

SPATIAL RELATIONSHIPS BETWEEN SOIL FERTILITY PARAMETERS AND ECOLOGICAL LANDFORMS¹

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ABSTRACT

A summary of routinely measured soil properties (pH, extractable nutrients and organic matter) will be presented. Maps showing the distribution of high phosphate soils, acid soils and potassium deficient areas in Alberta, for example, will be on display. The analysis will be within the framework of a land database model, such as ecodistricts and soil landscapes of Canada, to show how farm level sampling correlates with broad land classifications. The data is provided by Norwest Soil Research LTD.

OBJECTIVES

-determine geographical distribution of soil fertility parameters in Alberta using the Norwest Laboratories database and the relationship with ecodistricts

MATERIALS AND METHODS

-database from Norwest Labs (1993 - 1997) representing 77,962 records
-producer submitted soil samples taken for 0 - 15 cm sampling depth
-parameters include soil test P, K, S, OM, and pH
-N not included because of large annual fluctuations due to management and climate
-all data used for this exercise and there was no breakdown by management or crop
-for each ecodistrict, the average for each fertility parameter was calculated
-results were partitioned into agronomically significant soil test classes and ranges
-ArcView was used to show physical distribution of soil test classes on ecodistrict basis

RESULTS

-map illustrating ecoregions and ecodistricts (Figure 1)
-database representing soil sample coverage of the arable land in Alberta (Figure 2)
-Table 1 summarizes the composition of the Norwest Laboratory soil fertility database
-maps illustrating the distribution of soil fertility parameters by ecodistricts (Figures 3 to 7)

CONCLUSIONS

-maps are broad or general estimates for an ecodistrict
-summary is not intended as a substitute for soil sampling and testing on individual fields

FUTURE

-summary by ecoregions and soil landscapes of Canada
-summary by township
-compare non-irrigated and irrigated
-compare fallow with annual and forage crops
-trends of soil fertility over time

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Table 1. Composition of Norwest Laboratory soil fertility database.

	1993	1994	1995	1996	1997
Non-irrigated					
fallow	499	1677	1104	809	1026
annual	5184	15776	10441	8653	9954
forage	469	1505	1066	953	895
other	1632	4990	3465	3100	3478
total					76676
Irrigated					
annual	0	191	196	147	93
forage	0	90	84	49	12
other	0	221	85	73	45
total					1286

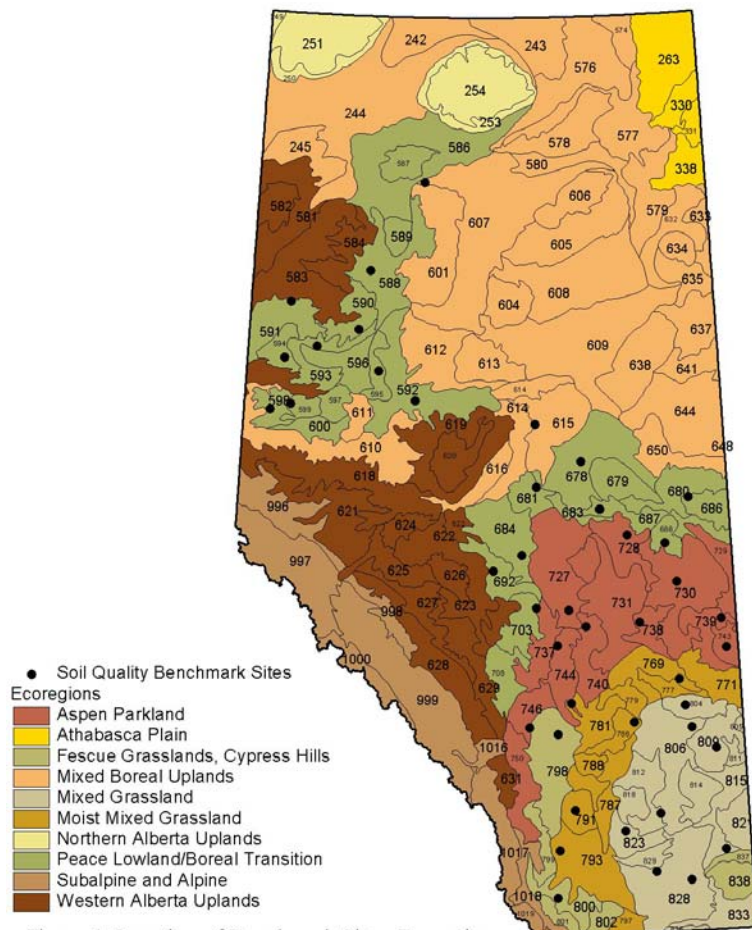


Figure 1. Location of Benchmark Sites, Ecoregions and Ecodistricts in Alberta.

Figure 2
Soil Sampling Sites
in Alberta (0 - 15 cm)

- Soil Sampling Sites
- Ecodistrict linework
- Major Rivers

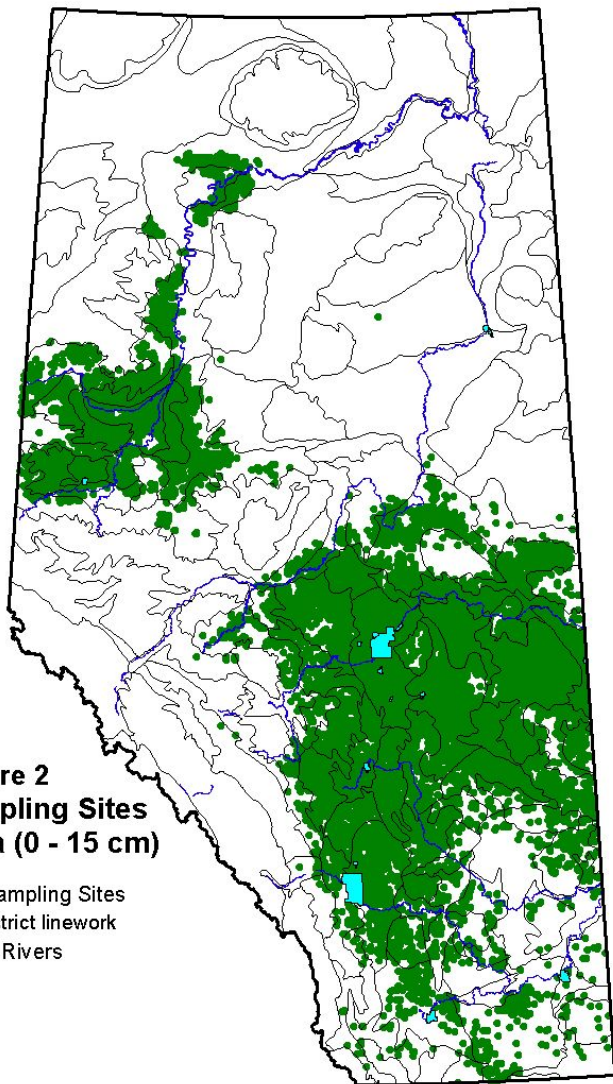


Figure 3
Ecodistrict pH Levels
(0 - 15 cm)

- pH
- 6.0 - 6.5 (acid)
 - 6.5 - 7.0 (neutral)
 - 7.0 - 7.5 (neutral)
 - > 7.5 (alkaline)
 - No Data
 - Ecodistrict linework
 - Major Rivers

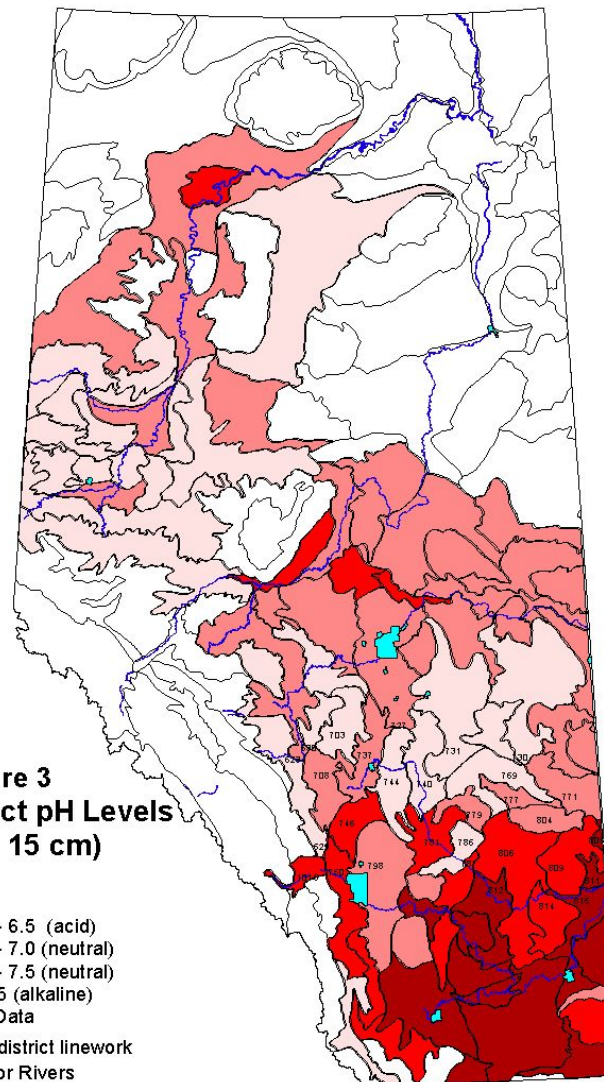


Figure 4
Ecodistrict Organic
Matter Levels (0 - 15 cm)

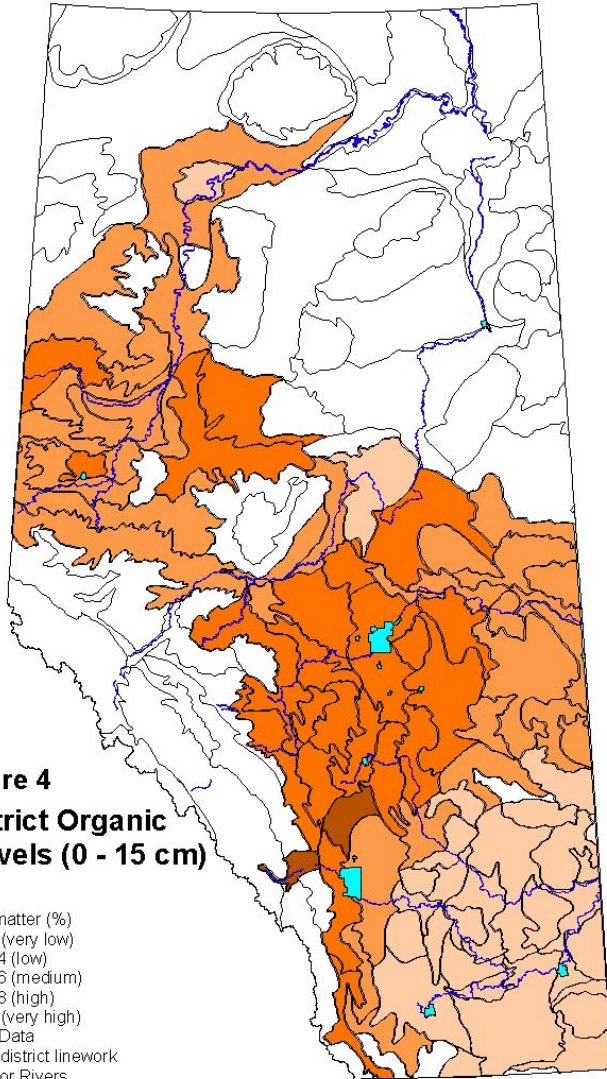


Figure 5
Ecodistrict Sulphur
Levels (0 - 15 cm)

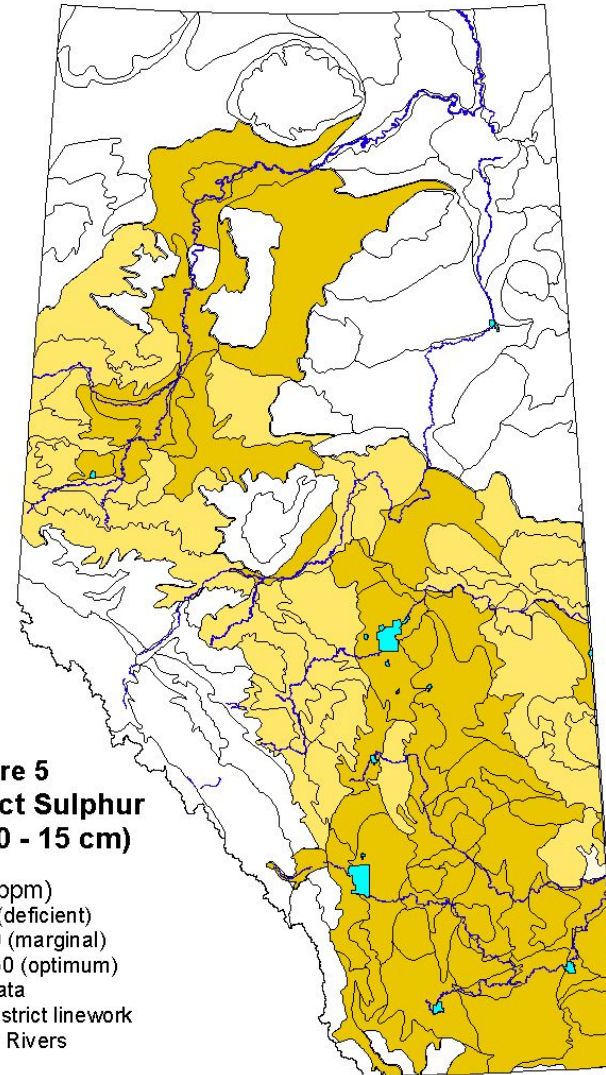
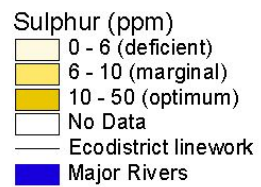


Figure 6
Ecodistrict Phosphorus
Levels (0 - 15 cm)

Phosphorus (ppm)
 8 - 15 (deficient)
 15 - 25 (marginal)
 > 25 (optimum or excess)
 No Data
 Ecodistrict linework
 Major Rivers

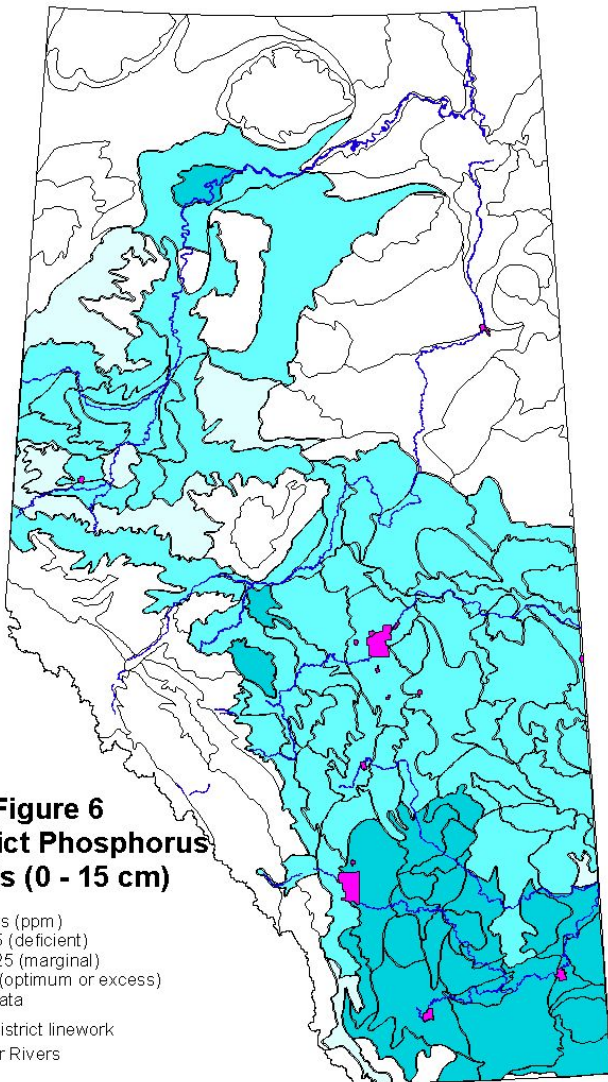
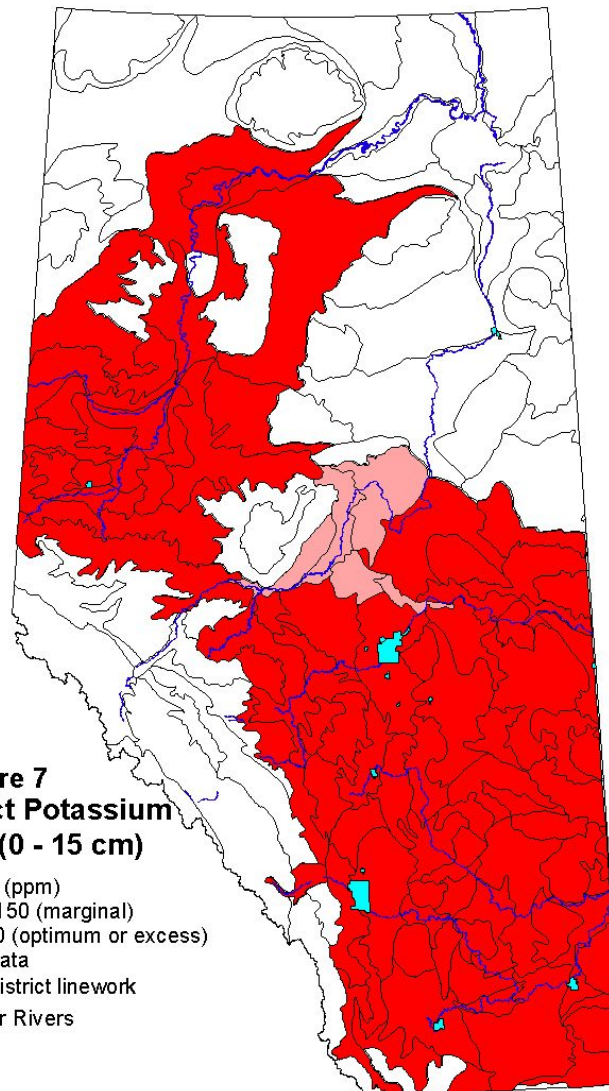


Figure 7
Ecodistrict Potassium
Levels (0 - 15 cm)

Potassium (ppm)
 75 - 150 (marginal)
 > 150 (optimum or excess)
 No Data
 Ecodistrict linework
 Major Rivers



- potential P loading
- combining the Norwest Laboratories database with Alberta Agriculture database
- acreage estimation of each soil
- combining database results with AGRASID

REFERENCES

- Kryzanowski, L.M. and D.H. Lavery, 1985. Computer assisted summarization of the spatial distribution of soil fertility factors for Alberta.
- Rennie, D.A., 1993. Trends in available soil N, P, K, and S. In D.A. Rennie, C.A. Campbell, T.L. Roberts. Impact of macronutrients on crop responses and environmental sustainability on the Canadian prairies. CSSS, Ottawa.

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