has potential for farming. Areas considered to have potential for farming include:

- natural and semi-natural vegetation,
- areas in managed vegetation (managed for landscaping, dust or soil control), and
- non-built or bare areas

Areas considered available for farming do not include built structures, fill piles, waterbodies, and wetlands. It is assumed these areas would not likely be removed or filled in to create land with cultivation potential. In addition, areas with steep slopes, rocky soils or operational constraints such as a very small size are considered to have limited potential for farming and are excluded from the available land cover.

Properties in Kelowna’s ALR and “Used for farming” have an average assessed land and improvement value of \$158,643 per ha.

Properties in the ALR that are considered “Unavailable for farming” have an average assessed land and improvement value of \$1,310,789 per ha.

(Calculated using 2012 BC Assessment)

¹⁰ In BC, the regulated marketing system requires that over 95% of our milk, eggs, chicken and turkey be produced in BC. The need to produce these products increases in direct proportion to the population growth.

ON PARCELS “USED FOR FARMING”

Parcels that are “Used for farming” do not always utilize 100% of their land area. Areas in natural and semi-natural vegetation or in anthropogenic managed vegetation may be available to bring into agricultural production. Some of these areas may be amalgamated into existing fields or may already be used for natural grazing. If the assumption is made that farmers generally do not leave productive land idle, it may indicate that these areas have a purpose that was not apparent in the field survey (e.g. wildlife habitat, stream buffers) or may have an unobserved physical limitation (e.g. soils, drainage).

Although there is some available land cover on “Used for farming” parcels, these areas are generally small and offer little opportunity to increase the overall amount of farmed area in Kelowna. In addition, these areas do not represent parcels available to new farming entrants.

The size distribution of “Used for farming” parcels is detailed in Section 5. Refer to Figure 22 for details on land use on “Used for farming” parcels.

Figure 31. Proportion of land cover categories on “Used for farming” parcels in the ALR

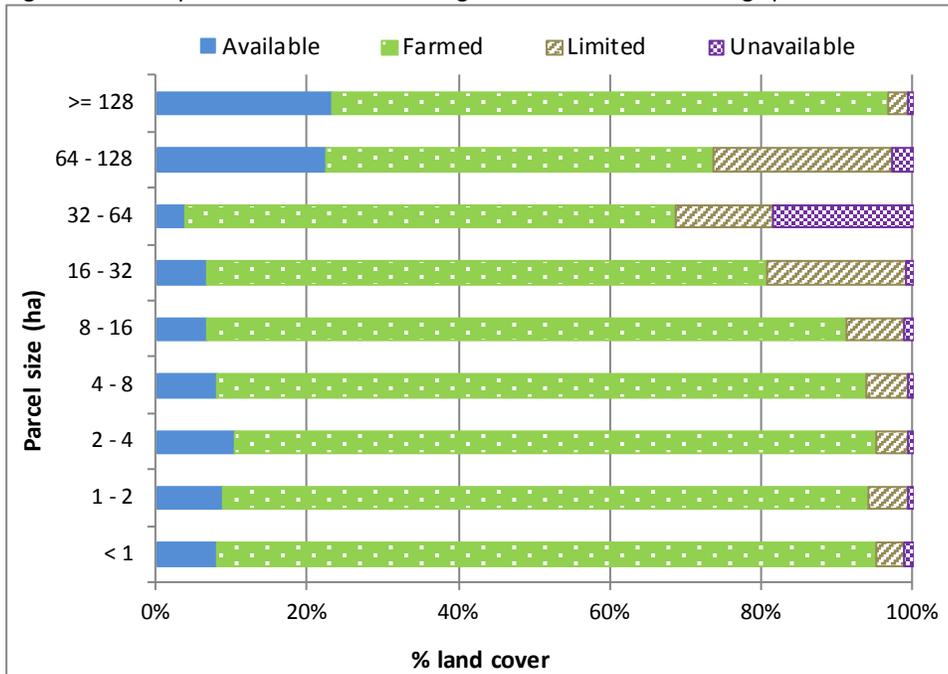


Figure 31 illustrates the proportion of land cover categories on parcels that are already farmed.

In general, the opportunities to expand agriculture on these parcels is limited.

Refer to page 14 for the definitions of the land cover categories.

Figure 32. Size of areas available for farming on “Used for farming” parcels in the ALR

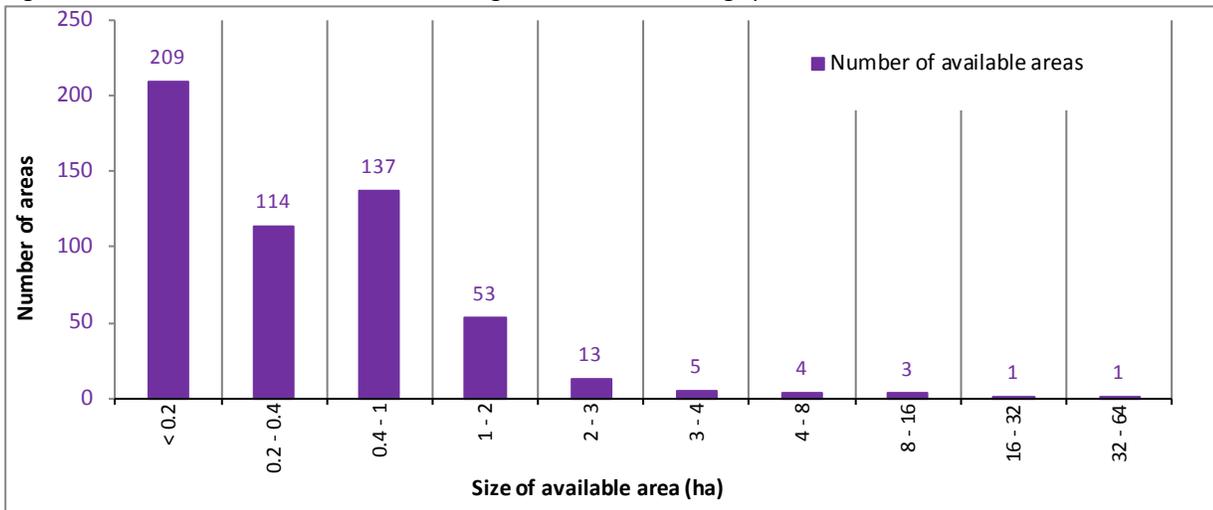


Figure 32 illustrates the size of the areas available for farming on “Used for farming” parcels. Most areas are small with 85% of the available land cover areas (460 out of 540) being less than 1 ha. These areas would have little influence on increasing the total area under cultivation. Furthermore, these areas do not represent areas available to new entrants.

Available areas less than 1 ha are adjacent to an existing fields and it is assumed that they could be amalgamated.

Figure 33. Available for farming land cover on “Used for farming” parcels in the ALR

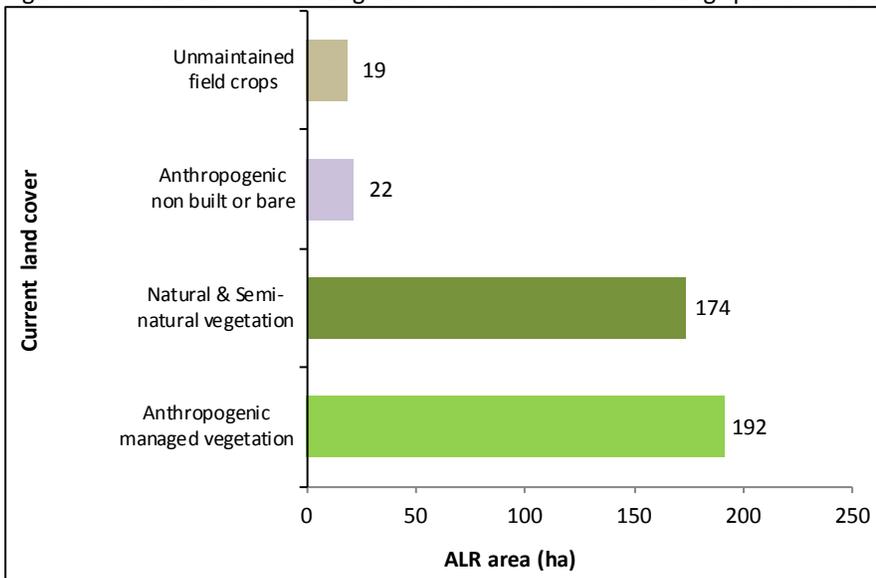


Figure 33 indicates that land currently in “Anthropogenic managed vegetation” could provide the greatest gains in farming on parcels that are already “Used for farming”.

Anthropogenic managed vegetation consists mainly of landscaping and lawns surrounding residences and other buildings. Converting this to agricultural use may not be supported by the land owners.

ON PARCELS AVAILABLE FOR FARMING

Parcels with ALR land available for farming that are currently “Not used for farming” offer the greatest potential for agricultural expansion. These parcels are a subset of the “Not used for farming” parcels described in Section 5. Parcels considered available for farming:

- Must not already be “Used for farming”
- Must not have an existing use that excludes agricultural development (e.g. parks, golf courses)
- Must have at least 50% of their parcel area and at least 0.4 ha in land that is available for farming

Figure 34. Proportion of land cover categories on available for farming parcels in the ALR

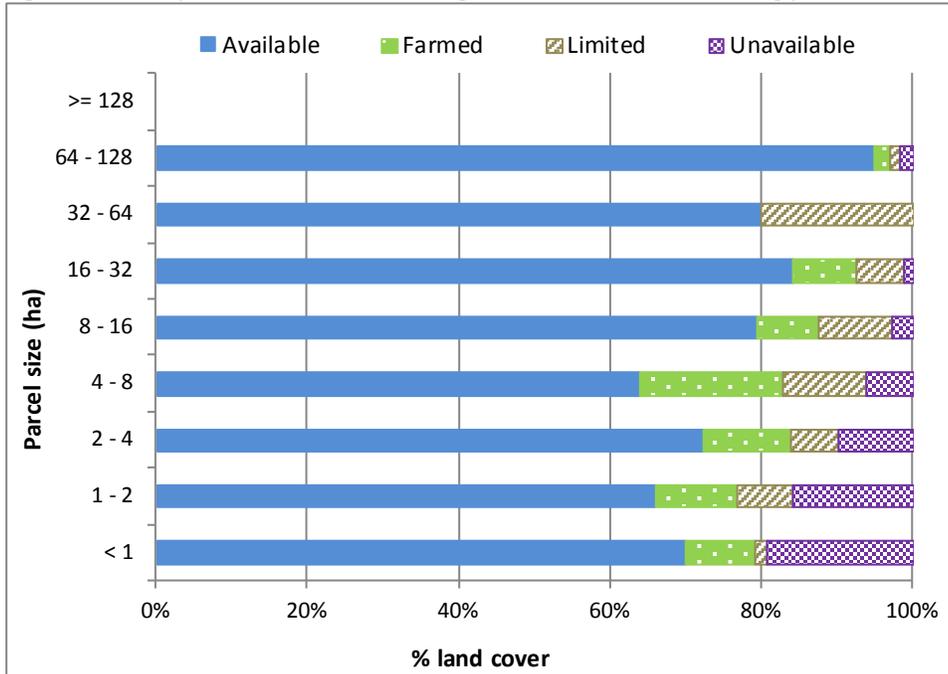


Figure 34 illustrates the proportion of land cover categories on parcels that are available for farming.

In general, these parcels have a large proportion of their area in land cover that is available for farming. These parcels offer the greatest potential to increase agricultural production in the future.

The largest amounts of “unavailable” land cover on these parcels occurs on parcels less than 1 ha.

Refer to page 14 for the definitions of the land cover categories.

Figure 35. Size of available areas on available for farming parcels in the ALR

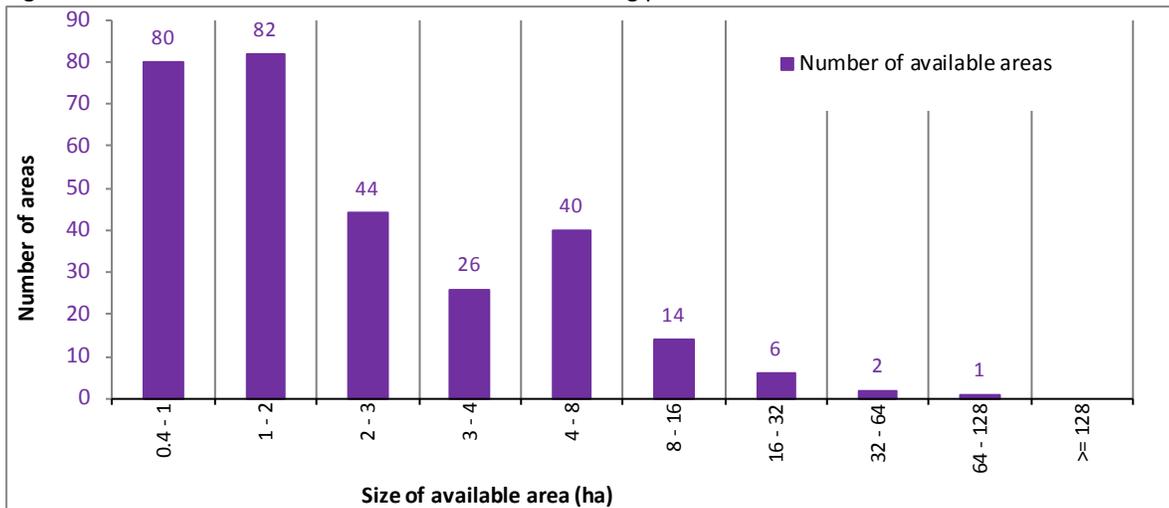


Figure 35 illustrates the size of the areas available for farming on parcels considered available for farming. Of these available areas, over half (55%) are less than 2 ha. There are few available areas that are larger than 8 ha.

Figure 36. Available for farming land cover on available parcels in the ALR

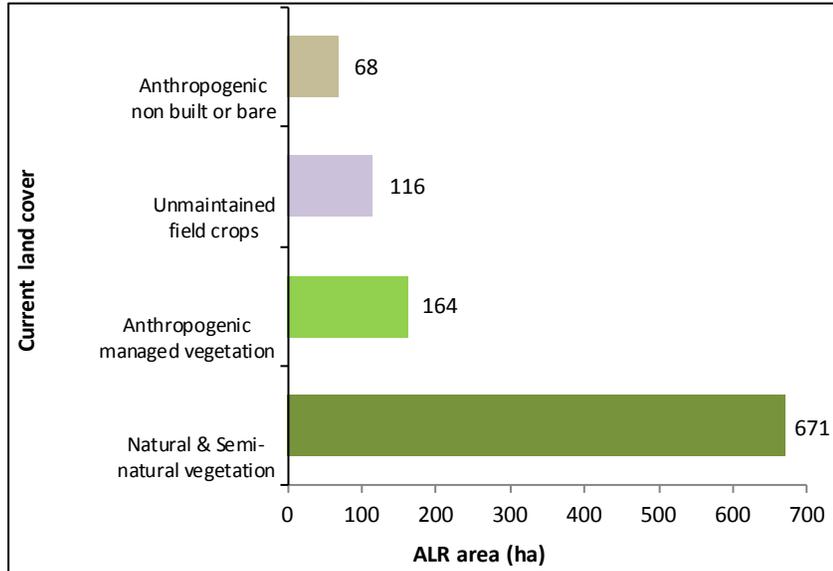


Figure 36 shows the type of land cover that comprises the available land on parcels that are available for farming.

Land currently in “Natural & Semi-natural” land cover could provide the greatest gains in cultivated land. The majority of this land is in herbaceous land cover (457 ha). The remainder of the natural & semi-natural land cover is in trees (128 ha) or in grass or shrubs (86 ha).

Some of this land may be utilized for other non-visible uses such as preserving sensitive ecosystems and wildlife habitat.

Parcel and Land Use Analysis

Figure 37. Parcel size distribution of available for farming parcels in the ALR

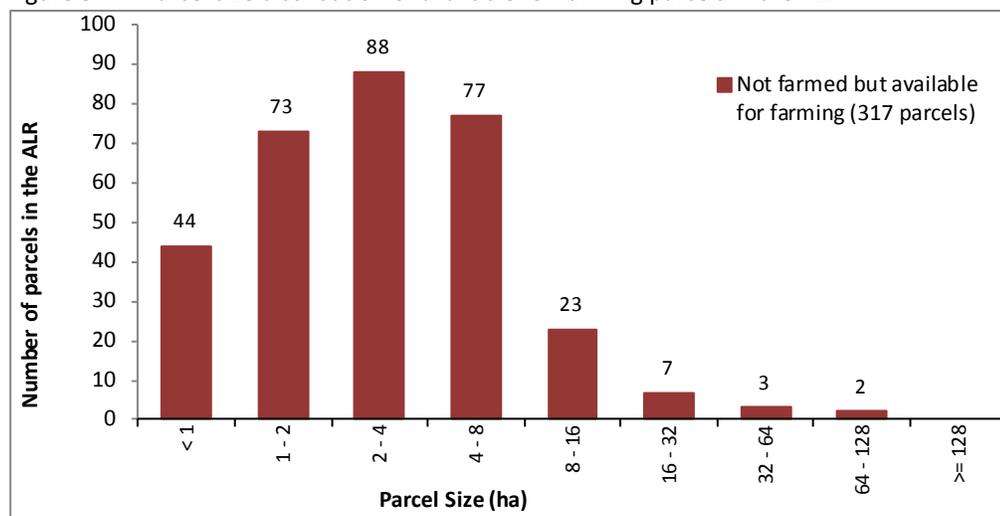


Figure 38 shows the number of ALR parcels that are available for farming, but are not currently farmed. These parcels have at least 50% of their parcel area and at least 0.4 ha (1 acre) of land available for farming.

There are 317 parcels in Kelowna’s ALR that are available. Of these parcels:

- 44 parcels (14%) are less than 1 ha
- 77 parcels (24%) are between 4 – 8 ha
- 205 parcels (65%) are less than 4 ha
- 35 parcels (11%) are greater than 8 ha

The land uses on these parcels are shown in Figure 39 and Figure 40.

Figure 38. Parcel size distribution and land uses on available for farming parcels in the ALR

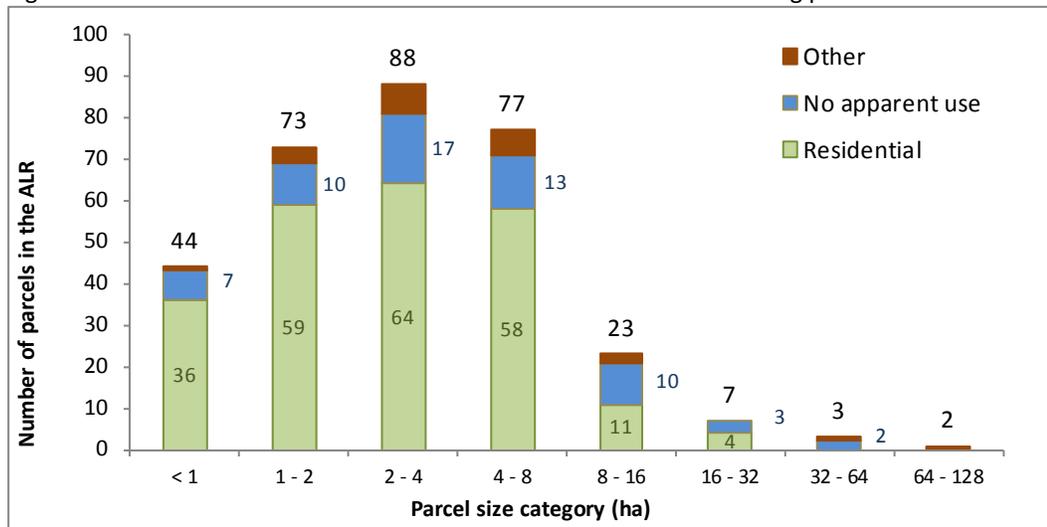


Figure 39 depicts the existing land uses on parcels in the ALR that are available for farming. In total, 73% of the available parcels have a residential land use, 19% have no apparent use, and the remaining 8% have other land uses including transportation, commercial, and gravel extraction.

Figure 39. Parcel size distribution of available for farming parcels in the ALR with no apparent use

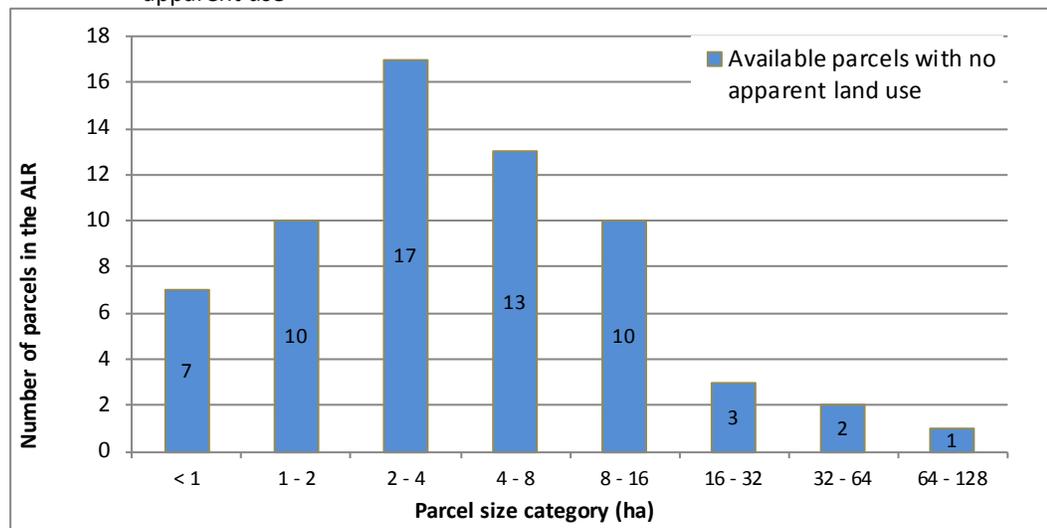


Figure 40 highlights the number of ALR parcels that are available for farming and that have no apparent land use. Of these 63 parcels:

- 17 parcels are less than 2 ha
- 34 parcels are less than 4 ha
- 29 parcels are greater than 4 ha
- 6 parcels are greater than 16 ha

ON PARCELS UNAVAILABLE FOR FARMING

Parcels that are “Not used for farming” and that are unavailable for farming have an existing land use that excludes agricultural development (e.g. golf courses, schools, small lot residential), or a lack of land cover that is available for farming. Parcels that do not meet the minimum parcel availability criteria (>50% of the parcel area and >0.4 ha in available land cover) are considered unavailable for farming. For example, a parcel where all of the land has topography is considered unavailable for farming because it does not have any available land cover.

Unavailable parcels are a subset of the “Not used for farming” parcels described in Section 5.

Figure 40. Parcel size distribution of unavailable for farming parcels in the ALR

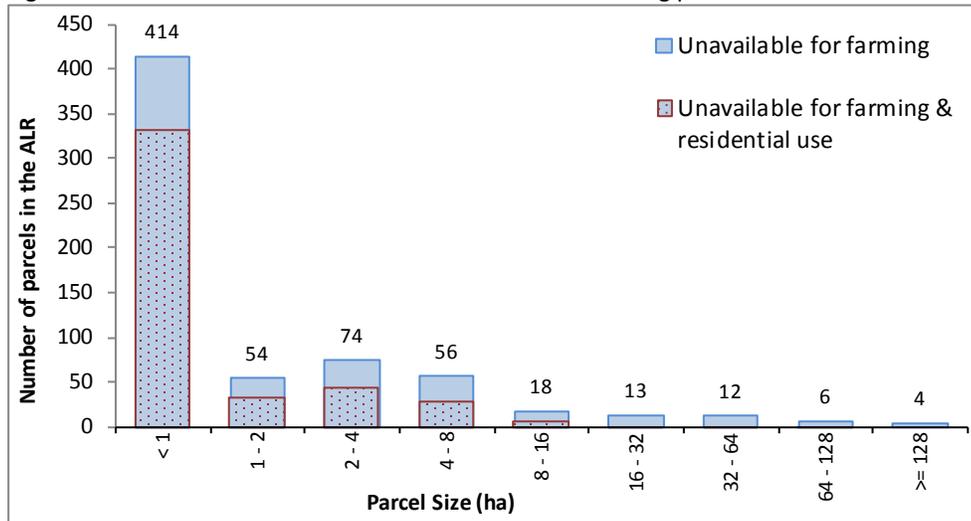


Figure 41 shows the number of ALR parcels that are unavailable for farming. These parcels have an existing land use or low availability of suitable land.

The majority of the unavailable parcels are less than 1 ha in size (64%). Furthermore, the majority of all unavailable parcels have a residential use (69%).

Figure 41. Land uses on unavailable parcels in the ALR

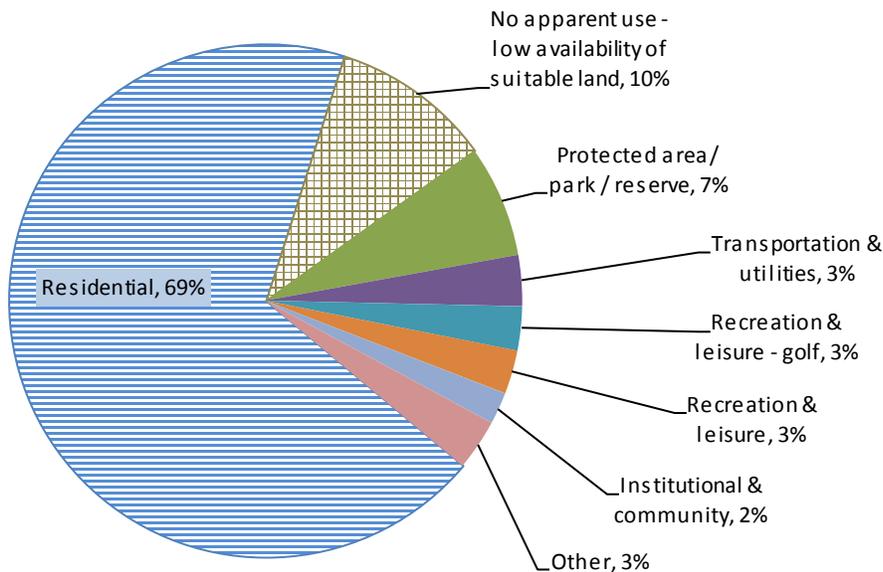


Figure 42 shows the proportion of unavailable for farming ALR parcels by their land use.

Most unavailable for farming parcels have a residential land use.

Parcels with low availability of suitable land have insufficient available land cover. The natural and semi-natural land on these parcels may have physical limitations such as topography or soils.

Appendix A - Glossary

Actively farmed – Land cover considered **Farmed** but excludes unused / unmaintained field crops, and unmaintained greenhouses. Does not include natural pasture or rangeland.

Agricultural Land Reserve (ALR) – A provincial zone in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are controlled.

Animal Unit Equivalent – A standard measurement used to compare different livestock types. One animal unit equivalent is approximately equal to one adult cow or horse. See **Scale of livestock operations**.

Anthropogenic – The term *anthropogenic* describes an effect or object resulting from human activity. In this report, the term anthropogenic refers to land cover originating from and maintained by human actions but excludes farmed land cover (cultivated field crops, farm infrastructure, and crop cover structures).

Anthropogenic – Built up - Other – Lands covered by various unused or unmaintained built objects (structures) and associated yards that are not directly used for farming.

Anthropogenic – Managed vegetation – Lands seeded or planted for landscaping, dust or soil control but not cultivated for harvest or pasture. Includes parklands, golf courses, landscaping, lawns, vegetated enclosures, remediation areas.

Anthropogenic – Non Built or Bare – Human created bare areas such as extraction or disposal sites. Includes piles, pits, fill dumps, dirt parking or storage areas.

Anthropogenic – Residential – Lands covered by built objects (structures) and their associated auxiliary buildings, yards, roads, and parking. Includes single family dwellings, multifamily dwellings, and mobile homes.

Anthropogenic – Residential footprint – Includes the main residence plus its associated yard, driveway, parking and any auxiliary buildings or structures. When two residences are on a property, areas associated to both (such as shared driveways, parking or yard), are assigned to the closest residence.

Anthropogenic – Settlement – Lands covered by built objects (structures) and their associated yards, roads, and parking. Includes institutional, commercial, industrial, sports / recreation, military, non linear utility areas and storage / parking.

Anthropogenic – Transportation – Lands covered by built objects (structures). Includes roads, railways, airports and associated buffers and yards.

Anthropogenic – Utilities – Lands covered by built objects (structures). Includes linear features such as pipelines or transmission lines.

Anthropogenic – Waterbodies – Areas covered by water, snow or ice due to human construction. Includes reservoirs, canals, ditches, and artificial lakes - with or without non cultivated vegetation.

Available for farming – Parcels that can be used for agricultural purposes without displacing a current use. Includes all parcels that do not meet the **Unavailable for farming** criteria.

BC Assessment – The Crown corporation which produces annual, uniform property assessments that are used to calculate local and provincial taxation. The database purchased from BC Assessment contains information about property ownership, land use, and farm classification, which is useful for land use surveys.

Cadastre – The GIS layer containing parcel boundaries, i.e. legal lot lines.

Crop cover structures – Land covered with built objects including permanent enclosed glass or poly structures (**greenhouses**) with or without climate control facilities for growing plants and vegetation under controlled environments, and barns used for growing crops such as mushrooms. Excludes non-permanent structures such as hoop or tunnel covers.

Crown ownership – Crown ownership includes parcels which are owned by provincial or federal governments. Parcel ownership is determined by the Integrated Cadastre Fabric maintained by the Parcel Fabric Section of the BC Government.

Cultivated field crops - Land under cultivation for harvest or pasture. Includes crop land, fallow farmland, unused forage or pasture, un-housed container crops and crops under temporary covers. Excludes natural pasture, rangeland, greenhouses, mushroom barns and other crop houses.

Effective ALR – The **Agricultural Land Reserve** area that is in legally surveyed parcels and under the jurisdiction of interest. The effective ALR is the total ALR area excluding ALR on Indian reserves and excluding ALR outside of legally surveyed parcels. Effective ALR can be used to compare land cover categories across jurisdictions.

Farm classification for tax assessment – Applies to parcels producing the minimum dollar amount to be classified as a farm by BC Assessment. Local governments apply a tax rate to farmland which is usually lower than for other land. To receive and maintain the farm classification, the land must generate annual income from agricultural production.

Farm infrastructure – Land covered by farm related built objects (structures) and their associated yards, roads, parking. Includes barns, storage structures, paddocks, corrals, riding rings, farm equipment storage, and specialized farm buildings such as hatcheries. Excludes greenhouses, mushroom barns and other crop houses.

Farm Unit – An area of land used for a farm operation consisting of one or more contiguous or non-contiguous parcels, that may be owned, rented or leased, which form and are managed as a single farm.

Farmed – Land cover directly contributing to agricultural production (both actively farmed and inactively farmed) and intentionally planted or built. Includes land in **Cultivated field crops**, **Farm infrastructure** and **Crop cover structures** (see individual definitions). Does not include natural pasture or rangeland.

Grazed – Land in **natural pasture or rangeland** that is used for grazing domestic livestock. These areas are considered separate from **Farmed** land cover.

Homesite (livestock) – The homesite is the primary location of a farm unit or livestock operation where most livestock management occurs. It is the location of the main ranch or main barn of a **farm unit**.

Inactively farmed – Land cover considered “Farmed” but is currently inactive. Includes unused / unmaintained forage and pasture, unmaintained field crops, and unmaintained greenhouses or crop barns. Does not include natural pasture or rangeland.

Intensive livestock – Intensive livestock have specialized structures such as barns, feedlots, or stockyards designed for confined feeding at high stocking densities.

Land use – Institutional & community – Parcels with churches, cemeteries, hospitals, medical centers, education facilities, correctional facilities, or government and First Nation administration.

Land use – Land in transition – Parcel with developed land in transition or where future change is likely to occur. Includes construction sites, tree removal, and demolished buildings.

Land use – No apparent use – Parcel with no apparent human use; natural areas, long term fallow land, cleared land not in production, abandoned or neglected land, abandoned or unused structures.

Land use – Protected area / park / reserve – Includes provincial parks, other parks, and ecological reserves. Areas may have passive recreation such as hiking, nature viewing, or camping.

Land use – Recreation & leisure – Parcels with intensive recreation (such as zoos, rinks, courts, walking/biking trails), or extensive recreation (such as horseback riding, wilderness camping sites, fishing, hunting, skiing, etc.). Golf courses are reported separately.

Land use – Water management – Areas used to actively or inactively manage water. Includes reservoirs, managed wetlands, dykes and land which provides natural flood/erosion protection (land outside dyke).

Land use – Wildlife management – Areas used to actively or inactively manage wildlife. Includes wildlife reserves, breeding areas, fishing areas, and fish ladders/hatcheries.

Limited potential for farming – See **potential for farming**.

Livestock operation scale – See **Scale of livestock operations**.

Natural and Semi-natural – Land cover which has not originated from human activities or is not being maintained by human actions. Includes regenerating lands, and old farm fields.

Natural and Semi-natural – Grass – Land cover dominated by herbaceous plants with long, narrow leaves characterized by linear venation; including grasses, sedges, rushes, and other related species.

Natural and Semi-natural – Herbaceous – Land cover dominated by low, non woody plants such as ferns, grasses, horsetails, clovers and dwarf woody plants. If greater than 50% cover is grass, the land is categorized as grass.

Natural and Semi-natural – Natural bare areas – Includes bare rock areas, sands and deserts.

Natural and Semi-natural – Natural pasture – Smaller fenced areas usually on private land with uncultivated (not sown) natural or semi-natural grasses, herbs or shrubs used for grazing domestic livestock.

Natural and Semi-natural – Rangeland – Larger areas usually on crown land with uncultivated (not sown) natural or semi-natural grasses, herbs or shrubs used for grazing domestic livestock.

Natural and Semi-natural – Shrubs – Land where less than 10% crown cover is native trees and at least 20% crown cover is multi-stemmed woody perennial plants, both evergreen and deciduous.

Natural and Semi-natural – Treed - closed – Land where between 60 – 100% of crown cover is native trees.

Natural and Semi-natural – Treed - open – Land where between 10 – 60% of crown cover is native trees.

Natural pasture or rangeland – Land with uncultivated (not sown) natural or semi-natural vegetation used for grazing domestic livestock. This land cover is considered “Used for grazing” and “Not used for farming” although these areas are usually extensions of more intensive farming areas.

Non homesite (livestock) – A location where livestock are present, but related infrastructure is minimal. Non homesites are used for pasturing and are secondary to the farm units primary (homesite) location.

Non intensive livestock – Non intensive livestock have the ability to graze on pasture and often utilize non intensive barns and corrals/paddocks.

Not used for farming – Parcels that do not meet the **Used for farming** criteria.

Not used for farming but available – Parcels that do not meet the **Used for farming** criteria but can be used for agricultural purposes without displacing a current use.

Scale of livestock operations – The scale system used in this report to describe livestock operations includes four levels:

- **“Very Small** Approximately 1 cow or horse or bison, 3 hogs, 5 goats or deer, 10 sheep, 50 turkeys, 100 chickens (1 animal unit equivalent)
- **“Small”** LESS THAN 25 cows or horses or bison, 75 hogs, 125 goats or deer, 250 sheep, 1250 turkeys, 2500 chickens (2 - 25 animal unit equivalents)
- **“Medium”** LESS THAN 100 cows or horses or bison, 300 hogs, 500 goats or deer, 1000 sheep, 5000 turkeys, 10,000 chickens (25 - 100 animal unit equivalents)
- **“Large”** MORE THAN 100 cows or horses or bison, 300 hogs, 500 goats or deer, 1000 sheep, 5000 turkeys, 10,000 chickens (over 100 animal unit equivalents)

Potential for farming – Land without significant topographical, physical or operational constraints to farming such as steep terrain, land under water, or built structures. For example, land with little slope, sufficient soils and exhibiting a natural treed land cover would be considered as having potential for farming. Areas less than 1 acre in size are considered to have limited potential for farming.

Unavailable for farming – “Not used for farming” parcels where future agricultural development is improbable because of a conflicting land use or land cover that utilizes the majority of the parcel area. For example, most residential parcels are considered unavailable for farming if the parcel size is less than 0.4 hectares (approximately 1 acre) since most of the parcel is covered by built structures, pavement and landscaping.

Unmaintained field crops – Land under cultivation for field crops which has not been maintained for several years and probably would not warrant harvest.

Unmaintained forage or pasture – Land under cultivation for forage or pasture which has not been cut or grazed during the current growing season and has not been maintained for several years.

Unused forage or pasture – Land under cultivation for forage or pasture which has not been cut or grazed during the current growing season.

Used for farming – Parcels where the majority of the parcel area is farmed OR parcels which exhibit significant intensity of farming are considered “Used for farming”. Specifically, parcels that meet at least one of the following criteria:

- medium or large scale livestock, apiculture or aquaculture operations
- at least 45% parcel area in cultivated field crops (excluding unused forage or pasture)
- at least 50% parcel area built up with farm infrastructure
- at least 25% parcel area built up with crop cover structures (excluding unmaintained structures)
- at least 40% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure and small scale livestock, apiculture or aquaculture operations
- at least 33% parcel area in cultivated field crops (excluding unused forage or pasture) and at least 55% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure
- at least 10% parcel area in crop cover structures (excluding unmaintained structures) and at least 40% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure
- at least 20% parcel area and at least 20 ha in cultivated field crops (excluding unused forage or pasture)
- at least 25% parcel area and at least 10 ha in cultivated field crops (excluding unused forage or pasture)
- at least 30% parcel area and at least 5 ha in cultivated field crops (excluding unused forage or pasture)
- at least 10% parcel area and at least 2 ha built up with crop cover structures (excluding unmaintained structures)
- at least 20% parcel area and at least 1 ha built up with crop cover structures (excluding unmaintained structures)

Used for grazing – Parcels **Not used for farming** with a significant portion of their area in natural pasture or rangeland and evidence of active grazing domestic livestock.