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TILL GEOCHEMISTRY OF DEAD WOLF POND (NTS MAP AREA 2D/10) AND PARTS OF NTS MAP AREAS 11O/16, 11P/13 AND 12A/07, NEWFOUNDLAND

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SUMMARY

This report provides the results of 37 till-geochemistry samples taken from various areas across the Island of Newfoundland: thirty-three of these samples were collected in the Dead Wolf Pond map area (NTS 2D/10. Also included in this report are three samples in southwestern Newfoundland (NTS map areas 11O/16 and 11P/13), and one sample from central Newfoundland (NTS map area 12A/07) (Figure 1). All till samples were collected from BC- and C-horizons as part of the ongoing till geochemistry and surficial mapping program across the island of Newfoundland. The primary objective is to assist the mineral exploration industry by delineating prospective areas using both till-geochemical anomalies and regional ice-flow history. This report also summarizes sampling methods as well as analytical methods and quality control.

SAMPLING METHODS

The field work was conducted using truck, ATV on forestry resource roads and helicopter to access remote areas. Approximately 1 kg of till was collected from the BC- or C-horizon soil from hand-dug pits, trenches or exposed road cuts and placed in a Kraft paper bag. Sample spacing in the Dead Wolf Pond area was completed on a 1 km linear grid. Field duplicates were collected at two sites, at an overall frequency of 1 in 21 to determine sample homogeneity. The results of the field-duplicate analyses are discussed briefly below and reported in Appendices B, C and D.

DATABASE NOTES

This database includes analytical results of thirty-seven till samples (Lab numbers 7834969–7835015), and two field duplicates, from locations across the island (NTS map areas 2D/10, 11O/16, 11P/13 and 12A/07; Appendix A). The <63 μm (silt and clay) fraction of the till sample was analyzed at the Geological Survey of Newfoundland and Labrador's (GSNL) laboratory in St. John's NL, by inductively coupled plasma-optical emission spectrometry (ICP-OES) after a 4-acid digestion (HCl-HNO_3-$HClO_4$-HF) for 31 elements consisting of aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, dysprosium, iron, lanthanum, lead, lithium, magnesium, manganese, molybdenum, nickel, niobium, phosphorus, potassium, rubidium, scandium, sodium, strontium, sulphur, titanium, vanadium, yttrium, zinc and zirconium. Additionally, loss-on-ignition (LOI) by gravimetry, silver by ICP-OES after nitric acid digestion and fluoride by ion-selective electrode after alkaline fusion. In addition, 27 elements were analyzed by instrumental neutron activation analysis (INAA) at Bureau Veritas in Mississauga, ON, consisting of antimony, arsenic, barium, bromine, cerium, cesium, chromium, cobalt, europium, gold, iron, hafnium, lanthanum, lutecium, molybdenum, rubidium, scandium, samarium, selenium, sodium, tantalum, terbium, thorium, tungsten, uranium, ytterbium and zirconium. A detailed description of the analytical methods employed can be found in Finch *et al.* (2018). In the database, elements are denoted by the elemental symbol and the analytical methods denoted by a numeric suffix (*e.g.*, Pb 2):

1. Suffix "1" – Instrumental neutron activation analysis (INAA),
2. Suffix "2" – Inductively coupled plasma-optical emission spectrometry (ICP-OES) after multi-acid (4-acid) ($HF/HCl/HNO_3/HClO_4$) digestion,

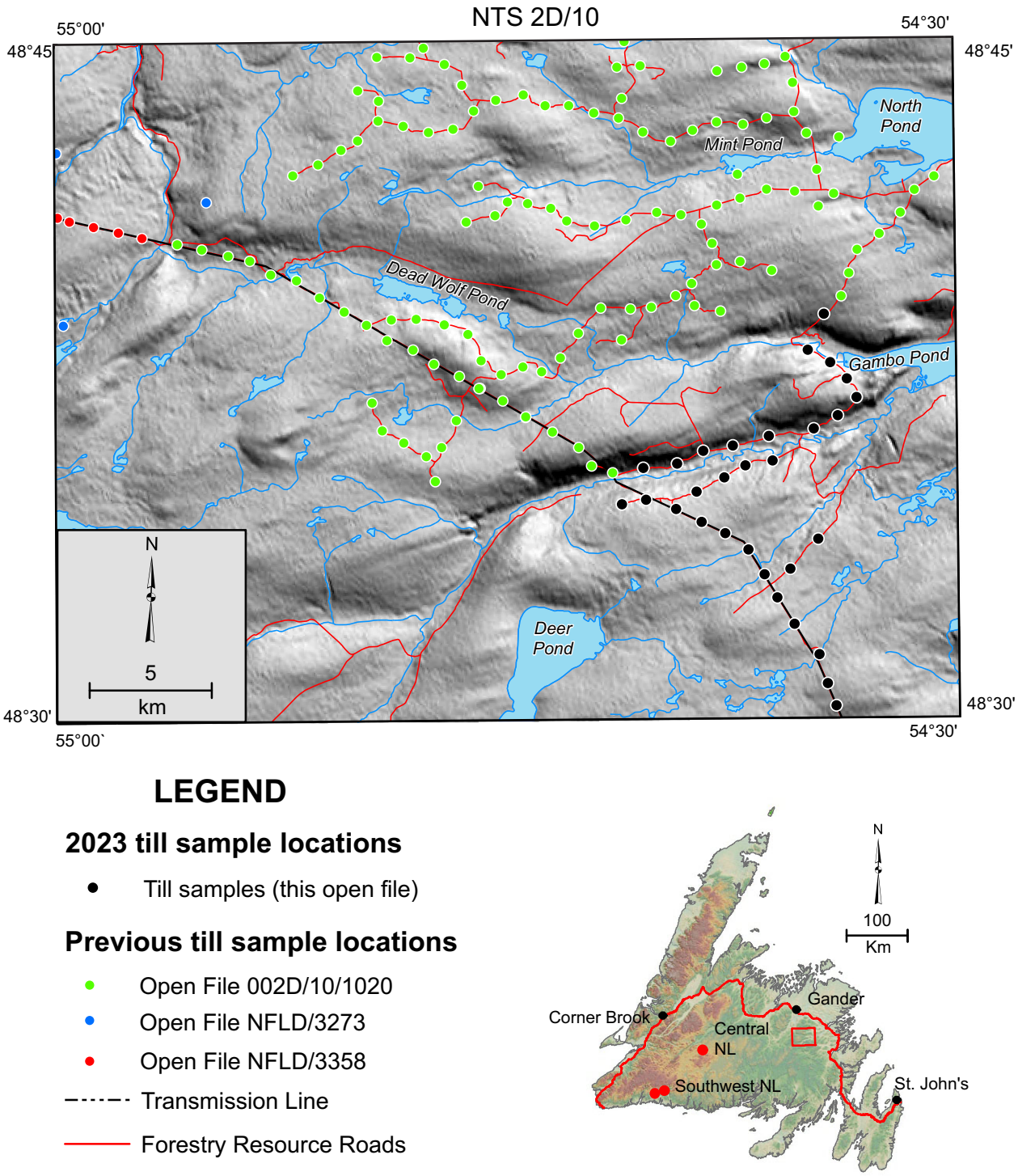

Figure 1. *Map showing location of 2023 till geochemical samples (black dots) released in this current open file, along with 118 samples (green dots) released by Organ (2024), 5 samples (red dots) released by Campbell (2019) and 3 samples (blue dots) released by Brushett and Amor (2016). General geology and mineral occurrences are displayed and discussed in Organ (2020). Red dots and the red box on the map of the island indicate study areas of this report.*

3. Suffix “28” – ICP-OES after nitric acid digestion,
4. Suffix “9” – Ion-selective electrode (ISE) after alkaline fusion.

Table 1 provides a complete list of elements, analytical method, units, detection limit and range of values. A negative sign is assigned to any value below detection limit.

The location for each sample is reported in Appendix A, as Universal Transverse Mercator (UTM) eastings and northings (zone 21; NAD 27 datum). Analytical data, along with a short description of each sample and site characteristics, are also included.

QUALITY CONTROL

Quality control measures include laboratory duplicates and certified reference materials (CRMs) are provided in Appendix B for INAA, Appendix C for ICP-OES and Appendix D for F, Ag and LOI. Detection limits, minimum and maximum values are provided in Table 1.

Quality assurance was determined by the insertion of one CRM and one analytical (laboratory) duplicate in every sequence of 20 samples. Certified reference materials included TILL-1 and TILL-2 for ICP-OES (CANMET; Lynch, 1996), and TILL-1 and TILL-3 for INAA, Standard and duplicate analyses for INAA and ICP-OES were within acceptable range.

ACKNOWLEDGMENTS

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Table 1. Geochemical variables with analytical method, units, detection limit (D.L.), number of analyses below the detection limit (<D.L.) and range of data values

Element	Method	Units	D.L.	<D.L.	Max	Min	Element	Method	Units	D.L.	<D.L.	Max	Min
Ag28	AAS	ppm	0.1	35	<0.1	<0.1	Mg2	ICP-OES	%	0.01	0	1.04	0.21
Al2	ICP-OES	%	0.01	0	7.64	4.57	Mn2	ICP-OES	ppm	1	0	2645	559
As1	INAA	ppm	0.5	2	172	<0.5	Mo1	INAA	ppm	1	33	32	<1
As2	ICP-OES	ppm	1	0	137	2	Mo2	ICP-OES	ppm	1	23	29	<1
Au1	INAA	ppb	1	27	14	<1	Na1	INAA	%	0.05	0	2.18	0.81
Ba1	INAA	ppm	50	0	790	170	Na2	ICP-OES	%	0.01	0	2.1	0.89
Ba2	ICP-OES	ppm	1	0	712	172	Nb2	ICP-OES	ppm	1	0	22	10
Be2	ICP-OES	ppm	0.1	0	7.4	1.1	Ni2	ICP-OES	ppm	1	0	64	9
Br1	INAA	ppm	1	2	36	<1	P2	ICP-OES	ppm	1	0	1421	252
Ca2	ICP-OES	%	0.01	0	2.1	0.21	Pb2	ICP-OES	ppm	1	0	72	12
Cd2	ICP-OES	ppm	0.1	15	0.5	<0.1	Rb1	INAA	ppm	5	0	166	32
Ce1	INAA	ppm	0.5	0	283	53	Rb2	ICP-OES	ppm	5	0	139	35
Ce2	ICP-OES	ppm	5	0	347	57	S2	ICP-OES	ppm	100	23	274	<100
Co1	INAA	ppm	2	1	28	4	Sb1	INAA	ppm	0.1	0	2.8	<0.1
Co2	ICP-OES	ppm	1	0	35	5	Sc1	INAA	ppm	0.1	0	23.4	5.3
Cr1	INAA	ppm	10	2	210	30	Sc2	ICP-OES	ppm	0.1	0	26.2	4.8
Cr2	ICP-OES	ppm	1	0	174	25	Se1	INAA	ppm	1, 2, 3	35	<1	<1
Cs1	INAA	ppm	0.5	0	20	1.3	Sm1	INAA	ppm	0.1	0	15.7	4.7
Cu2	ICP-OES	ppm	1	0	92	3	Sr2	ICP-OES	ppm	1	0	281	64
Dy2	ICP-OES	ppm	0.5	0	10.5	2.7	Ta1	INAA	ppm	0.1, 0.2	0	3.4	0.9
Eu1	INAA	ppm	0.5, 1.5	0	3.3	1	Tb1	INAA	ppm	0.5	1	2.3	<0.5
F9	ISE	ppm	5	0	391	160	Th1	INAA	ppm	0.5	0	21.9	5.7
Fe1	INAA	%	n/a	0	5.5	1.3	Ti2	ICP-OES	ppm	5	0	7555	3802
Fe2	ICP-OES	%	0.01	0	5.48	1.33	U1	INAA	ppm	1	0	11	2.2
Hf1	INAA	ppm	0.5	0	26	5	V2	ICP-OES	ppm	1	0	157	31
K2	ICP-OES	%	0.01	0	3.13	0.91	W1	INAA	ppm	1	1	8	<1
La1	INAA	ppm	0.1	0	82	26	Y2	ICP-OES	ppm	1	0	44	12
La2	ICP-OES	ppm	1	0	81	27	Yb1	INAA	ppm	0.5	0	5.8	2.1
Li2	ICP-OES	ppm	0.1	0	84.5	4.6	Zn2	ICP-OES	ppm	1	0	129	22
LOI	Gravimetric	%	0.1	0	13.1	1.03	Zr1	INAA	ppm	100	1	800	<100
Lu1	INAA	ppm	0.10	0	0.86	0.37	Zr2	ICP-OES	ppm	1	0	191	83

Notes: INAA analyses for seven elements had multiple detection limits, due to low sample weight, and are listed separately in the detection limit column. The suffix "1" denotes INAA analysis; "2" denotes ICP-OES analysis after multi-acid digestion; "28" denotes ICP-OES after nitric acid digestion; and "9" denotes ISE after alkaline fusion

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APPENDICES

Appendices A–E are included in the OF_NFLD_3557 zip folder as Excel (.xlsx) files.

APPENDIX A: Formatted Site, Sample and Analytical Results for Till Samples Collected from the Dead Wolf Pond Area

APPENDIX B: Raw Geochemical Data for Instrumental Neutron Activation Analysis (INAA).

APPENDIX C: Raw Geochemical Dataset for a Four Acid (HCl-HNO_3-$HClO_4$-HF) Digestion with Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) Finish for 32 Elements

APPENDIX D: Results of Fluoride Analysis Using Ion-Selective Electrode (ISE) after Alkaline Fusion, Silver Analysis Using ICP-OES after Nitric Acid Digestion and LOI was Determined Gravimetrically

APPENDIX E: Metadata for Open File NFLD/3557