Alberta Environmentally Sustainable Agriculture
Resource Monitoring
Water Quality

Watershed Selection for the AESA Stream Water Quality Monitoring Program

Anne-Marie Anderson[1], Sandra E. Cooke[2], and Neil MacAlpine[2]

[1] Alberta Environment, Water Sciences Branch, Edmonton, Alberta
[2] Alberta Agriculture, Food and Rural Development, Edmonton, Alberta

Executive Summary

A provincial stream survey conducted under the Canada-Alberta Environmentally Sustainable Agriculture (CAESA) agreement described the existence of relationships between agricultural intensity of small agricultural watersheds and stream water quality. A strong commitment was made under the new Alberta Environmentally Sustainable Agriculture (AESA) agreement to continue to monitor water quality in small agricultural watersheds as the industry grows and practices change.

The AESA Water Quality Monitoring Committee revisited the watershed selection process under the CAESA program as new technology (e.g GIS) and databases were available to select representative watersheds across Alberta. New databases, such as Agricultural Region of Alberta Soil Inventory Database (AGRASID), PFRA annual unit runoff digital maps and 1996 Canada census data, were used to define overland runoff potential and agricultural intensity. All data were rolled up and mapped according to PFRA gross watersheds of Alberta.

Watersheds were ranked according to agricultural intensity. Agricultural intensity indicators included manure production (tonnes/acre), fertilizer expenses ($/acre) and chemical expenses ($/acre) to represent the livestock and cropping sectors. Runoff potential was determined according to landform and soil characteristics that facilitate overland runoff.

Twenty-three watersheds were selected to cover the range of agricultural intensity that typifies the province. Most of these watersheds have soil and landscape features that promote runoff. The report describes how representative these watersheds are in a provincial and regional context.

Acknowledgements

The following individuals contributed expertise and advice in the selection of the watersheds for the AESA Water Quality Monitoring Program: David Neilson, Conny Tomas (AAFRD), and Dave Kiely (PFRA).

Members of the AESA Water Quality Monitoring Committee are acknowledged for their support in developing the water quality monitoring program. Review comments from Dave Kiely and Rod Bennett helped improve the report substantially.

The Irrigation Branch (AAFRD) supplied some of the initial databases that were assembled in an effort to develop a comprehensive geographic information system.

Natasha Carle (AAFRD) and Bridgette Halbig (AENV) provided technical assistance with data organization and presentation.

John Kirtz and Ian Johnson conducted the initial data compilation, analysis, and interpretation for the site selection process.

Carolyn King's assistance in reviewing and editing the various versions of this report is gratefully acknowledged.

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1. Introduction

Water quality studies conducted under the Canada-Alberta Environmentally Sustainable Agriculture (CAESA) agreement described the existence of relationships between agricultural intensity of small agricultural watersheds and stream water quality (Anderson et al. 1998 a, b), and highlighted the need for integrated management of water and land resources.

One of the CAESA recommendations was to develop a comprehensive, integrated, long-term water quality monitoring program to determine trends and assess water quality impacts associated with agriculture as the industry grows and practices change (CAESA 1998).

The Alberta Environmentally Sustainable Agriculture (AESA) agreement, which was struck in 1997, followed up on this recommendation by making water quality monitoring of small agricultural watersheds one of the priorities of the program.

The selection of streams that were monitored under CAESA was carried out in 1994. Since that time, new agricultural databases have become available and geographic information system (GIS) technology has improved substantially. Consequently, it was desirable to revisit the site selection process and validate the site selection in light of these new data bases. Furthermore, changes in the goal of the monitoring program warranted the re-validation of the sampling sites, as outlined below.

The purpose of the CAESA stream monitoring studies was to compare water quality of streams in agricultural basins with a different level of farming intensity. The purpose of the AESA stream monitoring studies is different. The AESA stream monitoring is intended to follow trends in water quality of agricultural watersheds which encompass the range of agricultural intensities across the province, including reference watersheds with low agricultural intensity, watersheds that already have intensive agriculture, and watersheds with a high potential for intensification of agriculture. Furthermore, there was a need to include watersheds from irrigated areas and watersheds from the Grande Prairie – Peace River area in the monitoring program. These important agricultural areas had not been part of the assessments conducted under CAESA.

In the AESA watershed, trends in water quality will be influenced by the rate of material movement from land to water. Therefore it becomes important to depict and understand trends in descriptors of material movement (i.e. mass load, export coefficient and flow weighted mean concentrations). Because these descriptors can be influenced by factors such as climatic conditions, watershed features and activities on the land, the potential influence of all of these factors needed to be considered in the site selection process.

The objectives of this report are to document the process that led to the selection of watersheds being monitored under the AESA program and to describe the selected

watersheds in relation to provincial and regional variability in agricultural production intensity, as well as soil, landscape and climate conditions.

2. Methods

2.1 Databases used in the Watershed Selection Process

1. **Canada Census Agricultural Data for 1996** (Statistics Canada 1996)
   - This database summarises 1996 census data for a wide variety of agricultural variables by SLC (Soil Landscape of Canada polygon as defined by Shields et al. 1991). The average size of SLC polygons is 600,000 km^2.
   - While evaluating specific information pertaining to types of crops and the nature of the livestock industry, Johnson and Kirtz (1999) confirmed that manure production, fertilizer expenses and chemical expenses were good indicators of agricultural intensity.
   - This database replaces the 1991 Census data used in the watershed site selection for the CAESA program (Anderson et al. 1996). In the CAESA program, animal unit density was used in conjunction with fertilizer and chemical expenses to define agricultural intensity. Animal unit density was calculated from different livestock density data. In some instances, original density data were suppressed for privacy reasons and as a result density was likely underestimated. Statistics Canada calculates fresh manure production from livestock numbers, species and age distribution without suppressing any data. In the AESA program, manure production was used as one of the measures of agricultural intensity instead of animal unit density

2. **Agricultural Region Of Alberta Soil Inventory Database** (AGRASID) (CAESA-Soil Inventory Project Working Group 1998)
   - This database summarises soil and landform data by AGRASID polygon. The average size of the AGRASID polygons is 6,000 km^2.
   - This database was preferred over the Soil Landscape of Canada database used in the CAESA program because it is more recent, and it has received more extensive site-specific validation. Furthermore the smaller average polygon size of the AGRASID data offers a better spatial resolution. However, the AGRASID database does not provide information outside of the agricultural ('white') zone (e.g. 'green' zone).

3. **Prairie Farm Rehabilitation Administration (PFRA) Gross Watersheds** (Cherneski and Ackerman 1998).
   - The digital map defines gross watershed polygons for 865 watersheds (Figure 1).
   - Census data and AGRASID data were projected at the scale of watershed polygons by area-weighting data by SLC and AGRASID polygons.
   - In the CAESA program agricultural and soil landscape information was projected at the scale of soil landscape units. Polygons were ranked and watersheds that met specific criteria were located by visually comparing ranked polygons and watershed maps.

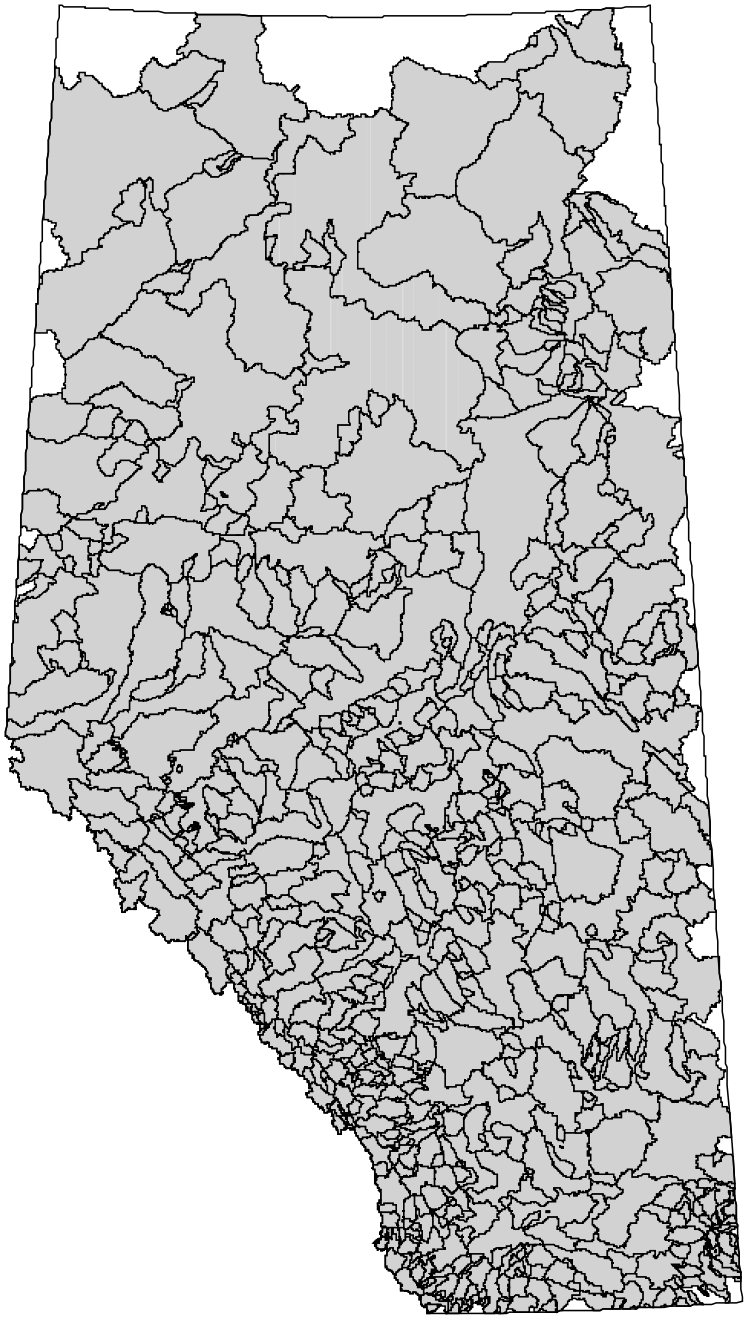

Figure 1. PFRA gross watershed boundaries in Alberta (Cherneski and Ackerman 1998).

4. **Provincial Annual Unit Runoff** (Bell 1994)
   - Runoff yield is reported as a series of ten maps, each representing a specific probability of annual unit runoff (AUR) in the form ofisopleths. It is derived by dividing the total annual stream discharge by the active drainage area and is expressed in mm of runoff per year. The 50^{th} percentile or median runoff map (Figure 2) was used as a reference to define three runoff zones in the province: high runoff zone (>50mm annual runoff), medium runoff zone (>20 and < 50 mm annual unit runoff) and low runoff zone (< 20 mm annual runoff) (Figure 3). By definition (50^{th} percentile) there is a one chance in two that these runoff values will be exceeded in any given year.
   - Runoff data used in the AESA program are similar to the information used in the CAESA program (i.e. PFRA 1994), but had the advantage of being available in an electronic form which could readily be incorporated in GIS.

5. **Ecoregions** (Ecological Stratification Working Group 1995)
   - Ecoregions share similar climate, landscape, soils and natural vegetation characteristics (Figure 4); they are sub-divided into eco-districts, which are uniform spatial units with respect to climate, soils and landscapes.
   - Because natural physical and climatic characteristics are fairly uniform within ecoregions, they can be a valid spatial unit to compare effects of agricultural intensity and trends on stream water quality.
   - Ecoregions were not incorporated in digital files in the CAESA program.

6. **Agricultural Zones** (Johnson and Kirtz 1998)
   - Eco-districts can be lumped into 15 zones based on agricultural production patterns (i.e. cow/calf production, intensive livestock production and grain and oil seed production) (Figure 5).
   - Agricultural zones may straddle two or more ecoregions.
   - Agricultural zones are also valid spatial units to compare effects of agricultural intensity and trends on stream water quality.
   - The identification of agricultural zones in Alberta was a new process initiated under the AESA program and was not considered under CAESA.

7. **List of Gauging Stations maintained by Water Survey of Canada** (Environment Canada 1997)

- The list of active gauging stations in Alberta is associated with site descriptions, site codes and geographical co-ordinates (latitude and longitude). Active stations were linked to the watershed polygons. Active drainage stations generally have the advantage of having a historical record of many years of flow data.

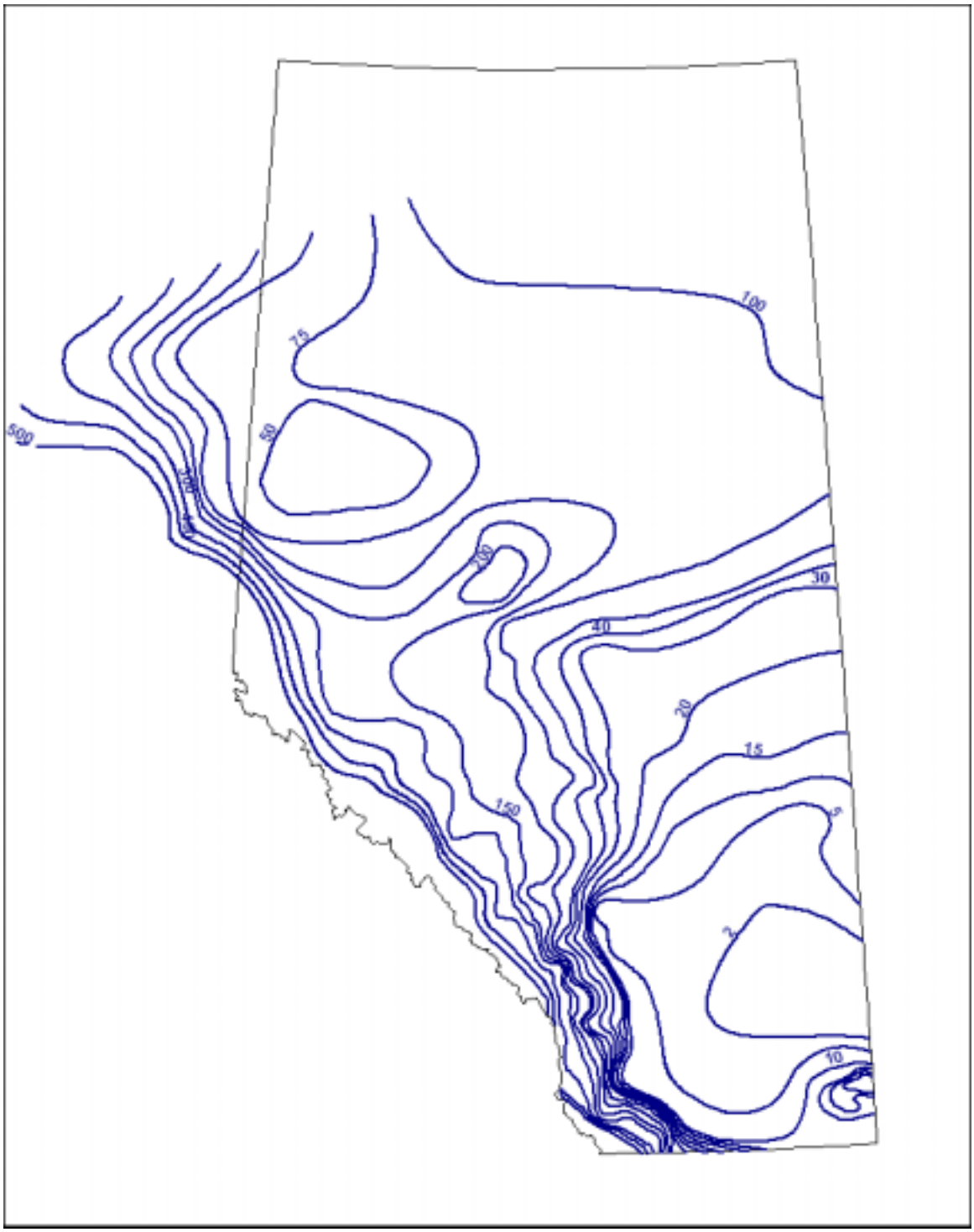

Figure 2. Provincial annual unit runoff yield (dam3/km2), 50% probability of exceedance. Numbers on isobars indicate annual unit runoff yield (Bell1994).

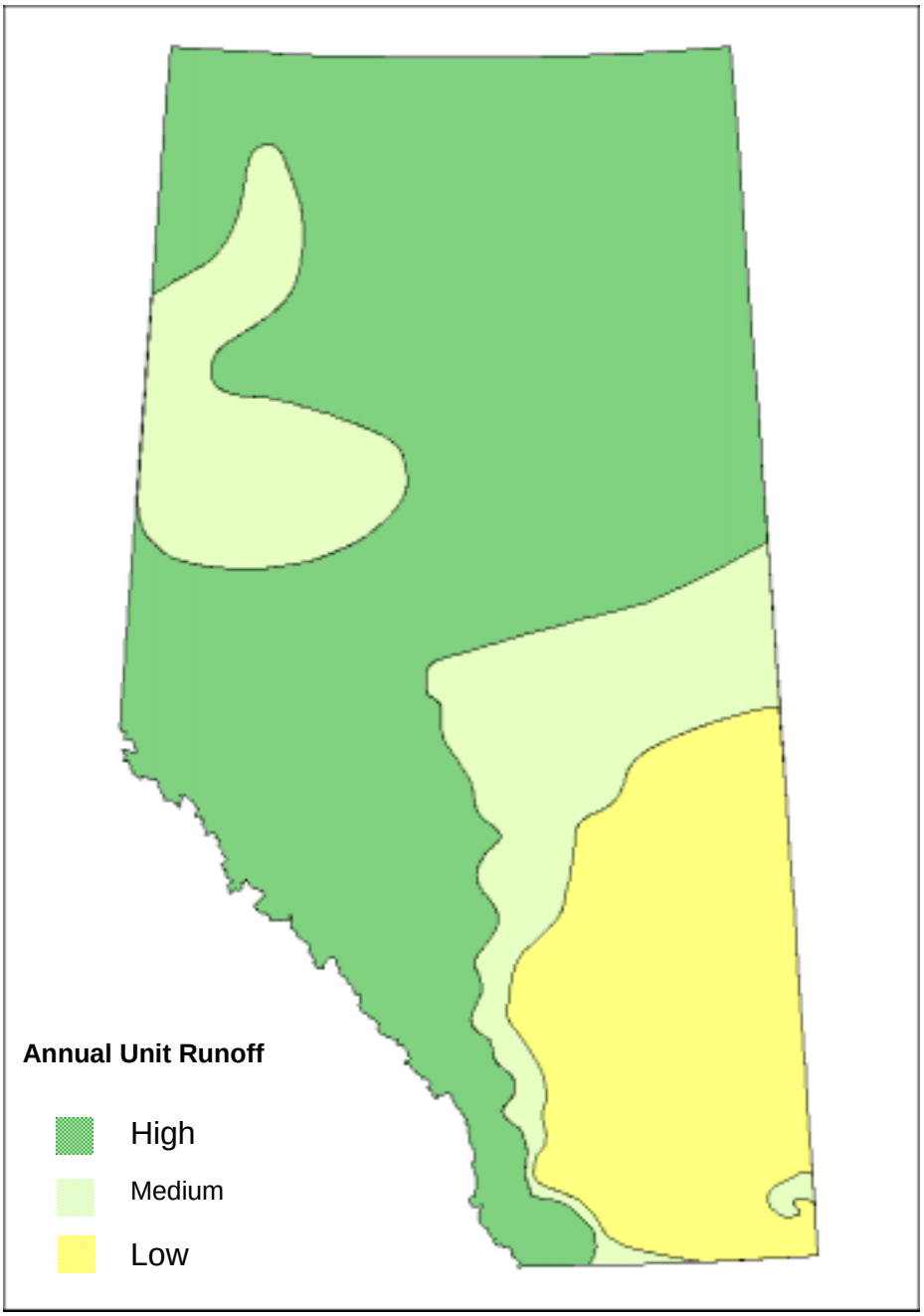

Figure 3a. Provincial annual unit runoff (AUR) zones. (High > 50 mm AUR; Medium 20 – 50 mm AUR; Low < 20 mm AUR).

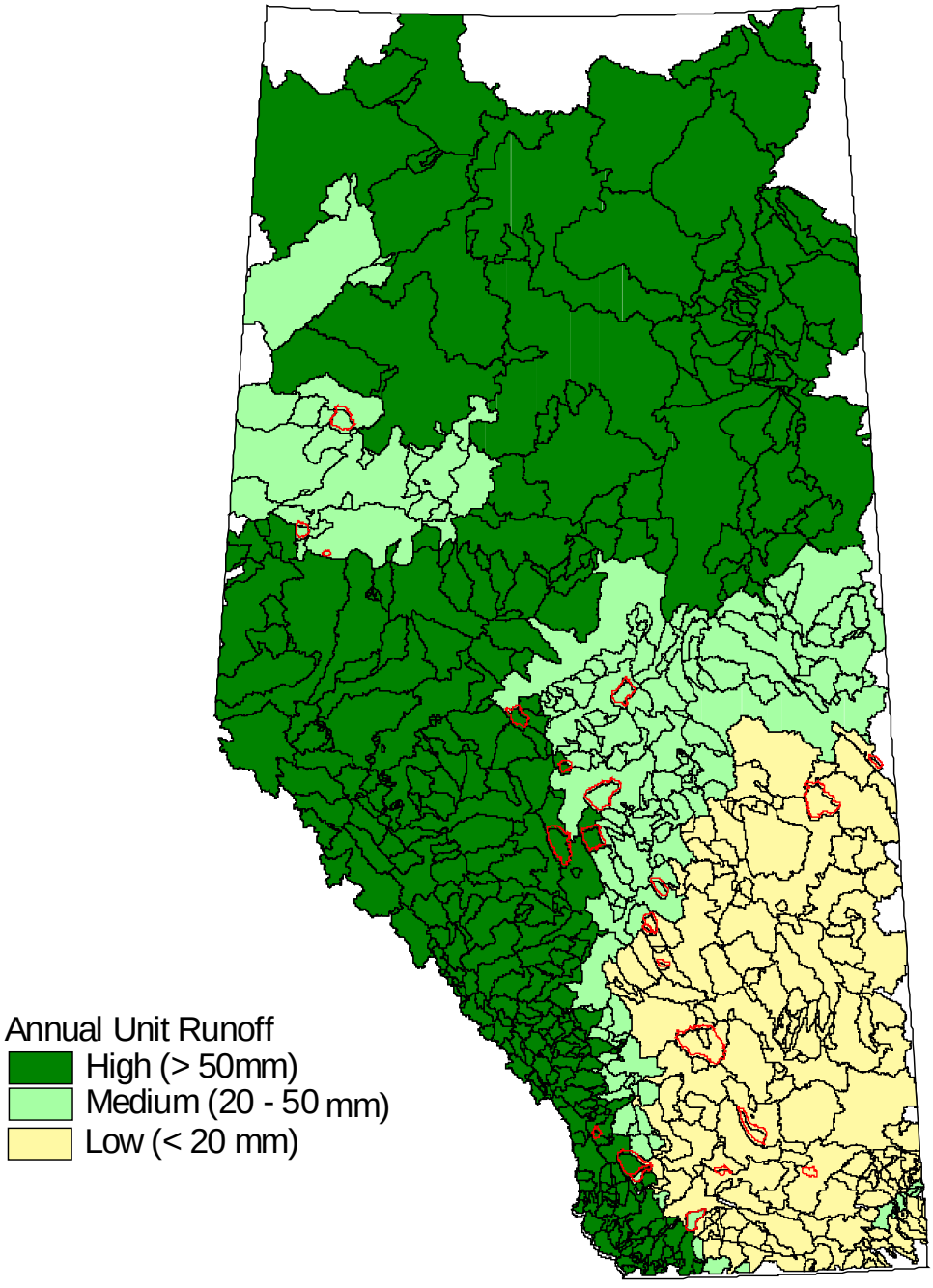

Figure 3b. Provincial watersheds ranked according to low, moderate and high annual unit runoff. AESA watersheds outlined in red.

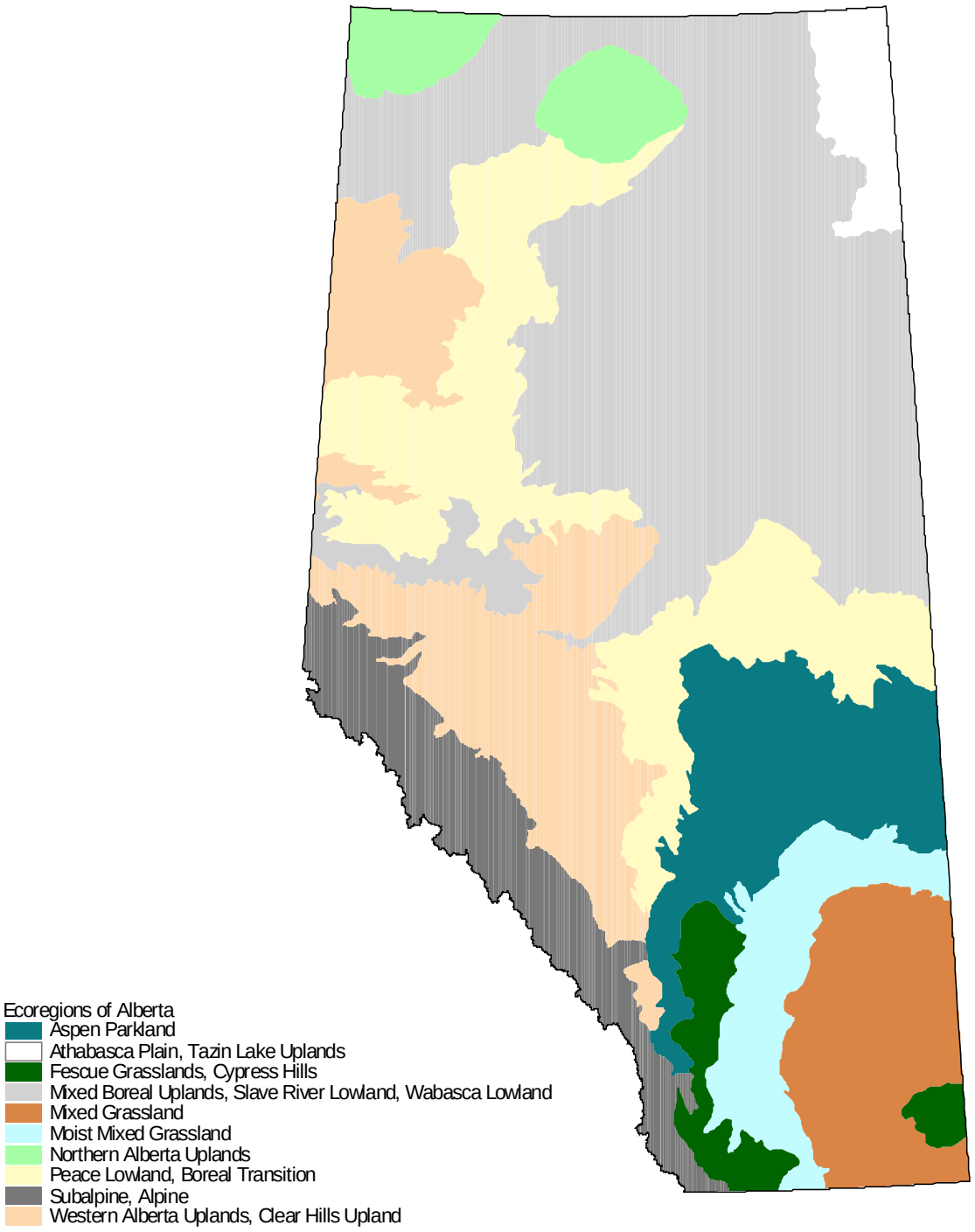

Figure 4. Ecoregions of Alberta (Ecological Stratification Working Group 1995).

Figure 5. Agricultural zones of Alberta (Johnson and Kirtz 1998).

8 Irrigation District Information (Irrigation Branch, AAFRD)

Information supplied included:

- The irrigation district boundaries and geographical watersheds within them (Figure 6)
- Cropping information by irrigation district
- Irrigation information provided by the irrigation districts, with the type of irrigation system and acres irrigated by that system

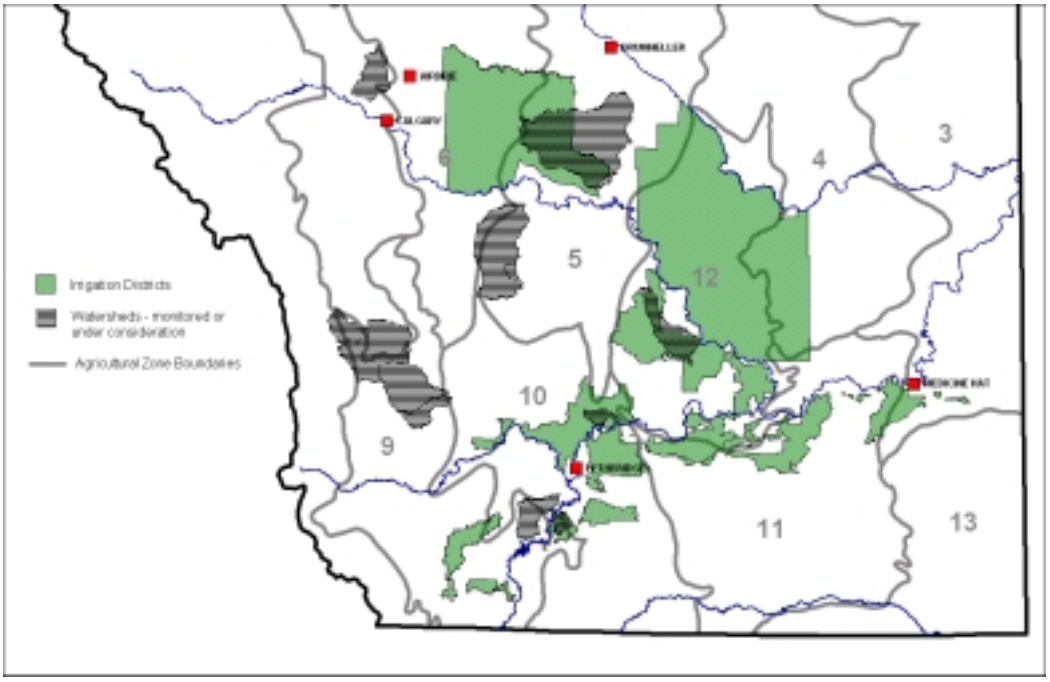

Figure 6. Irrigation districts of southern Alberta (Irrigation Branch, Alberta Agriculture, Food and Rural Development).

2.2. Software, basic GIS and other Data Handling Methods

Canada Census data, AGRISID data and watershed maps, were imported into MapInfo using ArcLink. Runoff yield and eco-districts maps were projected as 10TM NAD27 and exported as drawing exchange format (*.DXF extension) for import into Strategic Analysis Systems (SAS) software (Statistical Analysis Systems Institute Inc. 1988) and saved as SAS data sets.

Data sets representing census data and AGRISID data by watershed, SLC polygon and eco-district were downloaded as dBASE (Borland International Inc. 1992) files from SAS.

SLC polygons (Census data) and AGRISID polygons (AGRISID data) were apportioned according to the relative contribution of their respective polygon to the watershed surface area (i.e. area weighted).

SAS code, developed to derive variables or convert data to other spatial units, is documented in Appendix 5, 6 and 7.

2.3 Watershed Selection Criteria

The main restrictions that were placed on the watershed database were related to the need to :

- Restrict the size of the drainage basin to the range 50 km^2 - 1500 km^2 so that watersheds with towns and industries could easily be identified and avoided (Figure 7*)*;
- Have an active gauging station with historical and ongoing stream flow measurements according to Water Survey of Canada.

2.4. Definition of Runoff Potential

Surface landform and soil type characteristics as described in AGRASID were used to evaluate the potential for surface runoff in the watersheds.

2.4.1 Potential for surface runoff based on landform

Land forms were evaluated for their ability to deliver runoff and were divided into 3 types which include:

> **Type I** – Landforms with well developed natural drainage, having a high potential to deliver runoff to streams. Landforms listed in AGRASID which are of this type are of the rolling, undulating, ridged, inclined and valley types.
>
> **Type II** – Landforms with closed, poorly developed natural drainage (knob and kettle, potholes) which will trap runoff and have a low potential to deliver runoff. To be conservative, hummocky landscapes including low relief was interpreted as Type II landscapes.
>
> **Type III** – landforms that are flat to low undulating with poorly drained landscapes, but fine textured soils. In agricultural areas these are likely to be artificially drained.

Appendix 1 describes the criteria used to classify landforms according to runoff potential category. Type classification was considered dominant if the total basin area was more than 40%. Watersheds with two type categories having > 40% area were classified as co-dominant mixed while watersheds that had a mixture of type categories less than 40% were categorized as sub-dominant mixed.

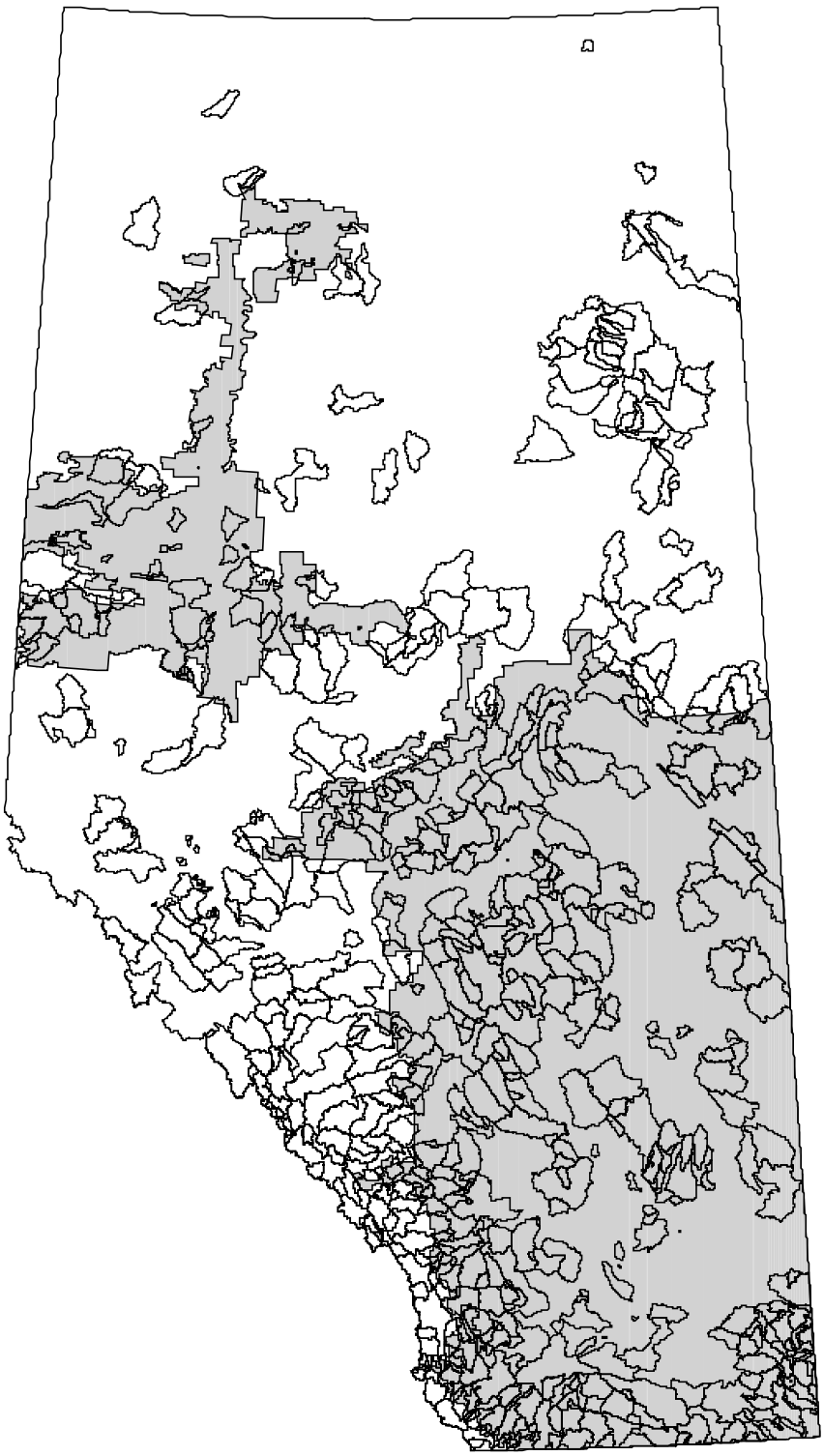

Figure 7. Watersheds that meet the size criteria used in the AESA site selection process (50 km² <..< 1500 km²). Agricultural region of Alberta shaded in grey.

Alberta watersheds showing runoff potential based on landform types are shown in Figure 8. The percentage of each runoff class based on landform type for each ecoregion is listed in Table 1.

Landform data for all provincial watersheds are presented in Appendix 2.

Table 1. Distribution of runoff classes based on landforms across ecoregions

	Runoff Potential Type Based on Landform (percent of area)			
Ecoregion	**Type I**	**Type II**	**Type III**	**Unknown**
Aspen Parkland	53.3	32.1	7.5	7.0
Boreal Transition	43.7	30.1	19.2	7.1
Clear Hills Upland	66.7	6.5	24.1	2.7
Cypress Upland	67.6	29.3	3.0	0.1
Eastern Continental Ranges	88.7	8.8	0.0	2.5
Fescue Grassland	67.4	20.3	6.9	5.4
Hay River Lowland	9.8	0.3	70.2	19.7
Mid-Boreal Uplands	40.0	30.0	21.1	8.9
Mixed Grassland	57.3	30.4	8.0	4.3
Moist Mixed Grassland	52.8	34.4	7.7	5.1
Northern Continental Divide	61.3	30.1	4.3	4.3
Peace Lowland	45.2	6.4	44.2	4.2
Wabasca Lowland	9.8	0.0	88.9	1.3
Western Alberta Upland	47.4	28.5	22.1	2.0
Western Boreal	68.0	6.8	21.5	3.7

2.4.2 Potential for Surface Runoff based on Soil Type

Soil types were evaluated with respect to their potential to deliver runoff. This involved identifying surface soil types where soil texture and structure would form restrictive layers, which would prevent infiltration. AGRASID polygons were assigned to one of the three classes.

High potential for runoff – Soils with restrictive layers and soils with shallow Ah or Ap horizons, and fine soil textures (silt, clay loam). Soils that typically fell into this type were luvisolic, solonetzic and their derivatives.

Moderate potential for runoff – Soils with a moderately deep Ah or Ap horizon and a moderately fine soil texture (loam, silt loam, fine sandy loam). Some derivates of solonetzic and luvisol soils fit this class (solods, dark gray soils).

Low potential for runoff – Soils with a deep Ah or Ap horizon, and a moderate to coarse soil texture (loams, sandy loams and sands). B horizon has the same permeability as A horizon. Soils, which typically fell into this type, were regosolics and chernozems with good profile development.

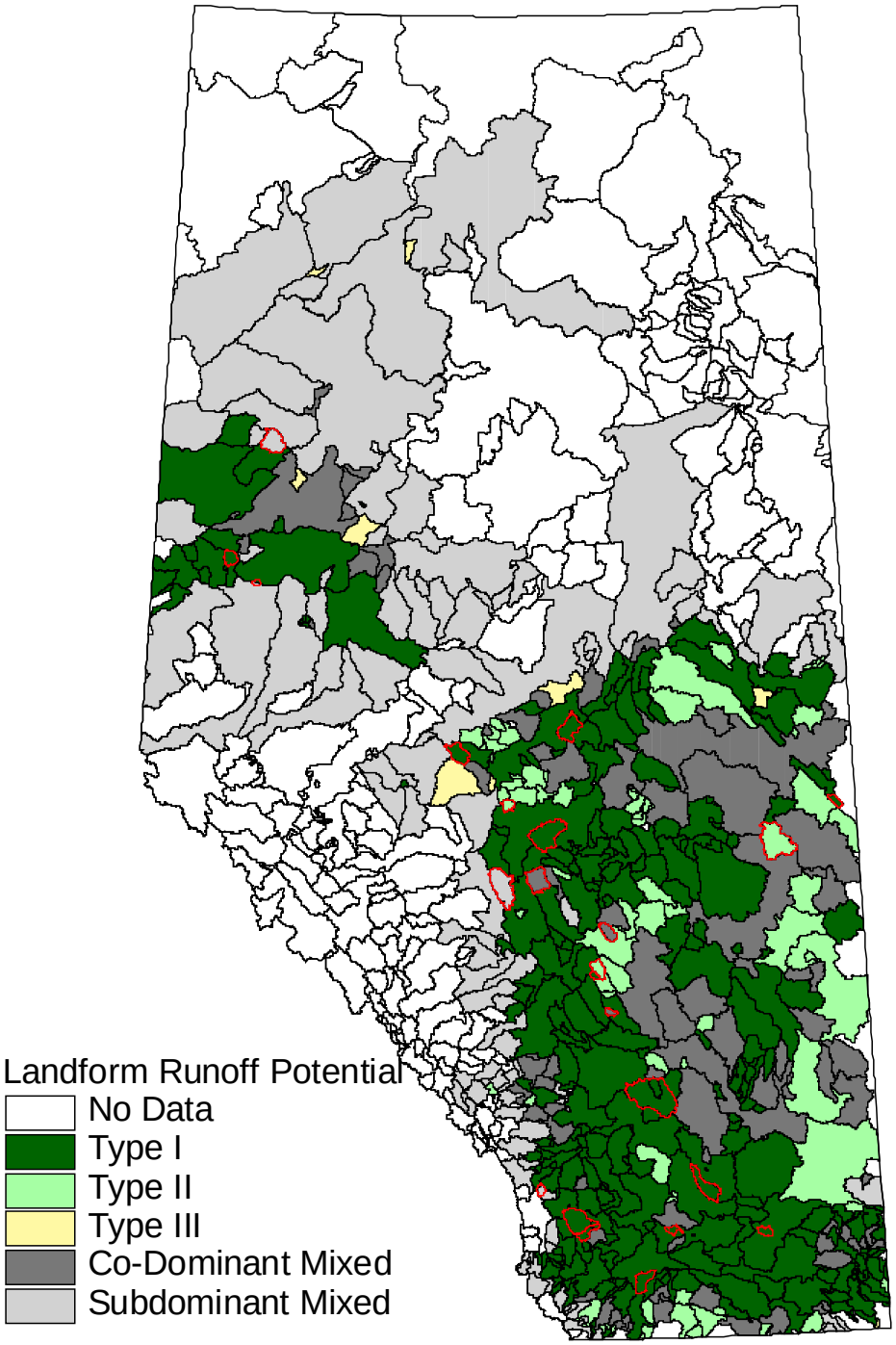

Figure 8. Watershed runoff potential classification based on landforms. AESA watersheds outlined in red.

Appendix 1 describes the criteria used to classify soils according to runoff potential category. Categories were considered dominant if the total basin area was more than 40%. Watersheds with two categories having > 40% area were classified as co-dominant mixed while watersheds that had a mixture of type categories less than 40% were categorized as sub-dominant mixed.

Runoff potential based on soil type for Alberta watersheds is shown in Figure 9. The percentage of each runoff class based on soil type for each ecoregion is listed in Table 2.

Soil type data for all provincial watersheds are presented in Appendix 2.

2.5. Definition of Agricultural Intensity

In the context of the stream water quality monitoring program, agricultural intensity is defined by indicators which describe agricultural intensity, and which are highly correlated to the presence of agricultural contaminants in surface water (Anderson et al 1998 a, b). Therefore, in this report, agricultural intensity is not specifically or solely defined in an economic or agronomic context. Manure production, fertilizer expenses and chemical expenses are indicators of potential nutrient and microbial contamination from livestock; nutrient contamination from inorganic fertilizers; and pesticide contamination mainly from the use of herbicides.

Although a strong correlation was described in the 1996 census data between fertilizer and chemical expenses (Johnson and Kirtz 1998) there is no guarantee that this relationship will persist in the future. Hence, even from an agronomic perspective, it is justified to incorporate both measures in the present definition of agricultural intensity.

Chemical expenses, fertilizer expenses and manure production per unit area were determined for each watershed and ranked individually for the population of watersheds. The sum of these ranks was ranked again. This ultimate rank represents the measure of agricultural intensity (AI) as defined for the AESA stream program. Streams with no agricultural activity or no data for chemical and fertilizer expenses or manure production (i.e. receiving an initial rank of “0”) were not included in the final ranking.

Data pertaining to agricultural intensity in all provincial watersheds are presented in Appendix 2.

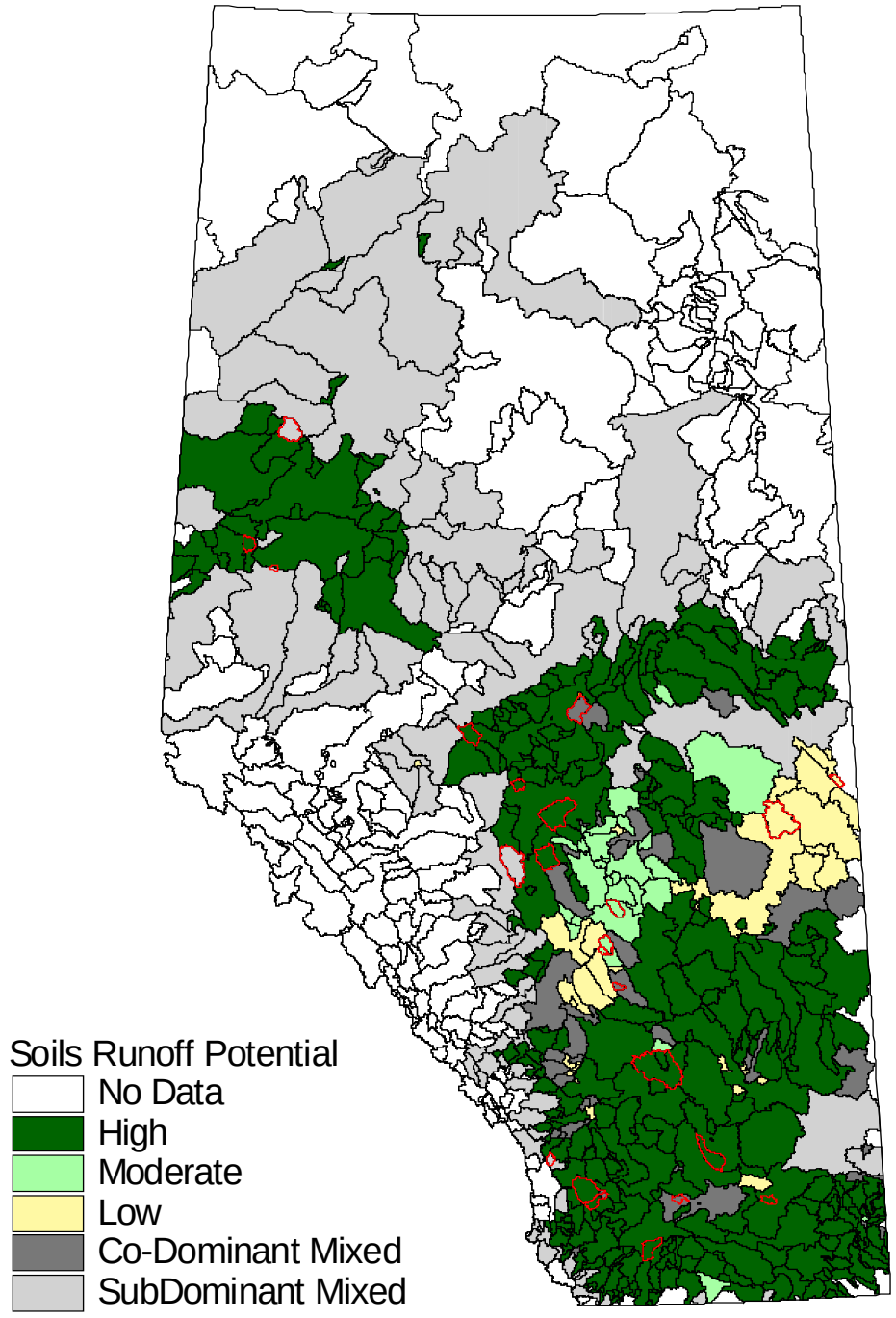

Figure 9. Watershed runoff potential based on soil types and textures. AESA watersheds outlined in red.

<u>Agricultural intensity classes</u> based on stream basin percentile ranking are defined as follows:

Non-agricultural: rank = 0
0 < Low Agricultural Intensity < 40
40 < Moderate Agricultural Intensity < 75
High Agricultural Intensity> 75

Table 2. Distribution of Runoff Classes based on Soil Types across the Ecoregions

	Runoff Potential Class Based on Soil Type (percent of area)			
Ecoregion	**High**	**Moderate**	**Low**	**Unknown**
Aspen Parkland	32.8	21.5	38.1	7.2
Boreal Transition	53.1	18.8	6.5	21.4
Clear Hills Upland	89.2		1.2	9.4
Cypress Upland	73.1	12.1	12.3	2.4
Eastern Continental Ranges	50.2	0.1	41.8	7.9
Fescue Grassland	68.3	4.7	23.7	3.3
Hay River Lowland	59.0		1.4	39.0
Mid-Boreal Uplands	62.9	1.9	4.0	31.1
Mixed Grassland	58.5	20.5	17.6	3.3
Moist Mixed Grassland	69.4	12.1	14.0	4.4
Northern Continental Divide	68.7	3.4	18.5	9.2
Peace Lowland	79.3	0.6	9.0	11.0
Wabasca Lowland	73.3	0.2	2.7	23.8
Western Alberta Upland	62.0	5.1	7.5	25.1
Western Boreal	82.5	0.1	3.0	14.4

Table 3 – shows actual agricultural intensity values which correspond to critical percentiles for the provincial distribution. Figures 10 to 13 show the provincial watersheds ranked according to agricultural intensity manure production, fertilizer expenses and chemical expenses, respectively. (Note that these maps depict aspects of agricultural intensity only; they do not take into account other aspects of watershed selection criteria discussed under 2.3.). Watersheds with high agricultural intensity are concentrated in southern and central Alberta, along the Lethbridge – Edmonton and Edmonton – Lloydminster transportation corridors and North West of Edmonton. In all of these watersheds, the intensity of agriculture is high as a result of intensive livestock (manure production) and crop production (fertilizer and chemical expenses). In contrast, agricultural intensity in northwestern Alberta is currently dominated by crop production (high fertilizer and chemical expenses), as opposed to livestock production (low to moderate manure production). Overall, the data base comprises 194 watersheds with no agricultural activity, and 255, 219 and 166 where agricultural activity is low, moderate and high, respectively.

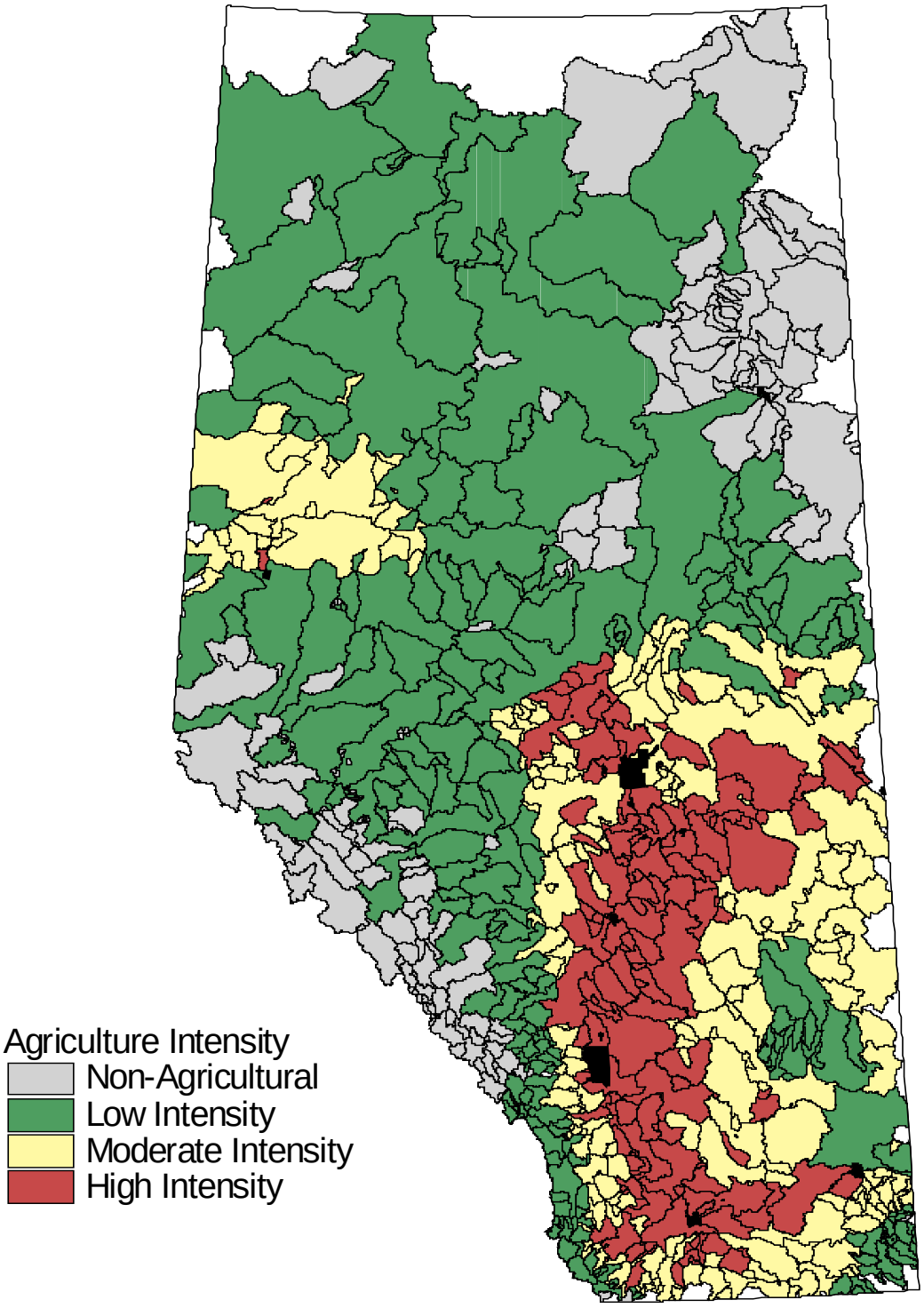

Figure 10. Watersheds ranked according to agricultural intensity based on 1996 census data (Statistics Canada 1996).

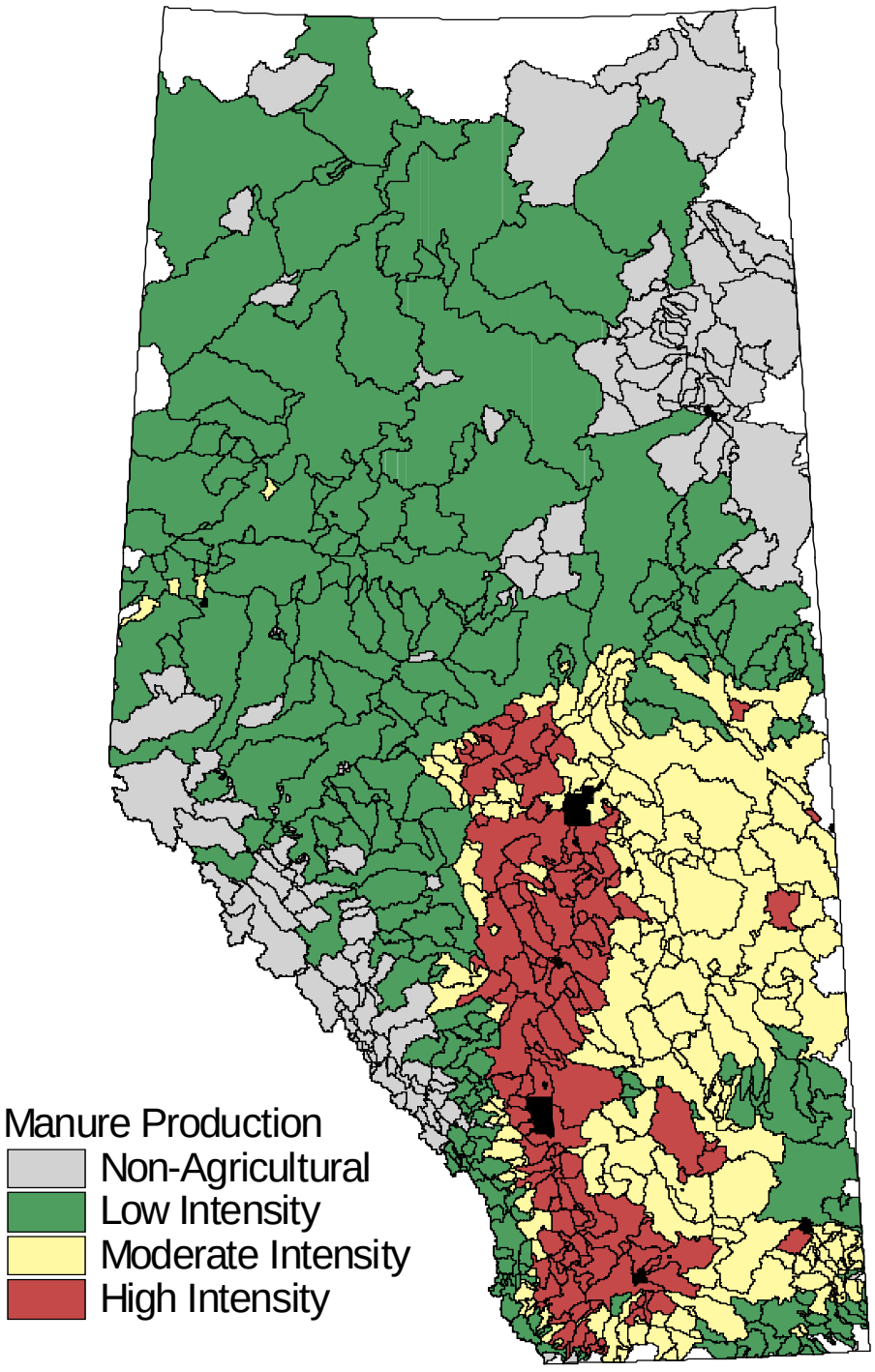

Figure 11. Watersheds ranked according to manure production (tonnes per acre) based on the 1996 census data (Statistics Canada 1996).

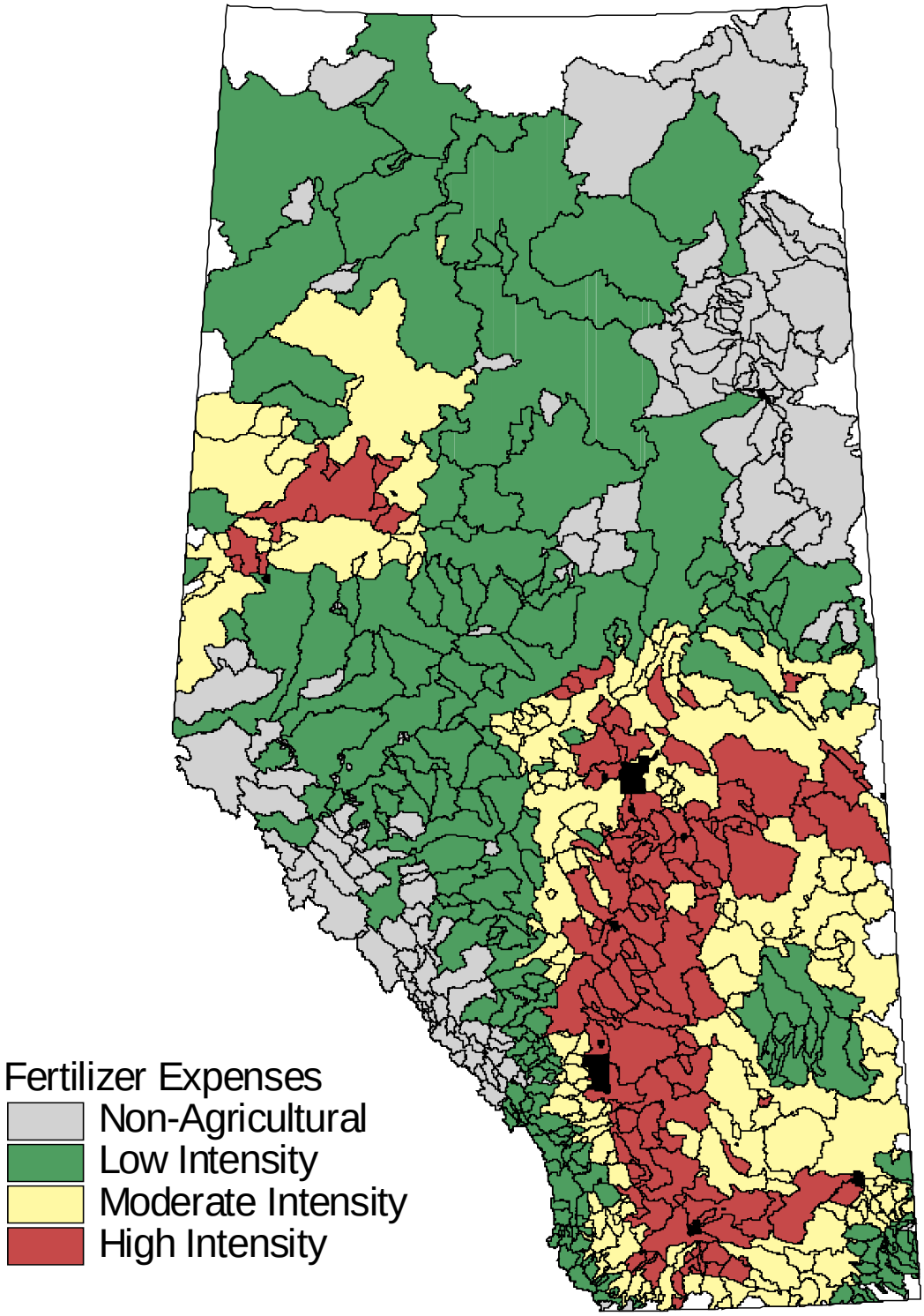

Figure 12. Watersheds ranked according to fertilizer expenses based on 1996 census data. (Statistics Canada 1996).

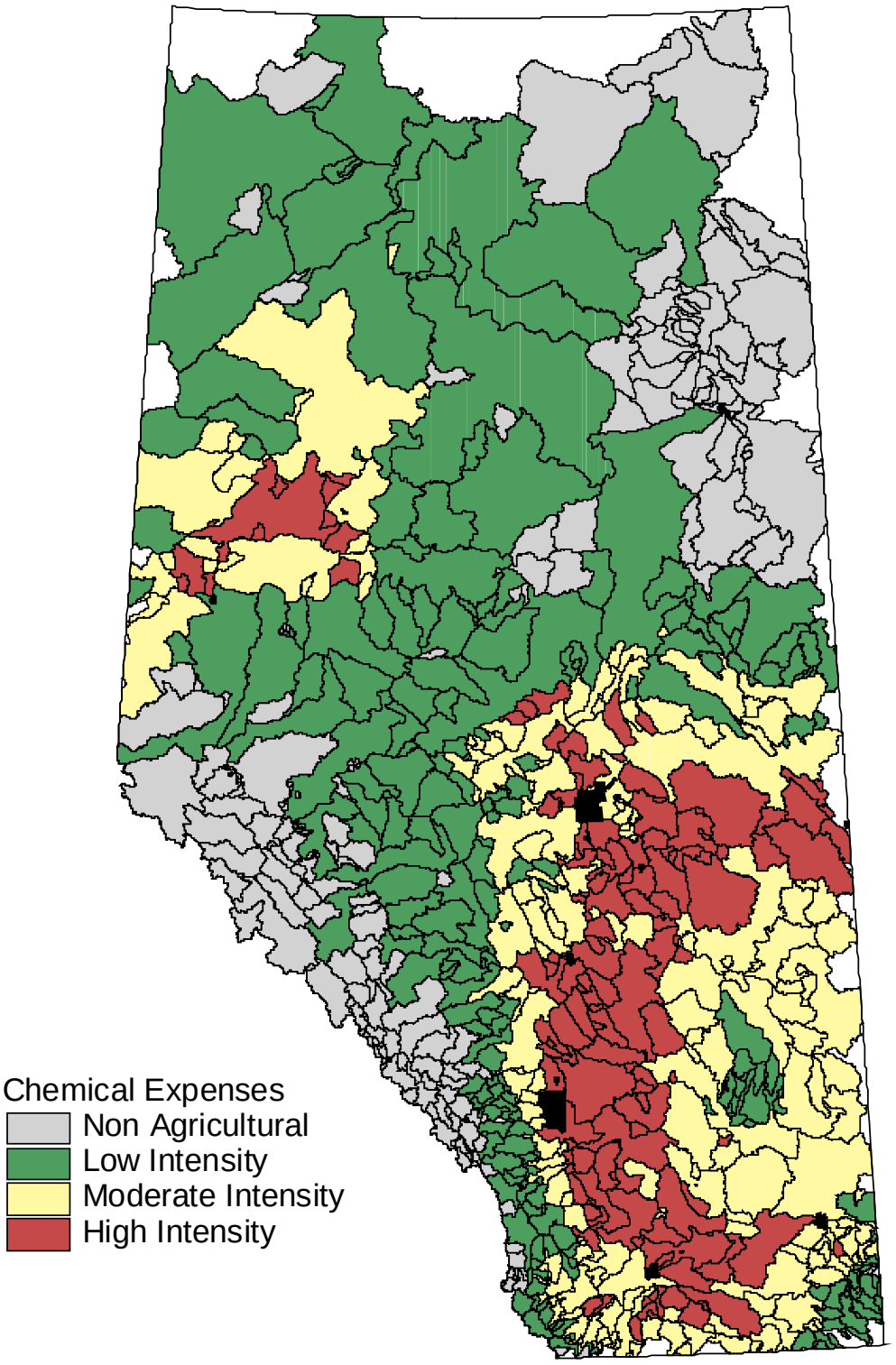

Figure 13. Watersheds ranked according to chemical expenses based on 1996 census data (Statistics Canada 1996).

Note that the definition of agricultural intensity under AESA differs from that used in the CAESA study in the following ways:

- In the CAESA study, fertilizer expenses, chemical expenses, and animal unit density per polygon were each classified into three classes "High", "Medium" and "Low". Polygons were assigned an intensity class only if they ranked high, medium and low for each of the three factors. Consequently, polygons that did not rank high, medium or low for all three criteria could not be ranked based on overall agricultural intensity.
- The intensity class for Low in the CAESA study was defined as $<25^{th}$ percentile rank.

The definitions used for the AESA study allow the ranking of all watersheds. The addition of a class for non-agricultural watersheds and the expansion of the upper boundary for the low agricultural intensity class provide a better indication of the distribution of agricultural intensity in Alberta streams.

Table 3. Agricultural intensity indicators: actual values for reference percentiles[1]

Percentiles	Total Manure Production (tonnes per acre)[2]	Total Fertilizer Expenses ($ per acre)[2]	Total Chemical Expenses ($ per acre)[2]
1.00	4.948	$31.21	$16.02
0.90	1.656	$14.41	$6.80
0.80	1.196	$10.84	$4.91
0.75	1.073	$9.38	$4.18
0.70	0.947	$7.29	$3.48
0.60	0.740	$4.44	$1.97
0.50	0.553	$2.69	$1.13
0.40	0.381	$1.50	$0.53
0.30	0.243	$0.67	$0.27
0.20	0.092	$0.28	$0.11
0.10	0.025	$0.05	$0.01
0.00	0.000	$0.00	$0.00

[1]Percentiles derived from the distribution of all agricultural watersheds
[2]Based on 1996 Census Data.

2.6 Watershed Selection

The final selection of watersheds involved the following steps:

1. Retain watersheds with a drainage area < 1500 km^2 and >50 km^2 that have a gauging station, but have no major urban or industrial development.
2. Retain watersheds, which cover the typical range of agricultural intensity for the province as a whole and for individual ecoregions recognizing that some of the watersheds are or may become important for agricultural production.
3. Retain streams that have primarily Type I landscapes and a high soil runoff potential.

In situations where several streams were regarded as representative, preference was given to streams that had been monitored under CAESA or AESA before. In several instances, ground-truthing was used to eliminate or retain some watersheds.

3. Selected Watersheds

3.1 Provincial Perspective

Twenty-three watersheds were selected across Alberta for the long-term monitoring of water quality in agricultural watersheds. The location of the watersheds is shown in Figure 14. Sixteen of these watersheds were part of the CAESA monitoring program. New watersheds include Hines Creek, Grande Prairie Creek and Kleskun Hills Main Drain in north western Alberta; Wabash Creek, north west of Edmonton; and New West Coulee, Drain S-6, and the Battersea Drain in the irrigated, southern portion of the province. These new watersheds will provide water quality data from agricultural areas that had not been sampled under CAESA.

Table 4 provides hydrometric and water quality station codes for the 23 watersheds as well as information on drainage basin size, and the year when hydrometric measurements started. Gross (total) and active drainage basin sizes are extracted from The Hydat database (Environment Canada 1997); total drainage basin size was determined from digital terrain maps in ARCview. Both Hydat and digital terrain maps provide fairly reliable estimates of drainage basin size, but each has some specific advantages. Hydat specifies the active portion of the drainage basin (the size of the drainage basin that contributes runoff to the stream), whereas digital terrain maps were used to define drainage basin boundaries electronically.

The gross drainage basin size for the 23 watersheds averages 312 km^2 and ranges from 42.5 km^2 (Ray Creek) to 1360 km^2 (Crowfoot Creek). The drainage basin size for some of the irrigation streams (Drain S-6, Battersea Drain) is not defined by Hydat, but has been determined from digital terrain maps. For most basins, the effective drainage basin is very similar in size to the gross drainage basin based on topographic features. This confirms that well-drained basins were selected where most of the basin potentially can contribute to stream loading. Some noteworthy exceptions include Buffalo and Crowfoot creeks where a fairly substantial portion of the basin is non-contributing. Calculations of export coefficients should apply to the effective portion of the basin. The definition of the contributing or effective watershed is considerably more complex for irrigation watersheds where canal systems can convey water in and out of the topographically defined basin boundaries at one or more locations. The current monitoring program does not allow for accurate estimates of export coefficients in such watersheds.

No attempt was made to select watersheds in areas of low runoff and low runoff potential (e.g. south-eastern portion of the province). The likelihood of identifying trends in water quality that would be linked to basin-wide agricultural activities was considered low relative to that elsewhere in the province.

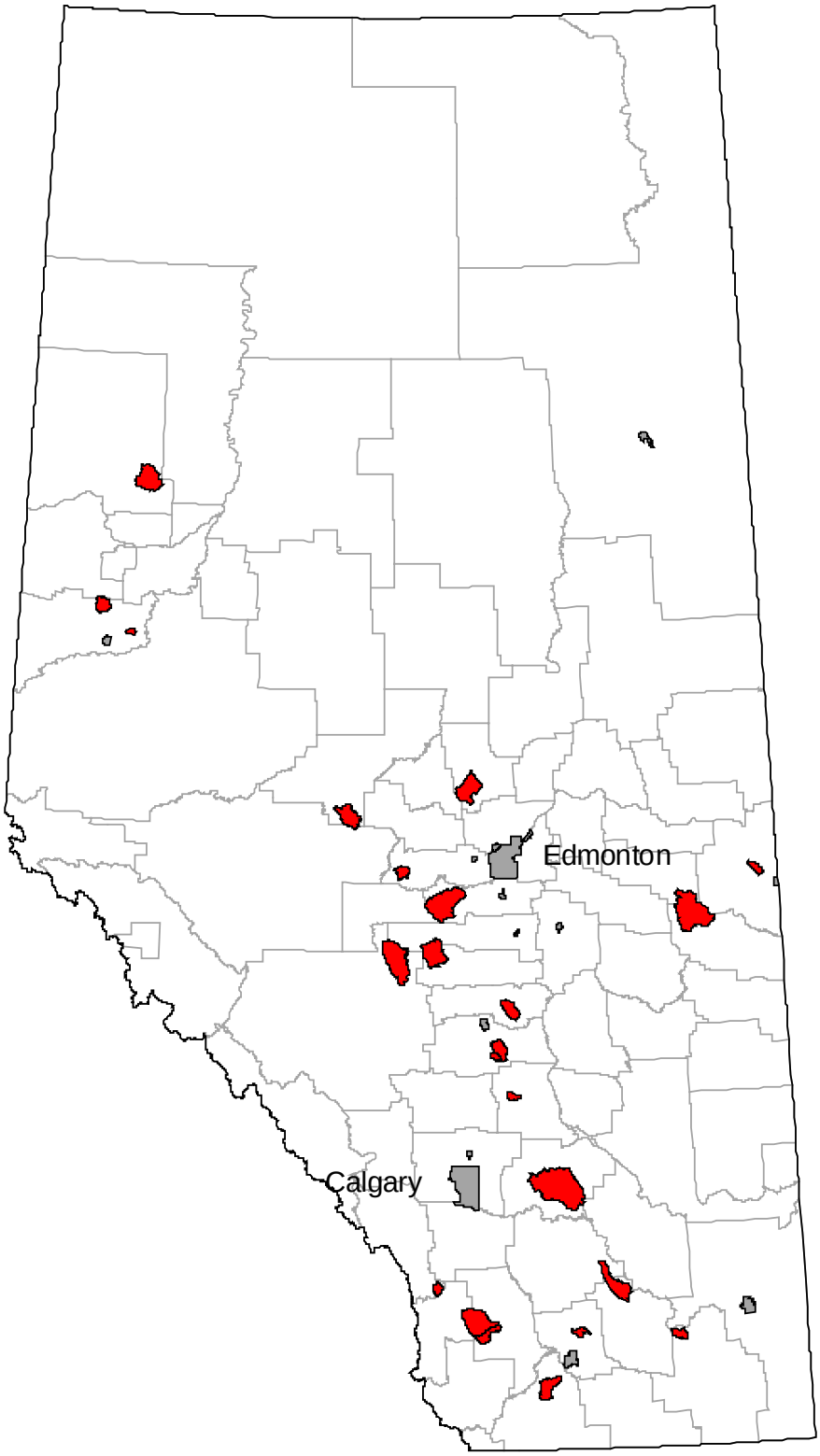

Figure 14. Location of AESA watersheds in Alberta.

Table 4. Basic hydrological reference data for AESA watersheds

		EnviroDat Station Code	Hydrometric Station Code	Watershed Name	Major River Basin	Drainage Basin Size (km^2)			Starting date of hydrometric records	Annual Unit Runoff Zone [1]
						Total (from DEM)	Gross (EC 1997)	Active (EC 1997)		
Aspen Parkland										
	Agriculture Zone 6									
1		AB05CE0710	05CE010	Ray Creek near Innisfail	Red Deer River	44.3	42.5	42.5	1967	Low
2		AB05CD0600	05CD006	Haynes Creek near Haynes	Red Deer River	166.0	166	166	1978	High
3		AB05CD0730	05CE018	Threehills Creek below Ray Creek	Red Deer River	154.9	197	154	1971	Low
4		AB05CE0720	05CE011	Renwick Creek near Threehills Creek	Red Deer River	58.8	57.2	57.2	1967	Low
	Agriculture zone 2									
5		AB05EE0550	05EE005	Stretton Creek near Marwayne	North Saskatchewan River	81.9	82.1	78.5	1978	Low
6		AB05FE0060	05FE002	Buffalo Creek at Hwy 41	Battle River	714.4	714	248	1972	Low
Boreal Transition										
	Agriculture zone 7									
7		AB05DF0020	05DF004	Strawberry Creek near the mouth	North Saskatchewan River Basin	581.9	584	582	1966	Medium
8		AB05CC0470	05CC008	Blindman River near Bluffton	Red Deer River	351.4	352	352	1965	Medium
9		AB05DE0550	05DE009	Tomahawk Creek near Tomahawk	North Saskatchewan River Basin	105.3	105	105	1984	High
	Agriculture Zone 8									
10		AB07BC0540	07BC007	Wabash Creek near Pibroch	Athabasca River	321.4	339	339	1979	Medium
Clear Hills Upland										
	No Agriculture Zone classified									
11		AB07FD1390	07FD011	Hines Creek above Gerry Lake	Peace River and Slave River	368.4	374	374	1974	Medium
Fescue Grassland										
	Agriculture zone 9									
12		AB05AB0240	05AB029	Meadow Creek near mouth	Oldman River	130.1	130	130	1966	High
13		AB05AB0230	05AB005	Trout Creek near Granum	Oldman River	440.2	440	440	1908	High
14		AB05AD0290	05AD035	Prairie Blood Coulee near Lethbridge	Oldman River	225.6	227	227	1970	Medium
Mixed Grassland										
	Agriculture Zone 12									
15		AB05BN0970	05BN006	New West Coulee near the mouth	Bow River	318.2	312	NA	1957	Low
	Agriculture zone 11									
16		AB05AJ0410	05AJ004	Drain S-6 near Bow Island	South Saskatchewan River	90.6	NA	NA	1985	Low
Moist Mixed Grassland										
	Agriculture Zone 5									
17		AB05BM0620	05BM008	Crowfoot Creek near Cluny	Bow River	1079.0	1360	959	1951	Low
	Agriculture Zone 10									
18		AB05AG0030	05AD038	Battersea Drain near the mouth	Oldman River	71.1	NA	NA	1973	Low
Northern Continental Divide										
	Agriculture zone 9									
19		AB05AB0265	05AB040	Willow Creek at secondary 532	Oldman River	65.2	65.3	NA	1996	High
Peace Lowland										
	Agriculture zone 14									
20		AB07GE0940	07GE003	Grande Prairie Creek near Sexsmith	Peace River and Slave River	151.1	152	152	1969	Medium
21		AB07GE0930	07GE002	Kleskun Hills Main Drain near Grande Prairie	Peace River and Slave River	32.3	31.6	NA	1966	Medium

Western Alberta Upland										
	Agriculture zone 7									
22		AB05DE0010	05DE007	Rose Creek near Alder Flats	North Saskatchewan River	558.5	551	551	1972	High
23		AB07BB0060	07BB011	Paddle River near Anselmo	Athabasca River	258.5	261	261	1980	High

Of the 23 AESA watersheds, 22 watersheds have some AGRASID coverage; Willow Creek at Hwy 532 has no coverage and there is only partial coverage for the Hines, Rose and Grande Prairie Creek watersheds (Figures 15, 16; Appendix 3). Most of the watersheds (15) are ranked as having primarily type I landform characteristics (well developed drainage based on having >40% classified as type I). Although Tomahawk Creek does not have type I landform characteristics, it does have soils that have a high runoff potential. Three watersheds (Threehills, Buffalo, Tomahawk) have type II landform characteristics. Four watersheds (Rose, Hines, Haynes Creeks and Blindman River) have a mixture of well developed to poorly developed landform runoff characteristics.

Soils and landform information is limited to the white zone in the AGRASID database. Fifteen of the 22 watersheds with AGRASID coverage are classified as having moderate to high potential for runoff based on soil types, textures and depth of the Ah horizon. Three watersheds (Renwick, Stretton and Buffalo Creek watersheds) are ranked as having low soil runoff potential while four watersheds have a mixture of high, moderate and low runoff potential (Hines, Wabash, Rose Creeks and Battersea Drain).

Table 5 provides actual agricultural intensity data as well as the ranking achieved by each of the 23 watersheds relative to the provincial distribution. Of the 23 basins chosen, 13, 5, and 5 drain areas of high, moderate and low agricultural intensity, respectively; non-agricultural streams are not included among the AESA streams. Figures 17, 18, 19 and 20 further illustrate how individual streams rank relative to the provincial percentile distribution for overall agriculture intensity, manure production, and fertilizer and chemical expenses, respectively.

- Generally, streams that rank in the high agricultural intensity class rank in the upper 25 percentiles for each agricultural intensity indicator. There are some exceptions. Strawberry Creek ranks lower for chemical and fertilizer expenses, while New West Coulee, Crowfoot Creek, Kleskun Hills Main Drain and Buffalo Creek rank lower for manure production.
- Among the streams that have basins in areas of medium agricultural intensity, all, except Trout Creek rank in the 40 to 75th percentile range for chemical and fertilizer expenses. Trout Creek ranks somewhat lower. With respect to manure production, Grande Prairie Creek ranks in the 40 to 75th percentile range, while Trout, Meadow and Tomahawk Creeks and the Blindman River are in the upper 25th percentile range.
- Chemical expenses in all streams that drain land farmed with low intensity rank in the lower 40th percentiles. However, manure production in the Rose Creek and Paddle River basins and fertilizer expenses in the Prairie Blood Coulee basin rank in the 40 to 75th percentile range.

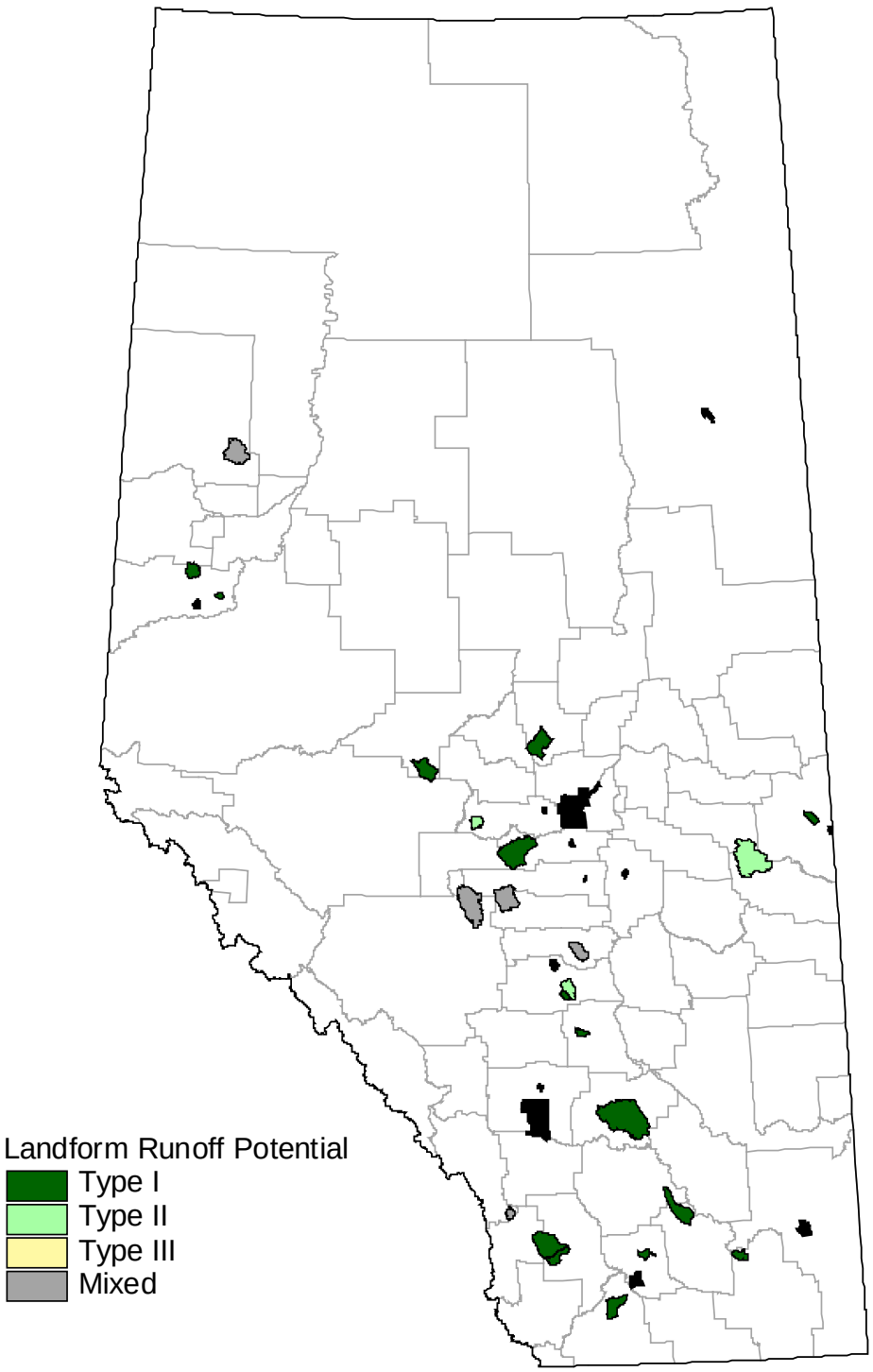

Figure 15. Runoff potential for AESA watersheds based on landforms

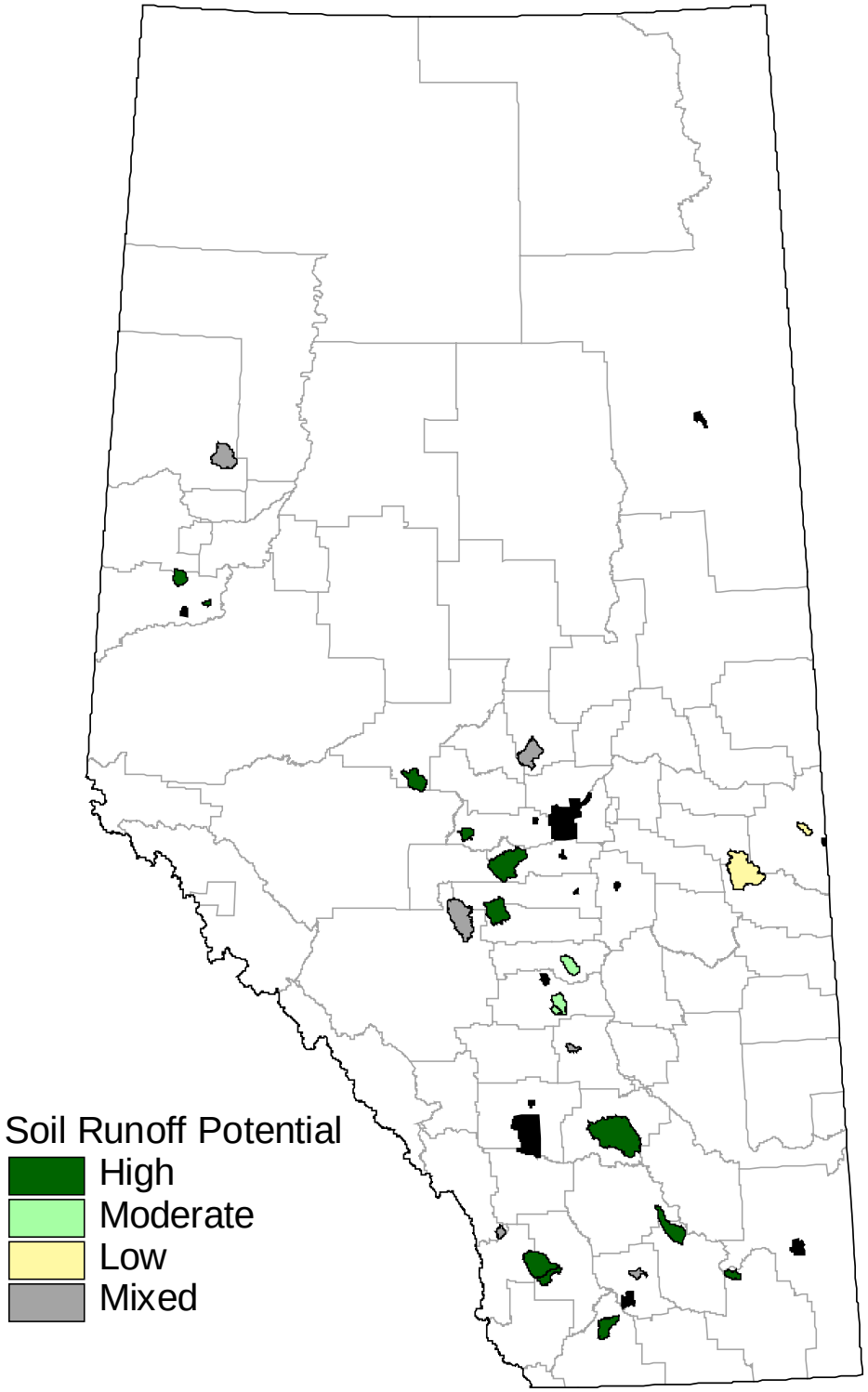

Figure 16. Runoff potential for AESA watersheds based on soil types and textures.

Table 5. Agricultural Intensity Data for AESA watersheds

		Watershed Name	Total Manure Production (tonnes per acre)[1]	Manure Production (percentile)	Total Fertilizer Expenses ($ per acre)[1]	Fertilizer Expenses (percentile)	Total Chemical Expenses ($ per acre)[1]	Chemical Expenses (percentile)	Agriculture Intensity	
Aspen Parkland									**Percentile**	**Rating [2]**
	Agriculture Zone 6									
1		Ray Creek near Innisfail	1.949	0.95	$19.33	0.97	$9.50	0.98	**0.99**	**H**
2		Haynes Creek near Haynes	1.716	0.92	$17.96	0.96	$8.12	0.94	**0.98**	**H**
3		Threehills Creek below Ray Creek	1.468	0.86	$19.27	0.97	$9.13	0.97	**0.98**	**H**
4		Renwick Creek near Threehills Creek	1.116	0.76	$24.82	1.00	$11.40	0.99	**0.96**	**H**
	Agriculture zone 2									
5		Stretton Creek near Marwayne	1.157	0.78	$12.93	0.87	$7.52	0.93	**0.91**	**H**
6		Buffalo Creek at Hwy 41	0.767	0.63	$12.90	0.87	$6.60	0.87	**0.83**	**H**
Boreal Transition										
	Agriculture zone 7									
7		Strawberry Creek near the mouth	1.235	0.82	$7.87	0.71	$3.06	0.65	**0.76**	**H**
8		Blindman River near Bluffton	1.682	0.90	$3.66	0.54	$0.90	0.44	**0.62**	**M**
9		Tomahawk Creek near Tomahawk	1.218	0.81	$3.02	0.51	$0.75	0.40	**0.57**	**M**
	Agriculture Zone 8									
10		Wabash Creek near Pibroch	1.703	0.91	$15.06	0.91	$7.76	0.93	**0.96**	**H**
Clear Hills Upland										
	No Agriculture Zone classified									
11		Hines Creek above Gerry Lake	0.041	0.14	$0.37	0.21	$0.11	0.15	**0.12**	**L**
Fescue Grassland										
	Agriculture zone 9									
12		Meadow Creek near mouth	1.285	0.82	$3.23	0.51	$0.82	0.40	**0.58**	**M**
13		Trout Creek near Granum	1.164	0.79	$1.66	0.40	$0.36	0.26	**0.48**	**M**
14		Prairie Blood Coulee near Lethbridge	0.208	0.27	$3.82	0.55	$0.84	0.42	**0.39**	**L**
Mixed Grassland										
	Agriculture Zone 12									
15		New West Coulee near the mouth	0.837	0.66	$10.68	0.79	$5.80	0.82	**0.80**	**H**
	Agriculture zone 11									
16		Drain S-6 near Bow Island	1.208	0.80	$23.97	0.99	$13.55	0.99	**0.97**	**H**
Moist Mixed Grassland										
	Agriculture Zone 5									
17		Crowfoot Creek near Cluny	0.605	0.53	$11.70	0.84	$7.27	0.92	**0.80**	**H**
	Agriculture Zone 10									
18		Battersea Drain near the mouth	4.352	0.99	$15.18	0.93	$6.61	0.88	**0.98**	**H**
Northern Continental Divide										
	Agriculture zone 9									
19		Willow Creek at secondary 532	0.101	0.21	$0.15	0.15	$0.04	0.09	**0.10**	**L**
Peace Lowland										
	Agriculture zone 14									
20		Grande Prairie Creek near Sexsmith	0.339	0.37	$7.02	0.69	$3.39	0.68	**0.57**	**M**
21		Kleskun Hills Main Drain near Grande Prairie	0.684	0.57	$12.97	0.87	$6.48	0.86	**0.80**	**H**
Western Alberta Upland										

	Agriculture zone 7									
22		Rose Creek near Alder Flats	0.699	0.58	$1.24	0.37	$0.25	0.25	**0.38**	**L**
23		Paddle River near Anselmo	0.576	0.52	$1.40	0.39	$0.37	0.31	**0.38**	**L**
(1) Based on 1996 Census Data										
(2) H= High; M= Moderate; L=Low										

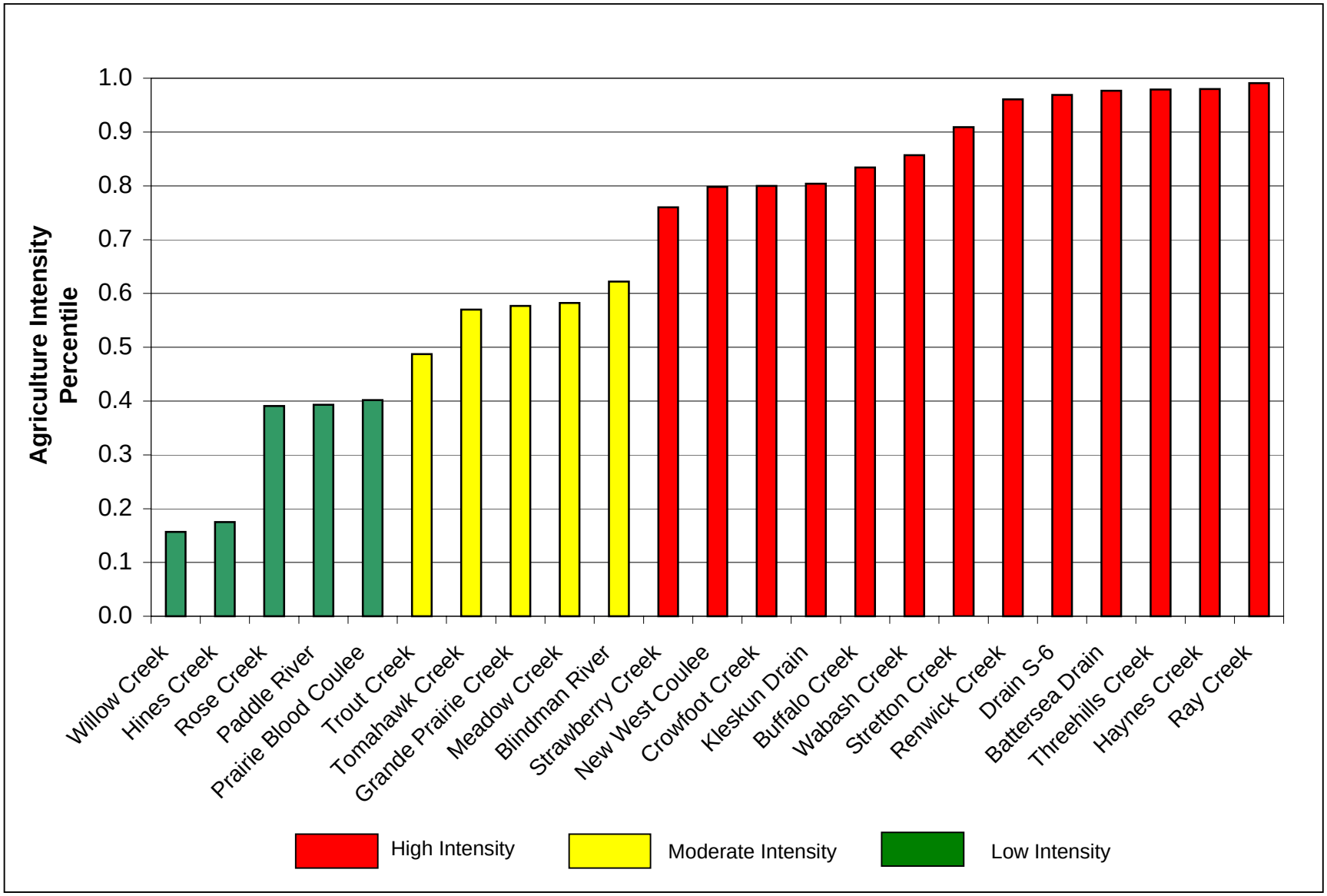

Figure 17. Agricultural Intensity for AESA Watersheds based on 1996 Canada Census Data.

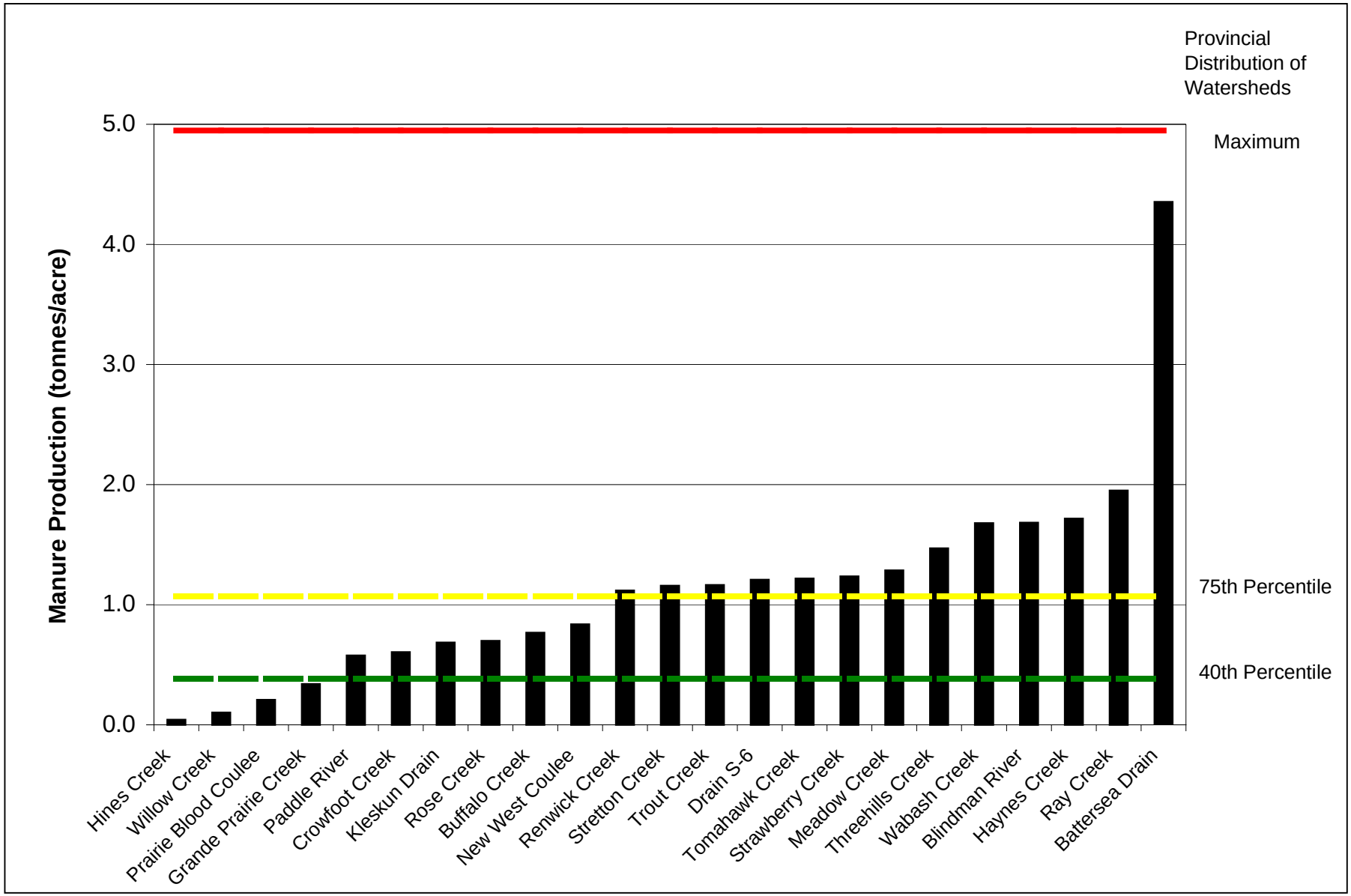

Figure 18. Manure production for AESA watersheds as compared to provincial values.

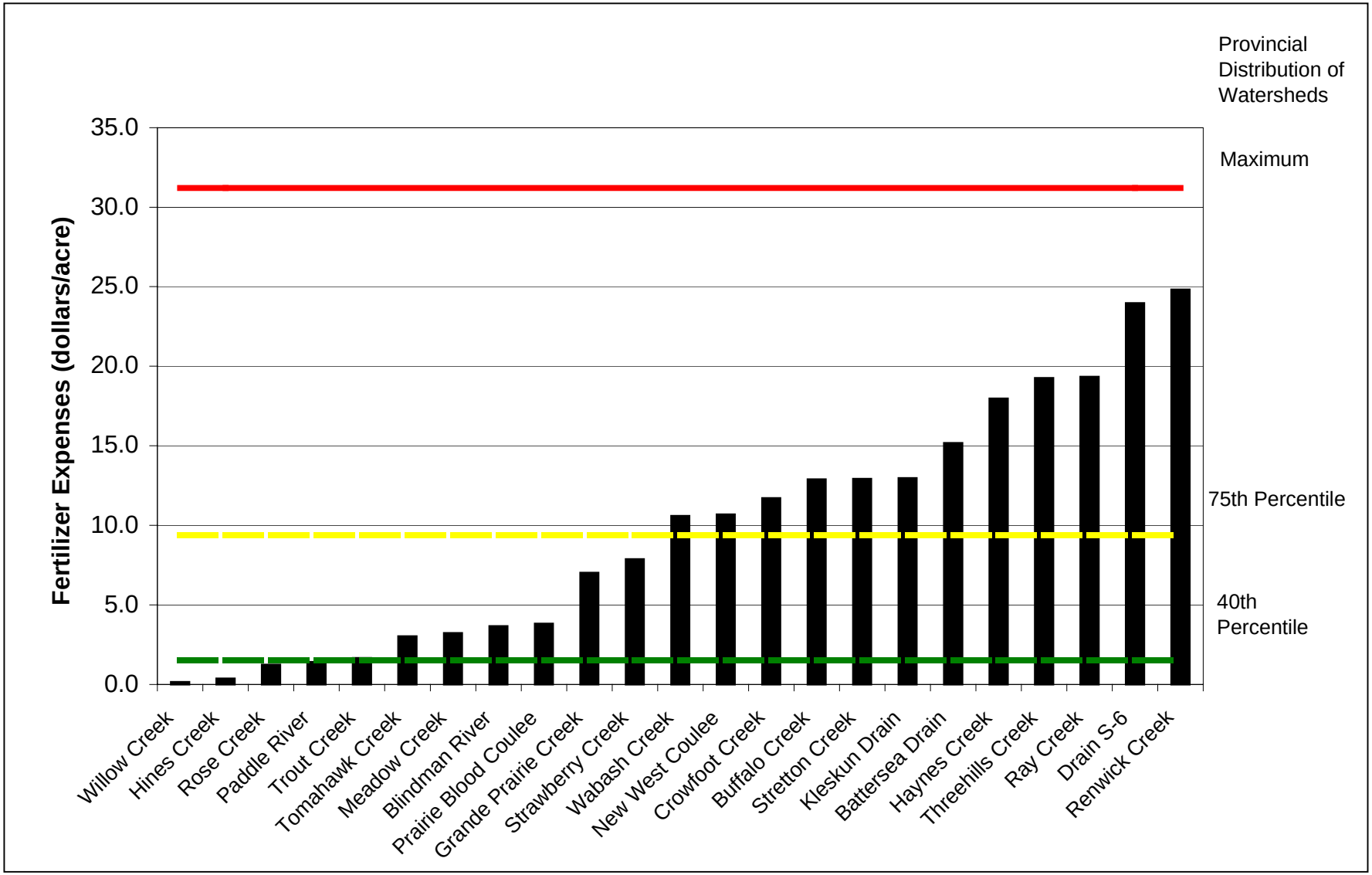

Figure 19. Fertilizer expenses for AESA watersheds as compared to provincial intensity values.

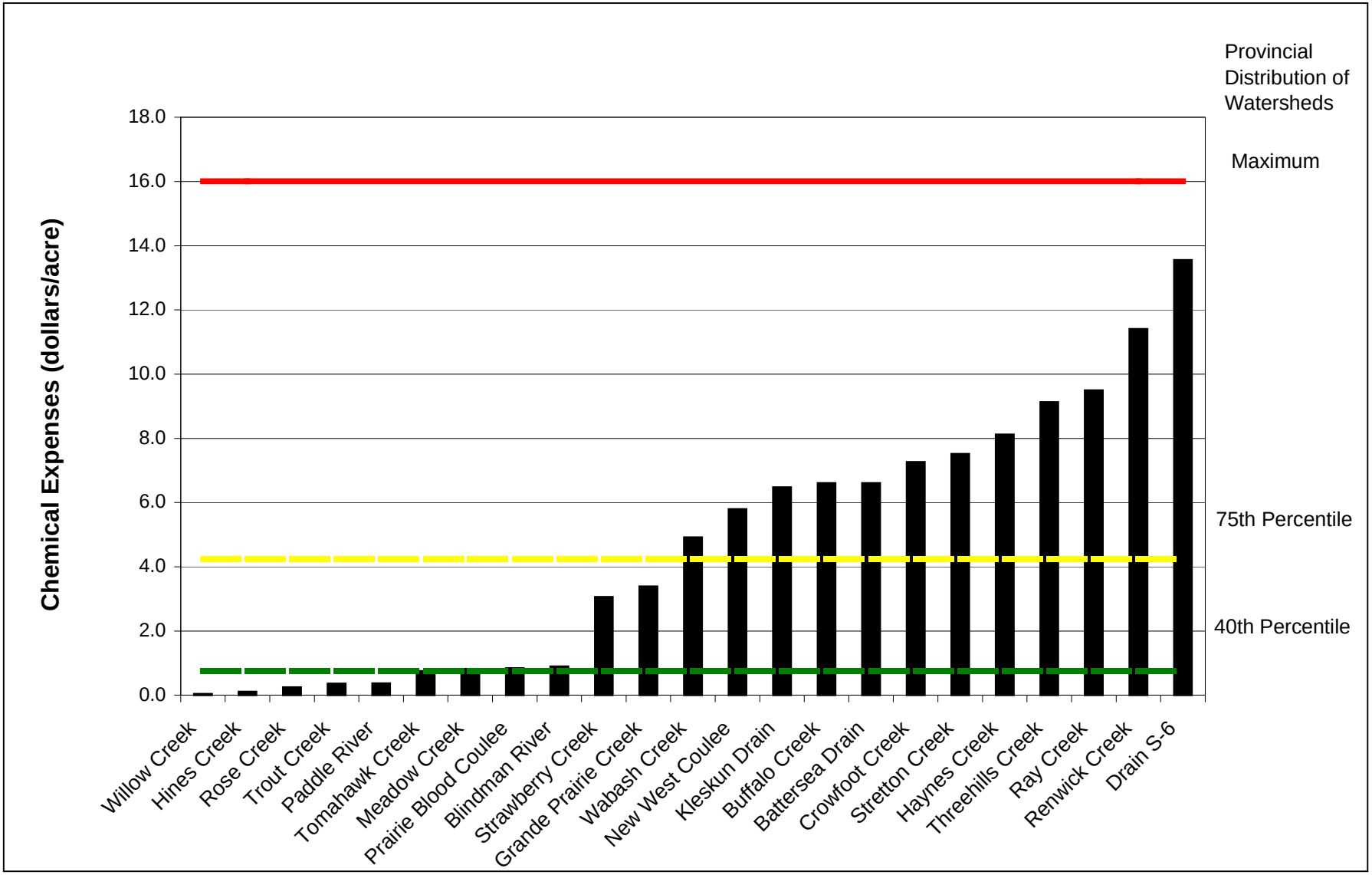

Figure 20. Chemical expenses for AESA watersheds as compared to provincial intensity values.

3.2 Regional Perspective

Ecoregions integrate aspects of natural spatial variability in climate, geology and physical characteristics and provide a logical framework to define attainable water quality goals and to describe and understand broad-scale regional differences in water quality (Hughes and Larsen 1988).

Ecoregions are appropriate spatial units in a program such as the AESA stream monitoring program because climate, geology and physical characteristics are more homogenous within than among ecoregions. Natural characteristics, are therefore, less likely to account for differences among streams in the same ecoregion, making it easier to study influences from man's activities. Agricultural zones within ecoregions define sub-units that have been standardized further based on the nature of agricultural production.

Ideally, trends in water quality would be followed in basins that cover the range of agricultural intensity typical for each ecoregion and each agricultural zone. However, in some instances, the entire range of agricultural intensity may not have been covered for some ecoregions or agricultural zones because the basins did not meet specified criteria for landscapes, soils and runoff potential. Furthermore, logistic factors (i.e. which define the cost of the program) become a significant consideration when a large number of streams need to be considered for monitoring. Finally, drainage basins in areas of very low runoff were avoided in the selection process because the lack of runoff would considerably reduce transport processes from the watershed to the stream. Consequently, it would be difficult to relate trends in water quality with trends in agricultural intensity for the entire basin (see above).

Streams have been selected in 6 out of the 8 ecoregions that support agriculture in the province (no streams were selected in the mixed boreal upland or the sub-alpine/alpine ecoregion) (Table 5). At least one stream was selected in 9 out of the 15 agricultural zones (no streams were selected in zones 1, 3, 4 and 13, which are areas of very low runoff, and in zones 8 and 15, which currently, have a very low level of agricultural development).

Figure 21 identifies streams selected for the AESA program in the Aspen Parkland Region and compares their agricultural intensity with that from other streams in that ecoregion. Streams are further grouped by agricultural zone.

Figure 21 illustrates how well selected streams cover the range of agricultural intensities within each ecoregion and agricultural zone. Over half of the streams in the Aspen Parkland drain land farmed with high intensity; these are well represented by the 6 streams selected in that ecoregion.

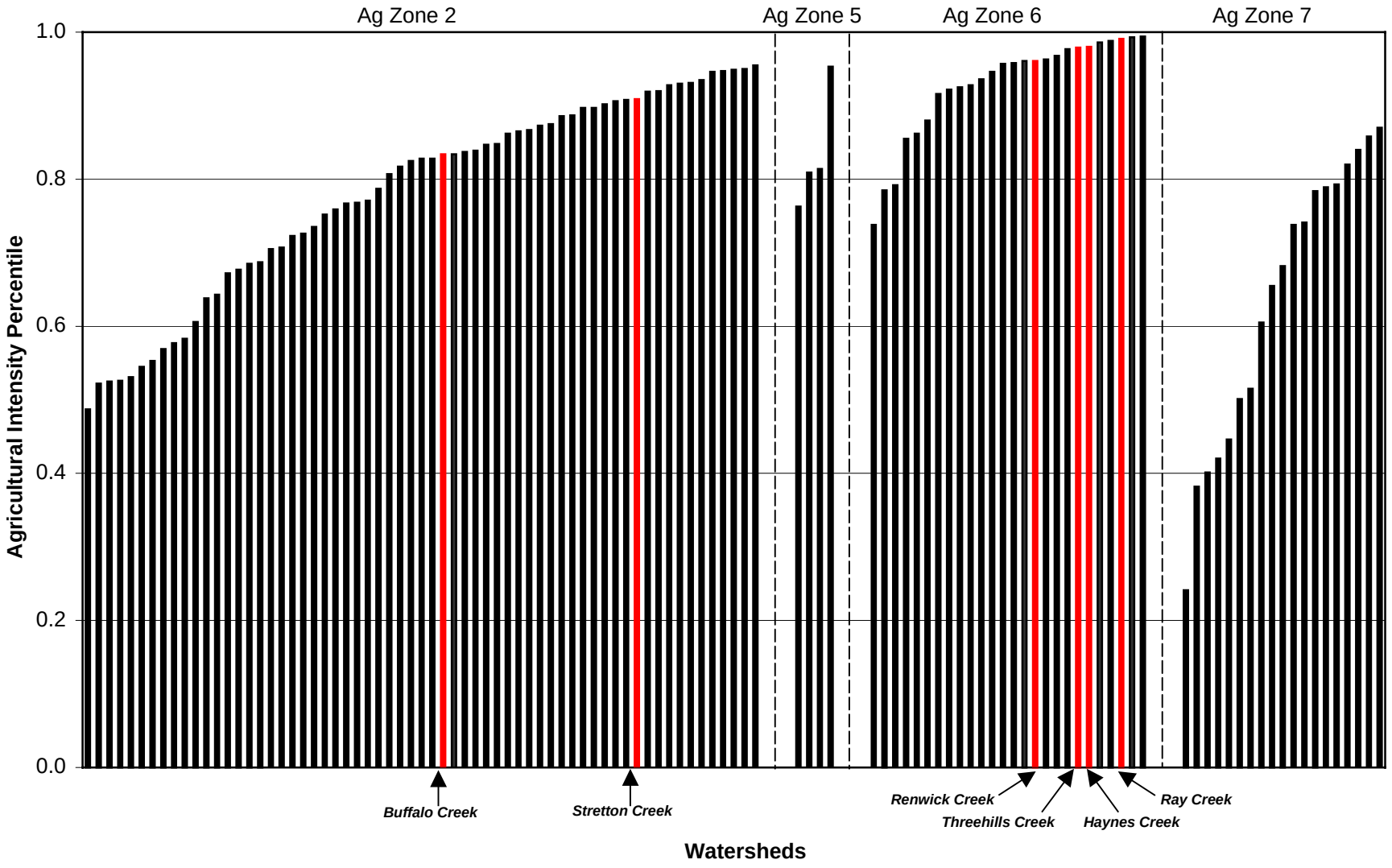

Figure 21. Distribution of agriucltural intensity in watersheds of the Aspen Parkland ecoregion compared to the AESA watersheds.

AESA Watersheds

Some streams in the Aspen Parkland drain land farmed with moderate and low intensity, but none were selected for monitoring. Some agricultural regions straddle the Parkland region and neighbouring ecoregions. In such instances, streams from nearby ecoregions could be used as surrogates. For example, there are no low intensity streams selected in the Aspen Parkland portion of zone 7, but Rose Creek and Paddle River in the Western Alberta Upland portion of zone 7 would provide background data, and Tomahawk Creek and the Blindman River in the Boreal Transition portion of zone 7 would provide data for medium intensity streams. Similar evaluations of how representative selected drainage basins are in other ecoregions can be made based on graphs presented in Appendix 4 for agricultural intensity, manure production, chemical and fertilizer expenses.

4. Conclusions

An intensive watershed selection process was undertaken to identify representative small agricultural watersheds across Alberta. Numerous large databases (e.g. AGRASID, Canada census) were queried to establish watershed profiles for agriculture intensity and runoff potential. As a result, 23 watersheds were selected for the AESA Water Quality Monitoring program.

The selected watersheds cover the range of agricultural intensity and patterns of production, which, based on 1996 census data, typify the white zone of the province. Water quality monitoring data from these AESA watersheds are considered to be representative of water quality conditions in other watersheds within the same ecoregion and agricultural zone and with similar agricultural intensity characteristics.

As the agricultural sector in Alberta grows and practices change to include Beneficial Management Practices (BMPs) to reduce impacts on water quality it is expected that trends in surface water quality may become apparent over time. Trends in water quality of the AESA watersheds will serve as surrogate for trends in other watersheds, regionally and provincially.

Although the influence of agricultural activity on the landscape is the predominant human influence in the AESA watersheds, it is important to recognise that factors unrelated to changes in agricultural intensity can influence the interpretation and extrapolation of the data. Following are some specific examples of factors that can influence trends in water quality:

- Climatic and hydrological influences must be considered carefully, both in the evaluation of temporal and spatial trends. Hydrological events (runoff from snowmelt or rainfall) are the main drivers of material movement from land to water; their intensity can vary from year-to-year within a watershed and among watersheds.

  Most of the AESA watersheds that have moderate and low agricultural intensity tend to be located in areas of moderate to high runoff, whereas most streams that drain intensively farmed land tend to be located in low runoff zones. The runoff volume

could have significant implications on the response time of water quality to changes in agricultural intensity in the watershed: streams in low runoff areas can be expected to respond more slowly than streams in high runoff areas. Trends may be delayed in high intensity watersheds in low runoff areas and the absence of trends may be misleading or unnecessarily disappointing.

- The AESA watersheds offer a good cross-section of current agricultural development and distribution in the province. However, over time, the nature and distribution of agriculture in the province could change. Regular reviews of Canada Census data will be critical to ensure that AESA watersheds remain representative of agriculture in the future.

  For example, relatively few streams have been selected in higher runoff areas. Future census data will need to be reviewed promptly to ensure that these watersheds remain representative and to determine the need to expand the AESA program to higher runoff zones

- Similarly it will be necessary to follow the evolution of human population densities and non-agricultural activities in the province and within the AESA watersheds.

- The importance of communicating results of the monitoring program to landowners living and farming within the AESA watersheds is unquestioned. However, there is a possibility that by doing so landowners will become aware sooner of the need to implement beneficial management practices (BMP) to protect water quality and will act sooner than the rest of the farming community. While the implementation of BMP is an essential outcome of the AESA program in general, greater activity in this regard in AESA watersheds would make these watersheds less representative of trends and impacts of agriculture in the province.

The AESA water quality-monitoring program is an industry-supported initiative that will help to report on the industry's progress towards environmental sustainability. Data for the 23 watersheds will assist scientists, technical specialists and the agricultural community to depict trends over time as well as to identify water quality concerns facing the industry.

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Appendix 1

AGRASID criteria to define landscape and soils with different runoff potential

Landscape Criteria, Likelihood to Deliver Runoff from Field to Creeks

Landscape characteristics in the AGRASID database as described in the Soil Inventory Project Procedures Manual (CAESA-Soil Inventory Project Working Group 1998) were classified according to runoff likelihood and classified as the following:

> **Type I** – Landforms with well developed natural drainage, having a high potential to deliver runoff to streams. Landforms listed in AGRASID which are of this type are of the rolling, undulating, ridged, inclined and valley types.
>
> **Type II** – Landforms with closed, poorly developed natural drainage (knob and kettle, potholes) which will trap runoff and have a low potential to deliver runoff. To be conservative, hummocky landscapes including low relief was interpreted as Type II landscapes.
>
> **Type III** – landforms that are flat to low undulating with poorly drained landscapes, but fine textured soils. In agricultural areas these are likely to be artificially drained.

Type I. Open, well developed natural drainage:	
AGRASID CODE	**Description**
M1	Rolling, moderate and high relief
R2	Ridged, moderate and high relief
U1	Undulating, high relief
SC1	Valley with confined flood plain, high relief (steep sides)
SC2	Wide valley with terraces
SC3	V-shaped valley, no flood plain or terraces
SC4	Sub-glacial channel
I1	Low relief, inclined plain
I2	No description here?
I3	Inclined to steep single slope landform, low, moderate, high relief
I4	Inclined to steep single slope with >10% exposed bedrock
I5	Inclined steep landforms with extensive failure slumps
IU	Inclined and undulating, low and high relief

Type II. Closed, poorly developed natural drainage (knob and kettle, potholes):	
AGRASID CODE	**Description**
H1	Hummocky, low, moderate and high relief
H5	Hummocky draped moraine over soft rock, low, moderate and high relief
HP1	Hummocky stagnation moraine with nearly level lacustrine plateaus (not sure whether this belongs in Type 2 or Type 3.
HR2	Hummocky and Ridged, moderate and high relief

NOTE: Hummocky landscapes, including low relief will be interpreted as type II landscapes.

Type 3 Flat to low undulating with poorly drained landscapes but heavy textured soils, likely artificially drained	
AGRASID CODE	**Description**
L1	Level Plain
L2	Level and Closed Basin
L3	Level and terraced Not within modern stream channels
R2	Ridged, low relief (may be well drained in some cases)
U1	Undulating, low relief

These landscapes combined with an identifier of parent material being glacial-lacustrine should give us old 'laking' basins where these landscapes are likely to occur.
Soils that have a Gleyed modifier in the subgroup category usually are soils in level or depressional landscapes. Consequently, gleyed soils should not be found in Type 1 landscapes, to a minor extent they should be found around potholes and sloughs in Type 2 landscapes. They should be common in Type 3 landscapes, up to 30% of the landscape.

Soils Criteria, Runoff Event Likelihood:

***High Likelihood*:**

There is a high likelihood of runoff from soils with a shallow depth of the Ah or Ap horizons and soil textures that include silt, or clay loam. High runoff likelihood also exists with a B-horizon that has higher clay content than A horizon or has high sodium content. Luvisol, solonetzic and their derivatives are soil development classes that would facilitate higher likelihood of runoff.

Heavy Soil Textures in A or B horizon that promote higher runoff likelihood include:

AGRASID CODE	Description
SI	Silt
SCL	Sandy Clay Loam
SICL	Silty Clay Loam
CL	Clay Loam
SC	Sandy Clay
SIC	Silty Clay
C	Clay
HC	Heavy Clay

High runoff likelihood may also be present as a result of the parent material texture and the layered materials that experience changes between 30 and 100 cm depth. (refer to : Table 4.7; CAESA-Soil Inventory Project Working Group 1998)

AGRASID CODE	Description
L1	Gravel or gravelly coarse over medium or fine textured till (includes cobbly and stony variations)
L2	Coarse textured (S, LS, SL) over medium or fine textured till
L3	Medium textured (VFSL, L, SiCL, CL) over medium or fine textured till
L6	Till (Till name) over soft rock
L7	Coarse (not till) over soft rock L8 – Medium (not till) over sof trock
L9	Coarse (not till) textured over fine or very fine (not till)
L10	Medium (not till) textured over fine or very fine (not till)
L17	Gravelly (includes stony variations) medium textured material over medium or fine textured till
L19	Gravelly medium textured material over soft rock
L20	Coarse textured over medium or moderately fine (not till)
L21	Gravelly coarse textured over medium or moderately fine (not till)

Other specific characteristics that would facilitate a high likelihood of runoff include the following

AGRASID CODE	Description
ZT	Solonetzic B Horizon
XL	Lithic (bedrock close to surface)
	Line needed?
TA	Thin A horizon
Yc	Clay at 100 to 200 cm
YL	Lithic at 100 to 200 cm (bedrock close to surface)
ZS	Solodic
ZT	Solonetzic

Order, Great Group and Subgroups

Gleyed subgroups are usually found in areas of poor surface drainage. Hence these categories fit with Type 3 landscapes. However, they also represent frequently saturated soils, consequently they also are soils with a higher runoff potential. The following Chernozemic soils would be classified as facilitating high runoff likelihood:

Brown
- SZ.B. = Solonetzic Brown
- GL.B = Gleyed Brown
- GLR.B = Gleyed Rego Brown
- GLCA.B = Gleyed Calcerous Brown
- GLSZ.B = Gleyed Solonetzic Brown

Dark Brown
- SZ.DB = Solonetzic Dark Brown
- GL.DB = Gleyed Dark Brown
- GLR.DB = Gleyed Rego Dark Brown
- GLCA.DB = Gleyed Calcareous Dark Brown
- GLSZ.DB = Gleyed Solonetzic Dark Brown

Black
- SZ.BL = Solonetzic Black
- GL.BL = Gleyed Black
- GLR.BL = Gleyed Rego Black
- GLCA.BL = Gleyed Calcareous Black
- GLE.BL = Gleyed Eluviated Black
- GLSZ.BL = Gleyed Solonetzic Black

Dark Grays
- SZ.DG = Solonetzic Dark Gray
- GL.DG = Gleyed Dark Gray

GLR.DG = Gleyed Rego Dark Gray
GLCA.DG = Gleyed Calcareous Dark Gray
GLE.DG = Gleyed Eluviated Dark Gray
GLSZ.DG = Gleyed Solonetzic Dark Grey

NOTE: Dark Gray soils should be checked for changes in Ksat between A and B horizons; Dark Gray Soils series with significant changes should be considered as having high runoff potential.

Regosolic (Rego) lack a B Horizon which means they are either a new soil (from sediment or extremely sandy. Consequently, they should be in the Low runoff class except for gleyed sub-groups.

All Gleysolic, Luvisolic and Solonetzic soils were classified as high runoff potential soils.

Moderate Likelihood:

Soils with a moderately deep Ah or Ap horizon, moderate soil texture (loam, silt loam, fine sandy loam), and B horizon that has similar Ksat to A horizon with no restrictive layer were classified as having moderate runoff likelihood. Some derivatives of solonetzic and luvisols were also considered for this class (solods, dark grey soils).

Moderate Soil Textures:

AGRASID Code	Description
L	Loam
SIL	Silty Loam
SI	Silt

Order, Great Group and Subgroups

Brown
O.B. = Orthic Brown
CA.B = Calcareous Brown
E.B. = Eluviated Brown
Dark Brown
O.DB = Orthic Dark Brown
CA.DB = Calcareous Dark Brwon
Black
O.BL = Orthic Black
CA.BL = Calcareous Black
E.BL = Eluviated Black
Dark Grey
O.DG = Orthic Dark Gray

CA.DG = Calcareous Dark Gray Luvisolic

DG.L = Dark Gray Luvisolic

Low likelihood

Soils with deep Ah or Ap horizon, moderate to coarse soil texture (loams, sandy loams and sands) and B horizons that have the same permeability as A horizon were classified as having low runoff potential. Regosolics were considered as having low runoff potential in terms of the soil development. Chernozems with good profile development also fit this category.

Moderate to Coarse Soil Textures

AGRASID Code	Description
S	Sand
LS	Loamy Sand
SL	Sandy Loam
L	Loam

Order, Great Group and Subgroup

Regosolic soils in any group unless modified by gleyed soils were classified as having low runoff potential as they should be well-drained soils.

Appendix 2:

Agricultural intensity, runoff potential characteristics for Alberta watersheds

Ecoregion: SubAlpine, Alpine

				Agricultural Indicators							Runoff Potential						
											Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Agriculture Intensity Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05BE999	GHOST TRAIL	187.8	0.36546	0.393	0.88506	0.326	0.19529	0.212	0.30300	0.300276	0.326318	0.147204	0.620092	0.11352093	0.019222	0.08732421
2	05BJ003	ELBOW RIVER AT FULLERTON'S RANCH	302.0	0.21873	0.279	0.54755	0.251	0.13778	0.173	0.22500	0.009554	0.052829		0.038676	0.01232227	0.008242	0.00314316
3	05BJ006	ELBOW RIVER ABOVE ELBOW FALLS	307.5	0.05734	0.161	0.14048	0.143	0.03465	0.081	0.14500							
4	05BL018	SHEEP RIVER AT BUCK RANCH	453.1	0.15955	0.244	0.23767	0.178	0.06224	0.113	0.18700	0.005891			0.003407		0.002485	
5	05BL019	HIGHWOOD RIVER AT DIEBEL'S RANCH	483.2	0.02671	0.116	0.03287	0.082	0.00149	0.02	0.10100	0.00844			0.001197	4.347E-05	0.001588	0.00561172
6	05BL027	TRAP CREEK NEAR LONGVIEW	137.1	0.10905	0.216	0.16246	0.148	0.04262	0.091	0.16700	0.209173		0.000415	0.180043		0.021547	0.00799791
	05AA002	CROWSNEST RIVER NEAR LUNDBRECK	208.8	0.53197	0.491	1.14878	0.358	0.4203	0.332	0.37300	0.572913	0.181876	0.020747	0.503593	0.01195774	0.271566	0.02256012
	05AA003	CASTLE RIVER NEAR COWLEY	57.6	1.65345	0.9	5.83511	0.66	2.2445	0.608	0.74800	0.422308	0.299106		0.547892	0.00774081	0.479159	0.03754763
	05AA004	PINCHER CREEK AT PINCHER CREEK	157.2	0.81507	0.654	1.74252	0.425	0.87062	0.433	0.49800	0.480888	0.31136	0.001251	0.602968	0.0075952	0.12611	0.06892662
7	05AA005	COW CREEK NEAR COWLEY	93.6	0.35397	0.383	0.78213	0.312	0.23964	0.242	0.30800	0.554943	0.203639	0.029573	0.719681	0.00470192	0.047364	0.01640887
8	05AA007	CONNELLY CREEK NEAR LUNDBRECK	51.3	0.5015	0.472	2.2303	0.462	0.78282	0.413	0.44000	0.562861	0.307775		0.690202	0.01527036	0.146524	0.01863942
9	05AA010	BEAVER MINES CREEK NEAR BEAVER MINES	63.0	0.78161	0.639	0.8421	0.322	0.67256	0.391	0.44500	0.396386	0.25689		0.589078	0.02579836	0.07246	0.06352235
10	05AA011	MILL CREEK NEAR THE MOUTH	178.6	0.34445	0.374	0.33943	0.197	0.29501	0.272	0.27400	0.255678	0.144876	0.010972	0.299122	0.00329148	0.090382	0.02017773
11	05AA015	CASTLE RIVER AT MCDONALD'S RANCH	74.4	0.687	0.568	0.59597	0.264	0.58485	0.376	0.39000	0.260468	0.07865		0.310037		0.075446	0.02179941
12	05AA016	CARBONDALE CREEK AT EVAN'S RANCH	309.2	0.25775	0.309	0.2236	0.175	0.21943	0.229	0.22700	0.004518	0.002894		0.007034		0.008631	0.00037836
13	05AA021	OLDMAN RIVER AT THE GAP	843.7	0.03686	0.137	0.04789	0.092	0.00532	0.026	0.11200							
14	05AA022	CASTLE RIVER NEAR BEAVER MINES	65.3	1.05022	0.737	1.83214	0.433	0.93433	0.453	0.53900	0.37357	0.315577	0.090029	0.596236	0.02724629	0.313493	0.03184974
15	05AA023	OLDMAN RIVER NEAR WALDRON'S CORNER	240.3	0.37972	0.401	0.56652	0.253	0.14943	0.178	0.26300	0.312002	0.061684	0.060335	0.302427	0.00561489	0.120028	0.00595028
16	05AA028	CASTLE RIVER AT RANGER STATION	374.7	0.10415	0.206	0.09035	0.116	0.08867	0.128	0.16400							
17	05AA029	CALLUM CREEK AT WALDRON'S RANCH	188.2	0.86906	0.677	2.05187	0.449	0.62511	0.379	0.49800	0.681601	0.191893		0.657468	0.00821138	0.112267	0.09554689

16	05AA909	TODD CREEK NEAR HIGHWAY NO.22	73.9	0.18398	0.257	0.27019	0.189	0.06685	0.115	0.18900	0.331352	0.132166	0.108763	0.445767		0.104097	0.01385342
17	05AB003		418.3	1.16397	0.786	1.65598	0.414	0.36383	0.304	0.47100	0.983371	0.014666		0.709427	0.02500686	0.118872	0.14473034
18	05AB022	WEST STREETER CREEK NEAR NANTON	1.3	1.12221	0.769	1.17299	0.36	0.20684	0.219	0.44900	0.987748						0.98774828
19	05AB023	MIDDLE STREETER CREEK NEAR NANTON	0.8	1.12264	0.774	1.17344	0.365	0.20692	0.224	0.46200	1.003533						1.00353255
20	05AB024	EAST STREETER CREEK NEAR NANTON	0.6	1.12225	0.77	1.17304	0.362	0.20685	0.22	0.44800	0.997732			0.475134			0.52259816
21	05AB028	WILLOW CREEK ABOVE CHAIN LAKES	161.4	0.26301	0.319	0.39378	0.22	0.1053	0.147	0.22000	0.176395	0.051074		0.192193		0.028417	0.00686013
22	05AB030	STREETER CREEK (MAIN STEM) NEAR NANTO	3.5	1.12231	0.772	1.1731	0.363	0.20686	0.222	0.45100	0.89272	0.106291		0.542367		0.031887	0.42475682
23	05AD001	MAMI CREEK AT MOUNTAIN VIEW	21.6	1.50341	0.875	3.70985	0.551	1.38503	0.515	0.63900	0.152837	0.845211		0.80719		0.14016	0.05069863
24	05AD003	WATERTON RIVER NEAR WATERTON PARK	209.0	0.25955	0.311	0.64046	0.279	0.23911	0.24	0.26100	0.019944	0.011073		0.021045	0.00997178		
25	05AD004	CROOKED CREEK NEAR WATERTON PARK	49.3	1.08823	0.755	2.68532	0.499	1.00254	0.459	0.56700	0.398021	0.238282	0.019896	0.52331	0.04449288	0.078684	0.00971231
26	05AD005	BELLY RIVER NEAR MOUNTAIN VIEW	101.5	0	0	0	0	0	0	0.00000	0.06467	0.06565		0.124843		0.025838	0.00306687
27	05AD010	DRYWOOD CREEK NEAR THE MOUTH	156.7	0.47544	0.459	0.71603	0.306	0.41802	0.331	0.36200	0.214768	0.331832	0.007771	0.312778	0.00149499	0.196101	0.03207686
28	05AD014	SPRING CREEK NEAR WATERTON PARK	0.2	1.73267	0.925	4.27557	0.59	1.59624	0.546	0.66900							
29	05AD016	DRYWOOD CREEK NEAR TWIN BUTTE	30.5	0.10553	0.21	0.09155	0.119	0.08984	0.132	0.16800	0.034368	0.045943		0.042597		0.038282	
30	05AD024	MAMI CREEK BELOW LEAVITT-AETNA DIVERS	35.0	0.27702	0.331	0.68358	0.296	0.25521	0.255	0.28800	0.237814	0.667408		0.83908		0.079286	0.05113424
31	05AD036	DRYWOOD CREEK BELOW SOUTH DRYWOOD CRE	51.1	0.32714	0.364	0.28379	0.192	0.2785	0.264	0.26000	0.070082	0.164173		0.14143		0.147318	0.00551145
32	05AD039	LONESOME LAKE AT WATERTON PARK	3.6	0	0	0	0	0	0	0.00000							
33	05AD903	COTTONWOOD CREEK NEAR TWIN BUTTE	34.8	0.47546	0.461	0.45955	0.231	0.40683	0.326	0.34000	0.269507	0.314869	0.118166	0.407565		0.162342	0.13781705
34	05AD904	GALWEY BROOK NEAR WATERTON PARK	20.5	0.01372	0.078	0.03385	0.084	0.01264	0.046	0.09600	0.017192	0.002011		0.008596		0.044993	
35	05AE023	LEE CREEK NEAR BEAZER	13.1	0.26283	0.317	0.64856	0.283	0.24213	0.244	0.27400	0.869313	0.12896		0.590231	0.13838612	0.26956	9.5487E-05

36	05AE037	LEE CREEK AT BEAZER	29.0	1.6986	0.911	4.1915	0.578	1.56485	0.541	0.67600	0.407392	0.590614		0.719992		0.266407	0.01160807
37	05AE039	TOUGH CREEK NEAR BEAZER	38.8	0.04658	0.153	0.11494	0.129	0.04291	0.093	0.14000	0.704266	0.276309		0.894946	0.0206045	0.078565	0.00401211
38	05AA008	CROWSNEST RIVER AT FRANK	160.3	0.0336	0.131	0.00609	0.025	0	0	0.05900	0.218829	0.0225		0.182012		0.071352	0.04001924
39	05AA009	CROWSNEST RIVER NEAR COLEMAN	102.1	0.04006	0.14	0.00019	0.004	0	0	0.05500	0.20224	0.004013		0.086434		0.060454	0.07174301
40	05AA012	SUMMIT CREEK AT CROWSNEST	12.4	0.08155	0.186	0	0	0	0	0.08100							
	05AA013	MCGILLIVRAY CREEK NEAR COLEMAN	32.4	0.02928	0.121	0.02852	0.059	0	0	0.07600	0.06089	0.003415		0.046533		0.008707	0.01215436
	05AA018	ALLISON CREEK NEAR SENTINEL	47.4	0.03066	0.123	0.02781	0.057	0	0	0.07600	0.050012			0.005001		0.02724	0.01777147
	05AA020	BLAIRMORE CREEK NEAR BLAIRMORE	47.7	0.03262	0.127	0.0269	0.055	0	0	0.07900	0.401053			0.378823		0.000122	0.02210789
41	05AA026	DUTCH CREEK NEAR THE MOUTH	142.4	0.02534	0.105	0.03009	0.07	0	0	0.07300							
42	05AA027	RACEHORSE CREEK NEAR THE MOUTH	217.3	0.02547	0.107	0.03025	0.071	0	0	0.07700							
43	05AA030	GOLD CREEK NEAR FRANK	63.2	0.03831	0.139	0.0303	0.073	0.0013	0.016	0.10600	0.587397			0.449243		0.094298	0.04456756
44	05AD006	CAMERON CREEK AT WATERTON PARK	79.5	0	0	0	0	0	0	0.00000							
45	05BA001	BOW RIVER AT LAKE LOUISE	6.1	0	0	0	0	0	0	0.00000							
46	05BA002	PIPESTONE RIVER NEAR LAKE LOUISE	306.2	0	0	0	0	0	0	0.00000							
47	05BA003	BATH CREEK NEAR LAKE LOUISE	68.9	0	0	0	0	0	0	0.00000							
48	05BA004	LOUISE CREEK NEAR LAKE LOUISE	25.4	0	0	0	0	0	0	0.00000							
49	05BA005	BOW RIVER ABOVE BATH CREEK	67.8	0	0	0	0	0	0	0.00000							
50	05BA006	JOHNSTON CREEK NEAR THE MOUTH	122.8	0	0	0	0	0	0	0.00000							
51	05BA007	BAKER CREEK NEAR THE MOUTH	125.6	0	0	0	0	0	0	0.00000							
52	05BA008	BOW RIVER BELOW HECTOR LAKE	50.6	0	0	0	0	0	0	0.00000							
53	05BA009	BOW GLACIER OUTFLOW	25.8	0	0	0	0	0	0	0.00000							
54	05BA010	BOW RIVER ABOVE HECTOR LAKE	164.1	0	0	0	0	0	0	0.00000							
55	05BA011	BALFOUR CREEK NEAR THE MOUTH	38.6	0	0	0	0	0	0	0.00000							
56	05BB001	BOW RIVER AT BANFF	807.4	0	0	0	0	0	0	0.00000							

57	05BB003	FORTY MILE CREEK NEAR BANFF	136.7	0	0	0	0	0	0	0.00000							
58	05BB004	BREWSTER CREEK NEAR BANFF	110.0	0	0	0	0	0	0	0.00000							
59	05BB005	REDEARTH CREEK NEAR THE MOUTH	150.4	0	0	0	0	0	0	0.00000							
60	05BC001	SPRAY RIVER AT BANFF	230.6	0	0	0	0	0	0	0.00000	0.000684			0.000342		0.000342	
61	05BC002	SPRAY RIVER NEAR SPRAY LAKES	361.6	0	0	0	0	0	0	0.00000							
62	05BC006	SPRAY RESERVOIR AT THREE SISTERS DAM	117.7	0	0	0	0	0	0	0.00000	0.001707			0.000854		0.000854	
63	05BC008	GOAT CREEK AT BANFF PARK BOUNDARY	39.5	0	0	0	0	0	0	0.00000	0.012016			0.006008		0.006008	
64	05BD002	CASCADE RIVER NEAR BANFF	16.8	0	0	0	0	0	0	0.00000							
65	05BD003	LAKE MINNEWANKA NEAR BANFF	191.8	0	0	0	0	0	0	0.00000							
66	05BD005	CASCADE RIVER ABOVE LAKE MINNEWANKA	451.4	0	0	0	0	0	0	0.00000							
67	05BE001	BOW RIVER NEAR MORLEY	207.6	0.19443	0.268	0.44906	0.229	0.07836	0.122	0.21100	0.263216	0.279959	0.169715	0.38166	0.13083745	0.055065	0.14896521
68	05BE003	BOW RIVER NEAR KANANASKIS	322.5	0	0	0	0	0	0	0.00000	0.266484	0.056045		0.143366	0.00916778	0.248851	0.02950255
69	05BE004	BOW RIVER NEAR SEEBE	76.6	0.18121	0.254	0.44396	0.226	0.10282	0.143	0.21200	0.167361	0.352004	0.151719	0.157354	0.19605522	0.238582	0.10142791
70	05BE006	BOW RIVER BELOW GHOST DAM	77.1	0.28668	0.341	0.65721	0.288	0.11083	0.157	0.25200	0.309509	0.160092	0.017195	0.218727		0.259882	0.00818767
71	05BE008	BOW RIVER AT CANMORE	216.4	0	0	0	0	0	0	0.00000	0.109956	0.001341		0.053203		0.068091	0.02655097
72	05BF001	KANANASKIS RIVER NEAR SEEBE	34.2	0.15573	0.241	0.38983	0.218	0.09809	0.14	0.20100							
73	05BF002	KANANASKIS RIVER ABOVE LOWER LAKE	0.2	0.02554	0.109	0.03033	0.074	0	0	0.07000							
74	05BF003	KANANASKIS RIVER ABOVE POCATERRA CREE	2.8	0.02556	0.113	0.03035	0.079	0	0	0.08400							
75	05BF004	POCATERRA CREEK NEAR MOUTH	62.9	0.02555	0.112	0.03034	0.078	0	0	0.08200							
76	05BF008	SMITH-DORRIEN CREEK NEAR MOUTH	100.9	0.00016	0.009	0.00019	0.006	0	0	0.00700							
77	05BF009	LOWER KANANASKIS LAKE	21.3	0.0045	0.052	0.00535	0.023	0	0	0.03500							

78	05BF010	KANANASKIS RIVER AT OUTLET OF LOWER L	28.9	0.02409	0.099	0.0286	0.06	0	0	0.06200							
79	05BF011	BOULTON CREEK NEAR MOUTH	27.4	0.02532	0.104	0.03007	0.068	0	0	0.07100							
80	05BF013	MUD LAKE DIVERSION CANAL	29.0	0	0	0	0	0	0	0.00000							
81	05BF015	MARMOT CREEK NEAR THE MOUTH	2.8	0	0	0	0	0	0	0.00000							
82	05BF016	MARMOT CREEK MAIN STEM NEAR SEEBE	1.1	0	0	0	0	0	0	0.00000							
83	05BF017	MIDDLE FORK CREEK NEAR SEEBE	1.7	0	0	0	0	0	0	0.00000							
84	05BF018	TWIN CREEK NEAR SEEBE	2.5	0	0	0	0	0	0	0.00000							
85	05BF019	CABIN CREEK NEAR SEEBE	2.5	0	0	0	0	0	0	0.00000							
86	05BF020	MIDDLE FORK CREEK IN CIRQUE NEAR SEEB	1.2	0	0	0	0	0	0	0.00000							
87	05BF021	KANANASKIS RIVER IN CANAL BELOW UPPER	147.9	0.02146	0.093	0.02548	0.051	0	0	0.05200							
88	05BF022	KANANASKIS RIVER AT CANYON ABOVE LOWE	5.5	0.02555	0.11	0.03034	0.076	0	0	0.08500							
89	05BF023	KANANASKIS RIVER BELOW RIBBON CREEK	325.0	0.00116	0.025	0.00137	0.014	0	0	0.01500							
90	05BF024	BARRIER LAKE NEAR SEEBE	127.5	0	0	0	0	0	0	0.00000							
91	05BF025	KANANASKIS RIVER BELOW BARRIER DAM	4.4	0	0	0	0	0	0	0.00000							
92	05BG001	GHOST RIVER NEAR COCHRANE	92.0	0.27596	0.33	0.62237	0.274	0.09591	0.137	0.23600				0.008011			
93	05BG002	GHOST RIVER NEAR BLACK ROCK MOUNTAIN	209.4	0	0	0	0	0	0	0.00000							
94	05BG006	WAIPAROUS CREEK NEAR THE MOUTH	103.1	0.07893	0.183	0.15097	0.146	0	0	0.13100							
95	05BG010	GHOST RIVER ABOVE WAIPAROUS CREEK	274.2	0.18618	0.262	0.42503	0.224	0.06993	0.118	0.20600	0.055517	0.178829		0.16383		0.026206	0.0443105
96	05BH013	JUMPINGPOUND CREEK NEAR COX HILL	36.9	0	0	0	0	0	0	0.00000							
97	05BJ009	LITTLE ELBOW RIVER ABOVE NIHAHI CREEK	130.0	0.0004	0.015	0.00047	0.011	0	0	0.01100							
98	05BL021	HIGHWOOD RIVER BELOW PICKLEJAR CREEK	132.2	0.02477	0.101	0.02942	0.063	0	0	0.06300							

99	05BL022	CATARACT CREEK NEAR FORESTRY ROAD	165.2	0.02522	0.102	0.02995	0.066	0	0	0.06800								
100	05CA004	RED DEER RIVER ABOVE PANTHER RIVER	939.9	0	0	0	0	0	0	0.00000								
101	05CA008	RED DEER RIVER AT FORESTRY ROAD	713.1	0.00202	0.031	0.00387	0.02	0	0	0.02200								
102	05DA001	WHITERABBIT CREEK NEAR WILSON'S RANCH	118.9	0	0	0	0	0	0	0.00000								
103	05DA002	SIFFLEUR RIVER NEAR THE MOUTH	514.0	0	0	0	0	0	0	0.00000								
104	05DA003	NORTH SASKATCHEWAN RIVER AT WILSON'S	121.0	0	0	0	0	0	0	0.00000								
105	05DA004	CLINE RIVER NEAR THE MOUTH	819.6	0	0	0	0	0	0	0.00000								
106	05DA005	MISTAYA RIVER NEAR THE MOUTH	67.3	0	0	0	0	0	0	0.00000								
107	05DA006	NORTH SASKATCHEWAN RIVER AT SASKATCHE	1285.8	0	0	0	0	0	0	0.00000								
108	05DA007	MISTAYA RIVER NEAR SASKATCHEWAN CROSS	204.0	0	0	0	0	0	0	0.00000								
109	05DA008	PEYTO CREEK AT PEYTO GLACIER	22.7	0	0	0	0	0	0	0.00000								
110	05DA009	NORTH SASKATCHEWAN RIVER AT WHIRLPOOL	320.1	0	0	0	0	0	0	0.00000								
111	05DA010	SILVERHORN CREEK NEAR THE MOUTH	21.0	0	0	0	0	0	0	0.00000								
112	05DB003	CLEARWATER RIVER ABOVE LIMESTONE CREE	1340.7	0	0	0	0	0	0	0.00000								
113	05DC005	BIGHORN RIVER NEAR THE MOUTH	334.9	0	0	0	0	0	0	0.00000								
114	05DC007	NORTH SASKATCHEWAN RIVER BELOW TERSHI	397.8	0	0	0	0	0	0	0.00000								
115	05DC008	RAM RIVER AT RAM GLACIER	3.7	0	0	0	0	0	0	0.00000								
116	05DD001	SOUTHESK RIVER NEAR FORESTRY FORD	432.5	0	0	0	0	0	0	0.00000								
117	05DD002	BLACKSTONE RIVER NEAR GRASS MOUNTAIN	779.4	0	0	0	0	0	0	0.00000								

118	05DD007	BRAZEAU RIVER BELOW CARDINAL RIVER	1665.9	0.00069	0.022	0.00145	0.015	0.00039	0.006	0.02100								
119	05DD008	CARDINAL RIVER NEAR THE MOUTH	492.8	0	0	0	0	0	0	0.00000								
120	07AA001	MIETTE RIVER NEAR JASPER	650.6	0	0	0	0	0	0	0.00000								
121	07AA002	ATHABASCA RIVER NEAR JASPER	2603.7	0	0	0	0	0	0	0.00000								
122	07AA003	ROCKY RIVER AT HAWES	727.1	0	0	0	0	0	0	0.00000								
123	07AA004	MALIGNE RIVER NEAR JASPER	901.8	0	0	0	0	0	0	0.00000								
124	07AA006	ROCKY RIVER AT ROCKY RAPIDS	407.1	0	0	0	0	0	0	0.00000								
125	07AA007	SUNWAPTA RIVER AT ATHABASCA GLACIER	29.3	0	0	0	0	0	0	0.00000								
126	07AA008	FIDDLE RIVER AT HIGHWAY NO. 16	38.6	0.00001	0	0.00002	0.001	0	0	0.00000								
127	07AA009	WHIRLPOOL RIVER NEAR THE MOUTH	595.1	0	0	0	0	0	0	0.00000								
128	07AA010	FIDDLE RIVER ABOVE MORRIS CREEK	201.5	0	0	0	0	0	0	0.00000								
129	07AB001	SNAKE INDIAN RIVER NEAR BEDSON	6.9	0	0	0	0	0	0	0.00000								
130	07AB002	SNAKE INDIAN RIVER NEAR THE MOUTH	1591.4	0	0	0	0	0	0	0.00000								
131	07AC001	WILDHAY RIVER NEAR HINTON	959.2	0	0	0	0	0	0	0.00000								
132	07AC003	EAST CABIN CREEK NEAR MUSKEG	12.1	0	0	0	0	0	0	0.00000								
133	07AC004	HENDRICKSON CREEK NEAR THE MOUTH	24.5	0	0	0	0	0	0	0.00000								
134	07AC005	VOGEL CREEK NEAR THE MOUTH	11.4	0	0	0	0	0	0	0.00000								
135	07AC008	LITTLE BERLAND RIVER AT HIGHWAY NO. 40	93.0	0	0	0	0	0	0	0.00000								
136	07AD001	ATHABASCA RIVER AT ENTRANCE	1780.4	0.00252	0.034	0.00746	0.028	0	0	0.02700								
137	07AF003	WAMPUS CREEK NEAR HINTON	25.9	0	0	0	0	0	0	0.00000								
138	07AF004	DEERLICK CREEK NEAR HINTON	13.9	0	0	0	0	0	0	0.00000								
139	07AF005	EUNICE CREEK NEAR HINTON	16.4	0	0	0	0	0	0	0.00000								
140	07AF006	CABIN CREEK NEAR THE MOUTH	5.0	0	0	0	0	0	0	0.00000								

141	07AF007	GREGG RIVER BELOW CABIN CREEK	15.3	0	0	0	0	0	0	0.00000							
142	07AF013	MCLEOD RIVER NEAR CADOMIN	214.0	0	0	0	0	0	0	0.00000							
143	07AF906	GREGG RIVER NEAR HINTON	363.3	0	0	0	0	0	0	0.00000							
144	07AF910	WHITEHORSE CREEK NEAR CADOMIN	116.2	0	0	0	0	0	0	0.00000							
145	07GA001	SMOKY RIVER ABOVE HELLS CREEK	3849.9	0	0	0	0	0	0	0.00000							
146	07GA002	MUSKEG RIVER NEAR GRANDE CACHE	702.8	0	0	0	0	0	0	0.00000							
147	07GB002	KAKWA RIVER NEAR GRANDE PRAIRIE	3306.1	0	0	0	0	0	0	0.00000							

Ecoregion: Boreal Transition, Peace Lowland																		
												Runoff Potential						
				Agricultural Indicators						Agriculture Intensity	Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05EC002		311.9	0.79063	0.646	8.67789	0.738	3.62581	0.697	0.70100	0.834893	0.000172	0.161645	0.452051	0.20541518	0.01248	0.326764555
2	05EC003	REDWATER RIVER NEAR REDWATER	1020.7	0.83761	0.665	9.40167	0.755	4.17903	0.742	0.74600	0.621194	0.109861	0.177132	0.396117	0.14807931	0.121605	0.328009299
3	05EC004	NAMEPI CREEK NEAR THE MOUTH	715.9	0.76743	0.627	9.6771	0.763	4.53189	0.772	0.74500	0.847121	0.013987	0.133835	0.747639	0.0034795	0.009928	0.230617899
4	05EC006	WHITE EARTH CREEK NEAR SMOKY LAKE	1009.6	0.27376	0.328	2.31595	0.465	1.00875	0.463	0.40400	0.326755	0.454479	0.157664	0.420883	0.2282976	0.079598	0.266170322
5	05ED001	STONY CREEK NEAR SADDLE LAKE	539.6	0.7466	0.611	3.13867	0.519	1.49917	0.536	0.54700	0.500382	0.372582	0.097716	0.385096	0.46058478	0.017664	0.129257312
6	05ED002	ATIMOSWE CREEK NEAR ELK POINT	361.8	0.92276	0.693	7.31351	0.704	2.51468	0.632	0.67200	0.54544	0.210978	0.158897	0.577084	0.22206222	0.102495	0.094067914
7	05ED003	MOOSEHILLS CREEK NEAR ELK POINT	37.0	0.34845	0.379	2.02234	0.444	0.35534	0.295	0.36500	0.190167	0.709839	0.095351	0.639439	0.06238326	0.07642	0.217114955
8	05EF003	NORTH SASKATCHEWAN RIVER AT LEA PARK	8588.4	0.73059	0.592	8.40622	0.728	4.24352	0.754	0.69300	0.395247	0.380336	0.114158	0.300807	0.3709245	0.197964	0.12339393
9	06AA001	BEAVER RIVER NEAR GOODRIDGE	1870.3	0.59894	0.532	2.40823	0.476	0.77065	0.408	0.46800	0.472745	0.157408	0.257341	0.696153	0.04727343	0.053038	0.151429644
10	06AA002	AMISK RIVER AT HIGHWAY NO. 36	2494.9	0.26628	0.322	0.65124	0.285	0.23386	0.235	0.26700	0.23946	0.491472	0.187102	0.676018	0.05223077	0.029186	0.238717919
11	06AA901	COLUMBINE CREEK NEAR GLENDON	241.1	1.54772	0.881	12.41088	0.866	3.75223	0.709	0.84500	0.318521	0.012264	0.643365	0.578314	0.27395104	0.02914	0.1126711
12	06AC006	MOOSELAKE RIVER NEAR FRANCHERE	1017.7	0.71539	0.584	4.25228	0.588	1.48933	0.53	0.55800	0.446704	0.204968	0.217635	0.731968	0.06536247	0.060142	0.113206611
13	06AC009	MANATOKAN CREEK NEAR IRON RIVER	441.7	0.23723	0.292	0.62226	0.272	0.2532	0.254	0.25800	0.43415	0.143125	0.123971	0.459619	0.07328454	0.062143	0.154643357
14	06AD006	BEAVER RIVER AT COLD LAKE RESERVE	1664.8	0.57349	0.518	2.17519	0.459	0.93446	0.454	0.47000	0.498661	0.176397	0.280813	0.683553	0.06459221	0.091522	0.169678832
15	06AD013	REITA CREEK NEAR OUTLET OF ANGLING LAKE	161.9	0.22582	0.285	0.48438	0.236	0.3007	0.274	0.25300	0.306834	0.447598	0.177011	0.859538	0.04558221	0.012264	0.077544806
16	07BC006	DAPP CREEK AT HIGHWAY NO. 44	562.9	0.64036	0.549	5.69249	0.652	2.37397	0.625	0.60300	0.41218	0.094292	0.473557	0.469872	0.08209094	0.009889	0.430766075
17	07BE004	STONY CREEK NEAR TAWATINAW	128.1	0.50544	0.475	3.8027	0.556	1.61496	0.553	0.51500	0.599828	0.094765	0.302338	0.582044	0.02606392	0.03497	0.34611447
18	07CA***		712.3	0.63037	0.543	4.54295	0.607	1.84886	0.575	0.56300	0.698567	0.102021	0.138329	0.504066	0.07055061	0.131353	0.279859445

19	07CA001	FLAT CREEK NEAR DONATVILLE	11.3	0.47092	0.454	9.87344	0.77	4.15551	0.739	0.64700	0.581374		0.414943	0.500144		0.023092	0.47308078
20	07CA003	FLAT CREEK NEAR BOYLE	183.4	0.5093	0.478	1.55436	0.405	0.40833	0.327	0.39000	0.445132	0.291076	0.260463	0.577603	0.01740514	0.015467	0.380035052
21	07CA005	PINE CREEK NEAR GRASSLAND	312.6	0.56919	0.515	6.16241	0.671	2.30815	0.622	0.59500	0.575383	0.00289	0.386038	0.544606	0.00501222	0.007406	0.439597347
22	07CA007	LA BICHE RIVER NEAR PLAMONDON	465.1	0.06565	0.175	0.3325	0.194	0.13107	0.167	0.18600	0.130555		0.349614	0.120091		0.035085	0.320129281
23	07CA008	BABETTE CREEK NEAR COLINTON	219.1	0.44841	0.442	2.33473	0.467	0.77647	0.411	0.43400	0.250989		0.71768	0.327266			0.665347095
24	07CA009	OWL RIVER NEAR THE MOUTH	281.4	0.03543	0.135	0.04822	0.094	0.0346	0.08	0.12300	0.080623	0.048206	0.038195	0.116905		0.005623	0.077725705
25	07CA011	LA BICHE RIVER AT HIGHWAY NO. 63	68.2	0.30825	0.353	2.07043	0.451	0.7599	0.404	0.38400	0.472289		0.421409	0.518934			0.477494985
26	07CA901	PINE CREEK NEAR COLINTON	251.1	0.5273	0.488	3.90038	0.567	1.38865	0.516	0.50900	0.466285	0.202485	0.324047	0.615782	0.01333252	0.020915	0.343674364
27	FLATLAK	FLAT LAKE NEAR STOCKS	471.8	0.45872	0.445	3.33045	0.531	1.10365	0.471	0.47500	0.452665	0.192742	0.264708	0.619717	0.00140017	0.002715	0.367201409
28	LACLABI	LAC LA BICHE AT LAC LA BICHE	961.2	0.27982	0.334	1.28414	0.377	0.46394	0.359	0.35400	0.379739	0.162965	0.082203	0.736401		0.014538	0.143288538
29	MOORELA	MOORE LAKE NEAR COLD LAKE	42.0	0.10503	0.208	0.16762	0.151	0.12298	0.162	0.17800	0.189245	0.398629	0.159598	0.759282	0.01165747	0.001861	0.222303792
30	MURIELL	MURIEL LAKE AT GURNEYVILLE	453.3	0.26174	0.315	1.05659	0.355	0.37985	0.317	0.32400	0.272755	0.450567	0.072505	0.848784	0.011699	0.030777	0.103937229
31	SMOKYLK	SMOKY LAKE NEAR WARSPITE	231.1	0.74588	0.609	13.17647	0.881	6.11348	0.846	0.82000	0.684127	0.117784	0.104353	0.245504	0.59958474	4.62E-05	0.151521218
32	05CB003	RED DEER RIVER AT GARRINGTON BRIDGE	244.6	0.85294	0.671	2.64021	0.496	0.6725	0.389	0.51200	0.452539	0.292807	0.139405	0.508786	0.13216944	0.070232	0.249031843
33	05CB004	RAVEN RIVER NEAR RAVEN	643.4	1.36541	0.838	3.51333	0.542	0.87586	0.434	0.60200	0.332691	0.21369	0.113343	0.335322	0.10323974	0.027492	0.243618474
34	05CB006	GLENIFFER RESERVOIR NEAR DICKSON	429.1	1.7224	0.919	6.35237	0.677	1.63177	0.556	0.74000	0.466263	0.231147	0.135788	0.497731	0.20646029	0.053508	0.217016306
35	05CC001	BLINDMAN RIVER NEAR BLACKFALDS	899.7	2.13464	0.963	12.23656	0.858	4.12895	0.735	0.89800	0.670897	0.268572	0.054491	0.317273	0.41830928	0.167656	0.092330443
36	05CC004	SYLVAN CREEK NEAR SYLVAN LAKE	152.7	1.19715	0.802	7.8861	0.719	3.07761	0.662	0.75100	0.635228	0.058794		0.311165	0.64844217	0.029117	0.008823273
37	05CC007	MEDICINE RIVER NEAR ECKVILLE	1856.3	1.44474	0.859	4.35373	0.598	1.1447	0.479	0.63800	0.444638	0.24557	0.167055	0.417897	0.18671131	0.035029	0.242682806
38	05CC008	BLINDMAN RIVER NEAR BLUFFTON	351.4	1.68224	0.901	3.65679	0.54	0.89732	0.435	0.62200	0.423222	0.44031	0.131576	0.374492	0.34385818	0.015017	0.254667878
39	05CC009	LLOYD CREEK NEAR BLUFFTON	238.0	1.9662	0.955	4.57469	0.612	1.12476	0.474	0.68200	0.458372	0.399512	0.074813	0.474923	0.25606795	0.035278	0.231030298
40	05CC010	BLOCK CREEK NEAR LEEDALE	56.7	1.04355	0.734	1.72981	0.424	0.42893	0.342	0.49300	0.185052	0.718079	0.094419	0.534221	0.32668264		0.135324588

41	05DB001	CLEARWATER RIVER NEAR ROCKY MOUNTAIN	130.4	1.91383	0.951	4.25106	0.586	0.64842	0.384	0.63500	0.617635	0.052709	0.306087	0.554323	0.00256251	0.080896	0.35979896
42	05DE001	NORTH SASKATCHEWAN RIVER AT ROCKY RAP	99.6	0.7404	0.601	1.51512	0.398	0.37198	0.312	0.43500	0.653327		0.264541	0.618361	0.0960346	0.175923	0.107027263
43	05DE002	WABAMUN LAKE AT WABAMUN	355.0	0.95059	0.703	1.75486	0.427	0.4538	0.354	0.48900	0.148675	0.3971	0.041346	0.687084	0.03592666	0.214268	0.060064563
44	05DE003	WABAMUN CREEK NEAR DUFFIELD	156.0	1.05612	0.742	3.33717	0.532	1.15993	0.489	0.58900	0.114901	0.723188	0.069797	0.38635	0.34311671	0.014583	0.253292342
45	05DE009	TOMAHAWK CREEK NEAR TOMAHAWK	105.3	1.2176	0.806	3.02125	0.507	0.74764	0.398	0.57000	0.171275	0.465757	0.310287	0.587474	0.00026258	0.018523	0.391072772
46	05DF002	CONJURING CREEK NEAR WIZARD LAKE	32.2	1.57627	0.886	5.64656	0.649	1.82159	0.573	0.71600	0.582926	0.134023	0.178768	0.48377	0.43523156	0.004392	0.058793846
47	05DF004	STRAWBERRY CREEK NEAR THE MOUTH	581.9	1.23475	0.816	7.87255	0.711	3.06112	0.652	0.76000	0.820314	0.107495	0.068169	0.669793	0.13251946	0.054719	0.140341054
48	05DF005	NORTH SASKATCHEWAN RIVER AT EDMONTON	3588.5	1.08504	0.753	6.50014	0.684	2.8297	0.645	0.70200	0.505039	0.253215	0.144198	0.529869	0.18674288	0.152688	0.123608065
49	05EA003	STURGEON RIVER NEAR DARWELL	44.5	0.90429	0.688	1.60329	0.408	0.39892	0.319	0.47300	0.002175	0.867792	0.127044	0.658946	0.02865664	0.082536	0.22713584
50	05EA004	STURGEON RIVER NEAR ONOWAY	35.8	1.05302	0.74	3.79934	0.555	0.91617	0.446	0.57800	0.069115	0.887908		0.366939	0.19759757	0.079362	0.353064343
51	05EA005	STURGEON RIVER NEAR VILLENEUVE	1168.6	1.19035	0.799	9.44139	0.757	3.49812	0.69	0.77600	0.436044	0.364679	0.14	0.604477	0.20694323	0.039179	0.144034216
52	05EA009	ATIM CREEK NEAR SPRUCE GROVE	291.5	1.09351	0.758	11.96343	0.851	6.45341	0.866	0.85300	0.244006	0.627251	0.096649	0.518831	0.28240071	0.078537	0.098523811
53	05EA010	STURGEON RIVER NEAR MAGNOLIA BRIDGE	121.1	1.06325	0.747	1.53384	0.403	0.44879	0.346	0.49500	0.092694	0.790062	0.078721	0.765027	0.03611138	0.028355	0.167818037
54	05FA002	PIGEON LAKE CREEK NEAR WESTEROSE	283.0	0.74457	0.606	1.37342	0.382	0.31523	0.279	0.41700	0.437893	0.211436	0.005053	0.628491	0.31962599	0.009353	0.039897606
55	05FA019	PIGEON LAKE CREEK NEAR USONA	93.9	1.70177	0.913	4.23658	0.583	1.34503	0.51	0.66500	0.825804	0.116081	0.055466	0.079984	0.78032808	0.063469	0.063264006
56	05FA912	MUSKEG CREEK NEAR WESTEROSE	97.6	1.01741	0.721	1.66077	0.419	0.40646	0.324	0.47900	0.265691	0.67009	0.061665	0.456629	0.45262331	0.009809	0.076850715
57	07BB001	LOBSTICK RIVER NEAR ENTWISTLE	77.4	0.87832	0.679	2.85576	0.505	0.8073	0.416	0.53300	0.2648	0.058116	0.645112	0.584816	0.06999868	0.079239	0.263275936
58	07BB003	LOBSTICK RIVER NEAR STYAL	362.5	0.48636	0.47	0.8873	0.328	0.15842	0.187	0.32700	0.358032	0.076695	0.549288	0.543241	0.04900548	0.02333	0.381739979
59	07BB004	PADDLE RIVER NEAR ROCHFORT BRIDGE	362.5	1.04068	0.731	3.74903	0.553	1.1478	0.481	0.58900	0.700941	0.187627	0.101454	0.733163	0.0821782	0.034817	0.146234013
60	07BB006	PADDLE RIVER AT BARRHEAD	606.9	1.73127	0.922	6.00406	0.668	2.21392	0.603	0.75900	0.483575	0.354995	0.104236	0.597755	0.15625247	0.008088	0.234645033

61	07BB009	CONNOR CREEK NEAR SANGUDO	99.4	1.1009	0.759	4.09351	0.577	1.28169	0.505	0.60800	0.177109	0.820097		0.84334	0.00878007		0.140898549
62	07BB010	CONNOR CREEK NEAR ROCHFORT BRIDGE	65.0	1.04256	0.733	3.8508	0.562	1.20569	0.493	0.59400	0.374714	0.568895	0.053676	0.730477	0.06982495		0.187092944
63	07BB012	PADDLE RIVER NEAR SANGUDO	215.4	1.47656	0.87	5.64376	0.645	1.76539	0.568	0.70100	0.331155	0.63044	0.031465	0.840938	0.01104715	0.053536	0.223654098
64	07BB013	PADDLE RIVER AT HIGHWAY NO. 764	288.9	1.46741	0.867	4.6613	0.615	1.4935	0.531	0.66600	0.068969	0.718604	0.038716	0.623992	0.04052601	0.016222	0.315398829
65	07BB014	COYOTE CREEK NEAR CHERHILL	57.8	1.21998	0.808	3.38123	0.537	0.85668	0.429	0.59200	0.653372	0.288605	0.055138	0.589305	0.28634231	0.020204	0.101264472
66	07BB903	ROMEO CREEK ABOVE ROMEO LAKE	113.6	0.66862	0.557	1.9914	0.443	0.62533	0.381	0.45700	0.039995	0.942637		0.889452			0.107766244
67	07BB908	07BB908	1.1	1.51388	0.878	8.5955	0.736	3.44765	0.685	0.80300				0.893948			0.099327591
68	07BC001	PEMBINA RIVER NEAR DAPP	2350.1	1.3842	0.843	8.41896	0.73	3.3785	0.68	0.77900	0.404217	0.299144	0.215028	0.55908	0.22396971	0.044032	0.164201944
69	ISLELAK	ISLE LAKE AT EUREKA BEACH	154.0	0.76397	0.617	1.18408	0.366	0.30506	0.275	0.41500	0.084072	0.625453	0.130225	0.746263	0.03504575	0.077405	0.138599786
70	LACLANO	LAC LA NONNE AT LAC LA NONNE	259.6	1.12396	0.775	1.49355	0.393	0.47822	0.362	0.50600	0.436042	0.402342	0.051732	0.820926	0.07136783	0.005239	0.095213472
71	NAKAMUN	NAKAMUN	53.8	1.28108	0.823	5.31763	0.636	2.01217	0.586	0.67900	0.634107	0.284418		0.710553	0.2095933	0.000647	0.075707949
72	STEANNE	LAC STE. ANNE AT ALBERTA BEACH	383.5	1.00194	0.717	2.84364	0.503	0.7065	0.396	0.54100	0.137667	0.551018	0.112588	0.514984	0.18781243	0.06108	0.233428689
73	THUNDER	THUNDER	35.8	1.60309	0.892	4.4568	0.604	1.42294	0.518	0.66800				0.744246	0.04486276		0.195876357
74	07BC002	PEMBINA RIVER AT JARVIE	585.0	0.92881	0.695	11.72777	0.845	4.9685	0.799	0.82200	0.194694	0.090981	0.610069	0.478412	0.11062247	0.005763	0.350018095
75	07BC003	WABASH CREEK NEAR WESTLOCK	321.8	1.67714	0.903	10.33487	0.781	4.75393	0.784	0.85100	0.681207	0.051992	0.249694	0.414148	0.48606953	0.01421	0.069031325
76	07BC004	SHOAL CREEK NEAR LINARIA	231.0	1.75931	0.933	20.3795	0.982	8.35169	0.951	0.98500	0.444179		0.547019	0.428564	0.32791662		0.240642286
77	07BC007	WABASH CREEK NEAR PIBROCH	18.2	1.70331	0.912	15.05831	0.914	7.75537	0.931	0.96400	0.015495		0.981402	0.865605	0.12165929		0.009632606
78	SHOALLA	SHOAL LAKE	210.7	1.64271	0.898	12.6023	0.869	4.62277	0.777	0.89200	0.671293	0.074169	0.211141	0.437492	0.23776069		0.321923795
79	WABASH	WABASH CREEK (AESA)	340.0		0.89800		0.78100		0.78500	0.85700							
80	07FD003	PEACE RIVER AT DUNVEGAN BRIDGE	6374.5	0.23387	0.289	5.65256	0.65	2.64219	0.64	0.51100	0.370506	0.045411	0.303079	0.583111	0.00152216	0.111891	0.026538519
81	07FD008	HINES CREEK NEAR FAIRVIEW	878.5	0.23428	0.29	6.69828	0.688	3.25327	0.673	0.54200	0.402493	0.141513	0.29903	0.696317	0.00909527	0.035839	0.135007498
82	07FD009	CLEAR RIVER NEAR BEAR CANYON	2124.1	0.09885	0.203	1.92647	0.44	0.72293	0.397	0.34100	0.128038	0.005525	0.185486	0.269618		0.025284	0.024610229
83	07FD013	EUREKA RIVER NEAR WORSLEY	755.0	0.26619	0.32	4.74174	0.617	1.95271	0.578	0.49000	0.442318	0.005764	0.277141	0.690235		0.016751	0.018237496
84	07FD014	WAINSCOTT COULEE NEAR BROWNVALE	149.4	0.46793	0.45	12.04996	0.853	6.51698	0.874	0.74900	0.200093		0.791038	0.914836	0.00665838	0.012291	0.060749199
85	07FD913	YOUNG DRAINAGE PROJECT NEAR SPIRIT RIVER	31.7	0.13278	0.232	20.45656	0.984	15.5582	0.996	0.76500	0.512284	0.041117	0.441882	0.967639			0.027643594

86	07FD921	VIXEN CREEK NEAR BELLOY	126.2	0.22149	0.281	10.42748	0.786	6.24763	0.851	0.62400	0.505606	0.168469	0.321796	0.949487	0.02743387		0.01895073
87	07GD001	BEAVERLODGE RIVER NEAR BEAVERLODGE	944.4	0.38185	0.402	7.05588	0.7	3.06935	0.66	0.58300	0.550175	0.021833	0.16798	0.655525	0.00171902	0.01715	0.101290635
88	07GD003	REDWILLOW RIVER NEAR BEAVERLODGE	359.5	0.43734	0.436	8.27849	0.727	3.71695	0.707	0.61400	0.655082	0.002531	0.155467	0.712871		0.043625	0.082214159
89	07GE005	BEAR RIVER NEAR GRANDE PRAIRIE	176.6	0.51319	0.48	16.48097	0.95	7.58454	0.931	0.82900	0.596733	0.07315	0.284051	0.912172			0.083303529
90	07GE006	COLQUHOUN CREEK NEAR GRANDE PRAIRIE	131.5	0.52785	0.489	10.81343	0.802	4.72838	0.782	0.69000	0.782217	0.078844	0.123646	0.925425	0.01207961		0.057671598
91	07GE007	BEAR RIVER NEAR VALHALLA CENTRE	183.0	0.24767	0.304	7.63521	0.714	3.1839	0.668	0.55000	0.678301	0.028147	0.051268	0.698359			0.05935688
92	07GJ001	SMOKY RIVER AT WATINO	4684.3	0.28581	0.339	6.41633	0.681	3.45314	0.687	0.55500	0.457502	0.090315	0.16627	0.58979	0.01590057	0.073959	0.046070463
93	07GJ005	LALBY CREEK NEAR GIROUXVILLE	159.5	0.05856	0.162	16.19197	0.945	8.49865	0.959	0.68500	0.536023		0.430811	0.896069			0.100281039
94	07HA001	PEACE RIVER AT PEACE RIVER	5429.5	0.24033	0.298	11.15287	0.814	6.37926	0.864	0.64900	0.496118	0.091867	0.352767	0.759717	0.00497519	0.136094	0.06506266
95	07HA002	HEART RIVER AT PEACE RIVER	288.5	0.08956	0.197	10.19628	0.778	5.23099	0.807	0.58900	0.412336		0.58399	0.796399		0.156879	0.043046807
96	07HA004	WHITEMUD RIVER AT HIGHWAY NO. 35	2.3	0.31757	0.36	3.9926	0.569	1.67325	0.561	0.47900	0.511033			0.621884			0.374915204
97	07HC002	BUCHANAN CREEK NEAR MANNING	232.0	0.06346	0.172	4.22696	0.582	1.97517	0.583	0.43200	0.348321		0.381714	0.597926		0.074459	0.057649167
98	07HD001	PEACE RIVER NEAR CARCAJOU	14564.8	0.04655	0.151	1.87852	0.437	0.90296	0.444	0.33600	0.145462	0.006731	0.170059	0.254523	0.0009445	0.04019	0.04143933
99	BEARLAK	BEAR LAKE NEAR CLAIRMONT	890.5	0.33893	0.369	9.81541	0.768	4.43296	0.767	0.62100	0.572615	0.086662	0.103881	0.774845	0.00613017		0.066104561
100	KLESKUN	KLESKUN DRAIN	32.3	0.68426	0.568	12.97403	0.871	6.47626	0.862	0.80400							
101	07BF003	IROQUOIS CREEK NEAR AGGIE	243.8	0.29676	0.349	2.15299	0.457	1.003	0.461	0.41300	0.489509	0.023787	0.483378	0.943548			0.053125686
102	07BF004	SOUTH HEART RIVER NEAR HIGH PRAIRIE	471.4	0.24352	0.301	4.01964	0.572	2.29504	0.617	0.47600	0.357603	0.091352	0.374989	0.602564		0.000733	0.357942787
103	07BF005	WINAGAMI LAKE SPILLWAY TO HEART RIVER	1.4	0.07951	0.184	0.99443	0.349	0.8928	0.439	0.31400	0.205225	0.788498		0.898525			0.09519878
104	07BF006	WINAGAMI LAKE AT PROVINCIAL PARK	265.6	0.08266	0.191	1.70446	0.422	1.22262	0.496	0.35800	0.145223	0.069883	0.183327	0.485955			0.086768957
105	07BF007	BRIDGE CREEK NEAR ENILDA	5.2	1.32056	0.83	14.39876	0.901	6.6908	0.882	0.91700				0.935397			0.062253477
106	07BH001	ARCADIA CREEK NEAR ARCADIA	177.9	0.11004	0.219	0.60803	0.269	0.26223	0.259	0.23800	0.07661	0.028814	0.1151	0.127032			0.093492847

107	07BK001	LESSER SLAVE RIVER AT SLAVE LAKE	4503.1	0.1056	0.211	0.83164	0.318	0.45298	0.351	0.28600	0.080995	0.019364	0.20134	0.248634		0.001911	0.071200971
108	07GH002	LITTLE SMOKY RIVER NEAR GUY	513.0	0.19644	0.27	9.1616	0.751	4.95584	0.795	0.59700	0.462402	0.121822	0.405654	0.847645		0.101316	0.047606436
109	07GH004	PEAVINE CREEK NEAR FALHER	537.5	0.11415	0.222	12.40885	0.864	6.86308	0.901	0.65400	0.255366	0.027945	0.498877	0.80383		0.002857	0.054875642
110	07HA003	HEART RIVER NEAR NAMPA	1949.4	0.04605	0.15	3.02188	0.511	1.56844	0.543	0.37600	0.160436	0.027634	0.195673	0.321803		0.004504	0.05743569
111	07HA902	KRAWCHUK DRAINAGE NEAR MCLENNAN	13.0	0.06048	0.165	10.53609	0.791	5.2873	0.809	0.58000	0.712		0.284511	0.7184			0.278111055
112	07HB002	ELDER CREEK AT HIGHWAY NO. 686	64.0	0.01096	0.072	0.17199	0.156	0.16581	0.197	0.14800				0.07023			0.047214648
113	07HF001	PEACE RIVER AT FORT VERMILION	9671.4	0.0149	0.082	0.48188	0.234	0.30985	0.277	0.19700	0.066062	0.024458	0.084634	0.148047	0.00155403	0.013064	0.031687903
114	07JD004	TEEPEE CREEK NEAR LA CRETE	134.8	0.05891	0.164	2.40081	0.475	1.49747	0.535	0.37100	0.041256		0.769027	0.668432		0.021941	0.122174775
115	07JF002	BOYER RIVER NEAR FORT VERMILION	6553.8	0.02225	0.096	0.60662	0.267	0.32043	0.28	0.21400	0.025313	0.004485	0.310308	0.291506	0.00182301	0.008105	0.047530908
116	07JF004	BOYER RIVER NEAR PADDLE PRAIRIE	93.7	0	0	0	0	0	0	0.00000	0.245655		0.750084	0.871131		0.049883	0.074725846

Ecoregion: Mixed Boreal Uplands, Slave River Lowland, Wabasca Lowland

				Agricultural Indicators						Agriculture Intensity	Runoff Potential: Landform Characteristics			Runoff Potential: Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	06AB001	SAND RIVER NEAR THE MOUTH	3794.3	0.01366	0.077	0.03786	0.086	0.00983	0.041	0.09500	0.009289	0.006042	0.005731	0.008854	0.000413308	0.005903	0.005892197
2	06AB002	WOLF RIVER AT OUTLET OF WOLF LAKE	725.9	0.00756	0.064	0	0	0.00093	0.011	0.03500							
3	06AB003	PUNK CREEK NEAR THE MOUTH	394.5	0.04158	0.145	0.0627	0.103	0.04079	0.088	0.13600	0.016635	0.034714	0.01183	0.043735		0.002674	0.016769313
4	06AC001	JACKFISH CREEK NEAR LA COREY	489.5	0.13383	0.233	0.27263	0.191	0.13116	0.168	0.20000	0.221584	0.164152	0.068128	0.359102	0.015987199	0.031953	0.089424629
5	06AF001	COLD RIVER AT OUTLET OF COLD LAKE	1145.5	0.03377	0.132	0.07462	0.11	0.03386	0.076	0.12800	0.049619	0.109042	0.015804	0.346572		0.015563	0.033903755
6	07CA006	WANDERING RIVER NEAR WANDERING RIVER	1119.2	0.03408	0.134	0.19234	0.167	0.08132	0.123	0.15100	0.034969		0.132584	0.061891		0.004795	0.109685281
7	07CA010	PICHE RIVER NEAR IMPERIAL MILLS	1031.0	0.01969	0.091	0.02429	0.049	0.0201	0.063	0.09200							
8	07CA013	OWL RIVER BELOW PICHE RIVER	1617.7	0.00398	0.045	0.00031	0.007	0.00026	0.003	0.02600							
9	07CC002	ATHABASCA RIVER AT MCMURRAY	13382.1	0.0492	0.156	0.53079	0.248	0.19725	0.215	0.20800	0.054836	0.0009	0.074023	0.056692	0.000626288	0.008799	0.068964849
10	BEAVERL	BEAVER LAKE AT RANGER STATION	331.8	0.18144	0.255	0.38331	0.212	0.16973	0.2	0.21700	0.105211	0.402465	0.104089	0.672543	0.000128685	0.002303	0.084167282
11	ETHELLK	ETHEL LAKE NEAR COLD LAKE	38.8	0.09219	0.202	0.48904	0.239	0.33241	0.287	0.23100	0.19781	0.544032	0.127735	0.685829	0.014453956	0.120737	0.175166344
12	HILDALK	HILDA LAKE NEAR COLD LAKE	38.7	0.1065	0.214	0.11683	0.13	0.08982	0.13	0.17000	0.133771	0.707865	0.061659	0.808774	0.014094933	0.014579	0.157440558
13	MARIELK	MARIE LAKE NEAR COLD LAKE	469.6	0.005	0.056	0	0	0.00062	0.01	0.03000	0.000228	0.014428		0.012344		0.000228	0.002083862
14	07BC005	STEELE LAKE NEAR JARVIE	254.5	0.24546	0.303	0.9809	0.344	0.32436	0.282	0.30000	0.098647	0.127728	0.114707	0.198265			0.150113907
15	07BE001	ATHABASCA RIVER AT ATHABASCA	8223.6	0.27924	0.333	1.37401	0.384	0.44327	0.344	0.35200	0.188239	0.114785	0.10069	0.231015	0.00750038	0.026525	0.149665814
16	07BE003	PORTER CREEK ABOVE BAPTISTE LAKE	57.1	0.38801	0.409	1.62414	0.411	0.53149	0.369	0.37700	0.056802	0.191294	0.152966	0.23959			0.161471462
17	07BK002	LESSER SLAVE RIVER ABOVE OTAUWAU RIVER	111.0	0	0	0	0	0	0	0.00000							
18	07BK003	LESSER SLAVE RIVER AT SAULTEAUX LANDING	93.4	0	0	0	0	0	0	0.00000							

19	07BK006	LESSER SLAVE RIVER AT HIGHWAY NO. 2A	588.3	0.00063	0.018	0.00421	0.022	0.00119	0.015	0.02400	0.012872	0.001059	0.010224	0.020166			0.003989536
20	07BK007	DRIFTWOOD RIVER NEAR THE MOUTH	855.0	0	0	0	0	0	0	0.00000							
21	BAPTIST	BAPTISTE LAKE NEAR ATHABASCA	248.5	0.25445	0.308	0.60863	0.271	0.23216	0.234	0.25600	0.115116	0.339059	0.036134	0.432266	0.002628809		0.098082521
22	CALLING	CALLING LAKE AT RANGER STATION	1223.6	0.00073	0.023	0.01033	0.038	0.00415	0.025	0.04000							
23	FAWCETT	FAWCETT LAKE NEAR SMITH	1242.2	0	0	0	0	0	0	0.00000				0.001527			0.001539414
24	07BF008	SOUTH HEART RESERVOIR NEAR MCLENNAN	2070.1	0.04383	0.146	0.36816	0.207	0.23471	0.237	0.19500	0.127517	0.106061	0.032179	0.227631			0.052509679
25	07BF009	SALT CREEK NEAR GROUARD	426.3	0.02746	0.118	0.19756	0.169	0.09971	0.142	0.15400	0.096194	0.170002	0.060535	0.266451		0.007247	0.053076233
26	07BG004	LILY CREEK NEAR SLAVE LAKE	23.7	0	0	0	0	0	0	0.00000							
27	07GD002	BEAVERTAIL CREEK NEAR HYTHE	663.3	0.19214	0.266	1.07442	0.357	0.45131	0.347	0.31600	0.365002		0.054103	0.389773	0.000195319	0.005013	0.055021801
28	07GF002	SPRING CREEK NEAR VALLEYVIEW	28.3	0.04986	0.157	0.13204	0.137	0.03593	0.085	0.14300	0.55373	0.237884	0.204626	0.880099		0.044131	0.072009364
29	07GF003	WOLVERINE CREEK NEAR VALLEYVIEW	11.2	0	0	0	0	0	0	0.00000	0.954323		0.041509	0.897553			0.098278318
30	07GF004	SPRING CREEK (UPPER) NEAR VALLEYVIEW	33.8	0.06662	0.176	0.17644	0.164	0.04802	0.103	0.16100	0.561174		0.384908	0.869934			0.076147126
31	07GF005	BRIDLEBIT CREEK NEAR VALLEYVIEW	20.7	0	0	0	0	0	0	0.00000	0.781411		0.213864	0.758014			0.237262007
32	07GF006	ROCKY CREEK NEAR VALLEYVIEW	19.0	0	0	0	0	0	0	0.00000	0.633807	0.034333	0.241642	0.695681			0.277404405
33	07GF007	HORSE CREEK NEAR VALLEYVIEW	4.3	0	0	0	0	0	0	0.00000	0.781299		0.21511	0.855799		0.045522	0.095088746
34	07GG003	IOSEGUN RIVER NEAR LITTLE SMOKY	1952.0	0.05484	0.159	0.16839	0.153	0.06103	0.108	0.14800	0.036824	0.002728	0.010308	0.036904		6.81E-06	0.012908645
35	07GH001	LITTLE SMOKY RIVER NEAR TRIANGLE	3941.0	0.14658	0.238	1.00955	0.352	0.50206	0.366	0.31300	0.39199	0.033742	0.156589	0.464302	0.001985701	0.043981	0.08282446
36	07GH005	WABATANISK CREEK AT HIGHWAY NO. 676	125.9	0.22385	0.282	2.037	0.448	1.09926	0.469	0.37400	0.19833	0.014012	0.044928	0.204766		0.007937	0.044567062
37	STURGEO	STURGEON LAKE AT WILLIAMSON PARK	640.4	0.18489	0.26	0.90639	0.333	0.42807	0.341	0.29700	0.209866	0.085974	0.072744	0.392785	0.003549822	0.003096	0.0441305
38	07CA012	LOGAN RIVER NEAR THE MOUTH	428.2	0.00411	0.047	0	0	0	0	0.02100							
39	07CB002	HOUSE RIVER AT HIGHWAY NO. 63	780.0	0.00296	0.041	0	0	0	0	0.01500							
40	07CC001	HORSE RIVER AT ABASANDS PARK	2131.8	0	0	0	0	0	0	0.00000							

41	07CD001	CLEARWATER RIVER AT DRAPER	8255.2	0	0	0	0	0	0	0.00000							
42	07CD002	CLEARWATER RIVER BELOW WATERWAYS	120.0	0	0	0	0	0	0	0.00000							
43	07CD003	CLEARWATER RIVER AT UPPER WINGDAM	29.8	0	0	0	0	0	0	0.00000							
44	07CD004	HANGINGSTONE RIVER AT FORT MCMURRAY	955.4	0	0	0	0	0	0	0.00000							
45	07CD005	CLEARWATER RIVER ABOVE CHRISTINA RIVER	97.3	0	0	0	0	0	0	0.00000							
46	07CE001	GREGOIRE LAKE NEAR FORT MCMURRAY	262.3	0	0	0	0	0	0	0.00000							
47	07CE002	CHRISTINA RIVER NEAR CHARD	3572.4	0.00053	0.017	0	0	0	0	0.00700							
48	07CE003	PONY CREEK NEAR CHARD	279.2	0	0	0	0	0	0	0.00000							
49	07CE004	ROBERT CREEK NEAR ANZAC	53.9	0	0	0	0	0	0	0.00000							
50	07CE005	JACKFISH RIVER BELOW CHRISTINA LAKE	1057.3	0	0	0	0	0	0	0.00000							
51	07CE006	BIRCH CREEK NEAR CONKLIN	231.8	0	0	0	0	0	0	0.00000							
52	07DA001	ATHABASCA RIVER BELOW MCMURRAY	286.8	0	0	0	0	0	0	0.00000							
53	07DA002	ATHABASCA RIVER NEAR MILDRED LAKE	448.0	0	0	0	0	0	0	0.00000							
54	07DA003	ATHABASCA RIVER NEAR FORT MACKAY	263.3	0	0	0	0	0	0	0.00000							
55	07DA004	ATHABASCA RIVER AT SHOTT ISLAND	1257.1	0	0	0	0	0	0	0.00000							
56	07DA005	BEAVER RIVER NEAR FORT MACKAY	288.5	0	0	0	0	0	0	0.00000							
57	07DA006	STEEPBANK RIVER NEAR FORT MCMURRAY	1320.1	0	0	0	0	0	0	0.00000							
58	07DA007	POPLAR CREEK NEAR FORT MCMURRAY	150.9	0	0	0	0	0	0	0.00000							
59	07DA008	MUSKEG RIVER NEAR FORT MACKAY	1098.1	0	0	0	0	0	0	0.00000							
60	07DA009	HARTLEY CREEK NEAR FORT MACKAY	358.4	0	0	0	0	0	0	0.00000							
61	07DA011	UNNAMED CREEK NEAR FORT MACKAY	277.9	0	0	0	0	0	0	0.00000							
62	07DA012	ASPHALT CREEK NEAR FORT MACKAY	144.2	0	0	0	0	0	0	0.00000							

63	07DA013	PIERRE RIVER NEAR FORT MACKAY	122.3	0	0	0	0	0	0	0.00000							
64	07DA014	CALUMET RIVER NEAR FORT MACKAY	180.6	0	0	0	0	0	0	0.00000							
65	07DA015	TAR RIVER NEAR FORT MACKAY	198.6	0	0	0	0	0	0	0.00000							
66	07DA016	JOSLYN CREEK NEAR FORT MACKAY	255.0	0	0	0	0	0	0	0.00000							
67	07DA017	ELLS RIVER NEAR THE MOUTH	1071.1	0	0	0	0	0	0	0.00000							
68	07DA018	BEAVER RIVER ABOVE SYNCRUDE	164.7	0	0	0	0	0	0	0.00000							
69	07DA019	TAR RIVER NEAR FORT MACKAY (UPPER STATION)	103.3	0	0	0	0	0	0	0.00000							
70	07DA022	07DA022	126.6	0	0	0	0	0	0	0.00000							
71	07DB001	MACKAY RIVER NEAR FORT MACKAY	1846.8	0	0	0	0	0	0	0.00000							
72	07DB002	DOVER RIVER NEAR THE MOUTH	961.1	0	0	0	0	0	0	0.00000							
73	07DB003	DUNKIRK RIVER NEAR FORT MACKAY	1564.3	0	0	0	0	0	0	0.00000							
74	07DB004	THICKWOOD CREEK NEAR FORT MACKAY	176.9	0	0	0	0	0	0	0.00000							
75	07DB005	MACKAY RIVER ABOVE DUNKIRK RIVER	1014.2	0	0	0	0	0	0	0.00000							
76	07DC001	FIREBAG RIVER NEAR THE MOUTH	5570.6	0	0	0	0	0	0	0.00000							
77	07DC002	LOST CREEK NEAR THE MOUTH	418.5	0	0	0	0	0	0	0.00000							
78	07DD001	ATHABASCA RIVER AT EMBARRAS AIRPORT	1952.1	0	0	0	0	0	0	0.00000							
79	07DD002	RICHARDSON RIVER NEAR THE MOUTH	2732.4	0	0	0	0	0	0	0.00000							
80	07DD003	EMBARRAS RIVER BELOW DIVERGENCE	26.8	0	0	0	0	0	0	0.00000							
81	07DD007	ATHABASCA RIVER ABOVE JACKFISH CREEK	5.4	0	0	0	0	0	0	0.00000							
82	07DD009	JACKFISH CREEK ABOVE ATHABASCA RIVER	31.9	0	0	0	0	0	0	0.00000							
83	07DD010	ATHABASCA RIVER ABOVE FLETCHER CHANNEL	335.4	0	0	0	0	0	0	0.00000							

84	07DD011	ATHABASCA RIVER NEAR OLD FORT	387.9	0	0	0	0	0	0	0.00000								
85	07HB001	CADOTTE RIVER AT OUTLET CADOTTE LAKE	877.4	0.01246	0.075	0.13661	0.14	0.10877	0.153	0.13900								
86	07JA003	WILLOW RIVER NEAR WABASCA	1036.2	0	0	0	0	0	0	0.00000								
87	07JB002	WABASCA RIVER BELOW TROUT RIVER	8777.1	0.00157	0.03	0.01129	0.039	0.0057	0.03	0.04400								
88	07JC001	LAFOND CREEK NEAR RED EARTH CREEK	491.3	0	0	0	0	0	0	0.00000								
89	07JC002	REDEARTH CREEK NEAR RED EARTH CREEK	616.8	0.00415	0.048	0.02985	0.065	0.01507	0.053	0.06600								
90	07JD001	WABASCA RIVER ABOVE PEACE RIVER	470.7	0.00281	0.037	0.14122	0.145	0.09293	0.133	0.12500								
91	07JD002	WABASCA RIVER AT WADLIN LAKE ROAD	20419.1	0.00295	0.039	0.02912	0.062	0.02113	0.066	0.06600								
92	07JD003	JACKPINE CREEK AT WADLIN LAKE ROAD	581.3	0.00489	0.055	0.24586	0.183	0.16179	0.188	0.15000	0.001587		0.061555	0.051554		0.001587	0.011589052	
93	07KA002	PEACE RIVER AT FIFTH MERIDIAN	16808.0	0.01659	0.085	0.59837	0.266	0.37031	0.311	0.21600	0.025253		0.099477	0.11283	0.001069576	0.005373	0.010744299	
94	07KC001	PEACE RIVER AT PEACE POINT	10169.2	0	0	0	0	0	0	0.00000								
95	07KC005	PEACE RIVER BELOW CHENAL DES QUATRE FOURCHES	11074.6	0.00001	0.001	0.00046	0.009	0.0003	0.005	0.00800								
96	07KE001	BIRCH RIVER BELOW ALICE CREEK	9842.2	0.00152	0.028	0.07663	0.114	0.05043	0.107	0.10900								
97	07KF009	MCIVOR RIVER NEAR THE MOUTH	1597.7	0	0	0	0	0	0	0.00000								
98	07KF015	EMBARRAS RIVER BREAKTHROUGH TO MAMAWI LAKE	20.2	0	0	0	0	0	0	0.00000								
99	07NA003	RIVIERE DES ROCHERS ABOVE REVILLON COUPE	171.3	0	0	0	0	0	0	0.00000								
100	07NB006	BENCH MARK CREEK NEAR FORT SMITH	66.3	0	0	0	0	0	0	0.00000								
101	07NB007	SALT RIVER BELOW PEACE POINT HIGHWAY	1605.2	0	0	0	0	0	0	0.00000								
102	07OA001	SOUSA CREEK NEAR HIGH LEVEL	819.1	0	0	0	0	0	0	0.00000								
103	07OB001	07OB001	11564.6	0.00008	0.006	0.00193	0.019	0.00143	0.018	0.01800								
104	07OB003	HAY RIVER NEAR MEANDER RIVER	25208.5	0.00029	0.012	0.00748	0.03	0.00561	0.028	0.03200								

105	07OB004	STEEN RIVER NEAR STEEN RIVER	2595.4	0	0	0	0	0	0	0.00000								
106	07OB005	MEANDER RIVER AT OUTLET HUTCH LAKE	402.2	0.00244	0.033	0.05012	0.095	0.03396	0.078	0.09500				0.068151				0.002197982
107	07OB006	LUTOSE CREEK NEAR STEEN RIVER	291.7	0.00035	0.014	0.00889	0.036	0.00668	0.035	0.03800								
108	07OB007	HUTCH LAKE TRIBUTARY NEAR HIGH LEVEL	103.1	0.00067	0.02	0.01368	0.046	0.00924	0.04	0.04600				0.013279				0.000897226
109	EAGLENE	EAGLENEST LAKE NEAR THE OUTLET	883.2	0	0	0	0	0	0	0.00000								
110	GARDINE	GARDINER LAKE (UPPER) IN BIRCH MOUNTAINS	195.7	0	0	0	0	0	0	0.00000								
111	NAMURLA	NAMUR LAKE AT BIRCH MOUNTAINS LODGE	176.5	0	0	0	0	0	0	0.00000								
112	PEERLES	PEERLESS LAKE NEAR PEERLESS LAKE	426.7	0	0	0	0	0	0	0.00000								
113	SWABASC	SWABASC	1601.9	0	0	0	0	0	0	0.00000								
114	UTIKUMA	UTIKUMA LAKE NEAR NIPISI	2477.6	0.00355	0.044	0.02557	0.052	0.01291	0.05	0.05500				0.000202				2.24774E-05

Ecoregion: Western Alberta Uplands, Clear Hills Upland																	
											Runoff Potential						
				Agricultural Indicators						Agriculture Intensity	Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05BH006	JUMPINGPOUND CREEK NEAR JUMPING POUND	214.1	0.56712	0.513	1.42678	0.389	0.361	0.299	0.38700	0.42633	0.45048	0.03806	0.69045	0.012067	0.08436	0.1279917
2	05BH009	JUMPINGPOUND CREEK NEAR THE MOUTH	114.7	0.57704	0.521	1.4608	0.392	0.37213	0.314	0.39600	0.84486	0.08519	0.06787	0.81189		0.09765	0.088382
3	05BH011	JUMPINGPOUND CREEK AT BATEMAN'S RANCH	204.1	0.35172	0.382	0.88047	0.325	0.22155	0.232	0.31000	0.02884	0.13923		0.11376		0.04899	0.0053114
4	05BJ004	ELBOW RIVER AT BRAGG CREEK	0.5								2.75163	31.0244	0.19258	22.5222	5.9081666	2.43275	3.1055427
5	05BJ007	ELBOW RIVER (RESEARCH) AT BRAGG CREEK	49.7							0.44300							
6	05BJ011	ELBOW RIVER AT CLEM GARDINER BRIDGE	80.6	0.67073	0.559	1.75578	0.429	0.46325	0.357	0.44300	0.2653	0.64756	0.08496	0.6039	0.1179578	0.16851	0.1074594
7	05BK001	FISH CREEK NEAR PRIDDIS	260.1	0.63163	0.545	1.63161	0.413	0.42466	0.334	0.42300	0.3555	0.44808		0.57343	0.0967707	0.06413	0.0687236
8	05BL013	THREEPOINT CREEK NEAR MILLARVILLE	506.4	0.61288	0.535	1.57501	0.406	0.42601	0.337	0.41800	0.28529	0.15686		0.33796	0.0142709	0.06783	0.0208082
9	05BL026	SULLIVAN CREEK NEAR LONGVIEW	124.4	0.38419	0.404	0.57521	0.258	0.15381	0.182	0.27500	0.47888			0.38639		0.0887	0.0037953
10	05CA001	RED DEER RIVER NEAR SUNDRE	255.3	0.08172	0.187	0.17024	0.154	0.04489	0.096	0.15600							
11	05CA002	JAMES RIVER NEAR SUNDRE	820.9	0.1239	0.229	0.25976	0.186	0.06968	0.117	0.18600	0.02206	0.01965	0.00475	0.02742	0.0036797	0.00747	0.0076337
12	05CA009	RED DEER RIVER BELOW BURNT TIMBER CREEK	584.3	0.03168	0.124	0.06059	0.102	0	0	0.10400							
13	05CA010	RED DEER RIVER AT SUNDRE	233.6	0.29659	0.347	0.65253	0.287	0.172	0.204	0.26600	0.37542	0.10797	0.20535	0.29654	0.2026321	0.10913	0.1447869
14	05CA011	BEARBERRY CREEK NEAR SUNDRE	226.4	0.2804	0.336	0.58496	0.259	0.15675	0.185	0.24700	0.25827	0.30138	0.03499	0.43878		0.04232	0.1135474
15	05CA012	FALLENTIMBER CREEK NEAR SUNDRE	487.2	0.16955	0.249	0.34669	0.2	0.07218	0.12	0.19400	0.20297	0.0458	0.00658	0.13472	0.0361046	0.00077	0.0837549
16	05CB002	LITTLE RED DEER RIVER NEAR WATER VALL	450.7	0.12235	0.227	0.2445	0.181	0.03374	0.073	0.17200	0.00583	0.03358		0.02116	0.0025031	0.00288	0.012861
17	05DB002	PRAIRIE CREEK NEAR ROCKY MOUNTAIN HOU	642.2	0.48216	0.464	0.90745	0.334	0.19128	0.21	0.34000	0.09152	0.01268	0.02168	0.06045		0.02746	0.0664771

18	05DB006	CLEARWATER RIVER NEAR DOVERCOURT	902.6	0.41851	0.428	0.81646	0.317	0.14612	0.175	0.29400	0.09502	0.03096	0.0468	0.08053	0.0186492	0.01733	0.0637764
19	05DC001	NORTH SASKATCHEWAN RIVER NEAR ROCKY M	761.7	0.29911	0.35	0.59231	0.263	0.13666	0.172	0.25000	0.11608	0.02291	0.05584	0.11449		0.03254	0.0936959
20	05DC002	NORTH SASKATCHEWAN RIVER AT SAUNDERS	645.8	0.02854	0.12	0.05935	0.1	0.01566	0.055	0.11500							
21	05DC004	SHUNDA CREEK NEAR SAUNDERS	276.9	0.07788	0.181	0.16247	0.149	0.04354	0.095	0.15400							
22	05DC006	RAM RIVER NEAR THE MOUTH	1500.3	0.01557	0.083	0.03248	0.081	0.0087	0.036	0.08800							
23	05DC012	BAPTISTE RIVER NEAR THE MOUTH	1344.3	0.08695	0.195	0.17209	0.157	0.04244	0.09	0.16100							
24	05DD005	BRAZEAU RIVER BELOW BRAZEAU PLANT	152.3	0	0	0	0	0	0	0.00000							
25	05DD006	BRAZEAU RESERVOIR	1722.6	0.16963	0.251	0.35387	0.204	0.09483	0.135	0.19800							
26	05DD009	NORDEGG RIVER AT SUNCHILD ROAD	874.4	0.08376	0.192	0.17243	0.161	0.0453	0.1	0.16500							
27	05DE005	NORTH SASKATCHEWAN RIVER NEAR DRAYTON	660.8	0.61995	0.54	0.74304	0.307	0.15481	0.183	0.34600	0.45464	0.03675	0.19642	0.40227	0.0596783	0.06786	0.173283
28	05DE006	NORTH SASKATCHEWAN RIVER NEAR LODGEPO	1634.6	0.26836	0.323	0.57398	0.256	0.09635	0.138	0.23000	0.06921	0.01839	0.02945	0.05951		0.01879	0.0568656
29	05DE007	ROSE CREEK NEAR ALDER FLATS	558.5	0.6989	0.579	1.23756	0.374	0.24846	0.252	0.39100	0.21356	0.02801	0.06692	0.17674	0.0122363	0.01937	0.1001414
30	05DE008	MODESTE CREEK NEAR BRETON	376.8	1.14157	0.78	1.85281	0.435	0.48138	0.364	0.52300	0.69581	0.25275	0.04443	0.54953	0.248236	0.03604	0.1636558
31	07AF001	EMBARRAS RIVER NEAR MCLEOD RIVER	620.6	0.01734	0.086	0.05441	0.097	0.00608	0.031	0.09900							
32	07AF002	MCLEOD RIVER ABOVE EMBARRAS RIVER	1737.1	0.00606	0.058	0.00813	0.031	0.00048	0.008	0.04400							
33	07AF010	SUNDANCE CREEK NEAR BICKERDIKE	173.2	0.01024	0.069	0.01357	0.044	0.00009	0	0.04800							
34	07AG001	MCLEOD RIVER NEAR WOLF CREEK	37.9	0.14249	0.236	0.44871	0.228	0.05016	0.105	0.19400	0.66437		0.33282	0.22328		0.38502	0.3889042
35	07AG002	MCLEOD RIVER NEAR EDSON	846.0	0.16007	0.246	0.38903	0.216	0.04687	0.102	0.19000	0.06645	0.01655	0.04136	0.05475		0.01969	0.0583645
36	07AG003	WOLF CREEK AT HIGHWAY NO. 16A	830.9	0.04518	0.148	0.12173	0.133	0.01326	0.051	0.13400	0.03141		0.00993	0.01553	0.0005238	0.00595	0.019335
37	07AG004	MCLEOD RIVER NEAR WHITECOURT	1953.5	0.28706	0.342	0.69105	0.299	0.10963	0.155	0.25500	0.30732	0.11938	0.14218	0.28781	0.0059023	0.06467	0.2207112

38	07AG007	MCLEOD RIVER NEAR ROSEVEAR	804.9	0.2245	0.284	0.58787	0.261	0.08466	0.125	0.21900	0.20418	0.01855	0.12641	0.17061	0.0009471	0.05781	0.1389984
39	07AG008	GROAT CREEK NEAR WHITECOURT	132.3	0.00021	0.011	0.00067	0.012	0.00013	0.001	0.01100	0.0698	0.00186	0.00056	0.04418		0.02229	0.0057519
40	07BA001	PEMBINA RIVER BELOW PADDY CREEK	2188.3	0.04118	0.142	0.09246	0.122	0.01581	0.056	0.12900							
41	07BA002	RAT CREEK NEAR CYNTHIA	603.2	0.1503	0.24	0.36087	0.205	0.03844	0.086	0.18600							
42	07BB002	PEMBINA RIVER NEAR ENTWISTLE	1504.2	0.37933	0.399	1.00996	0.354	0.2493	0.252	0.33500	0.13355	0.01272	0.20989	0.18791	0.0041309	0.05089	0.1135819
43	07BB005	LITTLE PADDLE RIVER NEAR MAYERTHORPE	323.4	0.7197	0.587	2.44322	0.481	0.73259	0.399	0.48100	0.3225	0.37663	0.13877	0.65835	0.0098106	0.01732	0.1232336
44	07BB008	CHIP LAKE NEAR NORTHVILLE	1208.3	0.34654	0.375	0.56762	0.255	0.10538	0.148	0.24700	0.19387	0.11648	0.45762	0.46849	0.0167865	0.03334	0.3193152
45	07BB011	PADDLE RIVER NEAR ANSELMO	258.5	0.57619	0.518	1.40413	0.388	0.3676	0.305	0.39300	0.59546	0.31729	0.08448	0.76973	0.0249594	0.03373	0.1660365
46	07BK004	OTAUWAU RIVER NEAR SLAVE LAKE	512.0	0.01044	0.071	0.0419	0.089	0.01096	0.043	0.09200							
47	07BK005	SAULTEAUX RIVER NEAR SPURFIELD	2597.8	0.02275	0.097	0.09177	0.121	0.02414	0.07	0.12000							
48	07BK009	SAWRIDGE CREEK NEAR SLAVE LAKE	234.1	0.00347	0.042	0.02322	0.047	0.00658	0.033	0.04900	0.00802	0.00153		0.00543			0.0041299
49	07FD006	SADDLE RIVER NEAR WOKING	540.2	0.18778	0.263	3.8479	0.561	1.97379	0.581	0.46200	0.36914	0.0682	0.01853	0.42267		0.03103	0.0021644
50	07FD007	07FD007	2075.7	0.08495	0.194	1.50569	0.397	0.66429	0.387	0.31900	0.07583	7.9E-05	0.05812	0.12262		0.0096	0.0018107
51	07FD011	HINES CREEK ABOVE GERRY LAKE	368.4	0.04142	0.142	0.37246	0.209	0.10553	0.151	0.17500	0.01633	0.00029	0.05303	0.06179			0.0220871
52	07FD012	MONTAGNEUSE RIVER NEAR HINES CREEK	228.2	0.16014	0.248	2.68505	0.497	1.16967	0.491	0.39500	0.24991	0.04941	0.10655	0.36129			0.0445833
53	07GE003	GRANDE PRAIRIE CREEK NEAR SEXSMITH	151.1	0.33904	0.37	7.02174	0.69	3.38947	0.676	0.57700	0.34556	0.15264	0.02806	0.47221	0.0048814		0.0491706
54	07GJ004	BAD HEART RIVER NEAR HEART VALLEY	191.4	0.15907	0.243	3.18047	0.524	1.64044	0.558	0.43100	0.23194	0.05633	0.00585	0.27109		0.00695	0.0160703
55	07HA005	WHITEMUD RIVER NEAR DIXONVILLE	2014.5	0.06277	0.169	0.70565	0.303	0.29194	0.27	0.23400	0.16087	0.00081	0.03515	0.17202	0.0035068		0.0637199
56	07HC001	NOTIKEWIN RIVER AT MANNING	4677.2	0.00466	0.053	0.2229	0.173	0.10772	0.152	0.14200	0.01279		0.00584	0.0137		0.00283	0.0022589
57	07BF001	EAST PRAIRIE RIVER NEAR ENILDA	1459.0	0.12583	0.23	0.67184	0.293	0.28027	0.265	0.25000	0.03796	0.00091	0.13668	0.10848			0.0913018
58	07BF002	WEST PRAIRIE RIVER NEAR HIGH PRAIRIE	1156.9	0.11639	0.225	0.64365	0.28	0.24578	0.245	0.23900	0.10732	0.02639	0.13813	0.21994		0.00127	0.0774857
59	07BH003	DRIFTPILE RIVER NEAR DRIFTPILE	836.7	0.06107	0.167	0.20583	0.17	0.06221	0.112	0.16200	0.05056	0.00867	0.00204	0.06558		0.00084	0.0127212
60	07BJ001	SWAN RIVER NEAR KINUSO	1606.1	0.02611	0.115	0.07395	0.108	0.02333	0.068	0.12100	0.03031	0.00882	0.01331	0.04979		3.9E-05	0.0171135

61	07BJ004	ADAMS CREEK NEAR KINUSO	139.1	0.01881	0.09	0.10091	0.125	0.02906	0.071	0.11800	0.01917			0.02604			0.002893
62	07GC002	PINTO CREEK NEAR GRANDE PRAIRIE	493.9	0.00682	0.063	0.05673	0.098	0.02106	0.065	0.10300							
63	07GE001	WAPITI RIVER NEAR GRANDE PRAIRIE	5158.9	0.08959	0.199	1.82663	0.432	0.83121	0.424	0.34400	0.13881	0.00558	0.05745	0.15614	0.0016589	0.0228	0.0378379
64	07GF001	SIMONETTE RIVER NEAR GOODWIN	4292.2	0.10589	0.213	0.77457	0.309	0.40393	0.322	0.26400	0.12565	0.026	0.02989	0.14199		0.01771	0.0222322
65	07GG001	WASKAHIGAN RIVER NEAR THE MOUTH	1036.2	0.01466	0.08	0.0388	0.087	0.01286	0.048	0.09900	0.02256		0.00755	0.02145		0.00386	0.0047965
66	07GG002	LITTLE SMOKY RIVER AT LITTLE SMOKY	3006.4	0.00959	0.067	0.02652	0.054	0.00911	0.038	0.06200	0.01604	0.00133	0.00617	0.01533		0.00506	0.0031193
67	07GJ002	SMOKY RIVER NEAR BEZANSON	6955.4	0.063	0.17	1.21096	0.371	0.58497	0.377	0.29200	0.07376	0.02686	0.03036	0.09361	0.0049113	0.01585	0.0353801
68	05BG009	WAIPAROUS CREEK BELOW MEADOW CREEK	228.9	0.04906	0.154	0.09384	0.124	0	0	0.11700							
69	05CA003	DEER CREEK (MAIN STEM) NEAR SUNDRE	4.6	0	0	0	0	0	0	0.00000							
70	05CA005	DEER CREEK EAST BRANCH	0.9	0	0	0	0	0	0	0.00000							
71	05DB004	PRAIRIE CREEK NEAR RANGER STATION	96.2	0.1105	0.221	0.23052	0.177	0.06177	0.11	0.17600							
72	05DB005	PRAIRIE CREEK BELOW LICK CREEK	111.5	0.1848	0.259	0.38551	0.213	0.1033	0.145	0.20900							
73	05DC003	MARTIN CREEK NEAR NORDEGG	3.1	0	0	0	0	0	0	0.00000							
74	05DC010	NORTH SASKATCHEWAN RIVER BELOW BIGHOR	0.6	0	0	0	0	0	0	0.00000							
75	05DC011	NORTH RAM RIVER AT FORESTRY ROAD	346.8	0	0	0	0	0	0	0.00000							
76	05DD003	CHUNGO CREEK NEAR THE MOUTH	187.5	0	0	0	0	0	0	0.00000							
77	05DD004	BROWN CREEK AT FORESTRY ROAD	218.4	0	0	0	0	0	0	0.00000							
78	07AC002	NORTH FOX CREEK NEAR MUSKEG	17.2	0	0	0	0	0	0	0.00000							
79	07AC006	HINTON STUDY BASIN NO.14	13.2	0	0	0	0	0	0	0.00000							
80	07AC007	BERLAND RIVER NEAR THE MOUTH	4520.5	0.00003	0.004	0.00009	0.003	0	0	0.00400							
81	07AD002	ATHABASCA RIVER AT HINTON	249.9	0.0222	0.094	0.06569	0.106	0	0	0.08800							

82	07AD003	CACHE PERCOTTE CREEK NEAR HINTON	4.3	0	0	0	0	0	0	0.00000							
83	07AD004	WHISKEYJACK CREEK NEAR HINTON	3.2	0	0	0	0	0	0	0.00000							
84	07AD005	FISH CREEK NEAR HINTON	25.2	0	0	0	0	0	0	0.00000							
85	07AD006	OLDMAN CREEK NEAR HINTON	17.7	0	0	0	0	0	0	0.00000							
86	07AD007	CACHE PERCOTTE CREEK (NORTH FORK) NEAR HINTON	2.6	0	0	0	0	0	0	0.00000							
87	07AD008	HINTON STUDY BASIN NO.1	17.5	0	0	0	0	0	0	0.00000							
88	07AD009	HINTON STUDY BASIN NO.2	14.6	0	0	0	0	0	0	0.00000							
89	07AD010	HINTON STUDY BASIN NO.5	19.2	0	0	0	0	0	0	0.00000							
90	07AE001	ATHABASCA RIVER NEAR WINDFALL	4841.1	0.00273	0.036	0.0074	0.027	0.00103	0.013	0.03700							
91	07AE002	HINTON STUDY BASIN NO.6	23.5	0	0	0	0	0	0	0.00000							
92	07AE003	HINTON STUDY BASIN NO.7	22.0	0	0	0	0	0	0	0.00000							
93	07AF008	QUIGLEY CREEK NEAR HINTON	15.5	0	0	0	0	0	0	0.00000							
94	07AF009	NORTH ANDERSON CREEK NEAR HINTON	11.0	0	0	0	0	0	0	0.00000							
95	07AF011	HINTON STUDY BASIN NO.15	20.2	0	0	0	0	0	0	0.00000							
96	07AF012	HINTON STUDY BASIN NO.16	8.0	0.00137	0.026	0.00178	0.017	0	0	0.01800							
97	07AF014	EMBARRAS RIVER NEAR WEALD	520.3	0.0065	0.06	0.00848	0.035	0	0	0.04100							
98	07AF015	GREGG RIVER NEAR THE MOUTH	0.0	0	0	0	0	0	0	0.00000							
99	07AF907	ERITH RIVER BELOW HANLAN CREEK	592.0	0	0	0	0	0	0	0.00000							
100	07AF909	EMBARRAS RIVER AT ROBB	123.0	0.00001	0.003	0.00001	0	0	0	0.00200							
101	07AG005	HINTON STUDY BASIN NO.8	23.5	0	0	0	0	0	0	0.00000							
102	07AG006	HINTON STUDY BASIN NO.9	7.7	0	0	0	0	0	0	0.00000							
103	07AH001	FREEMAN RIVER NEAR FORT ASSINIBOINE	1658.8	0.0117	0.074	0.09051	0.118	0.01665	0.058	0.11000	0.00844	0.00116	0.00079	0.00614	9.737E-05	0.00214	0.0020215
104	07AH002	CHRISTMAS CREEK NEAR BLUE RIDGE	422.5	0.03227	0.126	0.11692	0.132	0.03381	0.075	0.13200							

105	07AH003	SAKWATAMAU RIVER NEAR WHITECOURT	1143.4	0.01873	0.088	0.07518	0.111	0.01967	0.061	0.11400								
106	07BA003	LOVETT RIVER NEAR THE MOUTH	102.6	0	0	0	0	0	0	0.00000								
107	07BJ003	SWAN RIVER NEAR SWAN HILLS	156.3	0	0	0	0	0	0	0.00000								
108	07GB001	CUTBANK RIVER NEAR GRANDE PRAIRIE	914.2	0	0	0	0	0	0	0.00000								
109	07GB003	KAKWA RIVER AT HIGHWAY NO. 40	67.2	0	0	0	0	0	0	0.00000								
110	07GF008	DEEP VALLEY CREEK NEAR VALLEYVIEW	634.2	0	0	0	0	0	0	0.00000								
111	07HF002	KEG RIVER AT HIGHWAY NO. 35	665.0	0	0	0	0	0	0	0.00000	0.08927		0.18905	0.24876		0.02675	0.002806	
112	07OC001	CHINCHAGA RIVER NEAR HIGH LEVEL	10370.0	0.00016	0.007	0.00827	0.033	0.00341	0.023	0.02900	0.00192	8.9E-05	0.01574	0.01248		0.00036	0.0099329	

Ecoregion: Aspen Parkland

				Agricultural Indicators						Agriculture Intensity	Runoff Potential: Landform Characteristics			Runoff Potential: Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05EB005	SISIB LAKE NEAR NORTH COOKING LAKE	9.7	0.67334	0.562	2.2642	0.464	1.02046	0.464	0.48700	0.754502	0.241293		0.550414	0.262429		0.03467938
2	05EB006	COOKING LAKE CREEK NEAR NORTH COOKING	0.6	0.76483	0.624	2.57182	0.494	1.15911	0.488	0.52200	0.992928			0.893635			0.09929282
3	MIQUELO	MIQUELON LAKE AT PROVINCIAL PARK	37.8	0.76482	0.622	2.57178	0.492	1.15909	0.486	0.52500				0.639543	0.250616		0.09614873
4	HASTING	HASTINGS LAKE NEAR DEVILLE	73.0	0.7648	0.619	2.57174	0.489	1.15907	0.483	0.52600	0.265309	0.589623		0.705661	0.175256		0.08015151
5	05EB001	HASTINGS CREEK NEAR LINDBROOK	16.0	0.76481	0.62	2.57176	0.491	1.15908	0.484	0.53100	0.024724	0.972188		0.532212	0.299468		0.07887825
6	MINISTI	MINISTIK LAKE NEAR NEW SAREPTA	55.0	0.85636	0.676	2.74641	0.502	1.14382	0.478	0.54500	0.13963	0.460992		0.62962	0.264155		0.05714263
7	05EB010	KATCHEMUT CREEK NEAR TOFIELD	99.0	0.85	0.669	3.06152	0.518	1.24713	0.5	0.55300	0.173222	0.711146		0.697717	0.16427		0.06545741
8	COOKING		195.1	1.10909	0.763	3.04415	0.515	0.88848	0.438	0.56900	0.314148	0.481605		0.594835	0.286867	0	0.04465381
9	05EB909	POINTE-AUX-PINS TRIBUTARY NO. 1 NEAR	18.1	0.8307	0.657	3.4056	0.54	1.57266	0.545	0.57700	0.127628	0.869464		0.375429	0.521648		0.09499197
10	05DF001	NORTH SASKATCHEWAN RIVER AT EDMONTON	2.0	0.38662	0.407	6.29157	0.676	3.4222	0.683	0.58300						0.995937	
11	05FD003	RIBSTONE CREEK NEAR RIBSTONE	799.3	0.64186	0.551	5.34882	0.637	2.96087	0.652	0.60600	0.394886	0.343385	5.69E-05	0.243038	0.078763	0.610735	0.06269221
12	05FC004	PAINTEARTH CREEK NEAR HALKIRK	191.0	0.74572	0.608	5.31684	0.634	3.63042	0.698	0.63800	0.849933	0.032205	0.079541	0.701868		0.241556	0.05333394
13	05FD005	RIBSTONE CREEK NEAR CZAR	1747.4	0.89569	0.682	4.90567	0.623	2.75583	0.643	0.64300	0.311625	0.557199	0.0046	0.449421	0.060376	0.420632	0.06239789
14	05FE003	BATTLE RIVER AT HIGHWAY NO. 41	4468.9	0.71381	0.582	7.37587	0.706	4.2042	0.745	0.67200	0.503646	0.415892	0.021128	0.327551	0.024894	0.584926	0.0584222
15	05FE005	BLACKFOOT CREEK NEAR THE SASKATCHEWAN	709.2	0.59771	0.53	8.92643	0.744	4.5929	0.775	0.67700	0.306279	0.459719		0.032353	0.005934	0.667473	0.05969055
16	05GA010	KILLARNEY LAKE TRIBUTARY NEAR CHAUVIN	1008.9	0.74419	0.605	8.55497	0.735	3.84819	0.717	0.68500	0.583446	0.337443	0.023277	0.39721	0.358161	0.175703	0.04907006
17	05FD001	RIBSTONE CREEK NEAR EDGERTON	153.8	0.7102	0.579	8.72901	0.741	4.16579	0.74	0.68700	0.54801	0.380052		0.1279	0.049069	0.753997	0.06435477
18	05EB902	POINTE-AUX-PINS CREEK NEAR ARDROSSAN	75.6	1.48882	0.873	5.42235	0.639	1.91923	0.576	0.70500	0.164999	0.821559	0.010441	0.38833	0.511912		0.04755302

19	RIBSTON	RIBSTONE LAKE NEAR HEATH	826.5	1.23315	0.813	5.08911	0.626	2.89541	0.65	0.70700	0.239782	0.475727	0.002885	0.196842	0.034964	0.699491	0.06426386
20	BEAVER H	BEAVERHILL LAKE NEAR MUNDARE	1240.3	0.73095	0.593	8.91724	0.743	4.96741	0.797	0.72300	0.37131	0.37408	0.128331	0.629228	0.198835	0.052025	0.09848816
21	05EE006	VERMILION RIVER TRIBUTARY NEAR BRUCE	48.5	0.67737	0.565	9.73558	0.765	5.36015	0.811	0.72600	0.557718	0.019894	0.414568	0.92518	0.0064	0.003437	0.06145988
22	05FE004	BATTLE RIVER NEAR THE SASKATCHEWAN BO	2967.1	0.67803	0.567	10.42424	0.784	5.02189	0.802	0.73500	0.406105	0.482891	0.029839	0.047348	0.013989	0.845173	0.06300984
23	05EB002	BEAVERHILL CREEK NEAR MUNDARE	41.9	0.69779	0.576	10.56137	0.792	5.72537	0.826	0.75200	0.727834		0.268873	0.872007	0.052924	0.007376	0.05134508
24	05EB910	POINTE-AUX-PINS TRIBUTARY NO. 2 NEAR	8.2	0.79518	0.649	9.08026	0.748	5.02126	0.801	0.75900	0.333775	0.659942	0.003687	0.124837	0.788576		0.06636291
25	05FC002	BIGKNIFE CREEK NEAR GADSBY	225.1	0.84567	0.668	8.14751	0.724	5.7057	0.822	0.76700	0.85348	0.115429	0.015801	0.832955	0.009613	0.06633	0.08790192
26	05EB015	BEAVERHILL CREEK NEAR THE MOUTH	821.4	0.72815	0.59	11.02939	0.81	5.64811	0.821	0.76800	0.552035	0.233063	0.159058	0.497737	0.309748	0.081902	0.10056617
27	05EE007	VERMILION RIVER NEAR MARWAYNE	1131.4	0.75735	0.612	10.64706	0.797	5.60815	0.819	0.77100	0.283581	0.662061	0.03477	0.288109	0.072765	0.578635	0.05235383
28	05EE002	VERMILION RIVER AT LEA PARK	54.4	1.04733	0.736	9.2544	0.752	4.78267	0.785	0.78700	0.88382	0.023535	0.087632	0.007353	0.279487	0.663761	0.04275397
29	05EE008	VERMILION PARK LAKE NEAR VERMILION	399.5	0.78448	0.641	11.87087	0.848	5.70972	0.824	0.80700	0.574881	0.281263	0.086337	0.035238	0.163458	0.664161	0.11848114
30	05EE004	VERMILION RIVER NEAR HAZELDINE	478.5	0.9582	0.707	10.63293	0.795	5.83456	0.829	0.81700	0.608717	0.191775	0.196357	0.065359	0.206449	0.688723	0.04117469
31	05EB911	POINTE-AUX-PINS TRIBUTARY NO. 3 NEAR	3.6	0.8066	0.652	11.51751	0.838	6.46751	0.869	0.82500	0.04816	0.94884		0.028896	0.868404		0.09488399
32	05EE001	VERMILION RIVER NEAR MANNVILLE	4112.4	0.77679	0.636	12.34194	0.862	6.35688	0.862	0.82800	0.489729	0.346382	0.096051	0.214069	0.449468	0.226328	0.10164044
33	05FC005	REDWILLOW CREEK NEAR RED WILLOW	854.8	1.02549	0.723	9.78556	0.767	6.4817	0.871	0.82800	0.594044	0.319661	0.05996	0.570426	0.044064	0.314554	0.06331121
34	05FE002	BUFFALO CREEK AT HIGHWAY NO. 41	714.4	0.76651	0.626	12.89531	0.866	6.60209	0.87	0.83400	0.32029	0.624	0.025648	0.018062	0.046536	0.850821	0.0667498
35	05FB003	IRON CREEK NEAR VIKING	122.0	0.73438	0.598	12.98983	0.877	6.79454	0.896	0.83400	0.751814		0.244649	0.917176		0.018584	0.06070302
36	05FB002	IRON CREEK NEAR HARDISTY	3377.1	0.60772	0.533	15.44389	0.936	8.3213	0.946	0.83700	0.789148	0.179035	0.012881	0.501554	0.008221	0.413115	0.07323953
37	05EE003	VERMILION RIVER NEAR VEGREVILLE	1098.8	0.66516	0.554	15.09045	0.921	8.44075	0.954	0.83900	0.830712	0.031672	0.115603	0.852483	0.046988	0.025753	0.07072905
38	05EC005	REDWATER RIVER NEAR THE MOUTH	64.4	0.71357	0.581	15.26108	0.933	8.33209	0.948	0.84700	0.57125		0.08784	0.029146	0.254926	0.270822	0.4418957
39	05FA010	CAMROSE CREEK AT CAMROSE	457.1	0.9125	0.691	12.45242	0.867	6.88513	0.904	0.84800	0.601119	0.25276	0.118798	0.582687	0.294681	0.013593	0.09674481
40	05FA021	BATTLE RIVER BELOW PIPESTONE CREEK	631.6	1.23466	0.815	11.63061	0.842	5.95243	0.837	0.86200	0.482068	0.299269	0.102843	0.384451	0.378221	0.101555	0.11376156

41	05EE913	VERMILION RIVER DRAINAGE NEAR HOLDEN	55.8	0.7311	0.597	15.74412	0.939	8.849	0.964	0.86500	0.99667			0.698143	0.237621		0.06090598
42	05EB016	AMISK CREEK NEAR SHONTS	377.2	0.82869	0.655	14.48767	0.902	8.19236	0.944	0.86700	0.74925	0.078395	0.15824	0.800804	0.119901	0.001173	0.07000766
43	05EE915	VERMILION RIVER DRAINAGE NEAR BRUCE	384.3	0.74266	0.603	16.00036	0.944	8.84675	0.963	0.87300	0.904824	0.007901	0.07691	0.924887	0.015302	0.005896	0.05055905
44	05DF003	BLACKMUD CREEK NEAR ELLERSLIE	647.6	1.53798	0.879	11.39977	0.83	5.39091	0.812	0.87500	0.587402	0.309922	0.045691	0.285595	0.545766	0.070427	0.07845098
45	05FA018	DRIEDMEAT CREEK NEAR THE MOUTH	1151.7	0.73989	0.6	17.19396	0.96	9.47663	0.976	0.88600	0.874151	0.015275	0.098853	0.839417	0.064152	0.032025	0.05642609
46	THOMAS L	THOMAS LAKE NEAR VIKING	126.0	0.77628	0.635	16.40336	0.948	8.43892	0.953	0.88700	0.484786	0.37537	0.086183	0.668783	0.00094	0.289498	0.03705363
47	05FA022	PIPESTONE CREEK BELOW BIGSTONE CREEK	59.4	1.98978	0.957	11.84832	0.846	4.22491	0.747	0.89700	0.664064		0.031357	0.049545	0.106452	0.74676	0.09447992
48	05FA007	PIPESTONE CREEK NEAR MILLET	303.3	1.77384	0.938	11.35066	0.826	4.85828	0.79	0.89700	0.936525	0.011501	0.043124	0.145781	0.570145	0.143212	0.12102337
49	05FA023	BATTLE RIVER ABOVE PIPESTONE CREEK	951.6	1.35918	0.835	13.03445	0.878	6.32232	0.859	0.90200	0.498131	0.261992	0.177067	0.237467	0.455963	0.208878	0.09464991
50	05FC001	BATTLE RIVER NEAR FORESTBURG	446.6	1.01345	0.72	14.25976	0.899	8.443	0.956	0.90600	0.75052	0.15563		0.455842	0.217778	0.273814	0.04651542
51	05FA012	PIPESTONE CREEK NEAR WETASKIWIN	10.9	2.04245	0.958	12.07024	0.854	4.32564	0.76	0.90800	0.653772			0.043027		0.882032	0.07111678
52	05EE005	STRETTON CREEK NEAR MARWAYNE	81.9	1.15661	0.784	12.92548	0.868	7.51762	0.926	0.90900	0.951358	0.000523		0.041724	0.008001	0.855052	0.04710494
53	BIGLAKE	BIG LAKE NEAR ST. ALBERT	416.4	0.95566	0.704	16.85481	0.953	8.49082	0.958	0.91900	0.51085	0.129505	0.220067	0.567032	0.159794	0.139979	0.12391377
54	05EE009	VERMILION RIVER AT VEGREVILLE	36.1	0.96282	0.712	15.88966	0.942	8.87377	0.966	0.92000	0.861361		0.045531	0.519548	0.215091	0.084766	0.1771386
55	05DF006	WHITEMUD CREEK NEAR ELLERSLIE	270.9	1.27542	0.821	15.01036	0.913	6.91108	0.906	0.92800	0.44425		0.496928	0.55946	0.30438	0.076564	0.04198204
56	05EA001	STURGEON RIVER NEAR FORT SASKATCHEWAN	697.6	0.93195	0.696	20.0605	0.979	9.09288	0.971	0.93000	0.487305	0.066632	0.38609	0.563321	0.234955	0.126324	0.07196965
57	05FA024	WEILLER CREEK NEAR WETASKIWIN	235.2	1.20491	0.804	15.44044	0.934	7.20142	0.914	0.93100	0.586383	0.027267	0.355864	0.418254	0.480237	0.060659	0.03417114
58	05FA020	DRIEDMEAT LAKE AT OUTFLOW	573.3	1.00084	0.715	17.51208	0.963	10.46425	0.986	0.93500	0.818194	0.080059	0.051062	0.371539	0.420349	0.128211	0.07116846
59	05DF007	WEST WHITEMUD CREEK NEAR IRETON	63.9	1.56963	0.884	15.03919	0.918	6.78762	0.891	0.94600	0.476613		0.520689	0.494739	0.466048	0.001359	0.02980579
60	05EA002	STURGEON RIVER AT ST. ALBERT	9.6	1.08051	0.751	16.92494	0.956	9.85641	0.983	0.94700						0.996476	
61	05EC007	REDWATER RIVER NEAR VIMY	468.2	1.18349	0.797	18.27227	0.966	7.82713	0.936	0.94900	0.395593	0.007313	0.585547	0.413596	0.498482	0.007542	0.04887945

62	05FA016	COAL LAKE RESERVOIR NEAR WETASKIWIN	175.5	1.79266	0.941	12.93735	0.875	6.75999	0.886	0.95000	0.635338	0.26354		0.141416	0.673999	0.126241	0.0355281
63	05FA011	BATTLE RIVER AT DUHAMEL	149.6	1.12783	0.778	17.4975	0.961	10.38073	0.984	0.95500	0.588226	0.390742	0.01802	0.097625	0.71658	0.051281	0.12833953
64	BUFFALO	BUFFALO LAKE NEAR ERSKINE	699.5	0.9562	0.706	8.68352	0.74	4.2462	0.755	0.76300	0.136255	0.644561	0.031857	0.221589	0.394068	0.305836	0.07508539
65	05CE001	RED DEER RIVER AT DRUMHELLER	2970.2	0.95911	0.71	10.50937	0.789	5.509	0.816	0.80900	0.49603	0.46832	0.010124	0.395604	0.195688	0.352744	0.05750146
66	05FC003	MEETING CREEK NEAR THE MOUTH	206.4	0.8992	0.685	10.26284	0.779	6.33688	0.861	0.81400	0.240098	0.718222		0.292934	0.048752	0.572656	0.08259099
67	05FC006	MEETING CREEK NEAR DONALDA	474.9	1.1249	0.777	17.03466	0.958	9.71968	0.979	0.95300	0.287111	0.60057	0.0104	0.224886	0.566427	0.136784	0.06535225
68	GULLLAK	GULL LAKE AT ASPEN BEACH	293.6	1.36621	0.84	6.9634	0.695	2.30114	0.62	0.73800	0.29835	0.26254	0.145464	0.399444	0.33977	0.165624	0.09060892
69	05FA017	PIGEON LAKE CREEK NEAR THE MOUTH	5.8	2.3003	0.971	6.54761	0.685	2.25112	0.61	0.78500	0.99679				0.860846	0.057917	0.02944578
70	05CD902	PARLBY CREEK NEAR MIRROR	352.2	1.3128	0.829	9.60054	0.759	3.50709	0.692	0.79200	0.246737	0.635084	0.065293	0.07163	0.496146	0.344182	0.08409884
71	05FA001	BATTLE RIVER NEAR PONOKA	1354.3	2.57883	0.979	10.02945	0.775	3.84977	0.719	0.85500	0.562701	0.285167	0.069267	0.120342	0.552278	0.251776	0.06812468
72	05FA008	BIGSTONE CREEK NEAR BIGSTONE	547.4	3.08484	0.988	10.00861	0.773	3.9664	0.727	0.86200	0.79193	0.087023	0.032826	0.092954	0.637293	0.165854	0.08154455
73	05CD001	UPPER CHAIN LAKE OUTLET NEAR PONOKA	76.5	1.87193	0.947	11.4073	0.832	4.18713	0.744	0.88000	0.704518	0.2928		0.059883	0.567894	0.337459	0.02830541
74	05CD004	RED DEER RIVER NEAR NEVIS	1059.4	1.69283	0.908	13.40981	0.883	5.59108	0.817	0.91600	0.329621	0.6217	0.016284	0.023896	0.640414	0.275139	0.05738171
75	05FA015	MASKWA CREEK NO. 2 ABOVE BEARHILLS LA	30.1	3.54766	0.99	12.29459	0.861	4.58973	0.774	0.92200	0.792346	0.030633	0.142116	0.057316	0.785717	0.070257	0.07004649
76	05CE012	GHOSTPINE CREEK NEAR HUXLEY	512.0	1.21043	0.805	15.14935	0.928	6.98876	0.908	0.92500	0.292204	0.688373	0.007362	0.039034	0.522532	0.370243	0.0653466
77	05FA014	MASKWA CREEK NO. 1 ABOVE BEARHILLS LA	79.0	4.94751	1	12.29262	0.859	4.66328	0.779	0.92800	0.778941	0.100799	0.117578	0.022513	0.769902	0.143242	0.04001207
78	05CD007	PARLBY CREEK AT ALIX	436.3	1.5913	0.89	15.10474	0.925	6.3219	0.857	0.93600	0.470704	0.491421	0.02273	0.057756	0.722975	0.178172	0.03578075
79	05CE007	THREEHILLS CREEK NEAR CARBON	557.0	0.9909	0.714	20.79526	0.987	10.59455	0.989	0.94600	0.750223	0.233706	0.008946	0.506802	0.113681	0.361991	0.01497943
80	CYGNET L	CYGNET LAKE NEAR SYLVAN LAKE	89.3	2.39303	0.977	13.94943	0.891	6.46481	0.867	0.95700	0.73852		0.225711	0.158888	0.404709	0.179946	0.2539777
81	05CE901	BIGELOW RESERVOIR NEAR WIMBORNE	196.0	1.12165	0.767	22.03743	0.99	10.57168	0.988	0.95800	0.315251	0.618471		0.075155	0.670417	0.204056	0.04782355
82	05CE019	SHEEP COULEE NEAR CARSTAIRS	39.0	1.42526	0.854	19.86039	0.977	7.36075	0.923	0.96100	0.969081			0.068858		0.863384	0.06556619
83	05CE011	RENWICK CREEK NEAR THREE HILLS	58.8	1.11643	0.764	24.8242	0.995	11.40298	0.998	0.96100	0.637616	0.359911		0.471981	0.007833	0.517713	
84	05CE004	ROSEBUD RIVER NEAR CROSSFIELD	427.9	1.5814	0.887	18.82617	0.971	7.08117	0.909	0.96300	0.932087	0.000837	0.058065	0.157813		0.774287	0.06525322

85	05CE015	THREEHILLS CREEK NEAR TROCHU	65.7	1.16088	0.785	24.10443	0.995	11.90006	0.993	0.96800	0.252353	0.745182		0.078077	0.151149	0.689371	0.07893783
86	05CC002	RED DEER RIVER AT RED DEER	1136.5	2.13597	0.965	16.6048	0.952	6.76987	0.887	0.97700	0.692064	0.128189	0.121766	0.1824	0.294131	0.450701	0.06880707
87	05CE018	THREEHILLS CREEK BELOW RAY CREEK	154.9	1.46812	0.863	19.26562	0.969	9.13007	0.97	0.97900	0.225839	0.72259		0.050769	0.829518	0.072433	0.04476979
88	05CD006	HAYNES CREEK NEAR HAYNES	166.0	1.71634	0.915	17.96417	0.961	8.12251	0.94	0.98000	0.470536	0.526841		0.063241	0.776476	0.090855	0.06447186
89	05CC012	TINDASTOLL CREEK NEAR MARKERVILLE	140.7	1.95427	0.954	18.53237	0.969	8.56354	0.961	0.98600	0.886339		0.111198	0.256907	0.463887	0.224402	0.05234153
90	05CE013	LONEPINE CREEK NEAR LINDEN	885.9	1.76486	0.936	20.59046	0.985	8.95747	0.968	0.98800	0.754068	0.038889	0.200002	0.207843	0.003483	0.729401	0.0567344
91	05CE010	RAY CREEK NEAR INNISFAIL	44.3	1.94881	0.949	19.33206	0.971	9.49833	0.975	0.99100	0.75807	0.239183			0.861777	0.133724	0.00175315
92	05CC011	WASKASOO CREEK AT RED DEER	485.9	2.08659	0.962	20.12565	0.98	9.42327	0.974	0.99300	0.662101	0.209654	0.067108	0.11939	0.223212	0.570643	0.07553106
93	05CE016	KNEEHILLS CREEK NEAR LINDEN	645.1	1.84813	0.946	22.45617	0.992	9.81428	0.981	0.99400	0.696348	0.297008	0.002674	0.064328	0.254611	0.621439	0.0554895
94	05BL006	PEKISKO CREEK AT PEKISKO	202.5	0.31751	0.358	0.48462	0.237	0.12994	0.165	0.24100	0.581644	0.026585		0.362805		0.146035	0.0993891
95	05AB037	CHAIN LAKES RESERVOIR NEAR NANTON	24.9	0.76973	0.631	0.93254	0.336	0.20305	0.217	0.38200	0.818897	0.089155		0.842286	0.00633	0.077495	0.07203199
96	05AB039	WILLOW CREEK BELOW LANE CREEK	534.6	0.85409	0.672	0.97422	0.341	0.19635	0.214	0.40100	0.746382	0.087171	0.002554	0.679617	0.004327	0.114571	0.03759248
97	05BL008	HIGHWOOD RIVER AT BROWN'S RANCH	152.5	0.68945	0.57	1.42777	0.39	0.40158	0.321	0.42000	0.829355	0.000955	0.024727	0.566413	9.07E-05	0.278487	0.10569218
98	05BL007	STIMSON CREEK NEAR PEKISKO	262.4	0.76799	0.628	1.50111	0.395	0.40904	0.329	0.44600	0.80193	0.055993		0.665181	0.001146	0.142588	0.05270475
99	05BL023	PEKISKO CREEK NEAR LONGVIEW	29.1	0.89991	0.687	2.20723	0.46	0.63324	0.382	0.50100	0.997978			0.578745		0.387851	0.03138233
100	05BL014	SHEEP RIVER AT BLACK DIAMOND	140.3	0.93686	0.698	2.34195	0.468	0.67323	0.394	0.51500	0.834055	0.029594	0.029142	0.637664		0.27599	0.01321197
101	05BH005	BOW RIVER NEAR COCHRANE	464.4	1.23492	0.818	3.875	0.564	0.91952	0.448	0.60500	0.439107	0.544106		0.706187	0.00733	0.215836	0.05770079
102	05BH008	BOW RIVER BELOW BEARSPAW DAM	192.0	1.43363	0.857	4.48942	0.606	1.43735	0.52	0.65500	0.514012	0.389078	0.010234	0.562094	0.020734	0.384465	0.02876349
103	05CB005	BEAVERDAM CREEK NEAR COCHRANE	46.0	1.73248	0.924	5.83981	0.661	0.962	0.456	0.68200	0.605819	0.39203		0.696849	0.087112	0.183211	0.03067751
104	05BL012	SHEEP RIVER AT OKOTOKS	393.5	1.64015	0.897	5.84848	0.665	2.14143	0.596	0.73800	0.577542	0.371923	0.017949	0.716028		0.246691	0.03336045
105	05BJ010	ELBOW RIVER AT SARCEE BRIDGE	317.5	1.70632	0.916	5.77834	0.657	2.00908	0.585	0.74100	0.699166	0.235817	0.03478	0.585994	0.007331	0.362777	0.0417749
106	05BK002	FISH CREEK NEAR MIDNAPORE	164.6	1.83493	0.944	6.62077	0.687	2.41059	0.627	0.78400	0.536061	0.35285		0.479927	0.011273	0.477415	0.02797981
107	05BH004	BOW RIVER AT CALGARY	89.0	1.50419	0.876	8.04154	0.72	3.36761	0.678	0.78900	0.130167	0.155775		0.21883	0.029499	0.737151	0.00881161
108	05BL016	TONGUEFLAG CREEK NEAR HIGH RIVER	266.3	1.72772	0.921	7.55182	0.711	2.87381	0.647	0.79300	0.960279		0.037649	0.651102		0.340423	0.00640225

109	05BH904	BEDDINGTON CREEK NEAR CALGARY	241.8	1.45938	0.865	8.98046	0.746	3.93099	0.724	0.82000	0.410904	0.586927		0.436645	0.018501	0.453033	0.08620751
110	05BL020	SHEEP RIVER NEAR ALDERSYDE	71.9	2.19231	0.966	9.37608	0.754	3.70357	0.704	0.84000	0.807935	0.116831	0.004813	0.547977	0.002406	0.405462	0.03842752
111	05CB001	LITTLE RED DEER RIVER NEAR THE MOUTH	2078.5	1.75601	0.932	11.49726	0.835	3.78857	0.715	0.85800	0.542478	0.339555	0.039743	0.266213	0.189869	0.408691	0.08784509
112	05BJ005	ELBOW RIVER ABOVE GLENMORE DAM	34.0	1.90925	0.949	10.4552	0.787	4.39939	0.765	0.87000	0.299345	0.149696		0.281457		0.698475	0.01798896

Ecoregion: Moist Mixed Grassland																		
											Runoff Potential							
				Agricultural Indicators						Agriculture Intensity	Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05FC007	YOUNG CREEK NEAR CASTOR	76.5	0.7871	0.644	4.8069	0.62	3.15	0.667	0.63200	0.963888	0.014183		0.843292		0.102174	0.050979
2	05FD006	COPPER CREEK NEAR CORONATION	69.2	0.78708	0.642	4.8068	0.618	3.14993	0.665	0.63000	0.848829	0.136247		0.76249	0.000482	0.158112	0.075
3	05GA003	MONITOR CREEK NEAR MONITOR	267.6	1.00748	0.718	4.56896	0.609	2.45902	0.63	0.64700	0.460728	0.459671	0.062353	0.80465	0.044049	0.116418	0.030434
4	05GA005	GOOSEBERRY LAKE NEAR CONSORT	74.4	0.80583	0.65	2.09269	0.452	0.89465	0.441	0.50600	0.276368	0.664248		0.736975	0.108779	0.145655	0.004228
5	05GA009	KIRKPATRICK LAKE TRIBUTARY NEAR SPOND	221.9	0.6722	0.56	3.39907	0.539	2.43649	0.628	0.56700	0.602991	0.393357		0.782365		0.166179	0.047804
6	05GA013	LOYALIST CREEK NEAR CONSORT	261.1	1.03397	0.725	5.21565	0.629	3.01383	0.655	0.66300	0.50681	0.468043		0.859227	0.092568	0.009731	0.029478
7	SOUNDLA	SOUNDING LAKE NEAR MONITOR	3708.8	0.53402	0.494	2.37132	0.47	1.43977	0.521	0.48200	0.171692	0.63526	0.03078	0.496131	0.145261	0.26552	0.039346
8	SULLIVA	SULLIVAN LAKE NEAR SULLIVAN LAKE	1977.6	0.63622	0.548	3.6344	0.548	2.52654	0.633	0.56700	0.491073	0.310326	0.129265	0.818412	0.038978	0.05515	0.083766
9	05AC012	LITTLE BOW RIVER BELOW TRAVERS DAM	39.7	2.37377	0.976	7.52271	0.709	3.34059	0.677	0.83100	0.273628	0.569715		0.528814	0.067249	0.382029	0.01939
10	05AC022	LAKE MCGREGOR AT SOUTH DAM	650.3	0.40677	0.42	6.21243	0.673	4.048	0.734	0.60000	0.276614	0.594391	0.050803	0.849985	0.071308	0.025716	0.046405
11	05AC030	SNAKE CREEK NEAR VULCAN	349.6	0.67492	0.563	11.04875	0.811	6.63559	0.881	0.77800	0.707903	0.140399	0.138345	0.796651	0.13147	0.01837	0.051155
12	05AC922	LITTLE BOW RESERVOIR NEAR ENCHANT	26.5	0.46867	0.451	5.1992	0.628	3.75783	0.71	0.59100	0.070056	0.698284		0.60579	0.173375	0.171757	0.046382
13	05BM004	BOW RIVER BELOW BASSANO DAM	2238.6	0.85566	0.674	9.60602	0.76	5.50663	0.814	0.77400	0.589788	0.301475	0.039539	0.657481	0.100643	0.184371	0.062678
15	05BM007	PARFLESH CREEK NEAR CHANCELLOR	128.3	0.3437	0.372	11.26843	0.819	7.47796	0.926	0.71800	0.987801	0.00658	0.002866	0.841969	0.069641	0.054325	0.031398
16	05BM008	CROWFOOT CREEK NEAR CLUNY	1243.4	0.57326	0.516	11.50011	0.837	7.2288	0.916	0.78400	0.606496	0.300588	0.080687	0.75148	0.152913	0.046553	0.046421
17	05BM013	CLUNY SPILLWAY NEAR CLUNY	178.0	1.03776	0.728	11.385	0.827	6.20515	0.849	0.83600	0.701093	0.022481	0.115661	0.60319	0.072182	0.289025	0.03305
18	05BM014	WEST ARROWWOOD CREEK NEAR ARROWWOOD	767.3	0.69219	0.573	10.99778	0.808	6.31663	0.856	0.77300	0.835034	0.09977	0.035684	0.625506	0.294954	0.027114	0.021908
19	05BM018	WEST ARROWWOOD CREEK NEAR ENSIGN	29.5	0.68995	0.571	11.31328	0.821	6.77662	0.889	0.79000	0.990197	0.007186		0.664076	0.333308		
20	05CE003	ROSEBUD RIVER AT BEYNON	251.9	0.34769	0.377	11.14826	0.813	7.43262	0.924	0.71200	0.343332	0.594025	0.016952	0.503455	0.354845	0.112421	0.026565
21	05CE008	ATUSIS CREEK NEAR REDLAND	76.4	0.36204	0.39	11.38726	0.829	7.49437	0.928	0.72700	0.808425	0.186808		0.647864	0.231322	0.114885	0.003332

22	05CE009	SEVERN CREEK NEAR ROSEBUD	158.0	0.35792	0.385	10.92943	0.807	7.34636	0.921	0.71000	0.49702	0.473144	0.027186	0.322194	0.558669	0.104298	0.012189
23	05CE020	MICHICHI CREEK AT DRUMHELLER	1167.7	0.42931	0.431	10.06545	0.776	5.99326	0.839	0.67400	0.503968	0.471206	0.015345	0.698893	0.163818	0.075419	0.057089
24	05CG002	BULLPOUND CREEK NEAR HANNA	12.7	0.51599	0.483	2.92192	0.507	2.60857	0.635	0.53600	0.035756	0.877793		0.786293	0.115787	0.024357	0.064365
25	05CG004	BULLPOUND CREEK NEAR WATTS	199.9	0.5938	0.529	6.44911	0.682	4.23472	0.749	0.64400	0.242317	0.682105		0.619555	0.090585	0.256427	0.026599
26	05CG005	ATLAS MINE COULEE AT WESTERN MONARCH	51.3	0.35819	0.387	10.91411	0.805	7.33683	0.919	0.70900	0.2942	0.702898		0.54704	0.24832	0.122788	0.075773
27	05CG006	FISH CREEK ABOVE LITTLE FISH LAKE	117.7	0.69409	0.575	3.89066	0.566	1.55369	0.54	0.54800	0.858012	0.123597	0.015296	0.772982	0.099277	0.110712	0.013933
28	DOWLING	DOWLING LAKE NEAR DOWLING	1179.9	0.56228	0.507	5.47988	0.641	3.92844	0.722	0.61300	0.364357	0.52873	0.025846	0.641094	0.123471	0.167198	0.063285
29	05AB002	WILLOW CREEK NEAR NOLAN	98.6	2.71718	0.981	10.6886	0.8	4.14398	0.737	0.87600	0.807032	0.076538	0.107475	0.674319	0.18015	0.138128	0.005242
30	05AB007	OLDMAN RIVER NEAR FORT MACLEOD	168.4	1.24686	0.819	6.89801	0.692	2.16101	0.598	0.71900	0.486525	0.211277	0.143894	0.491789	0.225138	0.255367	0.025689
31	05AB015	WILLOW CREEK NEAR GRANUM	277.8	2.97408	0.985	10.59698	0.794	4.3022	0.759	0.88900	0.760212	0.02669	0.171715	0.575868	0.134607	0.258816	0.028608
32	05AC003	LITTLE BOW RIVER AT CARMANGAY	1077.8	1.39481	0.846	11.34843	0.824	5.92943	0.834	0.86400	0.729057	0.082613	0.166594	0.545532	0.102356	0.303127	0.046792
33	05AC006	KEHO LAKE RESERVOIR NEAR ALBION RIDGE	77.4	4.34654	0.993	15.16666	0.929	6.60235	0.877	0.97200	0.737359	0.032499	0.021559	0.943364	0.032313	0.018155	0.003833
34	05AC023	LITTLE BOW RIVER NEAR THE MOUTH	544.3	3.06898	0.987	11.22347	0.816	5.02581	0.804	0.91400	0.398596	0.391302	0.163018	0.710981	0.06899	0.204086	0.013446
35	05AC032	CLEAR LAKE NEAR STAVELY	163.4	4.10369	0.992	14.70567	0.909	6.51178	0.872	0.96600	0.614838	0.245999	0.122839	0.596641	0.156189	0.193208	0.051835
36	05AC033	CLEAR BROOK NEAR STAVELY	180.7	4.3536	0.995	15.17315	0.931	6.60294	0.879	0.97400	0.780642	0.086198	0.13101	0.813152	0.130785	0.035295	0.018617
37	05AC921	TRAVERS RESERVOIR NEAR ENCHANT	1555.4	2.32213	0.974	12.1692	0.856	6.03088	0.841	0.93800	0.676296	0.087662	0.192351	0.732957	0.067933	0.16104	0.035746
38	05AD007	OLDMAN RIVER NEAR LETHBRIDGE	1437.6	1.23005	0.812	10.8157	0.803	3.60777	0.695	0.81100	0.523857	0.210426	0.150637	0.68952	0.073565	0.216714	0.017976
39	05AD019	OLDMAN RIVER NEAR MONARCH	822.8	2.72788	0.982	11.46856	0.834	4.2433	0.752	0.90500	0.726556	0.056149	0.112836	0.634647	0.169538	0.170639	0.023054
40	05AD034	NOLAN COULEE NEAR COALDALE	114.1	4.89177	0.998	31.20619	1	16.00435	0.998	0.99900	0.383846		0.579254	0.946317	0.001307	0.043842	0.006093
41	05AE016	POTHOLE CREEK AT RUSSELL'S RANCH	71.7	2.04666	0.96	21.21646	0.988	8.35104	0.949	0.99000	0.928497	0.001869	0.063856	0.735653	0.065486	0.196283	0.000187
42	05AE042	NINE MILE COULEE NEAR LETHBRIDGE	158.7	1.69397	0.909	18.32933	0.968	7.26454	0.918	0.97100	0.446398	0.29891	0.252267	0.854938	0.092961	0.029918	0.019758
43	05AF029	STIRLING LAKE OUTFLOW NEAR STIRLING	410.1	1.76469	0.935	19.76741	0.976	7.9211	0.941	0.98300	0.633842	0.189901	0.15225	0.908153	0.013201	0.041618	0.034566
44	05AG008	BOUNTIFUL COULEE NEAR CRANFORD	795.2	2.77913	0.984	22.64921	0.993	11.99432	0.994	0.99600	0.536819	0.139267	0.287021	0.830206	0.119726	0.027299	0.020023
45	11AA004	MILK RIVER AT MACKIE'S RANCH	142.2	0.44813	0.44	2.55553	0.488	1.13499	0.476	0.46400	0.292157	0.523316		0.312758	0.375111	0.008622	0.118982

46	11AA005	MILK RIVER AT MILK RIVER	421.6	0.42996	0.432	2.52393	0.483	1.10719	0.473	0.45600	0.184077	0.801347	0.003922	0.193112	0.521712	0.186528	0.093015
47	11AA039	VERDIGRIS LAKE TRIBUTARY NEAR MILK RIVER	72.7	0.61611	0.537	6.77033	0.69	3.05113	0.657	0.61900	0.32421	0.673145		0.919566	0.046796	0.024933	0.00606
48	TYRELLL	TYRRELL LAKE NEAR WARNER	465.3	0.89861	0.684	11.34437	0.822	4.7189	0.78	0.79800	0.571429	0.370103	0.038221	0.800117	0.111551	0.065483	0.020258
49	BATTERSEA	BATTERSEA DRAIN	71.1	4.35207	0.992	15.17856	0.927	6.60639	0.875	0.97700							
50	CROWFOOT	CROWFOOT CREEK	1079.0	0.60476	0.532	11.7021	0.838	7.26545	0.915	0.80000							

Ecoregion: Fescue Grasslands, Cypress Hills

				Agricultural Indicators						Runoff Potential							
											Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Agriculture Intensity Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05AC031	MOSQUITO CREEK NEAR THE MOUTH	313.9	2.21655	0.968	13.50442	0.886	5.89617	0.831	0.94200	0.855042	0.125411	0.011383	0.573803	0.04705417	0.296677	0.080358393
2	05BH001	BOW RIVER AT C.P.R. HEADGATES IN CALG	30.1	1.05684	0.744	14.51206	0.904	6.79325	0.892	0.89200						0.997728	
3	05BH002	BOW RIVER AT CUSHING BRIDGE NEAR CALG	0.9	0.94561	0.699	15.03779	0.915	7.1038	0.911	0.87800						0.995007	
4	05BH003	NOSE CREEK AT CALGARY	722.9	1.4291	0.856	13.15494	0.88	4.90696	0.794	0.88300	0.675964	0.173599	0.005999	0.480237	0.00448028	0.35784	0.043811777
5	05BH901	NOSE CREEK NEAR THE MOUTH	13.3	1.14806	0.781	14.05435	0.893	5.90677	0.832	0.87300						0.998001	
6	05BJ001	ELBOW RIVER BELOW GLENMORE DAM	12.1	0.94603	0.701	15.03839	0.917	7.10392	0.913	0.88300						0.99789	
7	05BK003	FISH CREEK AT BOW BOTTOM TRAIL	14.3	1.0404	0.729	14.58901	0.905	6.83878	0.899	0.88600	0.038227	0.19928		0.087893	0.00280417	0.906102	0.000701043
8	05BL004	HIGHWOOD RIVER BELOW LITTLE BOW CANAL	0.1	1.635	0.895	14.74504	0.91	6.2735	0.854	0.95300					0.5167375	0.516738	
9	05BL009	HIGHWOOD RIVER NEAR ALDERSYDE	89.1	1.6763	0.902	14.21951	0.897	6.04799	0.842	0.92400	0.849985		0.138362	0.34065	0.00759885	0.646805	0.002764681
10	05BL024	HIGHWOOD RIVER NEAR THE MOUTH	75.3	1.0925	0.756	14.65534	0.907	6.88234	0.903	0.90200	0.693627	0.280228	0.023915	0.482647	0.09105082	0.379802	0.043825265
11	05BM002	BOW RIVER BELOW CARSELAND DAM	1152.2	1.11691	0.766	13.482	0.885	6.26495	0.852	0.87000	0.648424	0.177899	0.028763	0.694615	0.01734423	0.246894	0.036773726
12	05CE002	KNEEHILLS CREEK NEAR DRUMHELLER	902.5	1.03525	0.726	14.87753	0.912	7.66232	0.933	0.90500	0.902042	0.040606	0.039043	0.564936	0.14491819	0.257347	0.014890759
13	05CE005	ROSEBUD RIVER AT REDLAND	2741.0	1.1058	0.761	13.73197	0.888	6.79339	0.894	0.89400	0.811938	0.046011	0.081116	0.580102	0.12363983	0.262423	0.03130017
14	05CE006	ROSEBUD RIVER BELOW CARSTAIRS CREEK	283.6	1.36983	0.842	16.25536	0.947	6.74213	0.884	0.93900	0.742396	0.130536	0.124747	0.48318	0.00040561	0.455249	0.058844288
15	FRANKLA	FRANK LAKE NEAR HIGH RIVER	395.9	1.39047	0.845	15.0973	0.923	6.8102	0.897	0.93300	0.899697	0.042896	0.038792	0.867818	0.03816636	0.057423	0.034385177
16	05AA001	OLDMAN_RIV	303.2	1.18212	0.796	6.3705	0.679	2.27195	0.613	0.70500	0.714099	0.089308	0.139053	0.734247	0.03804183	0.207699	0.018133751
17	05AA006	TODD CREEK AT ELTON'S RANCH	70.1	0.76171	0.614	4.08913	0.575	1.46889	0.523	0.55900	0.840175	0.157701	0.000252	0.851023	0.00502507	0.130619	0.011461151
18	05AA024	OLDMAN RIVER NEAR BROCKET	372.9	1.40732	0.848	7.73454	0.716	2.62541	0.637	0.76200	0.678835	0.104223	0.114715	0.720861	0.03325395	0.261643	0.012917169
19	05AB005	TROUT CREEK NEAR GRANUM	21.9	1.16397	0.786	1.65598	0.414	0.36383	0.304	0.80100	0.836773	0.090027	0.070841	0.37232	0.38067461	0.224452	0.020194245

20	05AB006	MEADOW CREEK AT HART'S RANCH	101.6	1.28557	0.824	3.22527	0.526	0.82098	0.418	0.53400	0.926833	0.060643	0.010528	0.874295	0.02484936	0.074625	0.024233557
21	05AB012	OLDMAN RIVER AT CANAL INTAKE	780.1	1.41938	0.851	8.09498	0.722	2.87944	0.648	0.77000	0.630412	0.207476	0.101213	0.815349	0.03884414	0.126575	0.017319811
22	05AB013	BEAVER CREEK NEAR BROCKET	202.3	1.19517	0.8	2.37209	0.472	0.4757	0.361	0.54400	0.855337	0.130432	0.005005	0.862061	0.0239349	0.070215	0.041841051
23	05AB014	FIVE MILE CREEK NEAR SPRING POINT	53.1	1.16842	0.791	1.93053	0.441	0.37669	0.316	0.50800	0.998091			0.81813		0.153152	0.026810123
24	05AB021	WILLOW CREEK NEAR CLARESHOLM	424.9	1.80331	0.943	4.43953	0.601	1.65409	0.56	0.71600	0.671923	0.290585	0.035451	0.72073	0.0857241	0.158958	0.032547172
25	05AB029	MEADOW CREEK NEAR THE MOUTH	28.5	1.28557	0.824	3.22527	0.526	0.82098	0.418	0.75400	0.560304	0.180968	0.256217	0.534283	0.43020224	0.008588	0.024416893
26	05AB038	KYISKAP CREEK NEAR GRANUM	188.5	1.42009	0.853	4.64193	0.614	1.33235	0.508	0.65200	0.560453	0.346103	0.091419	0.832021	0.10970714	0.047302	0.008944647
27	05AC001	MOSQUITO CREEK NEAR NANTON	522.4	1.68113	0.905	5.64499	0.647	2.04874	0.59	0.72900	0.756699	0.238828	0.002436	0.733245	0.02475375	0.223681	0.016283189
28	05AC002	NANTON CREEK NEAR NANTON	119.0	1.58774	0.889	4.20637	0.58	1.4792	0.525	0.66000	0.630478	0.367462		0.652879	0.02000362	0.309631	0.015426464
29	05AD002	BELLY RIVER NEAR STAND OFF	431.8	0.89487	0.68	9.66409	0.762	3.68126	0.7	0.73200	0.749123	0.112442	0.112821	0.79332	0.0235352	0.159127	0.021990838
30	05AD008	WATERTON RIVER NEAR STAND OFF	103.5	1.17124	0.793	14.18855	0.894	5.1094	0.806	0.86200	0.541826	0.108253	0.347949	0.747858	0.0192802	0.229951	0.000938331
31	05AD018	BULLHORN COULEE NEAR CARDSTON	118.1	1.73528	0.928	4.28202	0.591	1.59865	0.548	0.69600	0.440074	0.509183		0.899027		0.058938	0.040046143
32	05AD026	WATERTON RESERVOIR	312.0	1.33432	0.832	3.05059	0.516	1.21867	0.494	0.61000	0.34757	0.502185	0.012434	0.60687	0.00034396	0.242522	0.038474735
33	05AD028	WATERTON RIVER NEAR GLENWOOD	226.5	1.4577	0.864	11.54081	0.84	4.34304	0.762	0.85000	0.610766	0.127741	0.215371	0.767644	0.01669909	0.204991	0.008646598
34	05AD035	PRAIRIE BLOOD COULEE NEAR LETHBRIDGE	225.6	0.20752	0.274	3.8243	0.548	0.84256	0.42	0.40200	0.535476	0.183887	0.278494	0.802439	0.07870574	0.078158	0.038554359
35	05AD041	BELLY RIVER NEAR GLENWOOD	280.6	1.45205	0.862	6.92955	0.693	2.62971	0.638	0.75600	0.38068	0.367903	0.11014	0.734648	0.00075311	0.216463	0.04624754
36	05AD901	FOOTHILLS CREEK NEAR PINCHER CREEK	132.3	1.47716	0.872	3.35095	0.535	1.34799	0.511	0.62800	0.427855	0.55778	0.008748	0.840414	0.00160445	0.085142	0.070986481
37	05AE002	LEE CREEK AT CARDSTON	77.0	1.62141	0.894	5.63431	0.644	2.12432	0.593	0.72100	0.633778	0.301354		0.791083	0.00934132	0.189812	0.007820877
38	05AE006	ST. MARY RIVER NEAR LETHBRIDGE	209.4	0.48306	0.466	5.62678	0.642	2.17037	0.6	0.55600	0.647427	0.055558	0.016677	0.588385	0.08223041	0.307076	0.017166022
39	05AE008	LEE CREEK AT LAYTON'S RANCH	54.9	1.73531	0.93	4.28207	0.593	1.59867	0.55	0.69100	0.645631	0.352371		0.804371	0.00066859	0.17352	0.019443221
40	05AE009	PINEPOUND CREEK NEAR SPRING COULEE	206.8	0.79163	0.647	11.64619	0.843	4.45095	0.769	0.78100	0.313169	0.684693		0.849219	0.04390905	0.039038	0.065696497
41	05AE011	POTHOLE CREEK NEAR MAGRATH	45.5	0.8319	0.66	12.64198	0.87	4.84203	0.787	0.81200	0.581213	0.416447		0.723517	0.19265834	0.077539	0.003945146
42	05AE012	POTHOLE CREEK NEAR MAGRATH (LOWER STA	166.2	1.22453	0.81	15.79653	0.94	6.12471	0.847	0.91300	0.543809	0.406082	0.012146	0.85861	0.061983	0.074885	2.26676E-05

43	05AE020	ROLPH CREEK NEAR TAYLORVILLE	29.1	0.77937	0.638	5.8668	0.666	2.2404	0.607	0.62500	0.248289	0.359343		0.382607	0.00082046	0.196835	0.008808767
44	05AE025	ST. MARY RESERVOIR NEAR SPRING COULEE	511.0	0.83763	0.666	8.25776	0.725	3.21572	0.672	0.69000	0.457359	0.327151	0.014588	0.77996	0.01278772	0.15651	0.026990336
45	05AE041	DRY COULEE NEAR MAGRATH	54.9	1.36255	0.837	15.1225	0.926	5.95096	0.836	0.91100	0.79071	0.206199	0.000809	0.800632	0.13695497	0.044605	
46	05AE912	AETNA CREEK AT HIGHWAY NO. 501	33.5	1.73518	0.927	4.28284	0.594	1.59897	0.551	0.69600	0.652864	0.345063		0.9519	0.03424438	0.00964	0.002142321
47	05BL003	HIGHWOOD RIVER AT HIGH RIVER	289.1	1.41232	0.849	6.28453	0.674	2.36792	0.623	0.73500	0.81909		0.08408	0.570139	0.03772244	0.36222	0.027870127
48	05AE005	ROLPH CREEK NEAR KIMBALL	105.7	0.73101	0.595	10.4082	0.783	3.9688	0.729	0.71600	0.258934	0.706111		0.849434	0.01875515	0.042202	0.051994842
49	05AE024	POTHOLE COULEE RESERVOIR NEAR MAGRATH	325.8	0.55108	0.5	5.69679	0.653	2.11444	0.591	0.57300	0.41969	0.559145		0.82085	0.03832474	0.114594	0.023981193
50	05AF030	MILK RIVER RIDGE RESERVOIR	180.3	0.83164	0.658	9.88486	0.771	4.01035	0.73	0.74500	0.177684	0.738819		0.755383	0.17903488	0.039913	0.023202867
51	11AA003	NORTH BRANCH OF MILK RIVER NEAR MACKIE'S RANCH	486.2	0.50233	0.473	4.24002	0.585	1.62003	0.555	0.53000	0.181394	0.788317	0.00506	0.457655	0.24166902	0.183396	0.095146637
52	05AF010	MANYBERRIES CREEK AT BRODIN'S FARM	338.3	0.40202	0.417	0.89215	0.33	0.45172	0.349	0.36000	0.679616	0.296406	0.019747	0.842287	0.0349115	0.100203	0.018368154
53	05AH002	MACKAY CREEK AT WALSH	65.0	0.45893	0.447	1.525	0.4	0.75294	0.403	0.40900	0.718499	0.133964	0.044183	0.62093	0.12051535	0.107952	0.038657719
54	05AH003	ROSS CREEK NEAR IRVINE	345.0	0.71605	0.586	4.42091	0.599	3.20939	0.67	0.61100	0.563417	0.287302	0.14476	0.752375	0.07092875	0.150087	0.022088187
55	05AH006	MACKAY CREEK AT GRANT'S RANCH	170.5	0.55481	0.503	3.03998	0.513	2.13213	0.595	0.53000	0.566028	0.198352	0.011393	0.637334	0.04702155	0.076219	0.015198877
56	05AH007	MCALPINE CREEK AT SCHNELL'S RANCH	104.9	0.7637	0.616	4.97229	0.625	3.70759	0.705	0.64100	0.623129	0.344866	0.027254	0.786216	0.07042209	0.072893	0.065718034
57	05AH009	GROS VENTRE CREEK AT TOTHILL'S RANCH	94.2	0.55584	0.505	2.38793	0.473	1.70982	0.563	0.50000	0.531999	0.463521		0.779812	0.12175731	0.052731	0.041220237
58	05AH010	BULLSHEAD CREEK AT CLARK'S RANCH	205.7	0.62556	0.541	3.16363	0.521	2.30011	0.618	0.55200	0.664211	0.320155	0.008544	0.730496	0.14402333	0.088676	0.032416557
59	05AH013	BULLSHEAD CREEK NEAR WOOLCHESTER	111.3	0.77355	0.633	5.26291	0.633	3.93109	0.725	0.65700	0.81917	0.176634		0.825983	0.05402278	0.110293	0.00550462
60	05AH036	ROSS CREEK AT KOENIG'S RANCH	59.3	0.56466	0.508	2.42672	0.478	1.71585	0.565	0.50300	0.475394	0.476223	0.043778	0.679479	0.08889958	0.156394	0.070622017
61	05AH037	GROS VENTRE CREEK NEAR DUNMORE	121.2	0.83326	0.661	5.83286	0.658	4.37345	0.764	0.69800	0.614026	0.381586		0.789283	0.05702625	0.102997	0.046304976
62	05AH038	PARADISE CREEK NEAR SEVEN PERSONS	223.7	0.71991	0.589	4.57024	0.61	3.28618	0.675	0.61700	0.594576	0.366348	0.035037	0.829241	0.05337127	0.097172	0.014929355
63	05AH041	PEIGAN CREEK NEAR PAKOWKI ROAD	438.2	0.47198	0.456	1.32848	0.381	0.79316	0.414	0.40900	0.457618	0.513215	0.025044	0.852114	0.03382694	0.091039	0.018621792

64	05AH042	MACKAY CREEK NEAR GRABURN GAP	77.0	0.45696	0.443	0.66871	0.291	0.16567	0.195	0.30300	0.548119	0.447085		0.658603	0.14617458	0.177304	0.013123011
65	05AH043	EAST MCALPINE CREEK NEAR ELKWATER LAK	20.1	0.76857	0.63	5.22724	0.631	4.01185	0.732	0.65800	0.35041	0.644737		0.910704	0.01674712		0.067695575
66	05AH046	ROSS CREEK AT OUTLET OF ELKWATER LAKE	28.8	0.39467	0.412	0.6722	0.295	0.1188	0.16	0.28300	0.871681		0.017087	0.329838	0.55083149	0.112378	0.002399398
67	11AB007	LODGE CREEK AT HARTT'S RANCH	127.2	0.45975	0.448	0.79891	0.314	0.13431	0.17	0.30700	0.990926	0.004557		0.387117	0.32394202	0.265273	0.019150457
68	11AB009	MIDDLE CREEK NEAR THE SASKATCHEWAN BOUNDARY	244.5	0.41819	0.426	0.77604	0.311	0.16414	0.19	0.30000	0.80709	0.160644	0.027556	0.510907	0.28953001	0.148608	0.040523437
69	11AB023	LODGE CREEK AT HESTER'S RANCH	215.6	0.23741	0.293	0.64389	0.282	0.28654	0.269	0.27400	0.63982	0.274625	0.041541	0.64636	0.06086449	0.24399	0.004771194
70	11AB063	THELMA CREEK AT ENGLISH'S RANCH	33.0	0.00652	0.061	0.01133	0.041	0.0019	0.021	0.05100	0.995532			0.397666	0.47225191	0.099002	0.026612317
71	11AB080		66.6	0.29303	0.344	0.5092	0.245	0.0856	0.127	0.22800	0.374133	0.29341		0.389977	0.15489139	0.111266	0.011409481
72	11AB090	REESOR RESERVOIR NEAR ELKWATER	3.7	0.56697	0.511	0.98523	0.347	0.16563	0.193	0.35200	0.988874	0.005179		0.135443	0.32423787	0.508511	0.025861183
73	11AB091	MICHEL RESERVOIR NEAR ELKWATER	23.0	0.4784	0.462	0.7004	0.301	0.17336	0.205	0.32100	0.802093	0.193111		0.505842	0.22813407	0.260509	0.00071864
74	11AB092	GREASEWOOD RESERVOIR NEAR ELKWATER	9.6	0.50929	0.477	0.79976	0.315	0.17066	0.202	0.33000	0.99584			0.973345	0.02171507	0.000639	0.000141937
75	11AB093	YEAST RESERVOIR NEAR ELKWATER	2.6	0.56691	0.51	0.98513	0.346	0.16562	0.192	0.34900	0.993725			0.676006		0.317718	
76	11AB094	BARE CREEK RESERVOIR NEAR ELKWATER	24.2	0.40208	0.418	0.50608	0.244	0.22025	0.23	0.28900	0.873894	0.121778		0.847717	0.0604319	0.086621	0.000903423
77	11AB099	MITCHELL RESERVOIR NEAR ELKWATER	60.5	0.52019	0.484	0.90393	0.331	0.15196	0.18	0.33200	0.984497	0.007875		0.467833	0.41295687	0.0702	0.040808133
78	11AB104	MASSY RESERVOIR NEAR ELKWATER	13.2	0.5517	0.502	0.93615	0.338	0.16696	0.198	0.34700	0.995453			0.453262	0.25134799	0.239344	0.051498419
79	11AB111	GRABURN CREEK NEAR THE MOUTH	41.8	0	0	0	0	0	0	0.00000	0.995214			0.710107	0.27408262	0.009921	0.00110237
80	11AB117		65.3	0.06531	0.173	0.11349	0.127	0.01908	0.06	0.13700	0.987119			0.620012	0.2516257	0.10749	0.007991529
81	11AB902	LODGE CREEK AT HIGHWAY NO. 41	81.5	0.5475	0.499	0.97674	0.342	0.20989	0.227	0.35500	0.908126	0.074735	0.012678	0.423603	0.20420099	0.333984	0.033751582
82	MEADOW	MEADOW CREEK	130.1	1.28549	0.816	3.22508	0.506	0.82093	0.396	0.58200							
83	TROUT	TROUT CREEK	440.2	1.16396	0.788	1.65597	0.397	0.36382	0.264	0.48700							
84	WILLOW	UPPER WILLOW CREEK	65.2	0.1014	0.205	0.15181	0.147	0.0406	0.088	0.15700							

Ecoregion: Mixed Grassland																		
											Runoff Potential							
				Agricultural Indicators						Agriculture Intensity	Landform Characteristics			Soil Characteristics			
	Watershed Code	Watershed Name	Area (km²)	Manure Production (tonne per acre)	Manure Production (Percentile)	Fertilizer Expenses (dollars per acre)	Fertilizer Expenses (Percentile)	Chemical Expenses (dollar per acre)	Chemical Expenses (percentile)	Overall Percentile	Type I	Type II	Type III	High (%)	Moderate (%)	Low (%)	Unknown (%)
1	05AH004	BULLSHEAD CREEK NEAR DUNMORE	110.0	0.65419	0.552	4.01436	0.57	2.18385	0.602	0.56100	0.609592	0.344025	0.009912	0.674022	0.07612643	0.217219	0.02540154
2	05AH012	BULLSHEAD CREEK AT BURTON'S RANCH	96.3	0.54512	0.497	3.17689	0.523	1.80764	0.571	0.51900	0.558572	0.43729		0.699233	0.10411609	0.179136	0.01337767
3	05AH032	ROSS CREEK NEAR PASHLEY	148.0	0.42596	0.429	2.09408	0.454	1.28999	0.506	0.45300	0.297208	0.588924	0.109302	0.470675	0.47004652	0.046441	0.00607643
4	05AH040	MACKAY CREEK NEAR WALSH	230.1	0.48406	0.467	2.10771	0.456	1.25344	0.501	0.46700	0.686815	0.165952	0.142499	0.686833	0.2033197	0.086113	0.0189361
5	05AH047	SAM LAKE TRIBUTARY NEAR SCHULER	82.4	0.25042	0.306	1.75856	0.43	1.96884	0.58	0.42400	0.380736	0.577656	0.036813	0.487497	0.462585	0.045124	
6	05AH048	CAVAN LAKE NEAR DUNMORE	11.5	0.52191	0.486	1.60688	0.409	0.77086	0.409	0.42800	0.207943	0.787906		0.870889	0.00015516	0.063544	0.06126073
7	05AH049	ROSS CREEK AT MEDICINE HAT	174.1	0.5871	0.522	3.53034	0.543	1.77483	0.57	0.53700	0.594875	0.318387	0.010686	0.543355	0.17630287	0.26212	0.01380784
8	05AH050		60.3	0.27009	0.325	1.39918	0.385	0.87048	0.431	0.36600	0.531404	0.203671	0.070458	0.412178	0.38900209	0.004262	9.0802E-05
9	05AK001	SOUTH SASKATCHEWAN RIVER AT HIGHWAY N	4828.3	0.24128	0.3	1.52783	0.401	0.92632	0.449	0.36800	0.271525	0.599492	0.014479	0.325416	0.33042126	0.307833	0.0194092
10	05CK002	RED DEER RIVER NEAR EMPRESS	1167.0	0.29346	0.345	2.0301	0.446	1.48501	0.526	0.42600	0.46889	0.358627	0.037929	0.342863	0.2107294	0.401153	0.03969554
11	05CK004	RED DEER RIVER NEAR BINDLOSS	2399.6	0.20725	0.273	0.68565	0.298	0.7688	0.406	0.31800	0.315694	0.635867	0.002591	0.519986	0.21607229	0.203695	0.05559679
12	05CK005	ALKALI CREEK NEAR THE MOUTH	590.2	0.22728	0.287	0.99551	0.35	1.48594	0.528	0.36900	0.440971	0.5074	0.047258	0.539232	0.23918869	0.171579	0.03982381
13	05CK006	KENNEDY COULEE NEAR ACADIA VALLEY	940.4	0.20957	0.276	2.68937	0.5	2.70663	0.642	0.46500	0.360654	0.549232	0.083509	0.664509	0.17250243	0.110668	0.04542561
14	05GA008	SOUNDING CREEK NEAR OYEN	685.3	0.32497	0.363	1.19517	0.368	1.49358	0.533	0.41000	0.432275	0.54782	0.011435	0.830515	0.06687237	0.054689	0.04061765
15	05GA011	MONITOR CREEK NEAR CONSORT	914.1	0.38875	0.41	1.91745	0.438	1.3694	0.513	0.44300	0.729651	0.116421	0.098547	0.830684	0.00015587	0.141099	0.02135769
16	05GA012	SOUNDING CREEK NEAR CHINOOK	2078.8	0.4391	0.437	0.96401	0.339	0.83853	0.426	0.38000	0.463596	0.176892	0.154003	0.71063	0.00584623	0.237612	0.04021582
17	05HA061		1497.9	0.11526	0.224	0.62969	0.275	0.4536	0.352	0.27400	0.13226	0.276164	0.039199	0.163541	0.18184563	0.092767	0.01917163
18	05BN002	TWELVE MILE CREEK NEAR CECIL	2803.1	0.47001	0.453	3.34464	0.534	1.50612	0.538	0.49300	0.500174	0.254635	0.212177	0.808994	0.09377683	0.078201	0.0144218
19	05CG001	BULLPOUND CREEK NEAR HUTTON	1210.7	0.41341	0.423	1.24621	0.376	1.0016	0.458	0.40600	0.515548	0.400335	0.060186	0.837464	0.02142953	0.096158	0.04122377
20	05CG003	BULLPOUND CREEK NEAR THE MOUTH	42.7	0.40012	0.415	0.50515	0.242	0.42578	0.336	0.32500	0.895676	0.101113		0.899656	0.00219696	0.020307	0.0725696
21	05CH003	BERRY CREEK (EAST BRANCH) NEAR WARDLO	651.4	0.25968	0.312	0.12902	0.135	0.26872	0.26	0.22500	0.580741	0.385944	0.01681	0.894743	0.02139764	0.039589	0.04002439

22	05CH005	DEAD FISH CREEK NEAR HUTTON	270.2	0.41515	0.424	0.38564	0.215	0.35979	0.297	0.30500	0.97897	0.017184	0.00052	0.943126	0.00861419	0.024514	0.01723039
23	05CH006	BARTMAN RESERVOIR ON EAST BERRY CREEK	221.3	0.35919	0.388	0.34452	0.199	0.32859	0.284	0.28500	0.673589	0.320484	0.002257	0.988021	0.00162556		0.00668358
24	05CH008	BERRY CREEK NEAR ROSE LYNN	1550.4	0.43124	0.434	0.65796	0.29	0.67272	0.392	0.36300	0.793934	0.109382	0.090052	0.915635	0.00728387	0.058066	0.01520829
25	05CH009	NATURAL FLOW A NEAR POLLOCKVILLE	3.2	0.39768	0.413	0.38144	0.21	0.3638	0.302	0.29600	0.995325			0.995325			
26	05CH010	BERRY CREEK NEAR POLLOCKVILLE	132.6	0.53432	0.496	0.40032	0.221	0.32953	0.285	0.33300	0.945324	0.002951	0.048239	0.671554	0.04157405	0.201408	0.0819775
27	05CH011	BERRY CREEK RESERVOIR OUTLET	33.8	0.35159	0.38	0.26933	0.188	0.34663	0.294	0.28200	0.866798		0.129636	0.907299	0.02622602	0.02518	0.03772866
28	05CH014	BERRY CREEK RESERVOIR NEAR SUNNYNOOK	349.5	0.33042	0.366	0.35222	0.202	0.34501	0.292	0.28000	0.677701	0.305394		0.95408	0.00456799	0.007137	0.0306885
29	05CJ009	RED DEER RIVER NEAR JENNER	3584.5	0.44411	0.439	2.94376	0.508	1.74293	0.566	0.49200	0.496669	0.405761	0.03236	0.585649	0.11701291	0.253196	0.0400484
30	05CJ011	NATURAL FLOW B NEAR PRINCESS	2.3	0.06976	0.18	0.41947	0.223	0.17829	0.207	0.20500	0.124869	0.870643		0.89596	0.09955115		
31	05CK001	BLOOD INDIAN CREEK NEAR THE MOUTH	130.0	0.28319	0.338	0.0754	0.113	0.33378	0.289	0.23300	0.384912	0.602208	0.009009	0.850581	0.00599219	0.093251	0.04630521
32	05CK003	BLOOD INDIAN CREEK AT HOGARTH'S RANCH	247.7	0.30978	0.355	0.21009	0.172	0.42756	0.339	0.27800	0.464519	0.520225	0.007762	0.971122	0.00045158	6.58E-06	0.02457093
33	05CK007	BLOOD INDIAN CREEK NEAR CABIN LAKE	321.7	0.30681	0.352	0.13631	0.138	0.33882	0.29	0.24400	0.545808	0.443975	0.006394	0.926313	0.04457152	0.005456	0.00941127
34	05AB***		736.9	1.0695	0.748	16.85813	0.955	8.98096	0.969	0.94100	0.597133	0.158619	0.191223	0.553061	0.1701653	0.259861	0.01396044
35	05AF006	ETZIKOM COULEE NEAR GODDARD	1478.6	0.38474	0.406	9.15412	0.749	4.84441	0.789	0.63300	0.660797	0.288716	0.037943	0.897333	0.04672551	0.027803	0.02513799
36	05AF011	ERICKSON COULEE AT E.C. BENNETT'S FAR	24.5	0.51323	0.481	1.28956	0.379	0.87923	0.436	0.42100	0.906593		0.089396	0.499263	0.31679884	0.166844	0.01188741
37	05AF021	COAL CREEK NEAR ORION	53.3	0.48421	0.469	1.20099	0.37	0.82601	0.423	0.41300	0.442249	0.378054	0.175713	0.780934	0.06533349	0.137002	0.0106603
39	05AF027	ETZIKOM COULEE NEAR NEMISCAM	452.3	0.23914	0.295	7.27848	0.703	4.23892	0.75	0.57200	0.69058	0.2995	0.006644	0.894564	0.03079286	0.053999	0.01710654
38	05AF022	GRAYBACK COULEE NEAR ORION	77.0	0.47286	0.458	1.69396	0.421	1.0614	0.468	0.43800	0.39498	0.461908	0.139312	0.926102	0.02391814	0.020805	0.02482735
40	05AF031	RUSH LAKE DRAIN NEAR NEW DAYTON	53.6	1.05099	0.739	14.20254	0.896	6.08341	0.844	0.85600	0.830122	0.060421	0.106523	0.993554		0.003512	
41	05AG024	NATURAL FLOW D NEAR CHIN	3.1	4.60389	0.996	31.03284	0.998	16.0201	1	0.99700	0.713276	0.282776		0.055448	0.15647743	0.780667	0.00345939
42	05AH005	SEVEN PERSONS CREEK AT MEDICINE HAT	501.4	1.35323	0.834	11.89502	0.85	4.27293	0.757	0.84200	0.661503	0.142906	0.162991	0.72365	0.11827896	0.14045	0.00464032
43	05AH033	SEVEN PERSONS CREEK NEAR SEVEN PERSON	265.4	0.61916	0.538	6.1056	0.669	3.13132	0.663	0.61600	0.680804	0.141654	0.100417	0.657776	0.16750414	0.149593	0.02128615

44	05AH039	SEVEN PERSONS CREEK NEAR WHITLA	1849.4	0.41198	0.421	5.84625	0.663	3.50769	0.693	0.58900	0.721331	0.237626	0.027011	0.758212	0.11978873	0.091553	0.02518739
45	05AJ001	SOUTH SASKATCHEWAN RIVER AT MEDICINE	2488.9	0.58837	0.526	13.90742	0.889	7.86171	0.938	0.82300	0.721805	0.156827	0.090631	0.594957	0.1964413	0.175946	0.02821437
46	11AA006	MILK RIVER AT WRITING-ON-STONE POLICE DETACHME	595.3	0.32211	0.361	4.80952	0.622	2.22923	0.605	0.51700	0.402887	0.341324	0.003076	0.521229	0.03391421	0.130117	0.06259186
47	11AA007	MILK RIVER AT PENDANT D'OREILLE POLICE DETACHM	654.9	0.1802	0.252	3.84458	0.559	2.01274	0.588	0.45600	0.470948	0.254517	0.002406	0.501946	0.14709631	0.074723	0.00410469
48	11AA036	MILK RIVER AT HIGHWAY NO. 880	458.0	0.23952	0.296	4.31638	0.596	2.25352	0.612	0.48700	0.571691	0.376322	0.002774	0.620768	0.19204512	0.10717	0.03080364
49	11AA038	VERDIGRIS COULEE NEAR THE MOUTH	283.4	0.36578	0.394	7.47426	0.708	3.788	0.714	0.59900	0.73782	0.220366		0.829496	0.00330072	0.130124	0.03425016
50	PAKOWKI	PAKOWKI LAKE NEAR PAKOWKI	1072.4	0.26163	0.314	4.06775	0.574	2.28389	0.615	0.48400	0.473173	0.313841	0.149207	0.748233	0.0716833	0.144312	0.03139407
51	05AG003	EXPANSE COULEE NEAR THE MOUTH	1843.6	0.5337	0.492	8.42311	0.732	4.88144	0.792	0.66100	0.598181	0.332221	0.044931	0.697011	0.13741447	0.13535	0.0213486
52	05AG006	OLDMAN RIVER NEAR THE MOUTH	1712.7	2.30774	0.973	15.61303	0.937	7.87956	0.939	0.98300	0.559976	0.139278	0.202282	0.466499	0.16912888	0.362125	0.00547785
53	05BN***		333.2	0.66698	0.556	7.15187	0.701	3.90793	0.72	0.65000	0.762657	0.156056		0.196397	0.14973599	0.643444	0.00722346
54	05BN006	NEW WEST COULEE NEAR THE MOUTH	318.2	0.83668	0.664	10.67753	0.792	5.79716	0.82	0.79800	0.878048		0.098882	0.817103	0.10878988	0.056544	0.01474056
55	05BN012	BOW RIVER NEAR THE MOUTH	1811.1	1.05717	0.745	6.97203	0.696	3.68357	0.702	0.73200	0.576581	0.232133	0.126484	0.618379	0.10610052	0.261603	0.01032541
56	05BN014	COAL CREEK AT BOW CITY	88.0	2.26375	0.969	2.52692	0.484	0.9308	0.451	0.62700	0.562735	0.434425		0.899348	0.06611958	0.031693	
57	05BN024	NATURAL FLOW C NEAR BOW CITY	3.1	1.54983	0.883	8.43774	0.733	3.78147	0.712	0.81500	0.997599			0.997599			
58	05CH001	BERRY CREEK AT FORSTER'S RANCH	91.9	0.90507	0.69	0.50333	0.24	0.24718	0.247	0.37900	0.974781	0.020461		0.437132		0.429189	0.13027112
59	05CH002	BERRY CREEK NEAR WARDLOW	306.4	0.63609	0.546	0.33673	0.196	0.24808	0.249	0.32900	0.7304	0.217919		0.498846	0.02932984	0.427269	0.04095484
60	05CH007	BERRY CREEK NEAR THE MOUTH	56.6	0.58711	0.524	0.25754	0.185	0.2705	0.262	0.32200	0.840962	0.038561		0.03457	0.14779084	0.743037	0.07112326
61	05CH013	FORSTER RESERVOIR NEAR CESSFORD	35.8	0.95846	0.709	0.51615	0.247	0.2349	0.239	0.38500	0.653014			0.355452		0.640412	0.00090421
62	05CH016	BERRY CREEK BELOW DEADFISH CREEK	24.4	1.07067	0.75	0.54311	0.25	0.20911	0.225	0.39800	0.51243			0.009255		0.89393	0.09340922
63	05CJ005	MATZHIWIN CREEK NEAR DUCHESS	0.0	0.37741	0.396	3.53457	0.545	0.57465	0.371	0.46200	1.132734					1.132734	
64	05CJ006	ONETREE CREEK NEAR PATRICIA	498.2	1.78059	0.939	7.61186	0.712	3.00326	0.653	0.80600	0.437959	0.154526	0.377306	0.688238	0.15512398	0.133469	0.01999174

65	05CJ007	MATZHIWIN CREEK ABOVE WARE COULEE	2458.7	1.17663	0.794	5.73833	0.655	3.46861	0.688	0.72600	0.385661	0.435047	0.147289	0.709454	0.08369954	0.170364	0.03273436
66	05CJ008	WARE COULEE ABOVE MATZHIWIN CREEK	91.0	1.45169	0.86	11.2249	0.818	4.45706	0.77	0.84400	0.49644	0.135191	0.36506	0.755455	0.17853818	0.059001	0.00369721
67	05CJ010	SPRING CREEK NEAR VERGER	87.2	0.37894	0.398	3.53765	0.547	0.58053	0.374	0.42900	0.614293	0.020577	0.218078	0.180775	0.08202926	0.70985	0.02425094
68	05CJ012	MATZHIWIN CREEK BELOW WARE COULEE	72.5	0.59273	0.527	4.44209	0.602	1.03479	0.466	0.52200	0.795645	0.050171	0.082797	0.221291	0.04013905	0.731723	0.00361212
69	05AF007	KETCHUM CREEK NEAR ORION	185.6	0.33048	0.368	0.70985	0.304	0.51685	0.367	0.34300	0.53178	0.211002	0.244357	0.811827	0.09129267	0.066173	0.02640961
70	05AF008	IRRIGATION CREEK NEAR ORION	204.8	0.36385	0.391	0.83371	0.32	0.57771	0.372	0.35700	0.73047	0.207632	0.05789	0.928318	0.02243805	0.030738	0.01449901
71	05AF009	CANAL CREEK NEAR MANYBERRIES	178.0	0.06861	0.178	0.17239	0.159	0.11754	0.158	0.17300	0.611955	0.084051	0.296526	0.572346	0.14038022	0.236004	0.0438021
72	11AA009	SAGE CREEK AT BJORDALS NEAR WILD HORSE	112.2	0.03345	0.129	0.04246	0.09	0.0452	0.098	0.12800	0.735636	0.152992	0.10688	0.839229	0.011205	0.123109	0.02196427
73	11AA011	DEER CREEK AT DEER CREEK CATTLE CO.'S RANCH	8.1	0.31419	0.357	2.43695	0.48	1.25477	0.503	0.43700	0.261016	0.735574		0.487379	0.26139605	0.234894	0.01292062
74	11AA023	LINDSAY COULEE NEAR ONEFOUR POST OFFICE	26.9	0.13728	0.235	0.17424	0.162	0.18552	0.209	0.20300	0.768416		0.227438	0.762717	0.15889566	0.05798	0.01626269
75	11AA024	MAYNARD COULEE NEAR ONEFOUR POST OFFICE	20.4	0.10973	0.218	0.13928	0.141	0.1483	0.177	0.18600	0.516066		0.479427	0.879358	0.02688511	0.041307	0.04794266
76	11AA026	SAGE CREEK AT Q RANCH NEAR WILDHORSE	457.7	0.27288	0.327	0.63162	0.277	0.36246	0.301	0.29100	0.72559	0.159267	0.110727	0.743103	0.05893425	0.178482	0.01506557
77	11AA027	SAGE CREEK NEAR INTERNATIONAL BOUNDARY	22.5	0	0	0	0	0	0	0.00000	0.3835		0.611961	0.578596	0.26680611	0.10425	0.0458079
78	11AA031	MILK RIVER AT EASTERN CROSSING OF INTERNATIONA	446.0	0.09022	0.2	1.22944	0.373	0.6559	0.386	0.31300	0.237185	0.109732	0.313962	0.356863	0.12592098	0.162018	0.01323032
79	11AA034	MILK RIVER NEAR WRITING-ON-STONE PARK	128.7	0.19852	0.271	2.54555	0.486	1.23516	0.498	0.40100	0.269035	0.365348		0.253467	0.18916228	0.168971	0.02278405
80	11AA035	MILK RIVER NEAR PENDANT D'OREILLE	312.2	0.08233	0.189	0.85907	0.323	0.45583	0.356	0.27800	0.305025	0.441265	0.164738	0.402332	0.33746451	0.143818	0.02528824
81	11AB082		260.1	0.10091	0.205	0.18464	0.165	0.12576	0.163	0.17900	0.678372	0.170612	0.111945	0.858582	0.02597226	0.074952	0.00142275
82	11AB086	WALBURGER COULEE BELOW DIVERSIONS	84.5	0.00933	0.066	0.01185	0.043	0.01261	0.045	0.05700	0.306901	0.456771		0.59561	0.05061649	0.073715	0.04373043
83	11AB097	CRESSDAY RESERVOIR NEAR CRESSDAY	32.9	0.21149	0.278	0.48143	0.232	0.28441	0.267	0.24200	0.741963	0.237849	0.015705	0.948495	0.04272026		0.00430151
84	11AB098	JAYDOT RESERVOIR NEAR JAYDOT	19.7	0.18898	0.265	0.23986	0.18	0.25539	0.257	0.22200	0.76669	0.222596		0.927642	0.03217471		0.02946879
85	DRAINS6	Drain S-6	90.6	1.20806	0.803	23.96689	0.992	13.55359	0.993	0.96900							

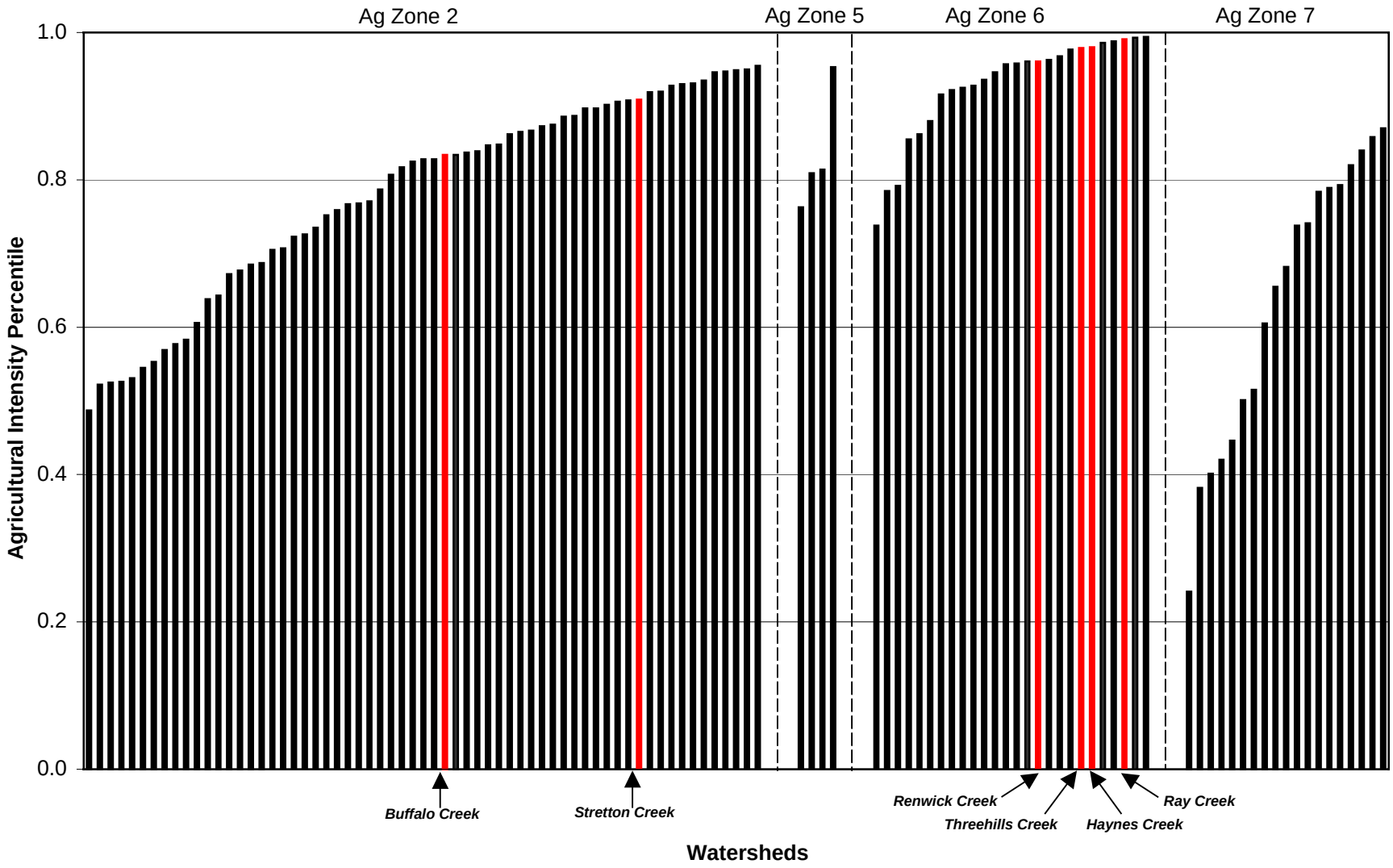

Figure A4.1a. Agricultural intensity in watersheds of the Aspen Parkland Ecoregion compared to the AESA watersheds.

AESA Watersheds

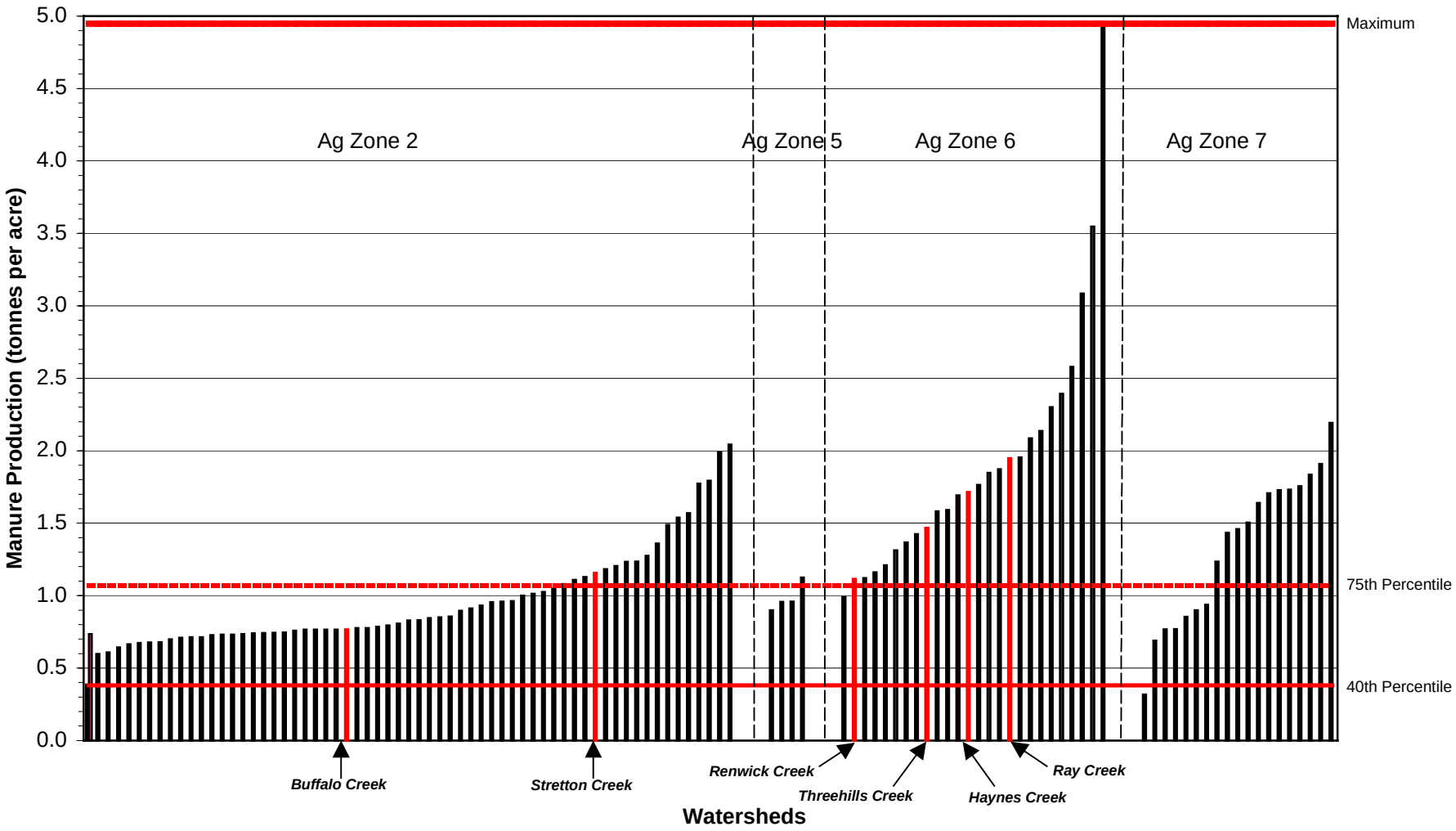

Figure A4.1b. Manure production in watersheds of the Aspen Parkland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

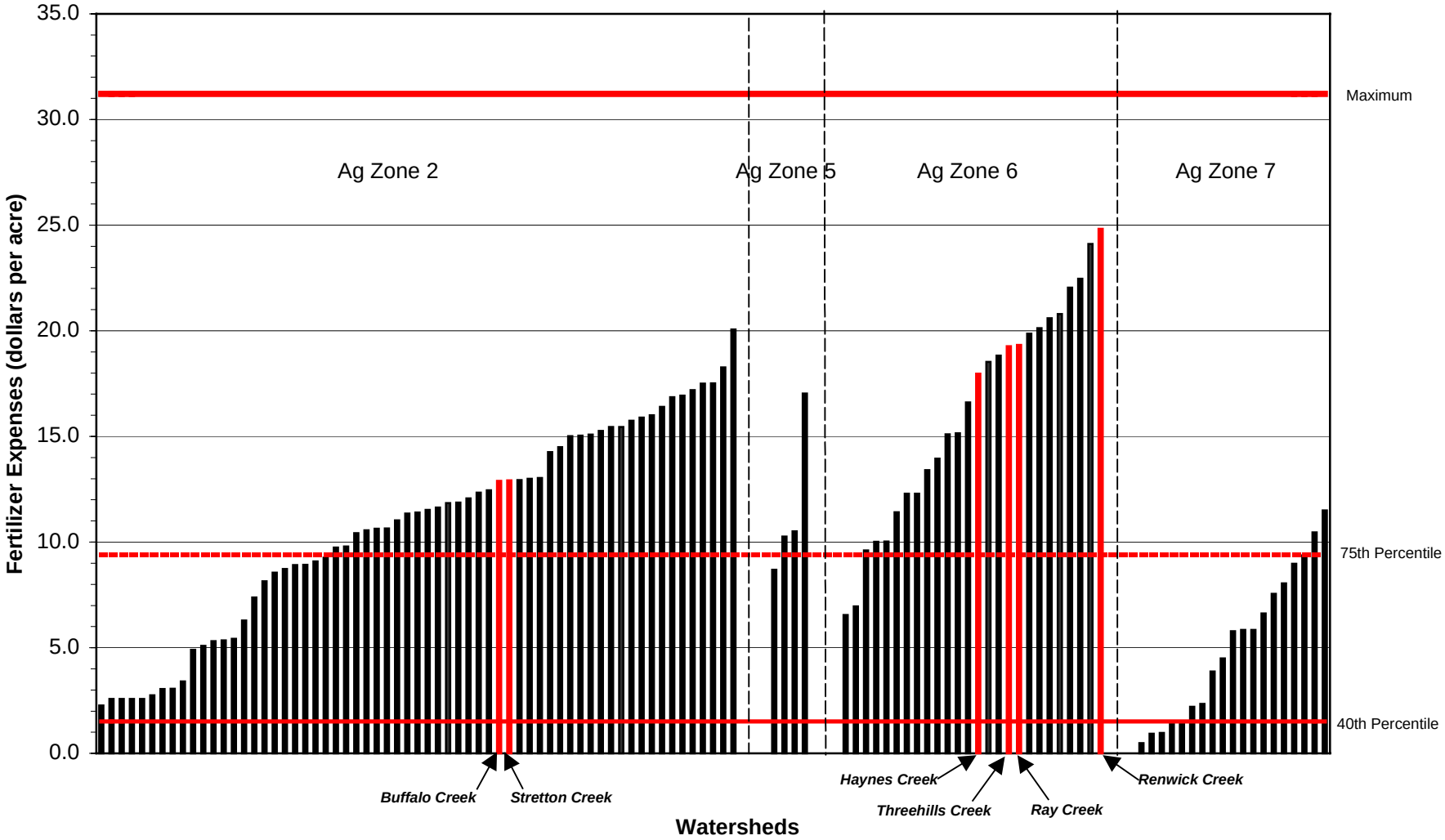

Figure A4.1c. Fertilizer expenses in watersheds of the Aspen Parkland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

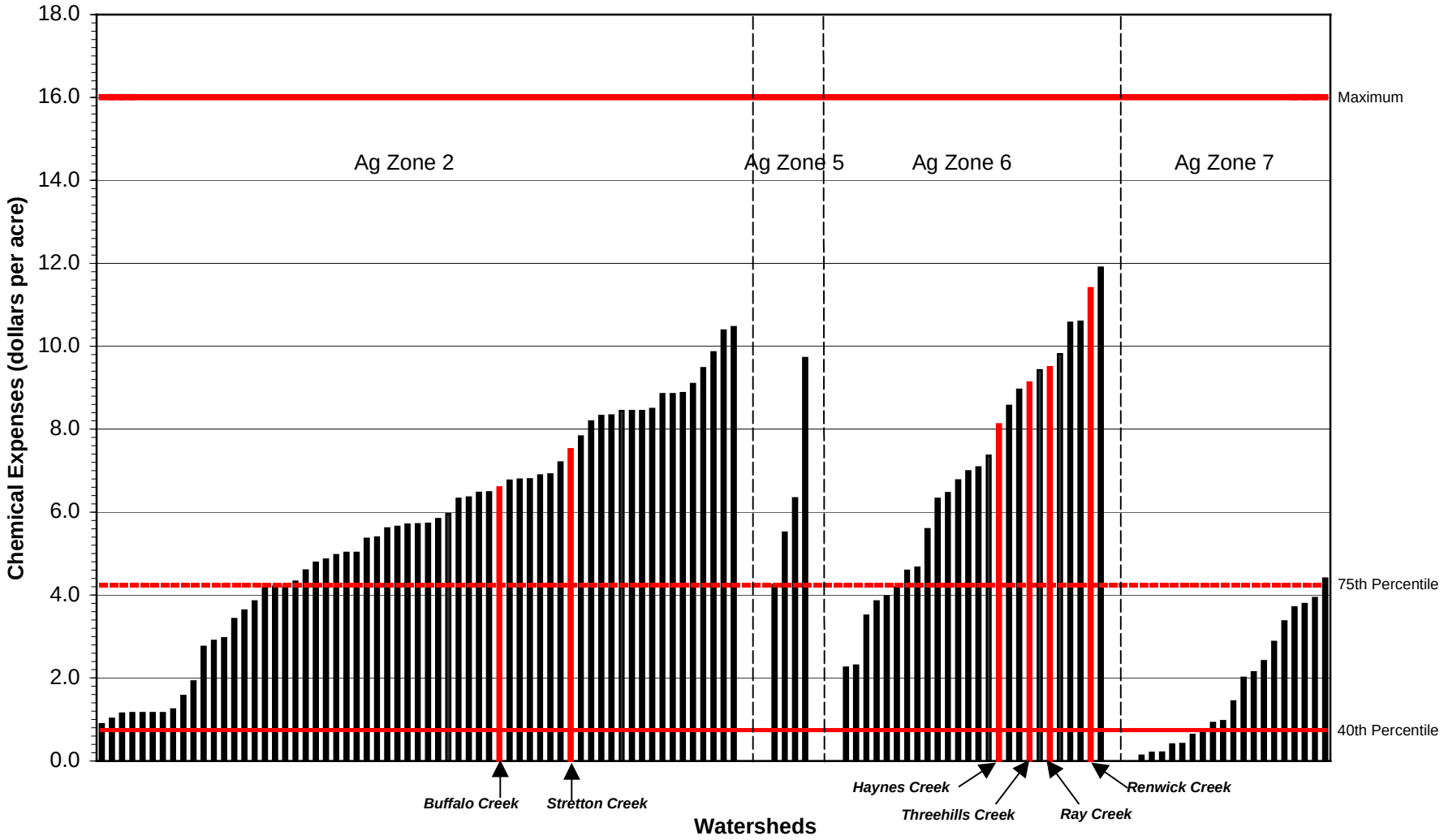

Figure A4.1d. Chemical expenses in watersheds of the Aspen Parkland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

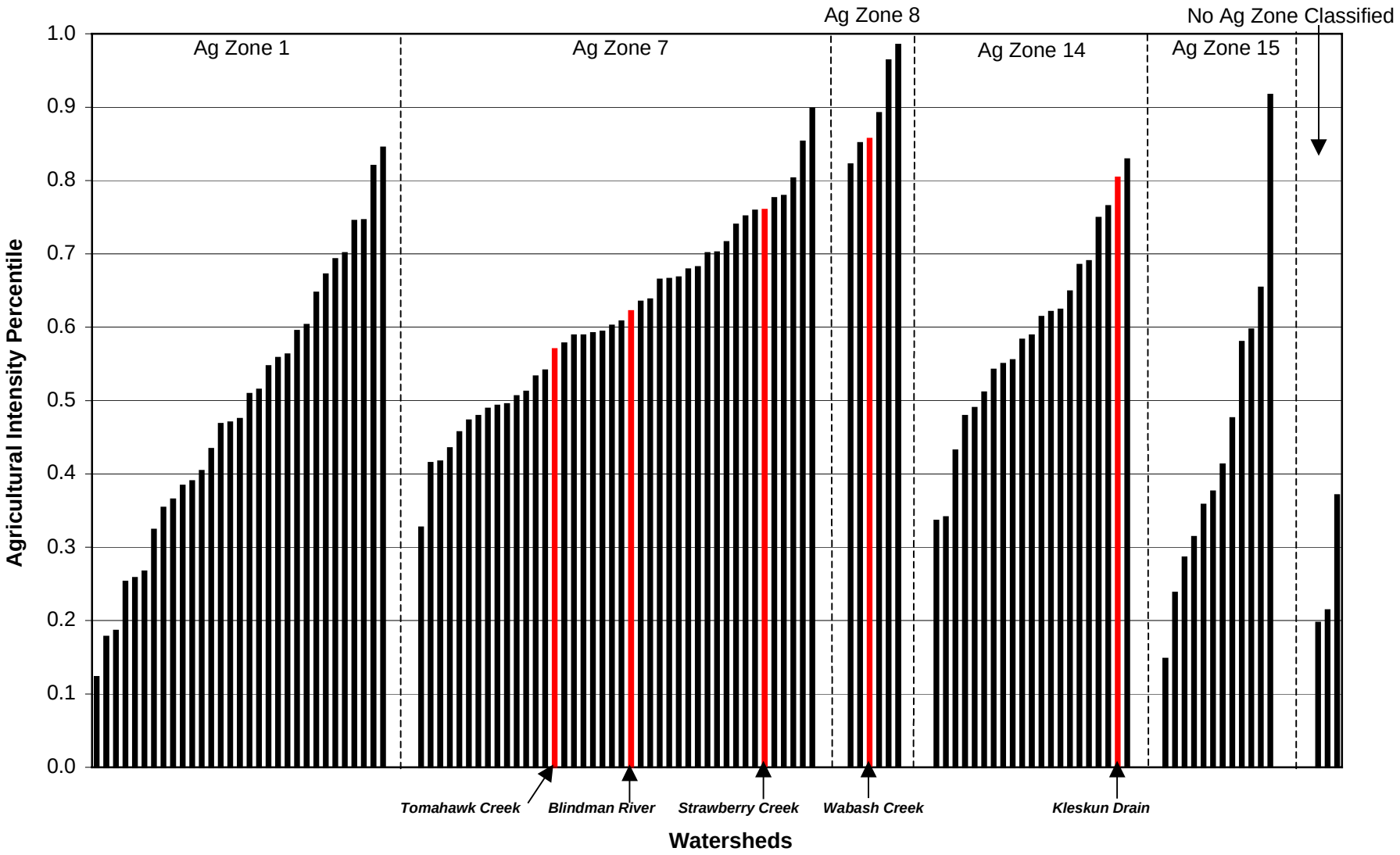

Figure A4.2a. Agricultural intensity in watersheds of the Boreal Transition/Peace Lowland Ecoregions compared to the AESA watersheds.

AESA Watersheds

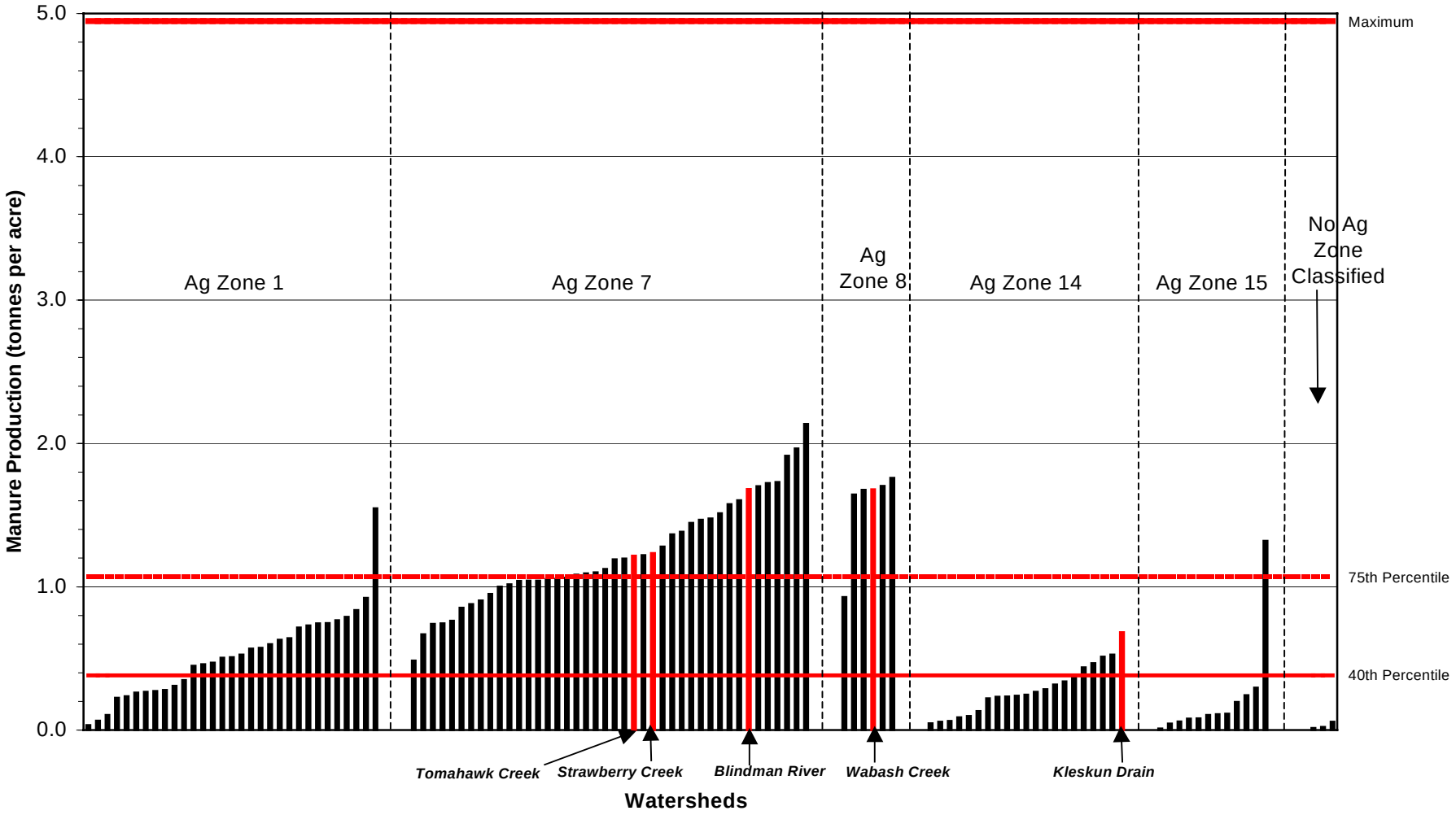

Figure A4.2b. Manure production in watersheds of the Boreal Transition/Peace Lowland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

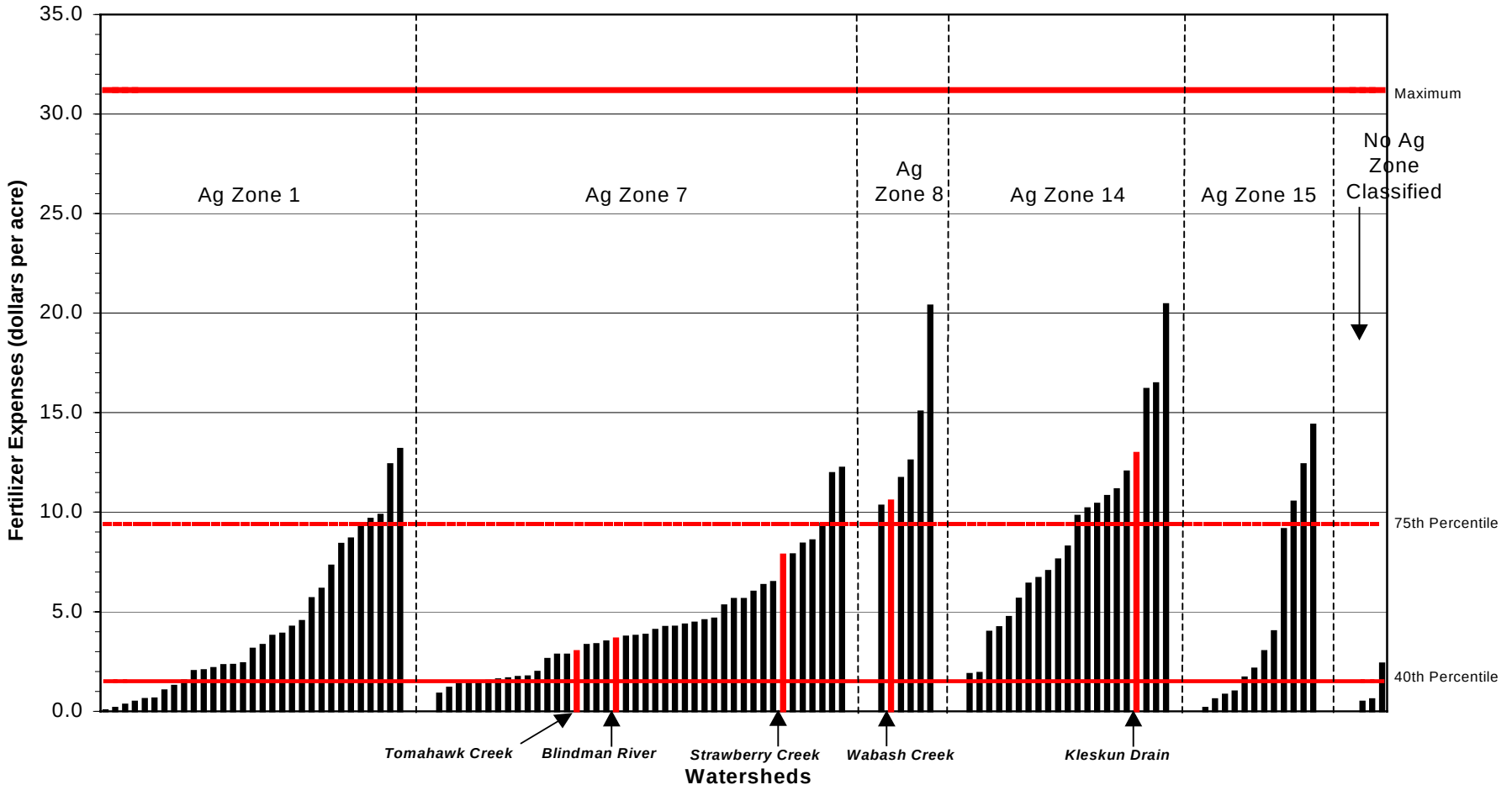

Figure A4.2c. Fertilizer expenses in watersheds of the Boreal Transition/Peace Lowland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

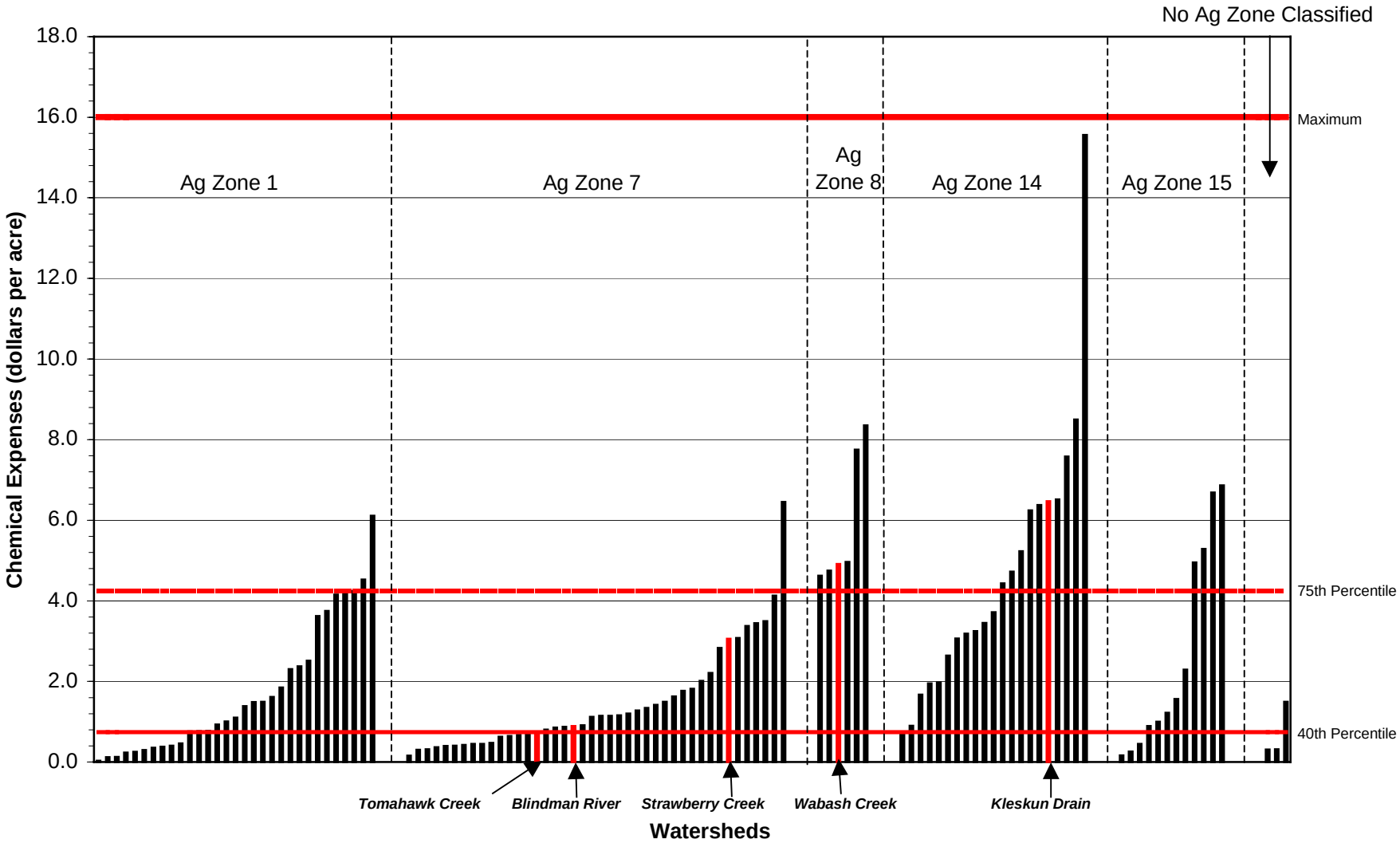

Figure A4.2d. Chemical expenses in watersheds of the Boreal Transition/Peace Lowland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

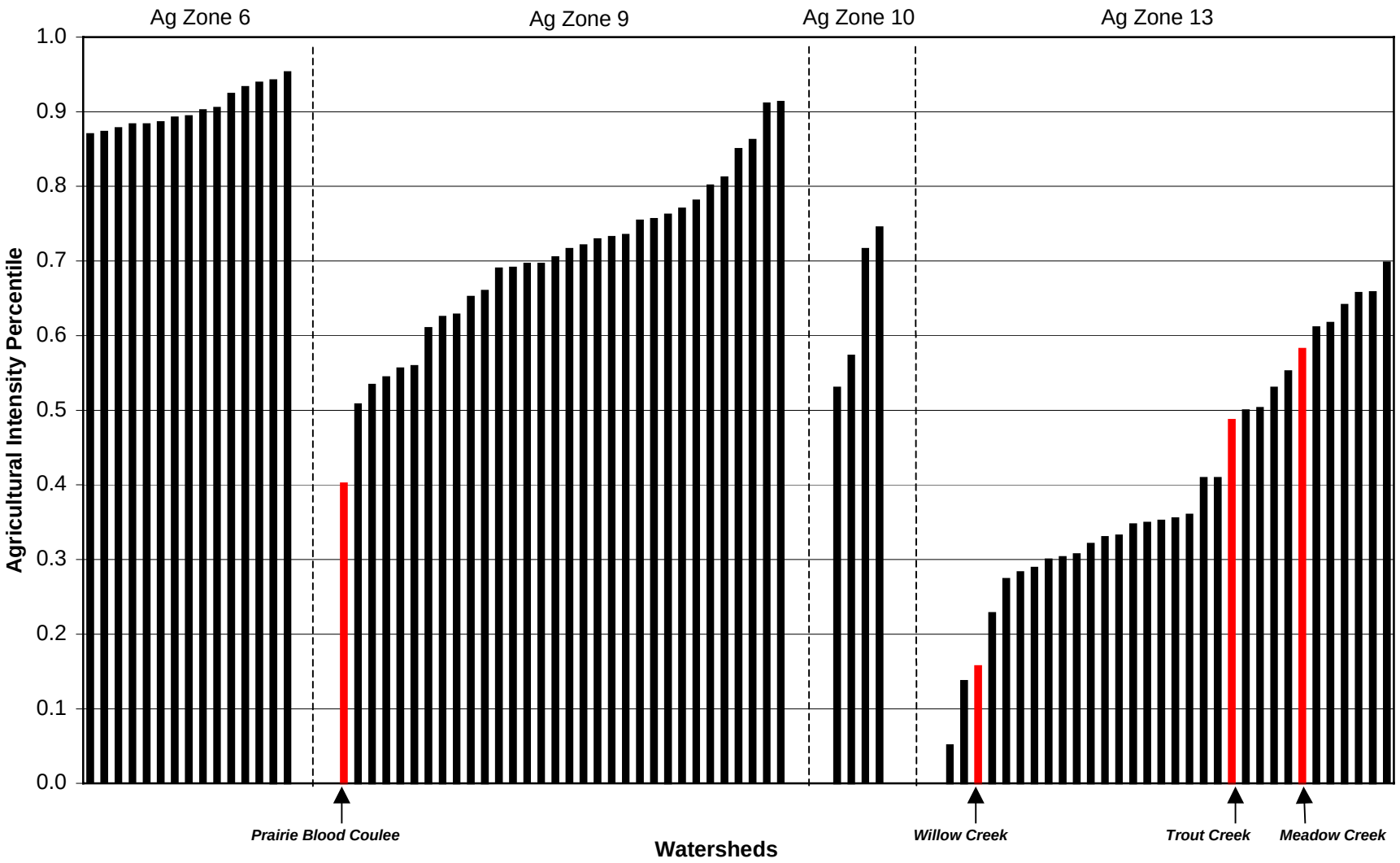

Figure A4.3a. Agricultural intensity in watersheds of the Fescue Grassland/Cypress Hills Ecoregions compared to the AESA watersheds.

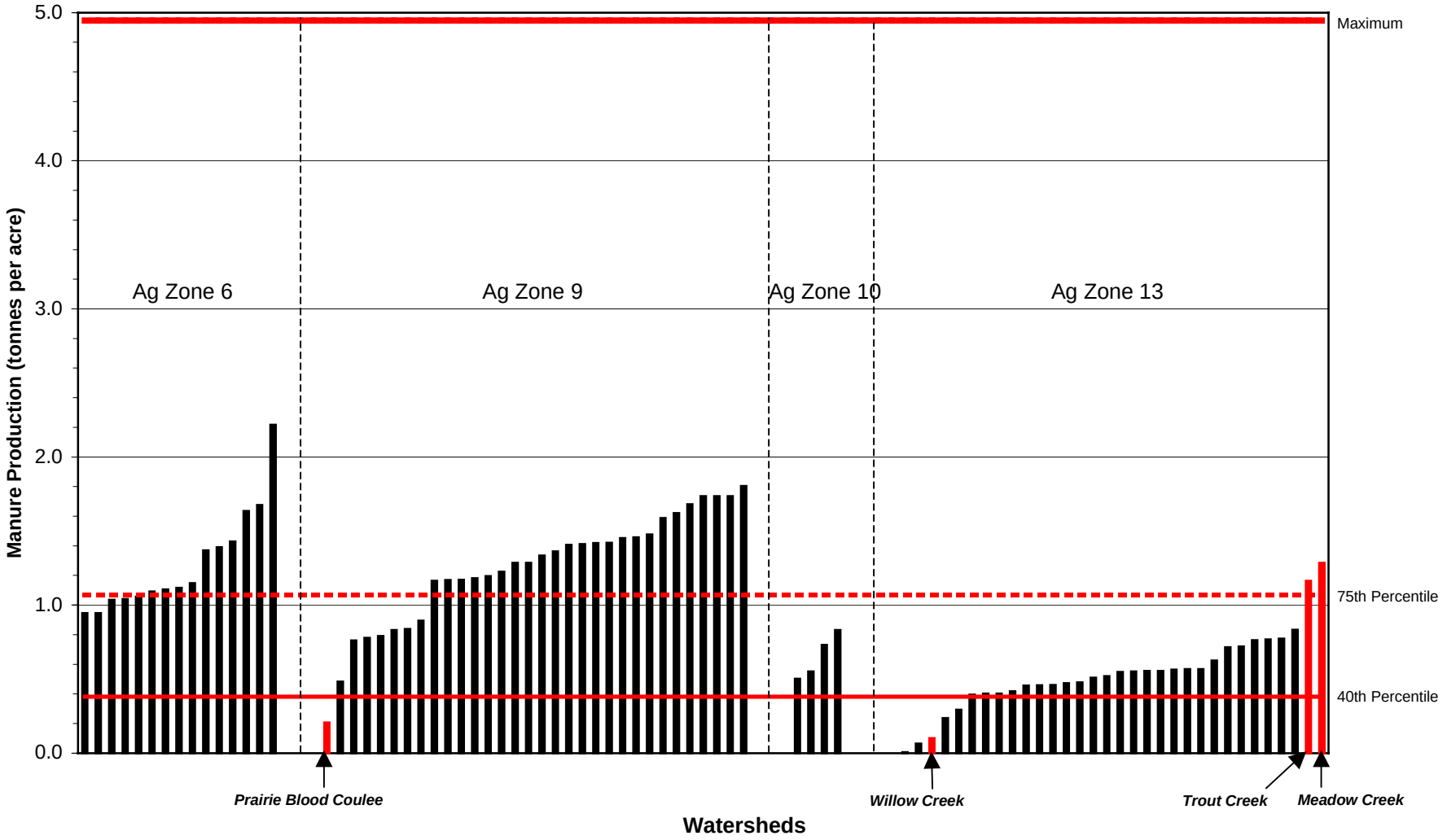

Figure A4.3b. Manure production in watersheds of the Fescue Grassland/Cypress Hills Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

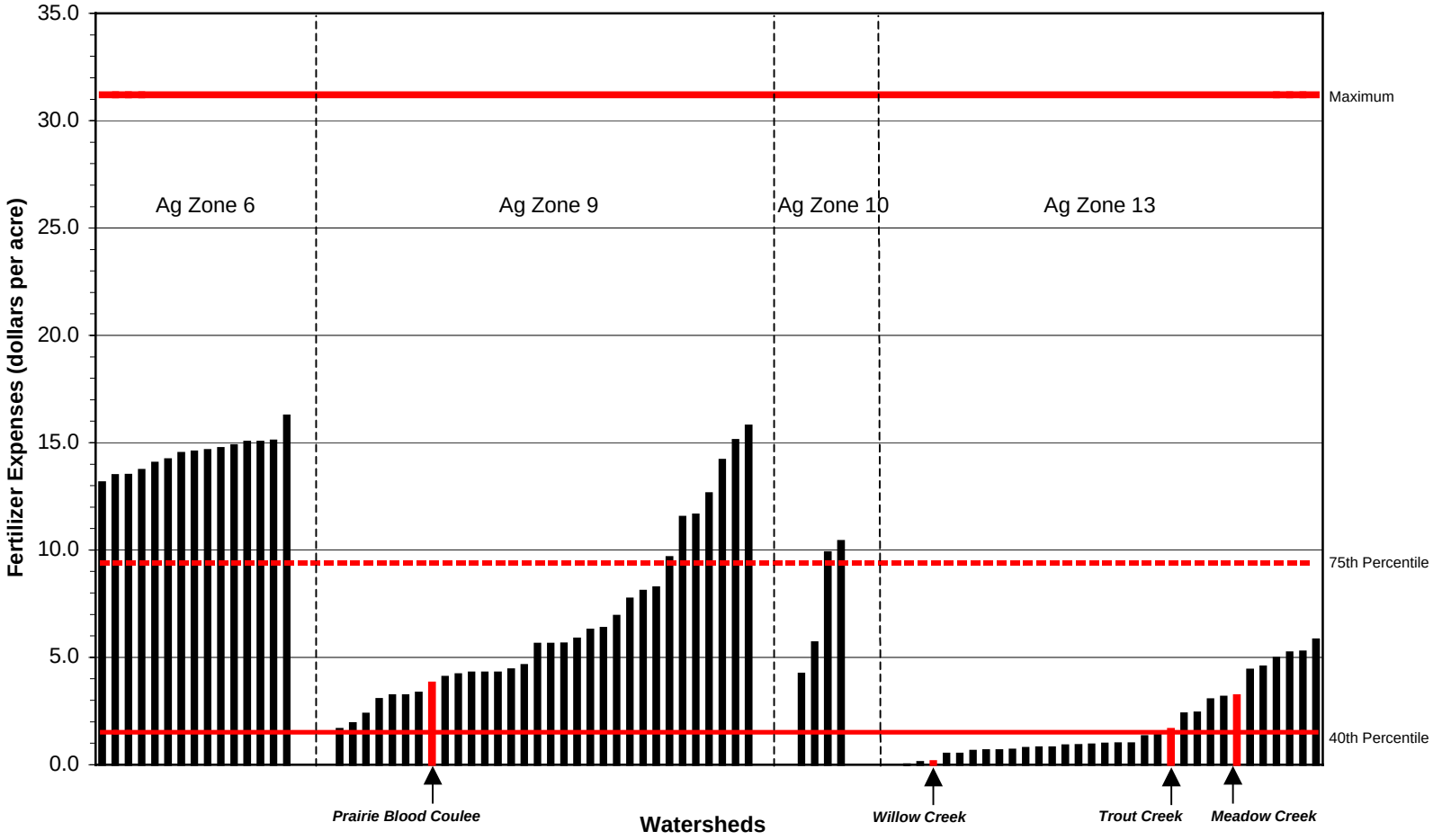

Figure A4.3c. Fertilizer expenses in watersheds of the Fescue Grassland/Cypress Hills Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

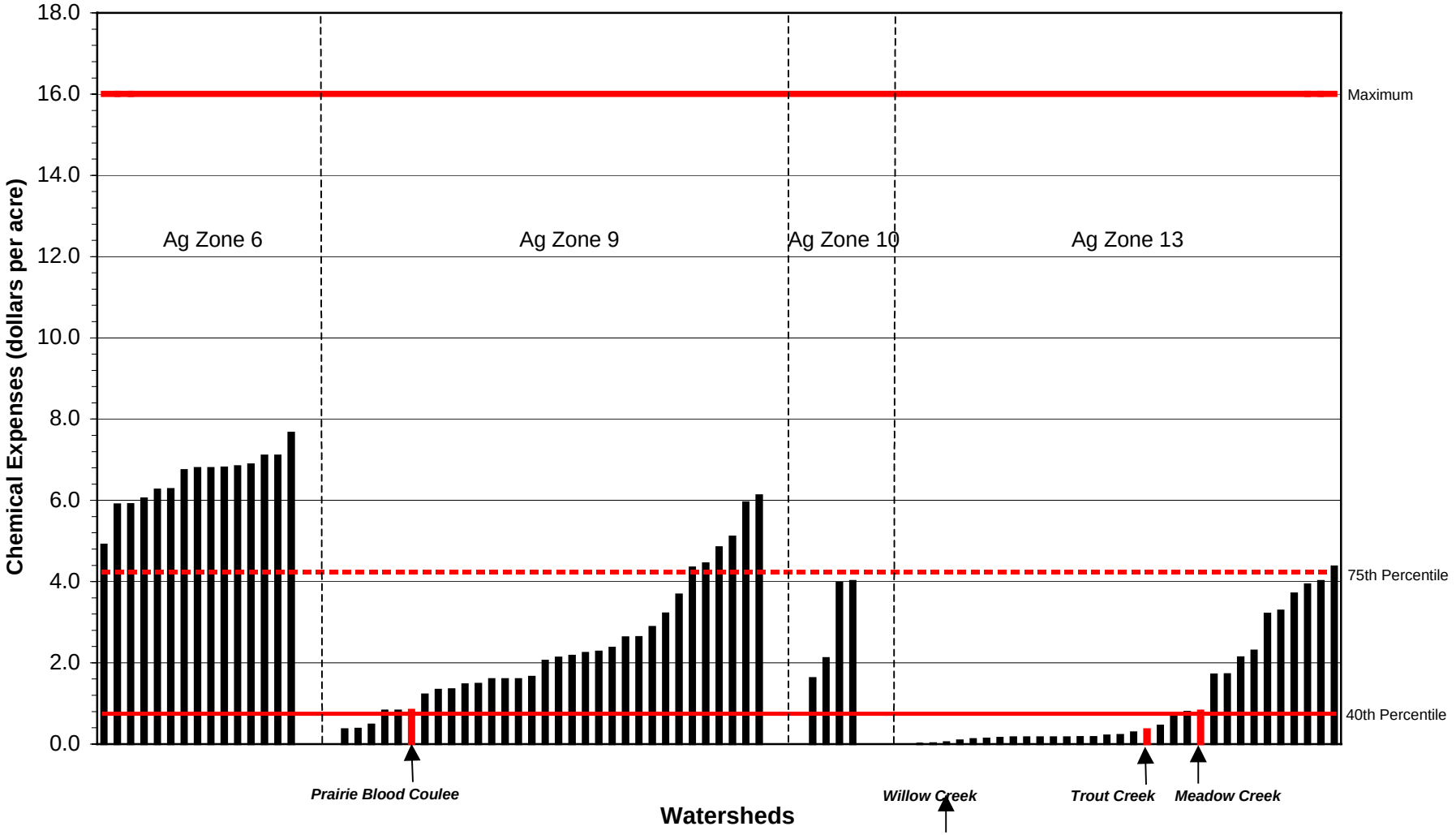

Figure A4.3d. Chemical expenses in watersheds of the Fescue Grassland/Cypress Hills Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

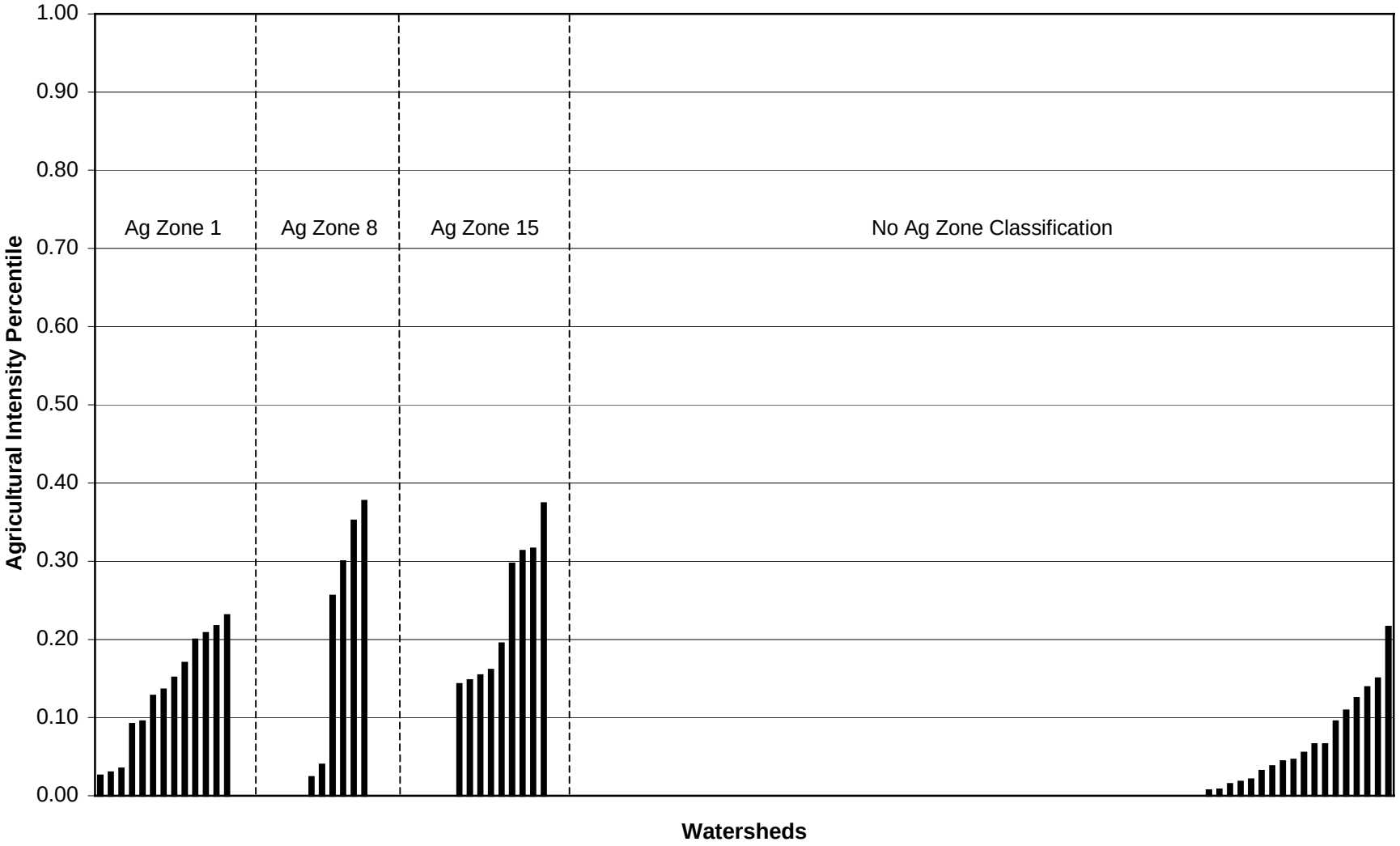

Figure A4.4a. Agricultural intensity in watersheds of the Mixed Boreal Uplands Ecoregion compared to the AESA watersheds.

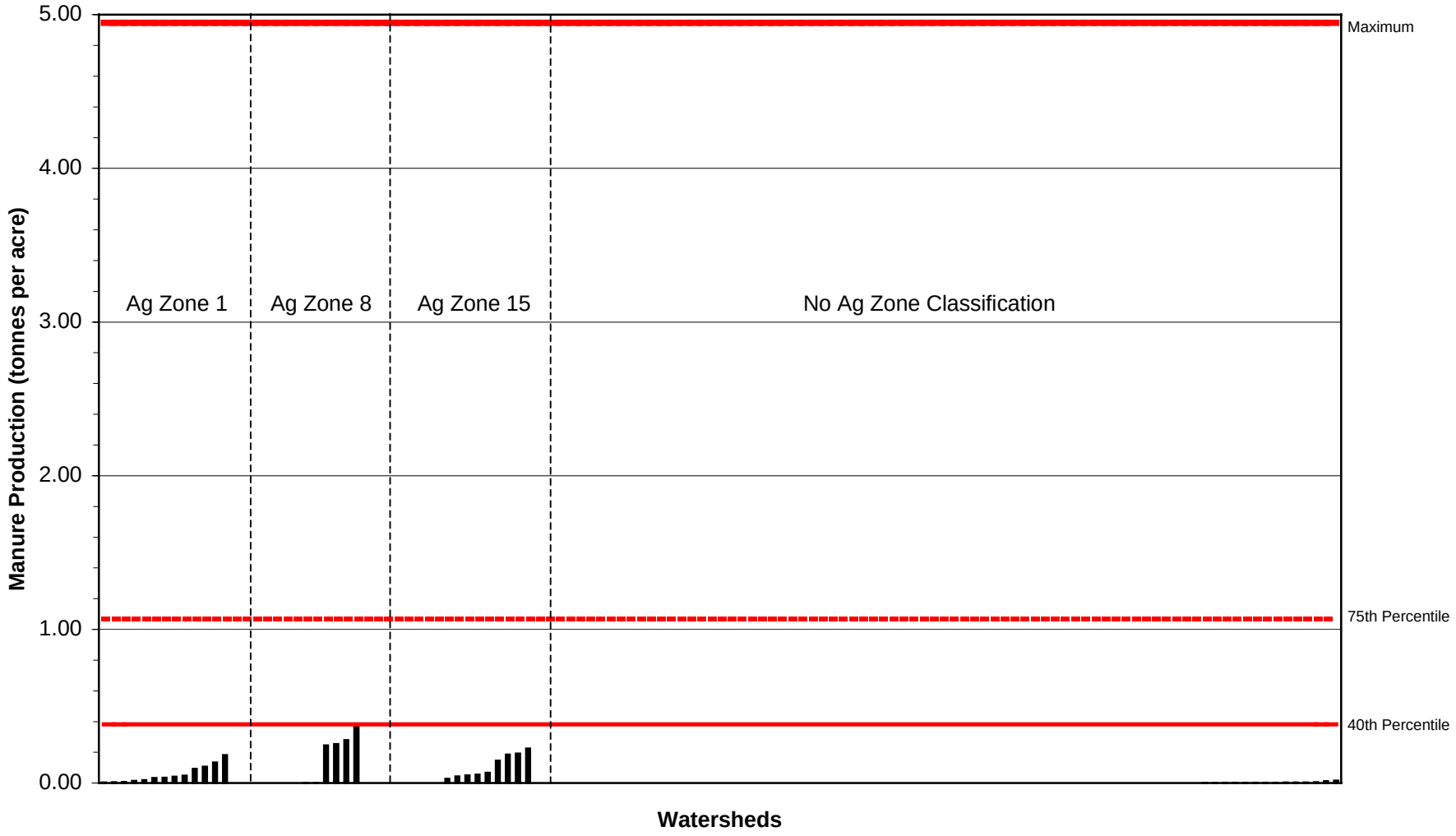

Figure A4.4b. Manure production in watersheds of the Mixed Boreal Uplands Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

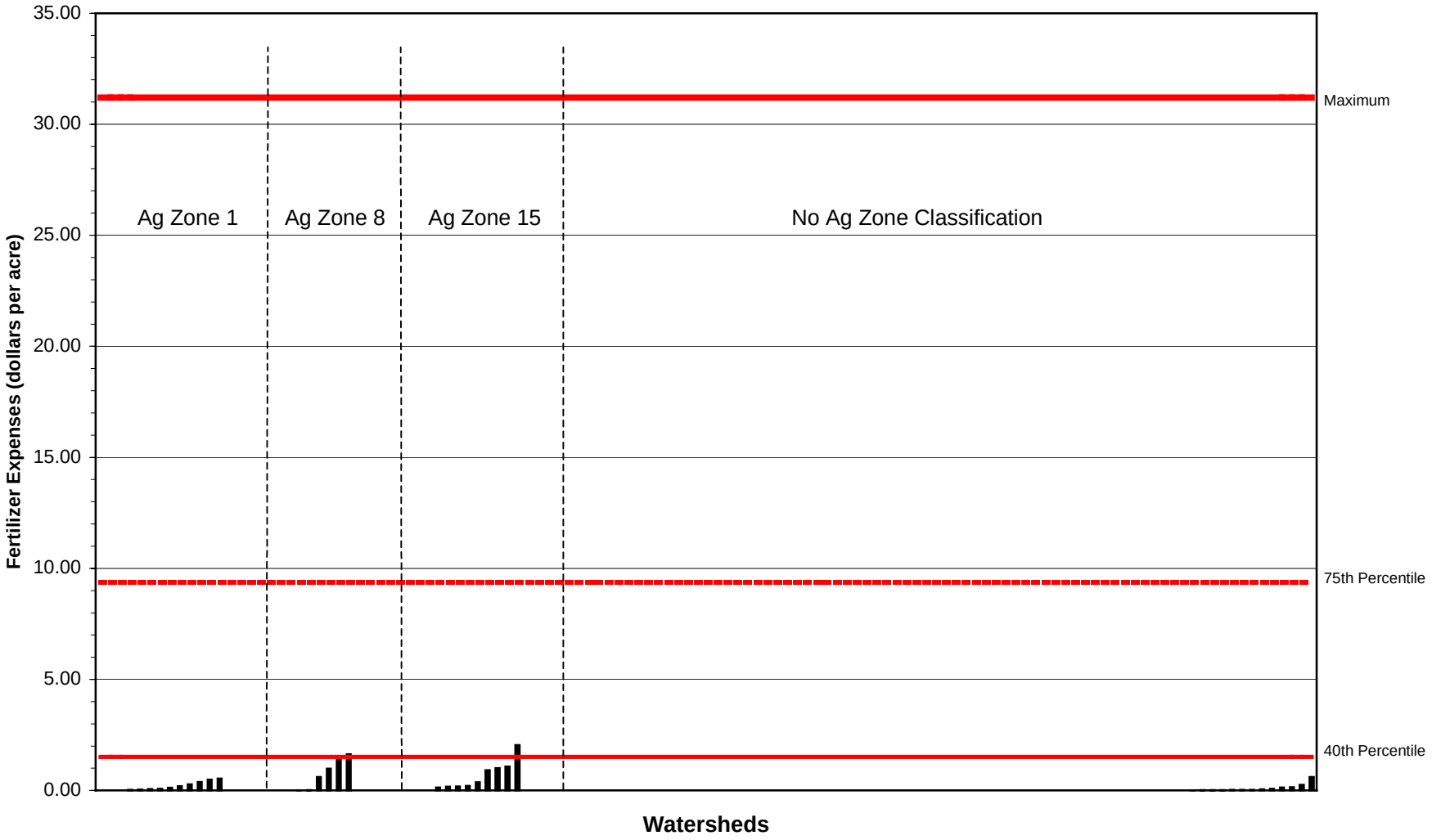

Figure A4.4c. Fertilizer expenses in watersheds of the Mixed Boreal Uplands Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

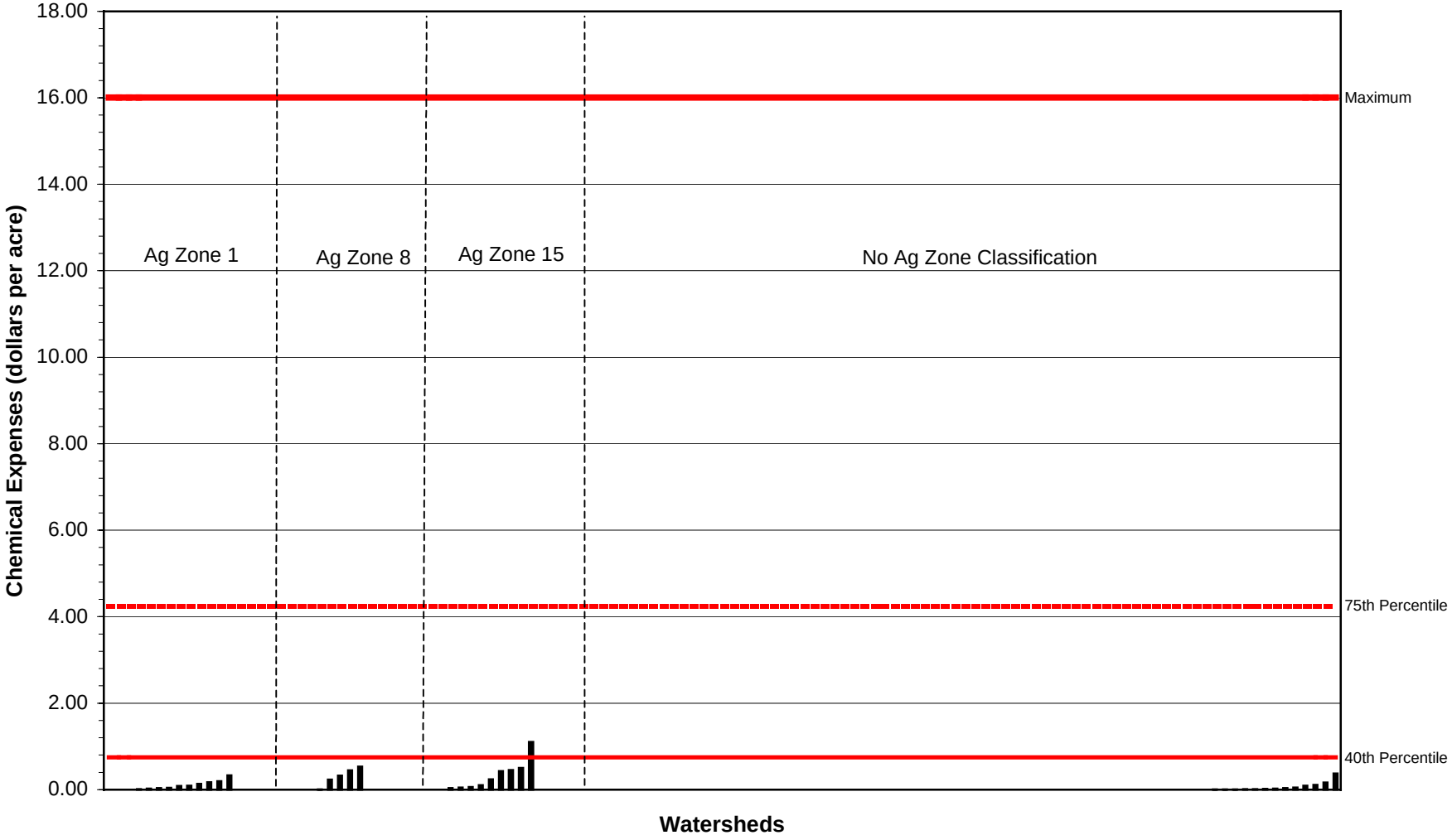

Figure A4.4d. Chemical expenses in watersheds of the Mixed Boreal Uplands Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

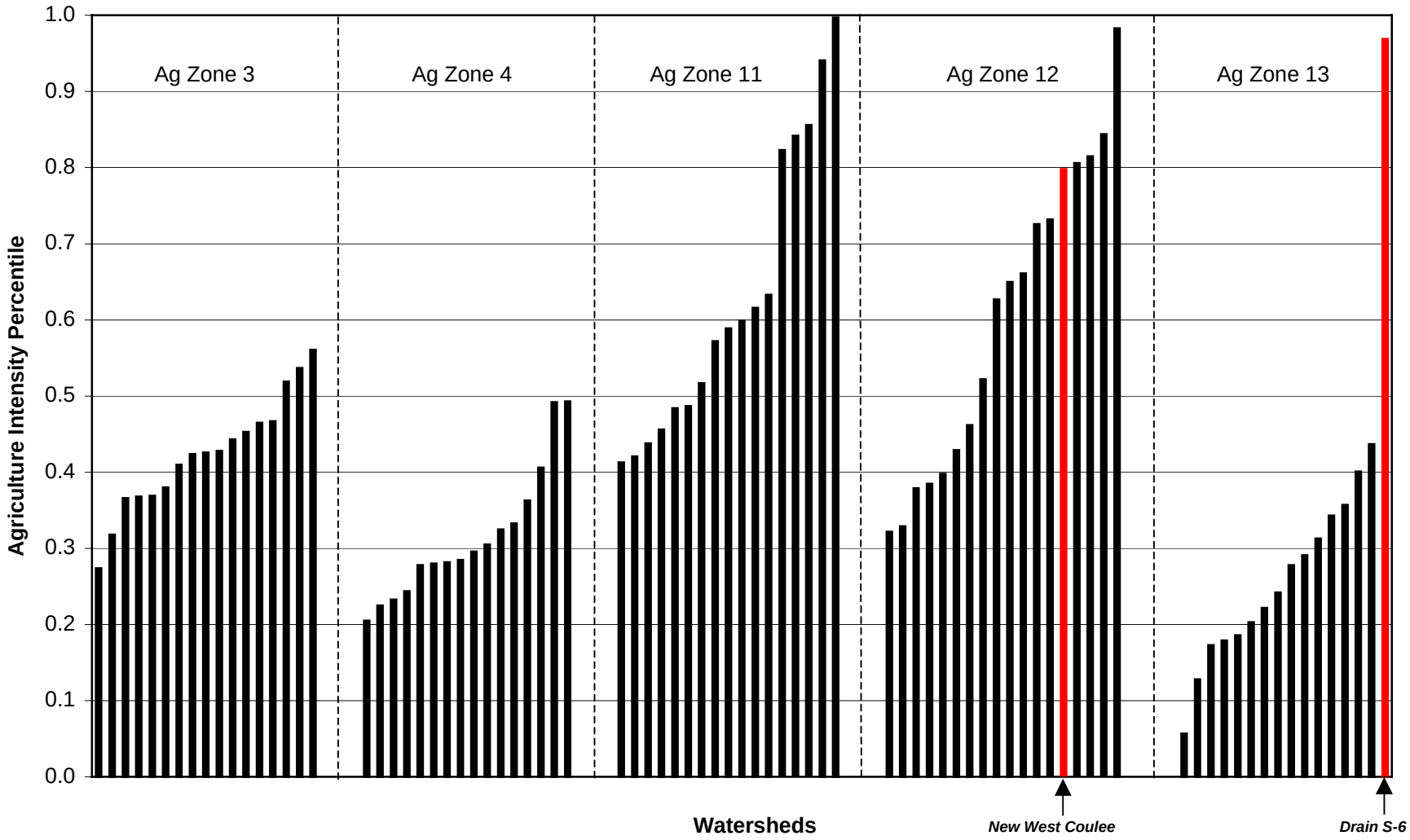

Figure A4.5a. Agricultural intensity in watersheds of the Mixed Grassland Ecoregion compared to the AESA watersheds.

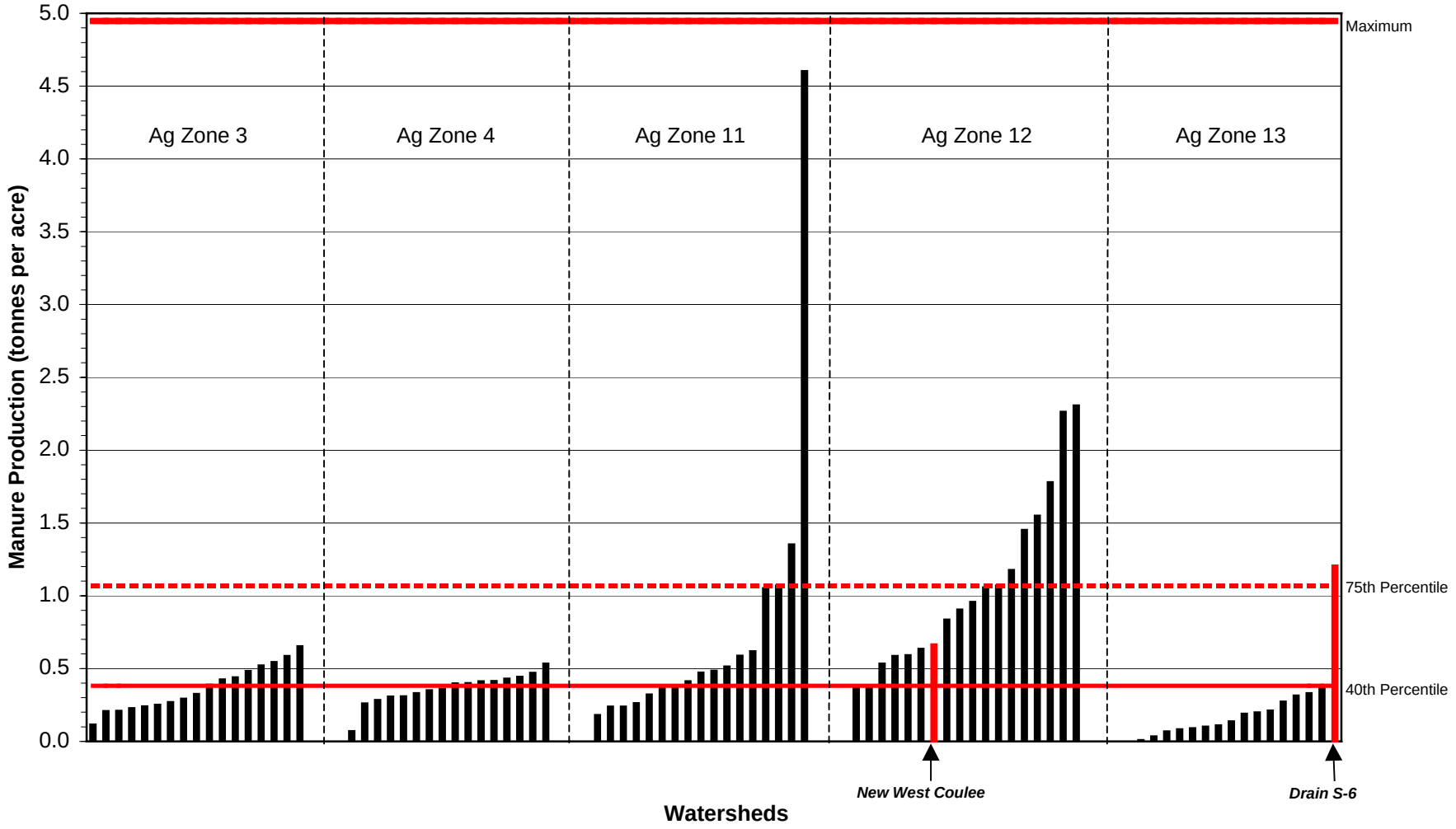

Figure A4.5b. Manure production in watersheds of the Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

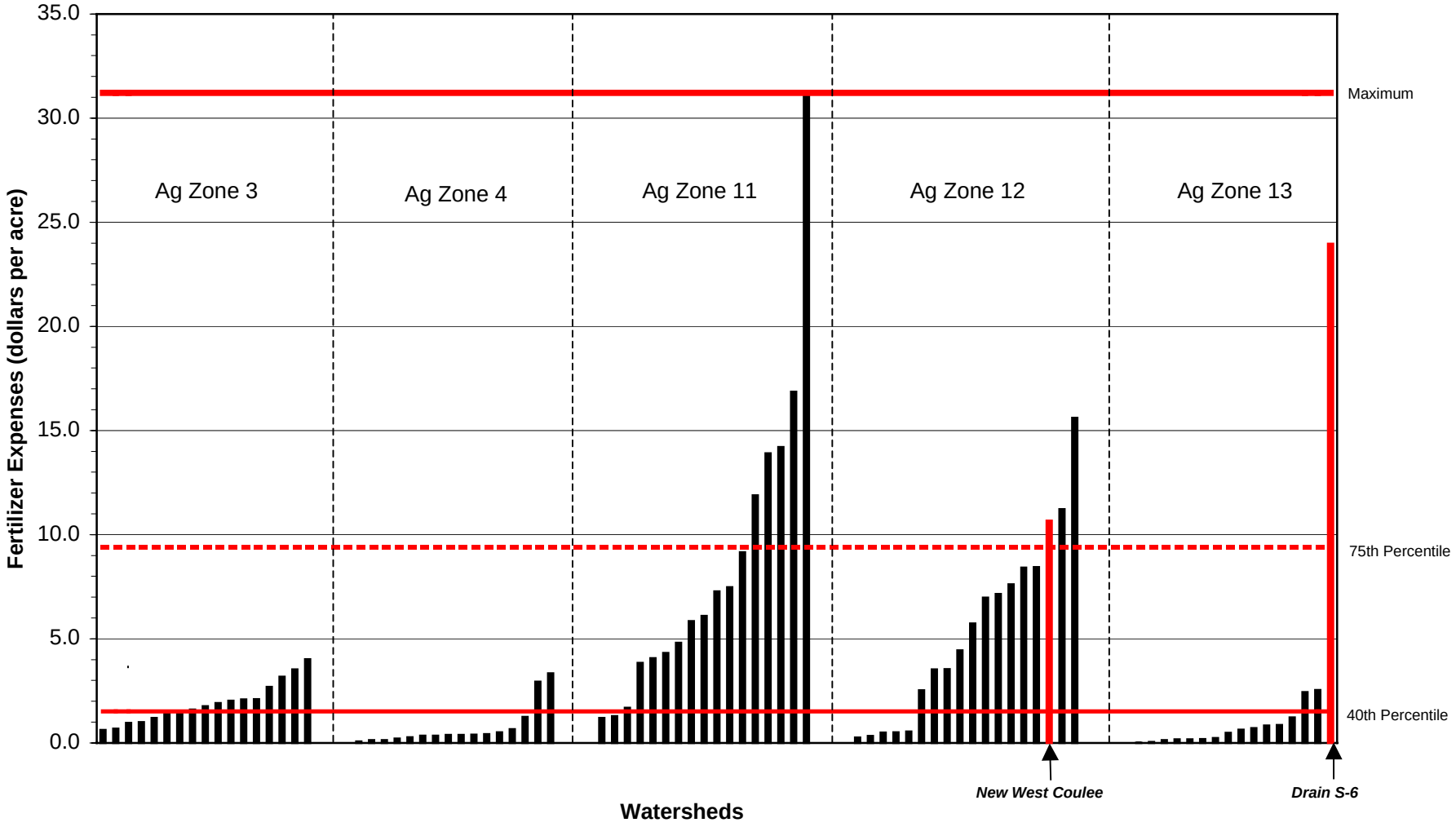

Figure A4.5c. Fertilizer expenses in watersheds of the Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

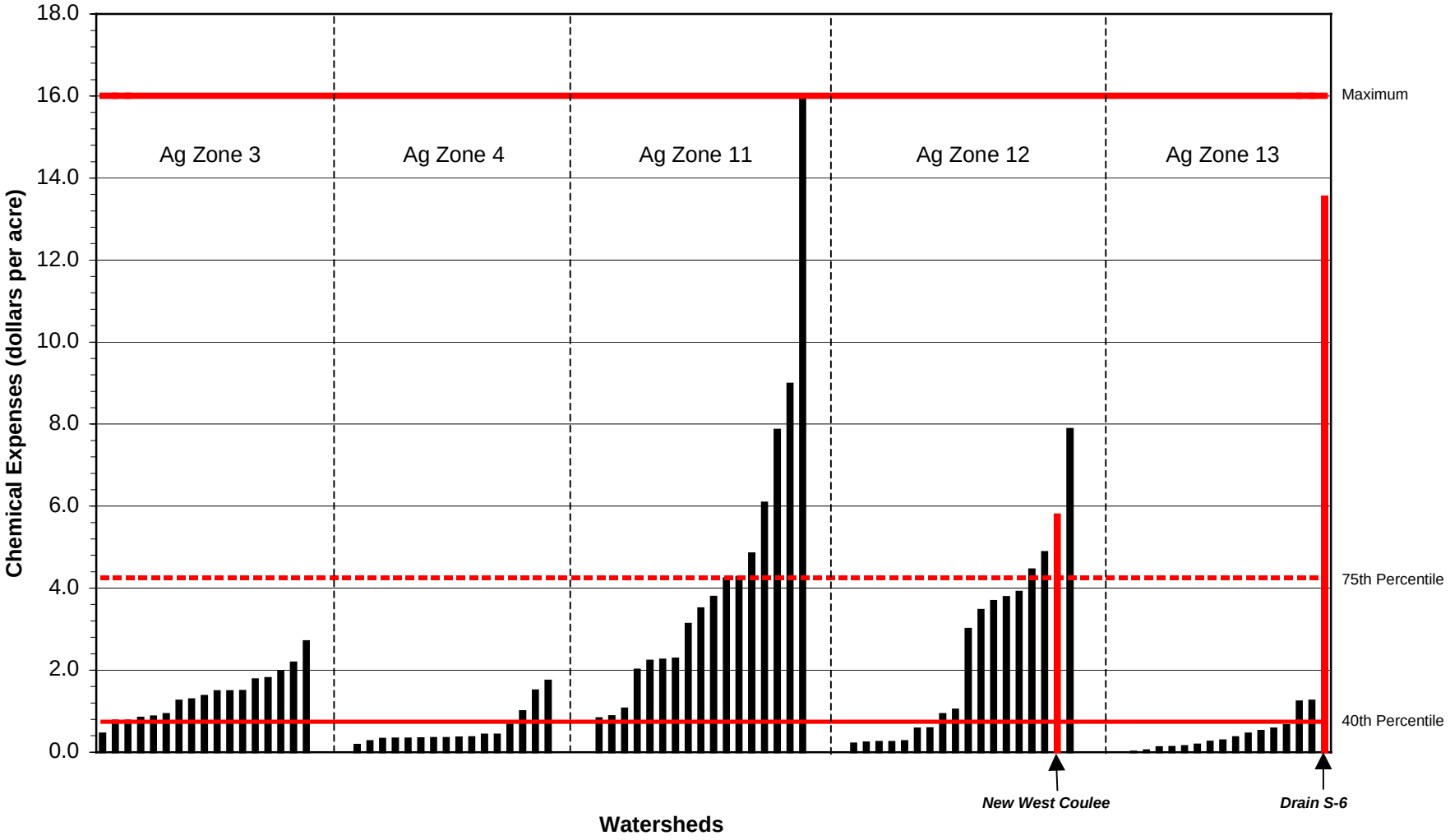

Figure A4.5d. Chemical expenses in watersheds of the Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

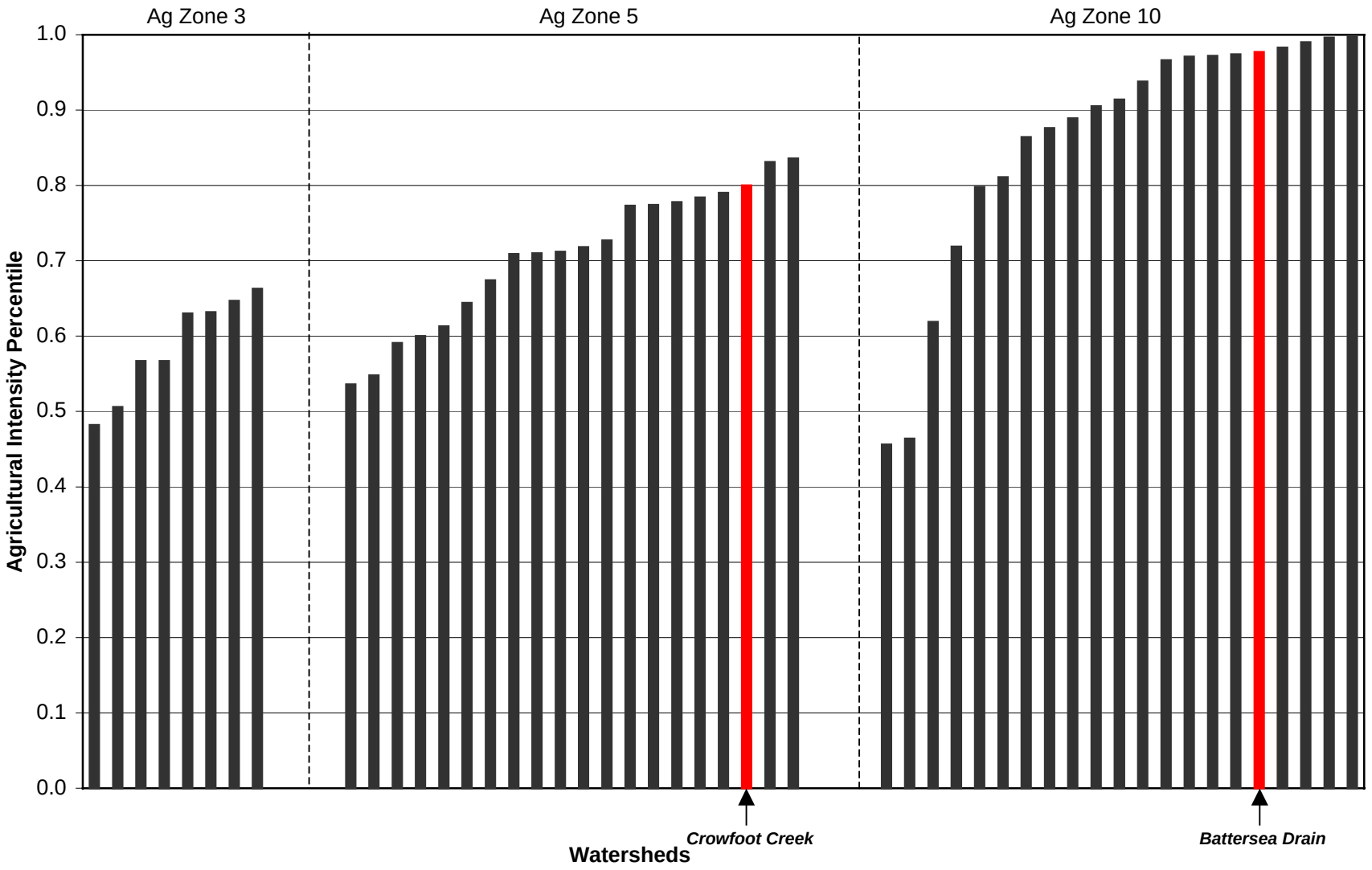

Figure A4.6a. Agricultural intensity in watersheds of the Moist Mixed Grassland Ecoregion compared to the AESA watersheds.

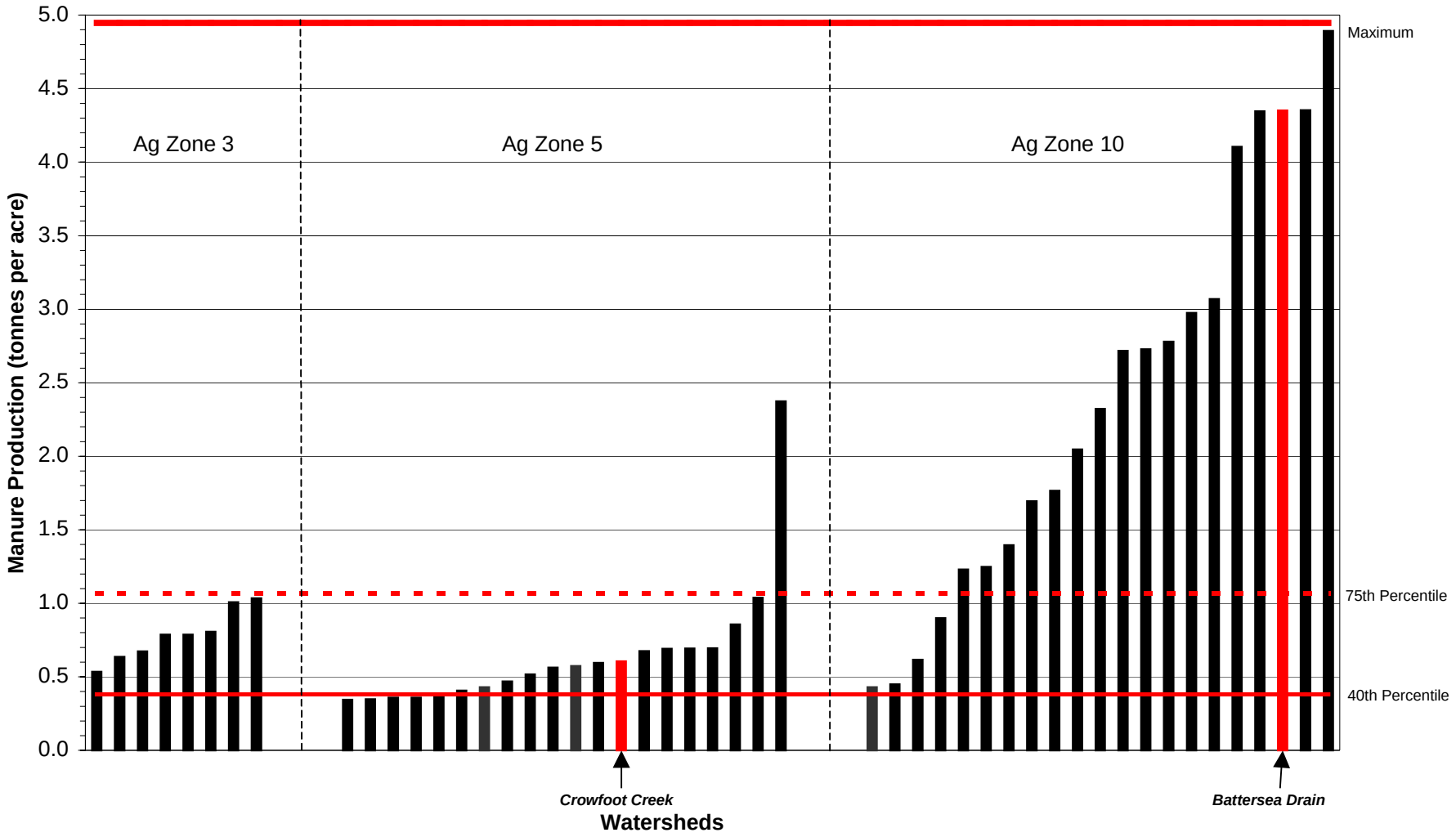

Figure A4.6b. Manure production in watersheds of the Moist Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

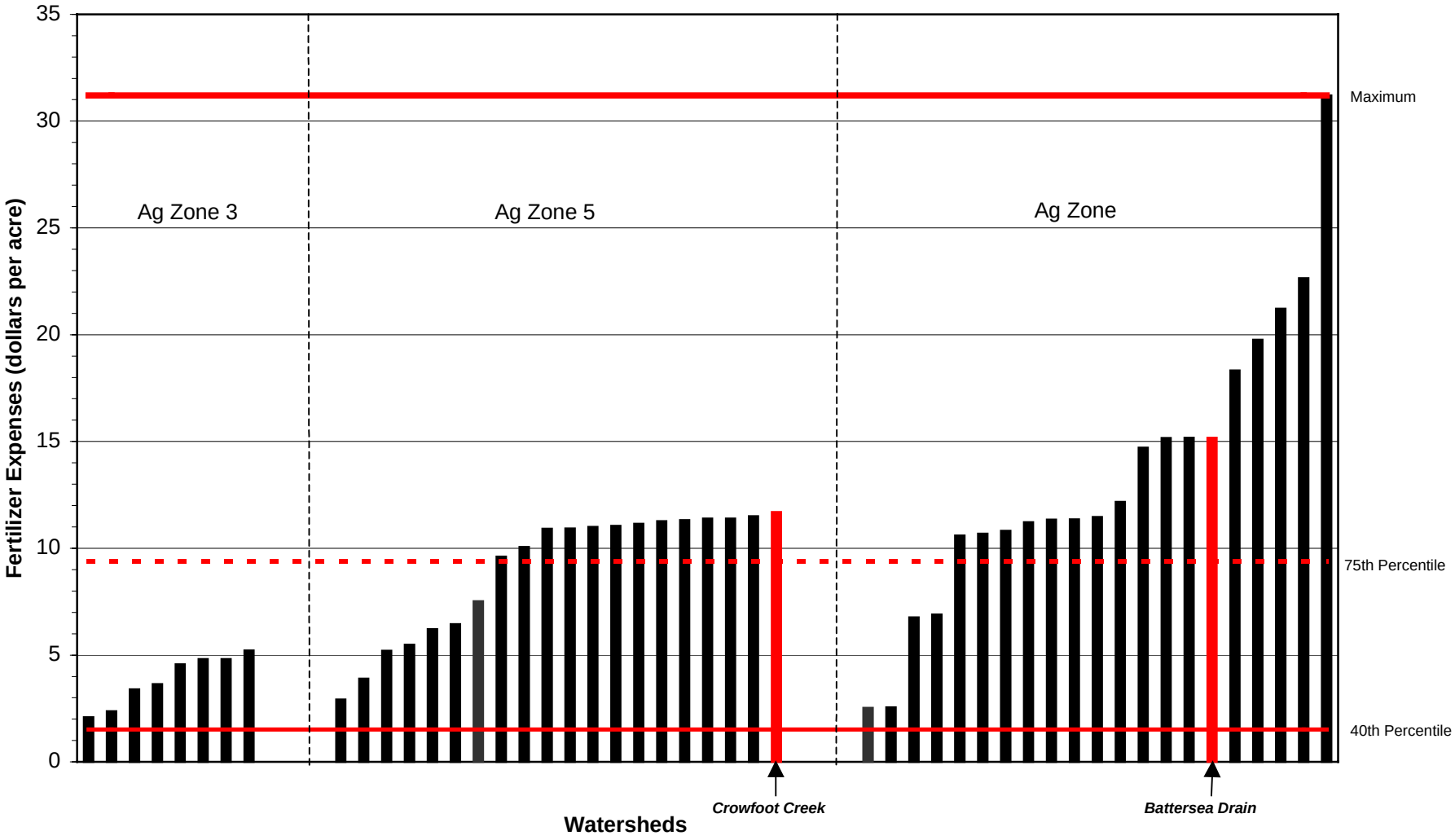

Figure A4.6c. Fertilizer expenses in watersheds of the Moist Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

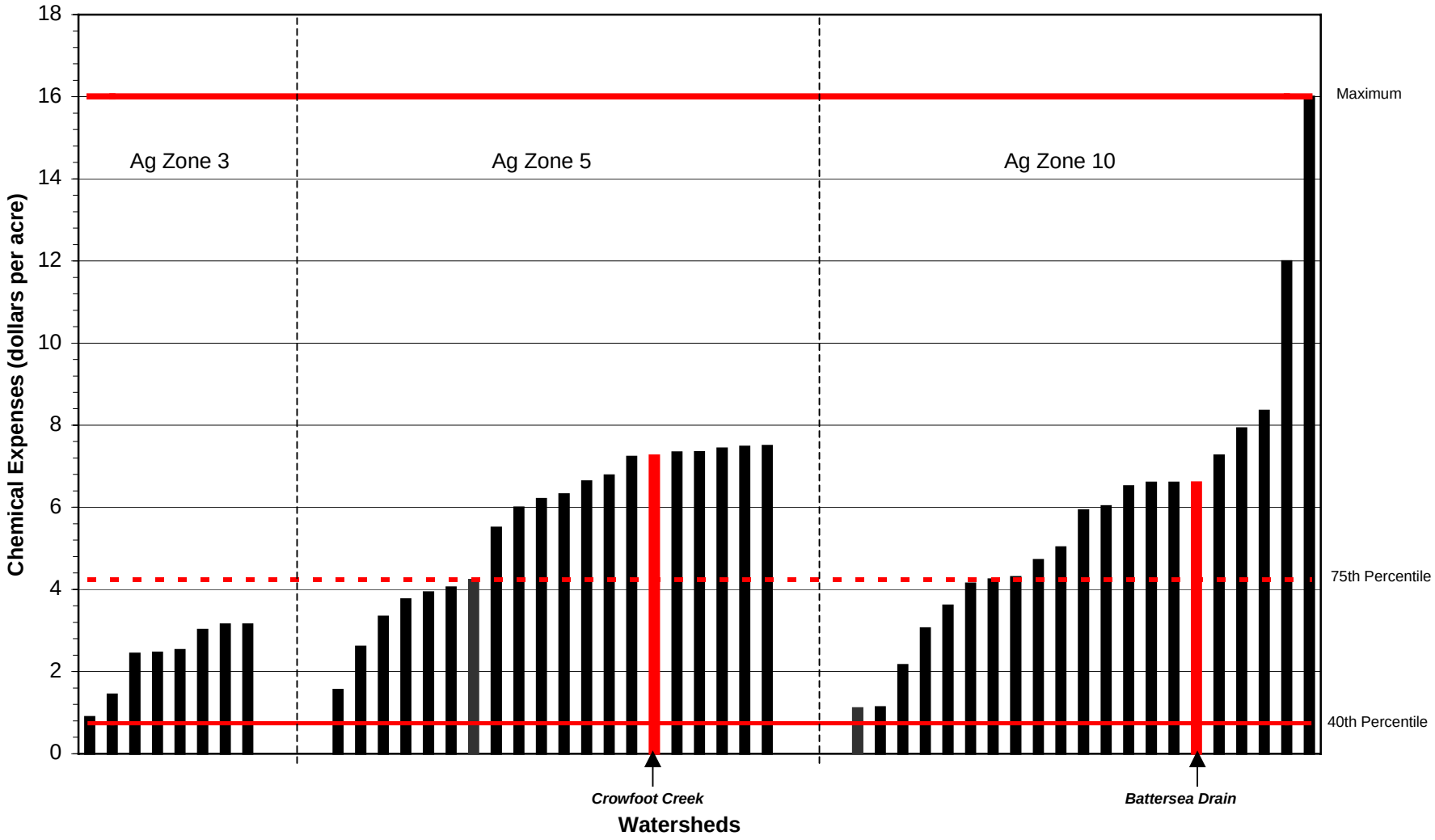

Figure A4.6d. Chemical expenses in watersheds of the Moist Mixed Grassland Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

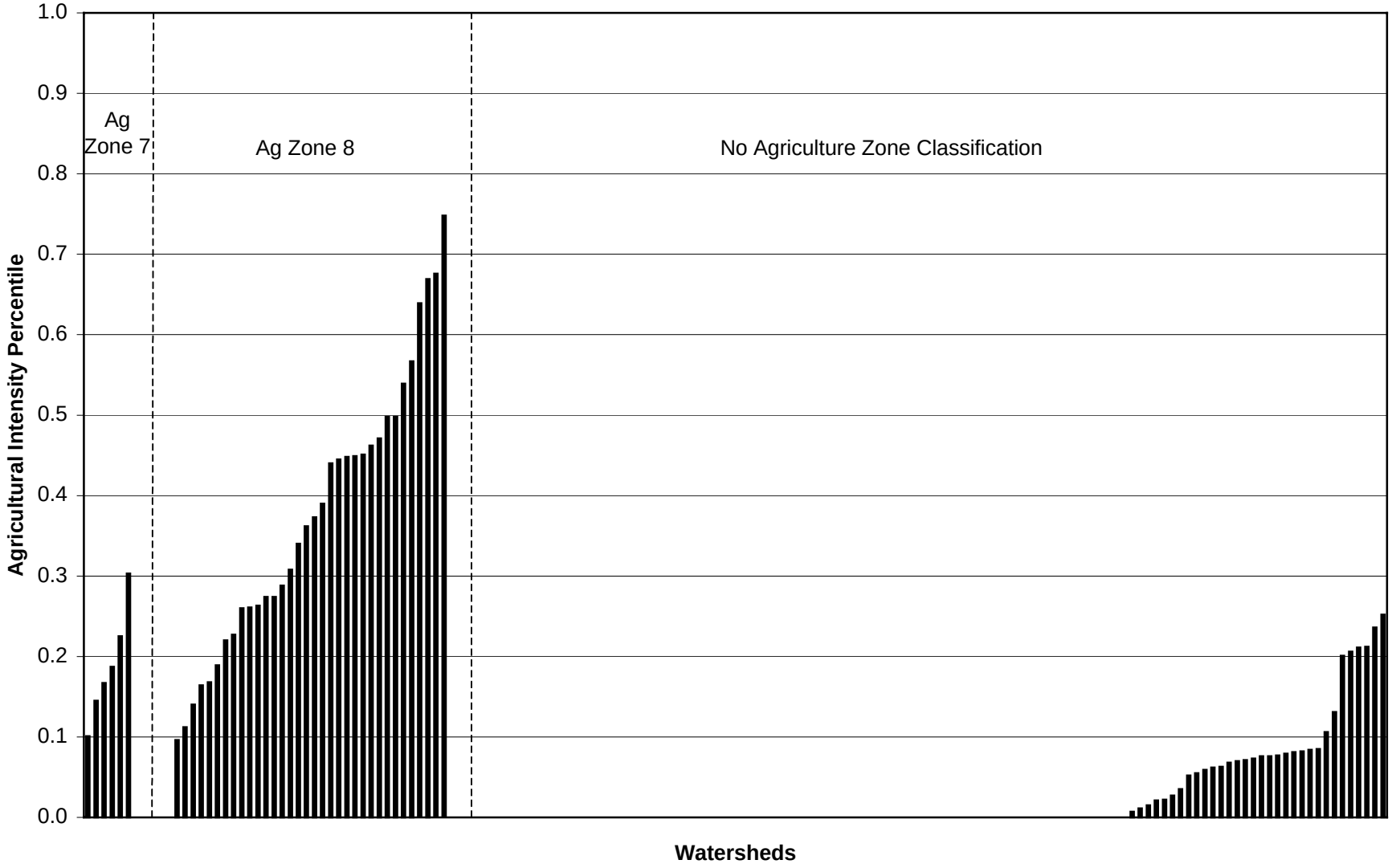

Figure A4.7a. Agricultural intensity in watersheds of the Subalpine/Alpine Ecoregion compared to the AESA watersheds.

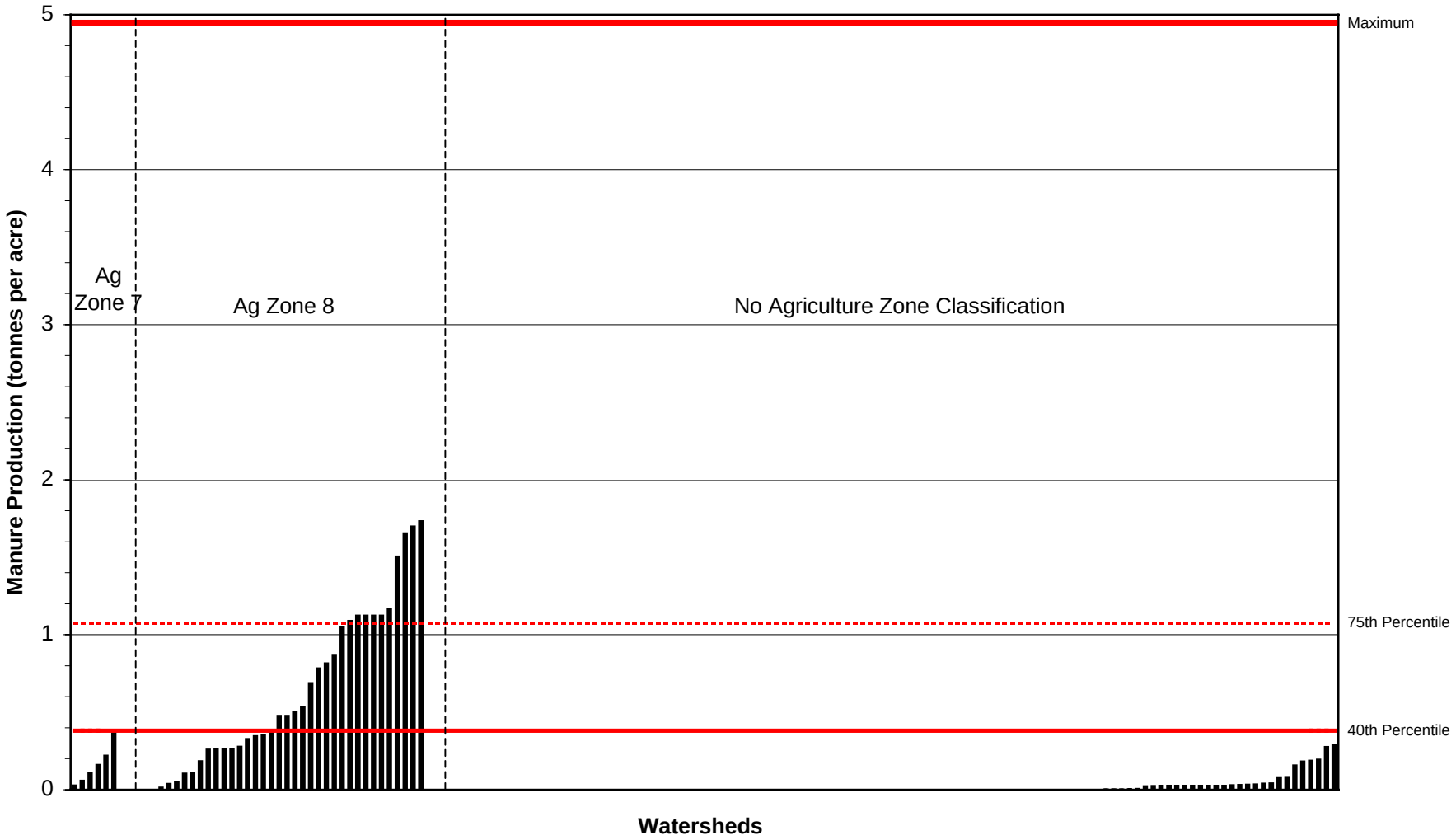

Figure A4.7b. Manure production in watersheds of the Subalpine/Alpine Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

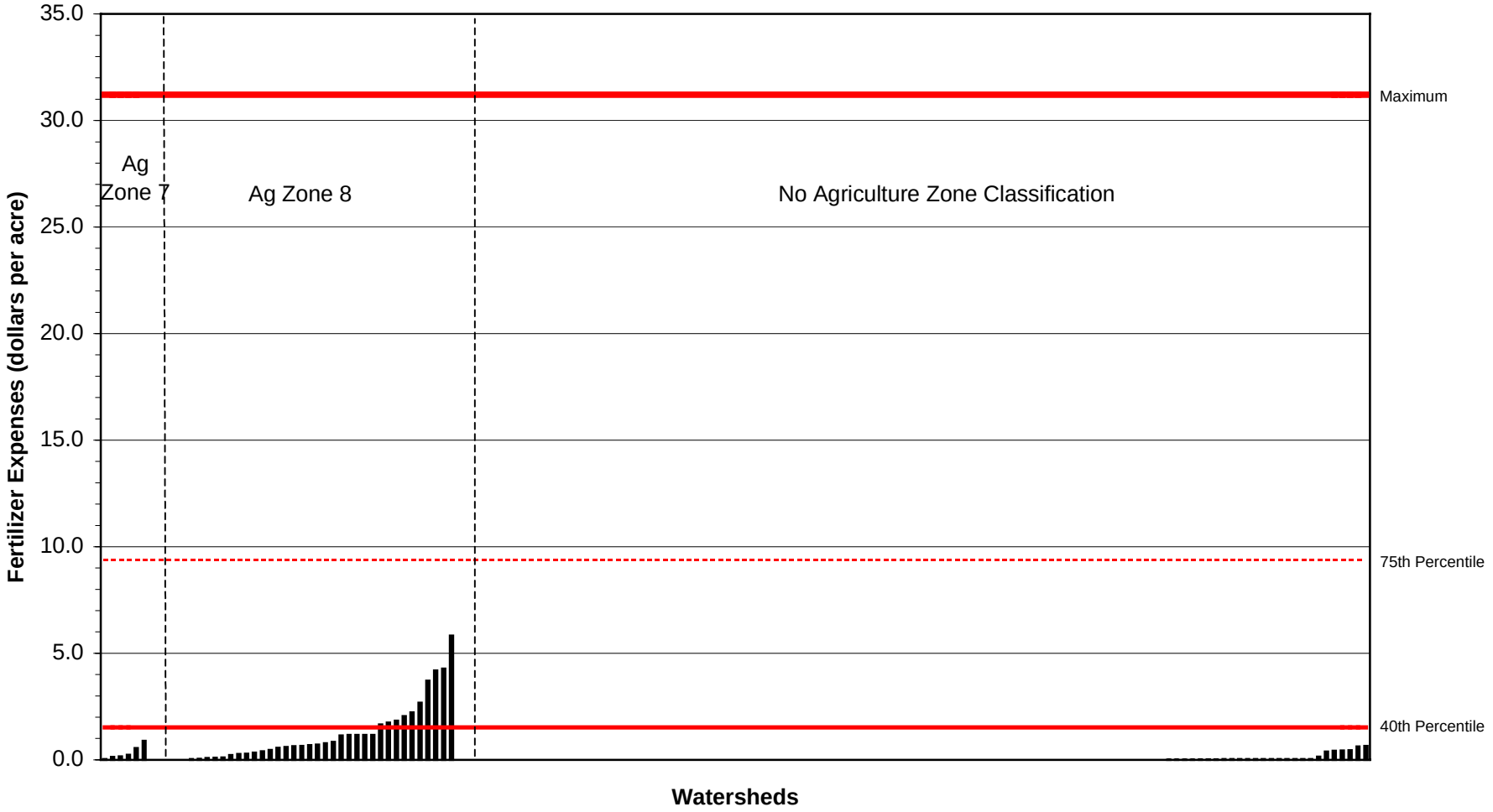

Figure A4.7c. Fertilizer expenses in watersheds of the Subalpine/Alpine Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

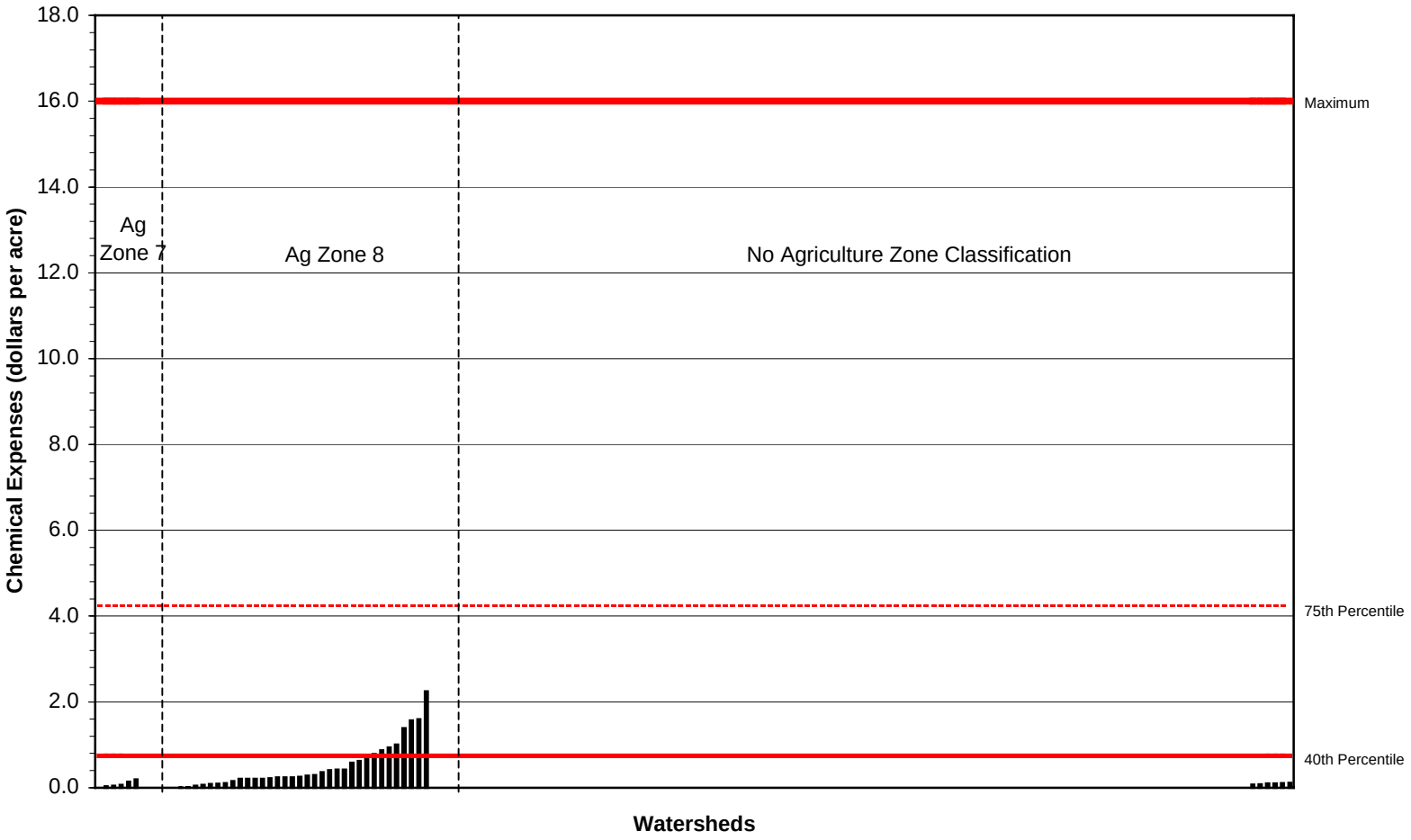

Figure A4.7d. Chemical expenses in watersheds of the Subalpine/Alpine Ecoregion compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

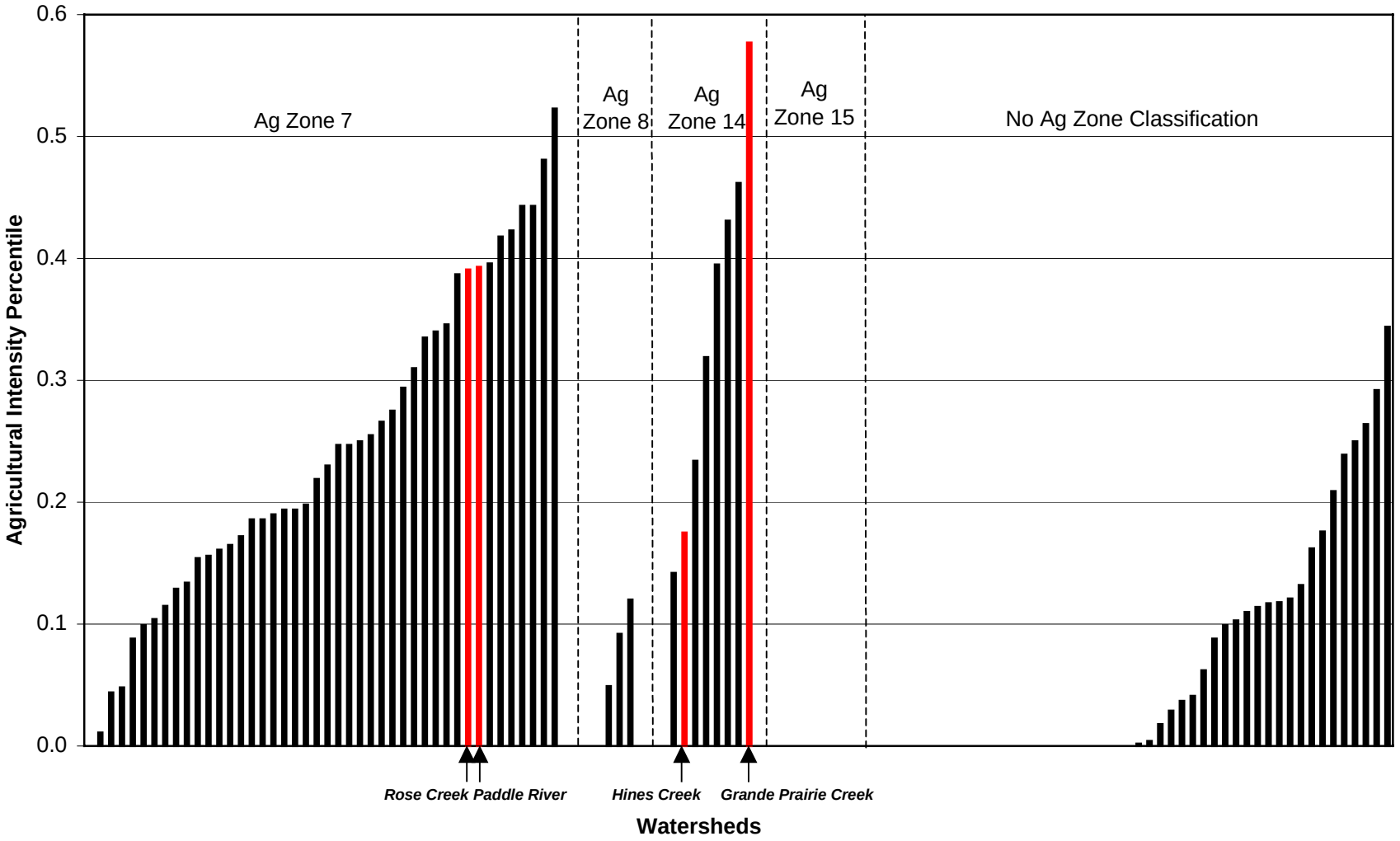

Figure A4.8a. Agricultural intensity in watersheds of the Western Alberta Upland/Clear Hills Upland Ecoregions compared to the AESA watersheds.

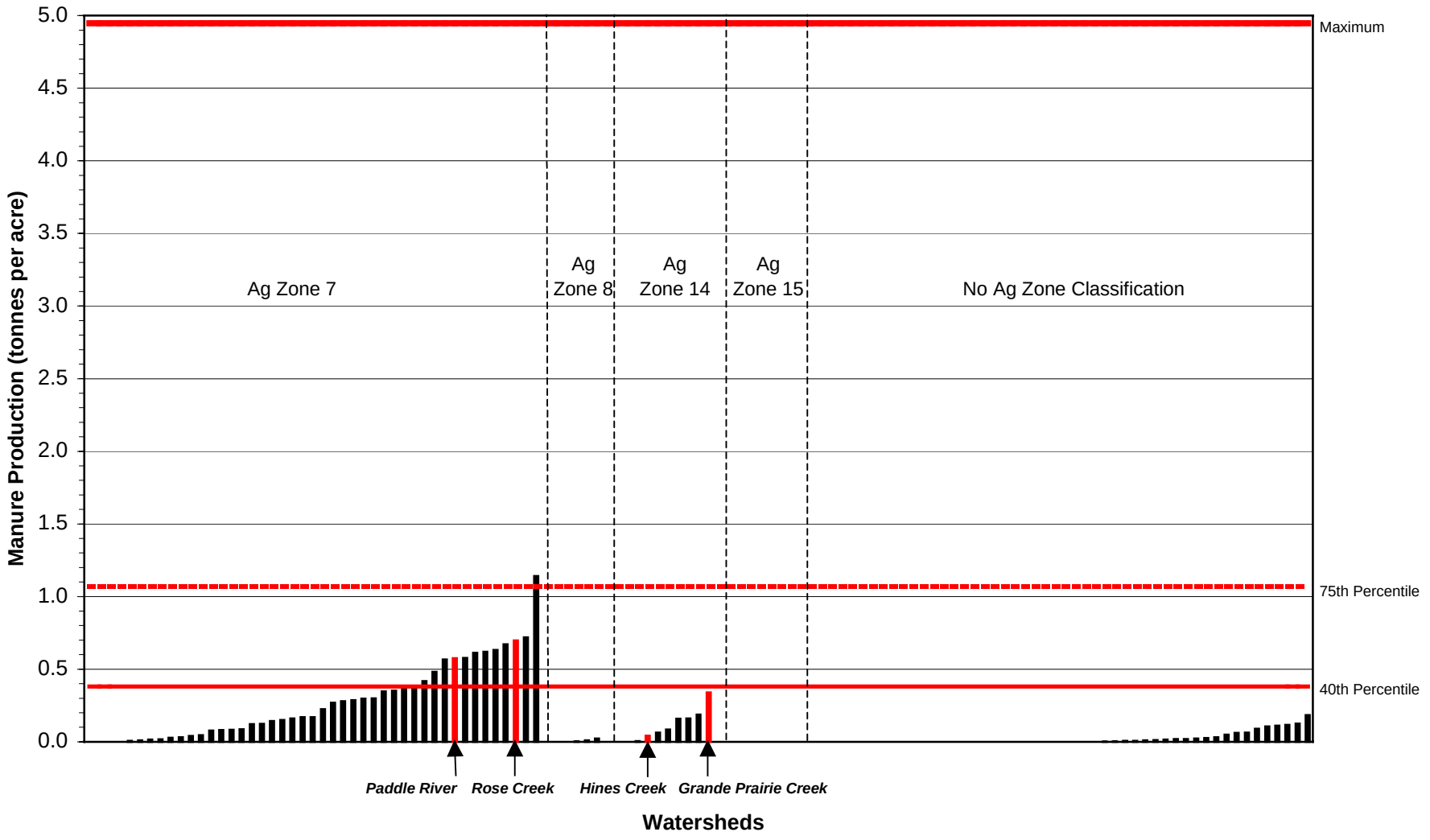

Figure A4.8b. Manure production in watersheds of the Western Alberta Upland/Clear Hills Upland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

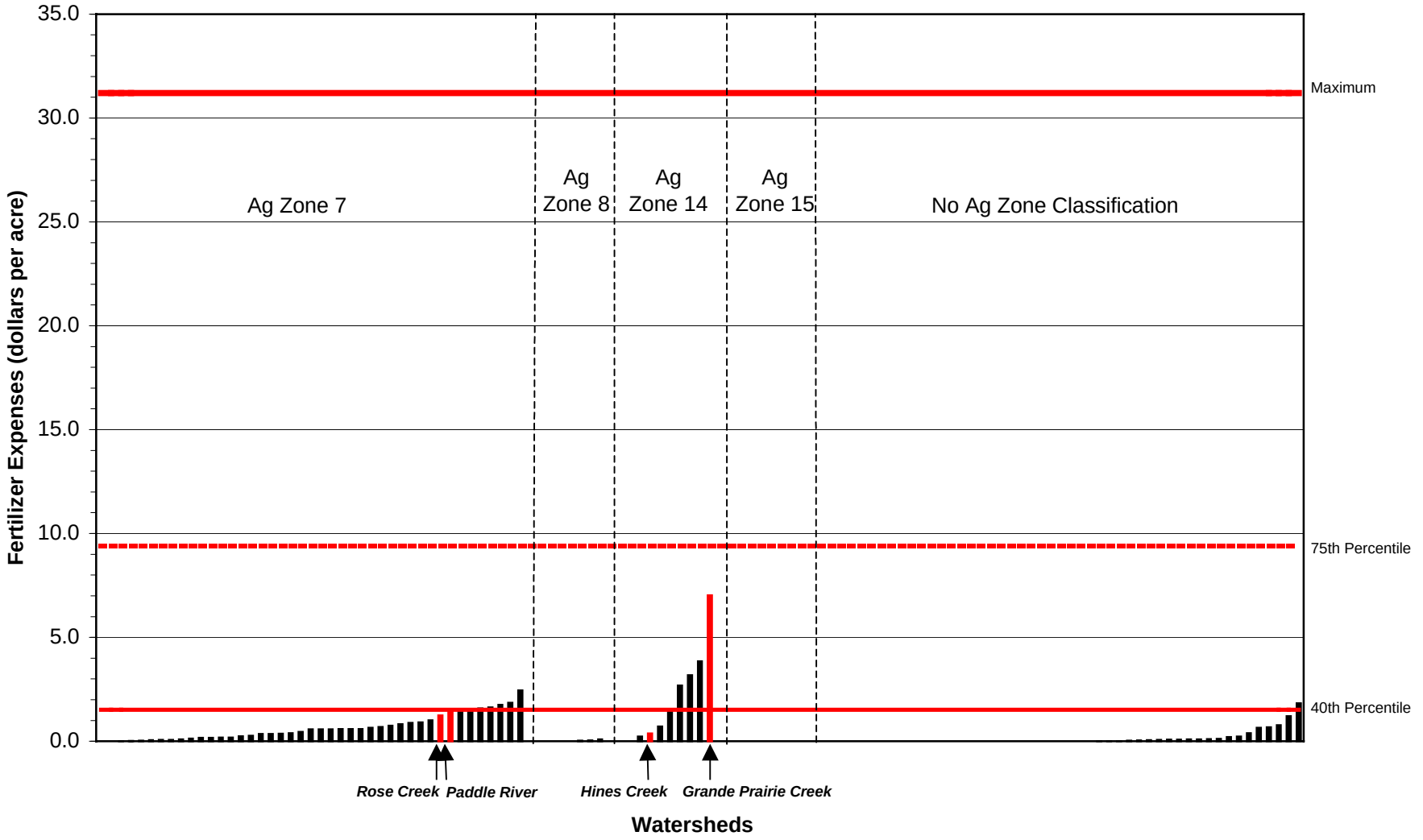

Figure A4.8c. Fertilizer expenses in watersheds of the Western Alberta Upland/Clear Hills Upland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

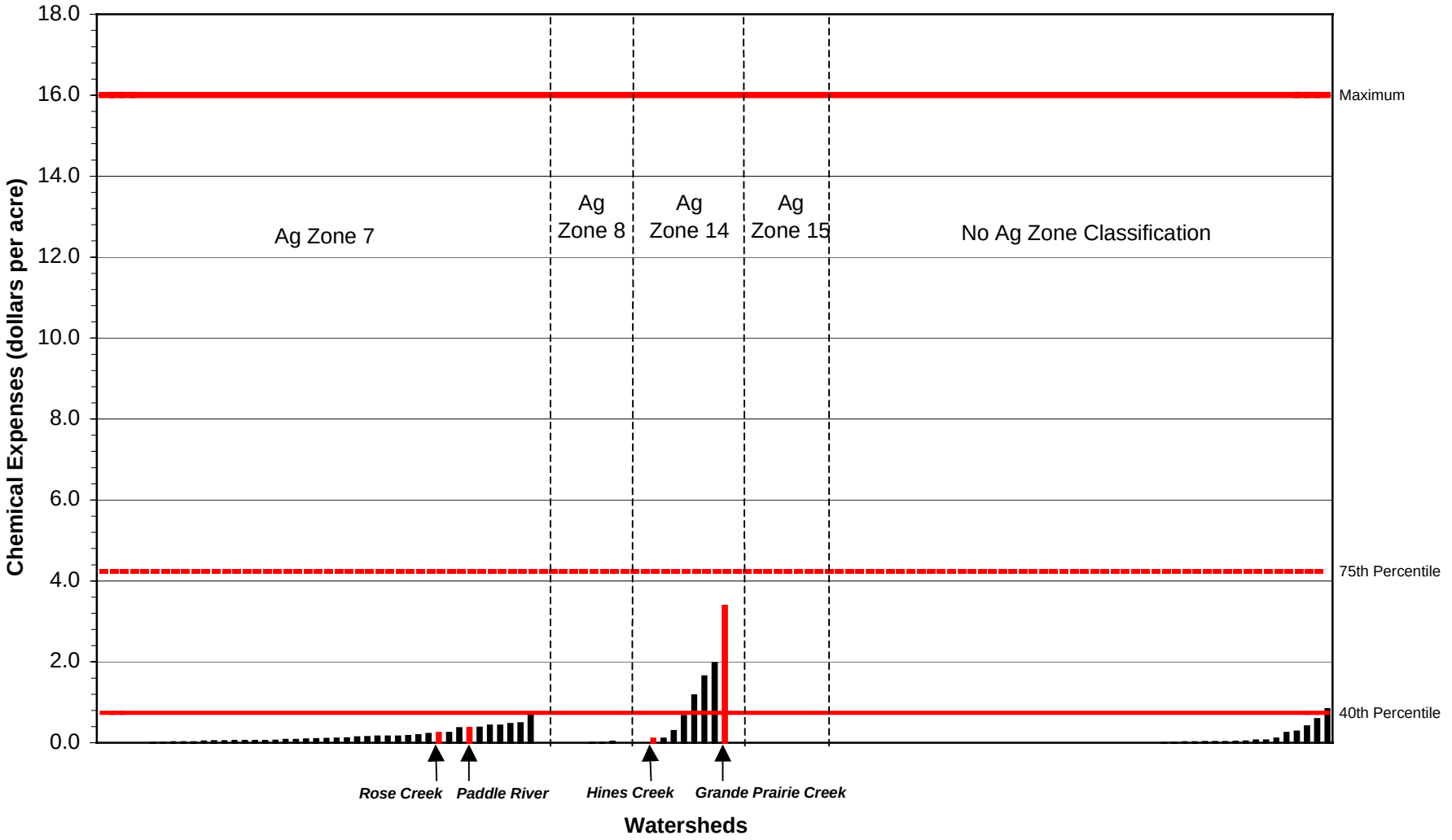

Figure A4.8d. Chemical expenses in watersheds of the Western Alberta Upland/Clear Hills Upland Ecoregions compared to the AESA watersheds.

Horizontal lines indicate the maximum, 75th and 40th percentile of the provincial distribution.

AESA Watersheds

Appendix 5

SAS code and data used to assemble integrated watersheds

The PFRA watersheds are reported as segments of watersheds, with each segment draining to a stream gauging station. Watersheds comprise the segment draining to the corresponding gauging station and all segments draining to upstream gauging stations. The following SAS program and table of watershed segment relationships (the watershed segment and the segment it drains directly into) were used to assemble the integrated watersheds, reported as a table with the gauge station code and all the watershed segments which drain into it.

```
options NOsource NOnotes nosymbolgen;
FILENAME DBINFILE 'D:\Site Selection Report\Alberta Basins.dbf';

 %MACRO ASSMBAS(NAME, filenm, clr_flg);

    %IF %UPCASE(&clr_flg) = YES %THEN
       %DO;
       proc datasets library=work;
          delete &filenm;
       run; quit;
       %END;
    %LET i = 1;
    proc sql;
    %DO %UNTIL (&sqlobs = 0);
       proc sql;
       CREATE TABLE sub_basn AS
          SELECT * FROM layer&i
          WHERE Name = &name;
       %LET i = %EVAL(&i+1); quit;
       Proc Append base = &filenm data = sub_basn; run;
    %END; quit;
 %MEND;

 %MACRO MK_LAYER(Rel_Tbl);
    data layer1;
    set &Rel_Tbl;
       subbasin = name;
       keep name subbasin;
    run;
    %LET i = 1;
    Proc SQL;
    %DO %UNTIL (&sqlobs = 0);
       %let j = %eval(&i);
       %let i = %eval(&i+1);
       CREATE TABLE LAYER&i AS
          SELECT
          A.NAME AS NAME,
          B.NAME AS SUBBASIN label="sub * &i basin"
       FROM
          layer&j  AS A,
          &Rel_Tbl AS B
       WHERE A.Subbasin=B.flowinto
       ORDER BY name;
    %END;
    QUIT;
 %MEND;

    proc dbf db4=dbinfile out=basins.alb_basn;
    run;

    data Pars_bas;
    set BASINS.alb_basn;
      if name NE receive;
      drop perimete select ws_maj12 hw1gxpf_ hw1gxpf0;
    run;

    Proc Sort data=pars_bas nodupkey; by name; run;
```

```
    data Basn_rel;
    set Pars_bas(rename=(receive=flowinto));
      keep name flowinto area ws_maj33;
    run;

  %Mk_Layer(Basn_rel);

    proc datasets library=basins;
      delete roll_up;
    run; quit;

    Data _null_;
    file 'P';
    set Basn_Rel;
      txt = '%ASSMBAS("' || Name ||'", BASINS.ROLL_UP,);';
      put txt;
    run;

  %include 'P';

PROC SQL;
   CREATE TABLE Temp_tbl AS
   SELECT
      A.Name,
      A.Subbasin,
      B.area
   FROM
      Basins.Roll_up  AS A,
      Basins.alb_basn AS B
   WHERE
      A.Subbasin=B.Name
   ORDER BY name;

   CREATE TABLE Bas_area AS
   SELECT
      Name label='Gauge Station Code',
      sum(area) AS Tot_Area label='Total effective drainage area - sq
km' format = 8.2
   FROM
      Temp_Tbl
   GROUP BY name
   ORDER BY name;
quit;



proc sort data=basins.stat_loc; by NAME; run;
proc sort data=bas_area; by name; run;

data basins.verify;
format tot_area area_dif perc_dif 8.2;
merge bas_area (in=ina) basins.stat_loc;
by name;
  if ina;
  area_dif = grs_area-tot_area;
  perc_dif = (area_dif/grs_area)*100;
```

```
 run;


 FILENAME DBverify 'D:\Site Selection Report\Alberta Basins
verify.dbf';

 proc dbf db4=DBverify data=basins.verify; run;
```

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07CA008	07CA005	07DD002	07DD010	07GJ004	07GJ001
07CA009	LACLABI	07DD003	07KF015	07GJ005	07HA001
07CA010	07CA013	07DD007	OUT	07HA001	07HD001
07CA010	07CA013	07DD009	OUT	07HA002	07HD001
07CA011	07CC002	07DD010	07DD007	07HA003	07HA002
07CA012	07CA013	07DD011	07DD010	07HA004	07HD001
07CA013	07CA009	07FD003	07AH001	07HA005	07HA004
07CA901	07BE004	07FD006	07HA001	07HA902	07HA003
07CB002	07CC002	07FD007	07FD003	07HB001	07HD001
07CC001	07DA001	07FD008	07FD003	07HB002	07HD001
07CC002	07DA001	07FD009	07FD003	07HC001	07HD001
07CD001	07CD003	07FD011	07FD008	07HC002	07HD001
07CD001	07CD001	07FD012	07FD003	07HD001	07HF001
07CD002	07DA001	07FD013	07FD009	07HF001	07KA002
07CD003	07CD002	07FD014	07HA001	07HF002	07HF001
07CD004	07CD002	07FD913	07FD003	07JA003	07JB002
07CD005	07CD001	07FD921	07HA001	07JB002	07JD002
07CE001	07CD001	07GA001	07GJ002	07JC001	07JD002
07CE002	07CE001	07GA002	07GJ002	07JC002	07JD002

NAME	RECEIVE
07JD001	07KA002
07JD002	07JD004
07JD003	07KA002
07JD004	07KA002
07JF002	07KA002
07JF003	07KA002
07JF004	07JF002
07KA002	07KC001
07KC001	07KC005
07KC005	OUT
07KE001	07KC005
07KF009	07KC005
07KF015	OUT
07NA003	OUT
07NB001	07NA003
07NB006	07NB007
07NB007	OUT
07NB008	OUT
07OA001	07OB003
07OB001	OUT
07OB003	07OB001
07OB004	07OB001
07OB005	07OB003
07OB006	07OB001
07OB007	07OB005
07OC001	07OB003
11AA002	11AA003
11AA003	11AA005
11AA004	11AA005
11AA005	11AA006
11AA006	11AA034
11AA007	11AA035
11AA009	11AA027
11AA011	11AA036
11AA023	OUT
11AA024	OUT
11AA026	11AA009
11AA027	OUT
11AA031	OUT
11AA031	OUT
11AA034	11AA036
11AA035	11AA031
11AA036	11AA007
11AA038	11AA006
11AA039	11AA038
11AB007	11AB902
11AB009	11AB080
11AB023	11AB082
11AB063	11AB007

NAME	RECEIVE
11AB080	OUT
11AB081	OUT
11AB082	OUT
11AB082	OUT
11AB086	11AB023
11AB090	11AB117
11AB091	11AB007
11AB092	11AB104
11AB093	11AB902
11AB094	11AB082
11AB097	11AA026
11AB098	OUT
11AB099	11AB009
11AB104	11AB902
11AB111	11AB117
11AB117	11AB081
11AB902	11AB023
BAPTIST	07BE001
BEARLAK	07GE005
BEAVERH	05EB002
BEAVERL	06AA001
BIGLAKE	05EA002
BUFFALO	05CE001
CALLING	07CC002
COOKING	HASTING
CYGNETL	05CC002
DOWLING	05CG001
EAGLENE	GARDINE
ETHELLK	06AD006
ETHELLK	06AD006
FAWCETT	07BK007
FLATLAK	07CA005
FRANKLA	05AC003
GARDINE	07DA017
GULLLAK	05CC001
HASTING	05EB001
HILDALK	ETHELLK
ISLELAK	05EA003
LACLABI	BEAVERL
LACLANO	07BC001
MARIELK	ETHELLK
MINISTI	05EB010
MIQUELO	05EB010
MOORELA	HILDALK
MURIELL	06AD006
NAKAMUN	LACLANO
NAMURLA	07DB003
PAKOWKI	05AH039
PEERLES	07JB002

NAME	RECEIVE
RIBSTON	05FD001
RICHARD	07DD009
SHOALLA	07BC004
SMOKYLK	05EF003
SOUNDLA	OUT
STEANNE	05EA004
STURGEO	07GH001
SULLIVA	DOWLING
SWABASC	07JB002
THOMASL	05FE003
THUNDER	07BB006
TYRELLL	05AF031
UTIKUMA	07JB002
WATERTO	05AD003

Appendix 6

SAS Code Used to Import and Parse AGRASID Soil and Landscape Information

The SAS code used to import AGRASID soil and landscape information into SAS data tables, organized for access for AERES follows. Note that AERES uses the Soil Polygon number as the key index variable to retrieve data.

```
libname agradata 'd:\agrasid\sas';

*1. create views of dbf data ;
*2. process pc-mas and cn-mas into allmasjk ;
*               - put mas_ext of signifigant soils into s1 to s5 order;
*               - filter aa in new_symb;
*               - assign area factor to each mas_ext;

*3. process pc-sl and cn-sl into allsl;
*4. process snf - drop 'N' land use if 'A' landuse exists;
*               - filter aa in new_symb, drop dup codes after;
*5. process slf - drop 'N' land use if 'A' landuse exists;
*               - filter aa in new_symb, drop dup codes after;


** section 1 ;
 proc access dbms=dbf  ;
   create work.pc_mas.access;
   path='d:\agrasid\dbf\pc-mas.dbf';

   create work.pc_mas.view;
   select all;
run;

 proc access dbms=dbf  ;
   create work.cn_mas.access;
   path='d:\agrasid\dbf\cn-mas.dbf';

   create work.cn_mas.view;
   select all;
run;


proc access dbms=dbf  ;
   create work.pc_sl.access;
   path='d:\agrasid\dbf\pc-sl.dbf';

   create work.pc_sl.view;
   select all;
run;

proc access dbms=dbf  ;
   create work.cn_sl.access;
   path='d:\agrasid\dbf\cn-sl.dbf';

   create work.cn_sl.view;
   select all;
run;

proc access dbms=dbf  ;
   create work.slf.access;
   path='d:\agrasid\dbf\slf.dbf';
```

```
   create work.slf.view;
   select all;
run;


proc access dbms=dbf  ;
   create work.snf.access;
   path='d:\agrasid\dbf\snf.dbf';

   create work.snf.view;
   select all;
run;

*****************************************************************;
** section 2 - a ;
* need to estimate the area of each soil(new_symb) assigned
  to a soilpoly ;
* cleanup data;

data all_mas;
   set pc_mas cn_mas ;
   new_symb=compress(new_symb,'a');
   if upcase(mas_ext) eq 'SL' then MAS_EXT='S1'; * data coding error;
   mas_ext=upcase(mas_ext);
   * aa code used to indicate out of area for soil, props the same;
   drop delete_f;
if soilpoly in (42004824,42105353) then put '0 ' soilpoly= new_symb=
mas_ext= ;
run;


proc sort data=all_mas ;
 by soilpoly mas_ext ;
 run;

* need to handle s1 and s4 filled in, but not s2 and s3. affects
  area fact calcs if not in filled in 1,2,34;
* 2 pass should get most, may need 3 passes;
 data all_mas;
 set all_mas;
 by soilpoly mas_ext;
 last_ext = lag1(mas_ext);
if soilpoly in (42004824,42105353) then put '0 ' soilpoly= new_symb=
mas_ext= last_ext=;
 if mas_ext in ('S1' 'S2' 'S3' 'S4') THEN DO;

     if mas_ext='S1' and last_ext eq 'S1' then do;
         mas_ext='S3';
     end;
     else
     if mas_ext='S2' and last_ext eq 'S2' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S2' and last_ext ne 'S1' then do;
         mas_ext='S1';
```

```
     end;
     else
     if mas_ext='S3' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S3' and last_ext eq 'S3' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S3' and last_ext Ne 'S2' then do;
         mas_ext='S1';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S4' then do;
         mas_ext='S5';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S2' then do;
         mas_ext='S3';
     end;
 end;
if soilpoly in (42004824,42105353) then put '1 ' soilpoly= new_symb=
mas_ext= last_ext=;
run;

proc sort data=all_mas ;
 by soilpoly mas_ext ;
 run;

* need to handle s1 and s4 filled in, but not s2 and s3. affects
  area fact calcs if not in filled in 1,2,34;
* 2 pass should get most, may need 3 passes;
 data all_mas;
 set all_mas;
 by soilpoly mas_ext;
 last_ext = lag1(mas_ext);
if soilpoly in (42004824,42105353) then put '0 ' soilpoly= new_symb=
mas_ext= last_ext=;
 if mas_ext in ('S1' 'S2' 'S3' 'S4') THEN DO;

     if mas_ext='S1' and last_ext eq 'S1' then do;
         mas_ext='S3';
     end;
     else
     if mas_ext='S2' and last_ext eq 'S2' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S2' and last_ext ne 'S1' then do;
         mas_ext='S1';
     end;
     else
```

```
     if mas_ext='S3' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S3' and last_ext eq 'S3' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S3' and last_ext Ne 'S2' then do;
         mas_ext='S1';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S4' then do;
         mas_ext='S5';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S2' then do;
         mas_ext='S3';
     end;
 end;
if soilpoly  in (42004824,42105353) then put '1 ' new_symb= mas_ext=
last_ext=;
run;



proc sort data=all_mas ;
 by soilpoly mas_ext ;
 run;

* need to handle s1 and s4 filled in, but not s2 and s3. affects
  area fact calcs if not in filled in 1,2,34;
* 2 pass should get most, may need 3 passes;
 data all_mas;
 set all_mas;
 by soilpoly mas_ext;
 last_ext = lag1(mas_ext);
if soilpoly in (42004824,42105353) then put '0 ' soilpoly= new_symb=
mas_ext= last_ext=;
 if mas_ext in ('S1' 'S2' 'S3' 'S4') THEN DO;

     if mas_ext='S1' and last_ext eq 'S1' then do;
         mas_ext='S3';
     end;
     else
     if mas_ext='S2' and last_ext eq 'S2' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S2' and last_ext ne 'S1' then do;
         mas_ext='S1';
     end;
     else
```

```
     if mas_ext='S3' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S3' and last_ext eq 'S3' then do;
         mas_ext='S4';
     end;
     else
     if mas_ext='S3' and last_ext Ne 'S2' then do;
         mas_ext='S1';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S4' then do;
         mas_ext='S5';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S1' then do;
         mas_ext='S2';
     end;
     else
     if mas_ext='S4' and last_ext eq 'S2' then do;
         mas_ext='S3';
     end;
 end;
if soilpoly  in (42004824,42105353) then put '1 ' new_symb= mas_ext=
last_ext=;
run;


* note need to access all new_symb for a soilpoly at the same time;
data q;
  set all_mas;
  by soilpoly;
  retain factor 0 D C1 C2 C3 c4 S1 S2 S3 S4  S5 0;
  if first.soilpoly then do;
    factor=0;
    D=0; C1=0; C2=0; C3=0; S1=0; S2=0; S3=0; S4=0; s5=0;c4=0;
  end;

  if upcase(mas_ext) eq 'D' then  D=1;
  if upcase(mas_ext) eq 'C1' then C1=1;
  if upcase(mas_ext) eq 'C2' then C2=1;
  if upcase(mas_ext) eq 'C3' then C3=1;
  if upcase(mas_ext) eq 'C4' then C4=1;
  if upcase(mas_ext) eq 'S1' then S1=1;
  if upcase(mas_ext) eq 'S2' then S2=1;
  if upcase(mas_ext) eq 'S3' then S3=1;
  if upcase(mas_ext) eq 'S4' then S4=1;
  if upcase(mas_ext) eq 'S5' then S5=1;

  if last.soilpoly then do;
* estimate the area of each soil(new_symb) assigned
  to a soilpoly by handling all logical combinations of mas_ext;

    if d then do;
       select(sum(s1,s2,s3,s4));
       when('4') do;
```

```
          d=.6; c1=0; c2=0; c3=0; s1=.1; s2=.1; s3=.1; s4=.1; s5=0;
          end;
        when('3') do;
          d=.7; c1=0; c2=0; c3=0; s1=.1; s2=.1; s3=.1; s4=0;  s5=0;
          end;
        when('2') do;
          d=.8; c1=0; c2=0; c3=0; s1=.1; s2=.1; s3=0 ; s4=0;  s5=0;
          end;
        when('1') do;
          d=.9; c1=0; c2=0; c3=0; s1=.1; s2=0 ; s3=0 ; s4=0;  s5=0;
          end;
        when('0') do;
          d=1.0; c1=0; c2=0; c3=0; s1=0; s2=0 ; s3=0 ; s4=0;  s5=0;
          end;
        otherwise;
        end;
    end;
    if c1 then do;
        select(sum(s1,s2,s3,s4));
        when('4') do;
          d=0 ; c1=.3; c2=0.3; c3=0; s1=.1; s2=.1; s3=.1; s4=.1;  s5=0;
          end;
        when('3') do;
          d=0 ; c1=0.35; c2=0.35; c3=0; s1=.1; s2=.1; s3=.1; s4=0;
s5=0;
          end;
        when('2') do;
          d=0 ; c1=0.4; c2=0.4; c3=0; s1=.1; s2=.1; s3=0 ; s4=0;  s5=0;
          end;
        when('1') do;
          if c3=0 then do;
            d=0; c1=0.45; c2=0.45; c3=0; s1=0.1; s2=0 ; s3=0 ; s4=0;
s5=0;
          end;
          else do;
            d=0; c1=.3; c2=0.3; c3=0.3; s1=0.1; s2=0 ; s3=0 ; s4=0;
s5=0;
          end;
          end;
        when('0') do;
          if c3=0 then do;
            d=0; c1=0.5; c2=0.5; c3=0; s1=0; s2=0 ; s3=0 ; s4=0; s5=0;
          end;
          else do;
            d=0; c1=.3334; c2=0.3333; c3=0.3333; s1=0; s2=0 ; s3=0 ;
s4=0; s5=0;
          end;
        end;
        otherwise;
        end;
    end;
    if not(c1) and not(d)  then do;
        select(sum(s1,s2,s3,s4,s5));
        when('4') do;
          d=0 ; c1=0; c2=0; c3=0; s1=.25; s2=.25; s3=.25; s4=.25; s5=0;
          end;
        when('5') do;
```

```
         d=0 ; c1=0; c2=0; c3=0; s1=.2; s2=.2; s3=.2; s4=.2; s5=0.2;
         end;
       otherwise;
       end;
    end;
    x=sum(d,c1,c2,c3,c4,s1,s2,s3,s4,s5);
    if not(0.99< x < 1.01) then put x= d c1 c2 c3 s1= s2= s3= s4= s5=;
    if soilpoly in (42004824,42105353) then put soilpoly= x= d c1 c2 c3
s1= s2= s3= s4= s5=;
    output;
  end; * lastpoly;

keep soilpoly new_symb d c1 c2 c3 c4 s1 s2 s3 s4 s5;
run;
* restructure for merge;

data z;
  length mas_ext $2;
  set q;
 if soilpoly in (42004824,42105353) then put soilpoly= x= d c1 c2 c3
s1= s2= s3= s4= s5=;
  mas_ext='D';areafact=d; output;
  mas_ext='C1';areafact=C1; output;
  mas_ext='C2';areafact=C2; output;
  mas_ext='C3';areafact=C3; output;
  mas_ext='C4';areafact=C4; output;
  mas_ext='S1';areafact=S1; output;
  mas_ext='S2';areafact=S2; output;
  mas_ext='S3';areafact=S3; output;
  mas_ext='S4';areafact=S4; output;
  mas_ext='S5';areafact=S5; output;
KEEP SOILPOLY MAS_EXT AREAFACT;
RUN;

* check for deleted obs in log, dup data in source dbf;
proc sort data=z out=qq nodupkey ;by soilpoly  mas_ext; run;

* check for deleted obs in log, dup data in source dbf;
proc sort data=all_mas out=xxx NODUPKEY ;by soilpoly mas_ext; run;

data agradata.allmasjk;
  merge  QQ(IN=INB) xxx(in=ina);
  by soilpoly mas_ext;
  * check for problems ;
  IF  INA AND NOT(INB) THEN PUT SOILPOLY= NEW_SYMB= MAS_EXT=;
 if soilpoly in (42004824,42105353) then put soilpoly= mas_ext=
areafact=;
  if ina;
run;

* check for deleted obs in log, dup data in source dbf;
proc sort data=agradata.allmasjk nodupkey;by soilpoly new_symb mas_ext;
run;

* check for problems ;
proc summary data=agradata.allmasjk(keep=soilpoly areafact) nway;
class soilpoly;
```

```
var areafact;
output out=t sum=sum;
run;

proc print;
where sum >1.000 or sum < 0.9;
run;
*************************************************************************
**************;
*** section 3 - process sl data;

data agradata.all_sljk;
   set pc_sl cn_sl ;
   drop delete_f;
run;

*************************************************************************
**************;
*** section 4 - process snf data;
* snf has A for ag profile, N for natural. Take A as per connie;
*remove aa from new_symb;
data snf1;
set snf;
  new_symb=compress(new_symb,'a');
run;
* note 'A' code will be taken if both exist;
proc sort data=snf1 ;
 by new_symb lu;
run;

data agradata.snfjk;
 set snf1;
 by new_symb lu;
 if first.lu then output;
run;


*************************************************************************
**************;
*** section 5 - process slf data;
* snf has A for ag profile, N for natural. Take A as per connie;
*remove aa from new_symb;
data slf1;
set slf;
  new_symb=compress(new_symb,'a');
run;


proc sort ; by new_symb lu layer_no; run;
* check this dataset to insure deleting aa loses no data;
* ie records are identical except for variant column;
data checkdup;
 set slf1;
 by new_symb lu layer_no;
 if first.layer_no ne last.layer_no;
run;
```

```
proc sort data=slf1 nodupkey; by new_symb lu layer_no; run;

* use snf table to filter whether A or N lu kept;
proc sql;
 create table slf2 as
 select a.*
 from slf1 as a, agradata.snfjk as b
 where a.new_symb=b.new_symb and a.lu=b.lu ;
quit;

proc sort data=slf2 nodupkey out=agradata.slfjk;
 by new_symb lu layer_no;
run;
```

Appendix 7

SAS Code Used to Classify Soil Polygons by Landscape and Soil Characteristics (Potential for Runoff)

Soil Polygon Landscape Characteristics for Runoff Potential Type

```
data agradata.splylscp;
 set agradata.all_sljk(keep=soilpoly sl_lmode sl_lmod);
 length lmodemod $6 lscaptyp $1;
 lmodemod=compress( sl_lmode  || '-' || sl_lmod);
;
lscaptyp ='4';
if upcase(SL_lmode) in (
 'M1M','M1H','R2M','R2H','U1H','SC1','SC1L','SC1H','SC2','SC3','SC4'
 'I3','I3L','I3M','I3H','I4','I4L','I4M','I4H','I5','I5L','I5M','I5H'
 'I1','I1L','I1M','I1H','I2','I2L','I2M','I2H',
 'IUL','IUH'
) THEN lscaptyp='1';

if upcase(SL_lmode) in (
 'H1L','H1M','H1H'
 'H5L','H5M','H5H'
,'HP1','HP1H','HP1M'
,'HR2','HR2H','HR2M'
) THEN lscaptyp='2';

if upcase(SL_lmode) in (
 'L1','L2','L3'
,'R2L'
,'U1L'
,'O1','O2','O3','O4','O5'
) THEN lscaptyp='3';
run;
```

Soil Textures and Restrictive Layers for Runoff Potential Class

```
libname agradata 'd:\agrasid\sas';

 /*
 objective is to create a dataset at soilpoly resolution

 note the following column definitions
high - percent of soilpoly in high runoff class
med - percent of soilpoly in med runoff class
low - percent of soilpoly in low runoff class
unkn - percent of soilpoly not assigned to a runoff class

A2 - percent of soilpoly with restrictive layer based on criteria 2
A3 - percent of soilpoly with restrictive layer based on criteria 3
A4 - percent of soilpoly with restrictive layer based on criteria 4
UK - percent of soilpoly not assigned to a restrictive layer class
*/


*CODE FOR RESTRICTIVE LAYERS;
data t;
set agradata.slfjk;
```

```
length texture $4 REST_LAY $2;
  new_symb=compress(new_symb,'a');

* CALC SOIL TEXTURE;
TEXTURE='    ';
if tsand >85 and tsilt+(tclay*1.5) <=15
then texture='S';
if tsand >=85 and tsand <=90 and tsilt+(tclay*1.5) >15
then texture='LS';
if tsand >=70 and tsand <85 and tsilt+(tclay*2.0) <=30
then texture='LS';
if tclay <=20 and tsilt+(tclay*2) >30 and tsand >=52
then texture='SL';
if tclay <7 and tsilt <50 and tsand >=43 and tsand <=52
then texture='SL';
if tclay >=7 and tclay <=27 and tsilt >=28 and tsilt <50 and tsand <52
then texture='L';
if tsilt >=50 and tclay >=12 and tclay <=27
then texture='SIL';
if tsilt >=50 and tsilt <=80 and tclay <12
then texture='SIL';
if tsilt >=80 and tclay <12
then texture='SI';
if tclay >20 and tclay <=35 and tsilt <28 and tsand >45
then texture='SCL';
if tclay >27 and tclay <=40 and tsand >=20 and tsand <=45
then texture='CL';
if tclay >27 and tclay <=40 and tsand <20
then texture='SICL';
if tclay >=35 and tsand >45
then texture='SC';
if tclay >40 and tsilt >=40
then texture='SIC';
if tclay >40 and tclay<=60 and tsand <45 and tsilt <40
then texture='C';
if tclay >60
then texture='HC';
if texture='' then put layer_no= tsand= tsilt= tclay= NEW_SYMB=;
* CALC RESTRICTIVE HORIZONS;
rest_lay='UK';
if KSAT<10.000 then rest_lay='A4';
if upcase(variant)='XP' and upcase(hzn_mas) = 'C' then rest_lay='A3';
if upcase(variant)='XP' and upcase(hzn_mas) = 'R' then rest_lay='A3';
if upcase(variant)='XL' and upcase(hzn_mas) = 'C' then rest_lay='A3';
if upcase(variant)='XL' and upcase(hzn_mas) = 'R' then rest_lay='A3';
IF UPCASE(HZN_SUF)='N'  THEN REST_LAY='A2';
IF UPCASE(HZN_SUF)='NT' THEN REST_LAY='A2';
IF UPCASE(HZN_SUF)='NJT' THEN REST_LAY='A2';
IF UPCASE(HZN_SUF)='NTJ' THEN REST_LAY='A2';
IF UPCASE(HZN_SUF)='NJTJ' THEN REST_LAY='A2';
if upcase(hzn_mas)="O" then rest_lay='UK';
if udepth>50 then rest_lay='UK';
*if layer_no=1 then output;
keep new_symb rest_lay layer_no texture lu VARIANT; run;
run;

proc sort nodupkey;
```

```
 by new_symb lu layer_no;
run;

data t1;
 set t;
 length orestlay stexture $4;
 retain orestlay stexture'';
 by new_symb lu;
 if first.lu then do; stexture=texture; orestlay='UK'; end;
 if rest_lay IN ('A2','A3','A4')  and orestlay eq 'UK' then
orestlay=rest_lay;
 if last.lu then do;
     restrlay=orestlay;
     output;
 end;
drop orestlay rest_lay layer_no ;
run;

proc sort nodupkey;
by new_symb lu;
run;

data symrest1;
  set t1;
  by new_symb;
  if first.new_symb then output;
run;

* merge with area factor and soilpoly info ;
proc sort data=agradata.allmasjk; by new_symb; run;

*CODE FOR RUNOFF ASSIGNMENT;

data symrestr;
length runoff srunoff $4;
merge agradata.allmasjk(in=ina) symrest1(in=inb);
by new_symb;
* if restrlay IN ('A2','A3','A4') then put restrlay=;
if soilpoly eq . then delete; * only need codes appearing in mas file;
if restrlay='' then restrlay='UK'; * not in soils file;
*if not(ina and inb) then put ina= inb= new_symb= lu= ;
srunoff='UNKN';
* set runoff based on mas_order and texture;
select(upcase(mas_orde)) ;
when ('BRUN') do;
        end;
when ('VERT') do;
        end;
when ('SOLO') do;
        end;
when ('CHER') do;
        if STEXTURE in ('SI','SIL','SCL','SIC','C','HC') then
srunoff='HIGH';
        if STEXTURE in ('L','CL','SICL') then srunoff='MED';
        if STEXTURE in ('S','SL','LS') then srunoff='LOW';
        end;
when ('LUVI') do;
```

```
        if STEXTURE in ('SI','SIL','SCL','SIC','C','HC') then
srunoff='HIGH';
        if STEXTURE in ('S','SL','LS') then srunoff='MED';
        end;
when ('REGO') do;
        end;
otherwise;
end;
* set runoff by using mas_sg, independant of mas_orde;
*brun;
        if upcase(mas_sg) eq 'E.DYB' then srunoff='HIGH';
*vert;
        if upcase(mas_sg) in ('O.HV','O.V') then srunoff='HIGH';
*solo;
        if upcase(mas_sg) in (
        'B.SO'
        'B.SS'
        'B.SZ'
        'DB.SO'
        'DB.SS'
        'DB.SZ'
        'BL.SO'
        'BL.SS'
        'BL.SZ'
        ) then srunoff='HIGH';
* cher;
        if upcase(mas_sg) eq 'O.BL' and variant ne 'TA' then
srunoff='LOW';
if upcase(mas_sg) eq 'O.BL' and STEXTURE in ('L','CL','SICL') then
        srunoff='LOW';
if upcase(mas_sg) in (
        'SZ.B'
        'SZ.DB'
        'SZ.BL'
) then srunoff='MED';
*luvi;
if upcase(mas_sg) in (
        'O.GL'
        'SZ.GL'
        'GLD.GL'
        'GLSZ.GL'
) then srunoff='HIGH';
if upcase(mas_sg) in (
        'D.GL'
) then srunoff='MED';
*rego;
if upcase(mas_sg) in ('O.R','O.HR') then srunoff='LOW';
*IF UPCASE(MAS_ORDE)='CHER' AND SRUNOFF='UNKN' THEN PUT MAS_SG=
STEXTURE=;
runoff=srunoff;
if restrlay IN ('A2','A3','A4') then runoff='HIGH';
run;

proc sort;by soilpoly descending areafact mas_ext;run;

* create the runoff risk columns;
```

```
proc summary  data=symrestr nway;
class soilpoly runoff;
var areafact;
output out=xruno sum=areafact;
run;

proc transpose out=zruno;
by soilpoly;
id runoff;
var areafact;
run;

* create the restrictive layer columns;
proc summary  data=symrestr nway;
class soilpoly restrlay;
var areafact;
output out=xrest sum=areafact;
run;

proc transpose out=zrest;
by soilpoly;
id restrlay;
var areafact;
run;

* combine the columns at soilpoly level ;
data z;
  merge zruno(in=ina) zrest(in=inb);
  by soilpoly;
  if not(ina and inb) then put ina= inb= ;
run;

* final dataset soilpoly runoff/ restrictive layer percentages;
data agradata.splyruno;
 set z;
  high=100*high;
  unkn=100*unkn;
  low =100*low;
  med =100*med;
  uk =100*uk;
  a2 =100*a2;
  a3 =100*a3 ;
  a4 =100*a4;
run;
```