Core/Profile: BL-1
Location: Red Lake Bog
Legal description: SW SW NW 6 T149N R30W
County: Beltrami
Parent material: Supraglacial/till
Vegetation: Grass
Slope: <2%
Elevation: 1390 feet
Topo. Map: Borden Lake
Remarks: 1 ¼ miles north of junction of County Road 30 and T.H. 72; on east side of T.H. 72; near Blackduck

Depth cm(ft)	Horizon or Zone	Description
0-15 (0-.5)	A	black (10YR2/1) heavy silt loam, very few, fine pebbles at base; weak granular; firm; noneffervescent; 0.13 m coarse charcoal fragments, angular; clear lower boundary, bioturbated; supraglacial.
15-25 (.5-.8)	Bg1	dark to very dark grayish brown (2.5Y3.5/2) silty clay, little sand, very few granules; weak, fine, subangular blocky; firm; noneffervescent; clear lower boundary; supraglacial.
25-50 (.8-1.6)	Bg2	olive gray (5Y4/2) heavy silty clay loam to loam, with little sand, zone of common granular, concretions, very few pebbles, one moderately decomposed granitic pebbles; many, fine, very faint grayish brown to light olive brown (2.5Y5/3) mottles; weak, medium, subangular blocky; firm; noneffervescent; gradual lower boundary; supraglacial.
50-77 (1.6-2.5)	2Bg3	olive gray (5Y5/2) loam diamicton; many, medium, light olive brown to olive brown (2.5Y4.5/4) mottles (approximately 50%); moderate, very coarse, columnar breaking to very weak subangular blocky; very firm; violently effervescent, with few, fine, soft secondary carbonate masses; clear lower boundary; till.
77-113 (2.5-3.7)	2Bkg1	olive gray (5Y5/2) loam diamicton; many, medium, light olive brown to olive brown (2.5Y4.5/4) mottles (approximately 50%), and many, medium and coarse, yellowish brown (10YR5/6) mottles (approximately 30%) in lower half; moderate, very coarse subangular blocky; very firm; violently effervescent, with thin, nearly continuous, soft, secondary carbonates coating ped faces and many carbonate masses and pore linings; gradual lower boundary; till.
113-142 (3.7-4.7)	2Bkg2	olive gray (5Y5/2) loam diamicton; many, medium, light olive brown to olive brown (2.5Y4.5/4) mottles (approximately 20%) and many, medium and coarse, yellowish brown (10YR5/6) mottles (approximately 40%); very weak subangular blocky; very firm; violently effervescent, with thin common, soft secondary carbonates coating ped faces and many carbonate masses and pore linings; gradual lower boundary; till.
142-183 (4.7-6.0)	2Ckg	olive gray (5Y5/2) loam diamicton; many, coarse, olive brown (2.5Y4/4) mottles (50%) and many, medium, yellowish brown to light olive brown (10YR-2.5Y5/6) mottles (20%); uncut core exterior shows dipping rhythmites in color - not evident in split core; very firm; violently effervescent, with common, fine to medium, soft, secondary carbonate linings and masses; diffuse lower boundary; till.
183-266 (6.0-8.7)	2C1	olive brown (2.5Y4/4) loam diamicton; common, medium and coarse, some tending horizontal, olive gray (5Y5/2) mottles (10%) and common to many fine and medium, yellowish brown to light olive brown (10YR-2.5Y5/6) mottles (10%); uncut core exterior shows dipping rhythmites in color - not evident in split core; very firm; violently effervescent, with few, fine to medium, soft, secondary carbonate masses; diffuse lower boundary; till.
266-342 (8.7-11.22)	2C2	olive brown (2.5Y4/3.5) loam diamicton; few, medium and coarse, olivegray (5Y5/2) and grayish brown (2.5Y5/2) mottles (25%), some horizontal, some vertical in coarse pores, and many, fine, dark grayish brown to olive brown (2.5Y4/3) mottles, mostly around pores, and few, coarse, vertical and other (very few horizontal), dark yellowish brown (10YR4/6) mottles, surrounding coarse pores; massive; very firm; clear lower boundary; till.
344-384 (11.22-12.6)	2C3	olive brown (2.5Y4/3.5) loam diamicton; dark yellowish brown (10YR4/6) mottles lining pore spaces (5%); weak, medium and coarse, platy; very firm; violently effervescent; clear to gradual lower boundary; till.
384-508 (12.6-16.7)	2Cg1	very dark gray to very dark grayish brown to dark olive gray (2.5Y-5Y3/1.5) (slightly lighter upper 25 cm) loam diamicton; massive; very firm; violently effervescent; clear lower boundary; till.
508-537 (16.7-17.6)	2Cg2	very dark gray (5Y3/1) loam, few strata with common granules and very few, fine pebbles, finer pebbles, granules than above and below; strata, very weakly expresed; breaks massive; one siltier lamina, one thick lamina with more sand; firm; violently effervescent, but took slightly longer to react than above/below; clear lower boundary; till.
537-607 (17.6-19.9)	2Cg3	very dark gray to dark greenish gray (5Y-5BG3/1) loam diamicton; massive; firm; violently effervescent; till.
607-728+(19.9-23.9+)	2Cg4	very dark gray (5Y3/1) loam diamicton, 669-674 cm has more gravel and sand and granules than above/below; massive; firm; violently effervescent; base of core; till.

Core/Profile: BL-2
Location: Red Lake Bog
Legal description: NW NW NW 30 T150N R30W
County: Beltrami
Parent material: Supraglacial/till/glaciolacustrine
Vegetation: Grass
Slope: <2%
Elevation: 1338 feet
Topo. Map:Borden Lake
Remarks: 3.2 miles north of junction of County Road 30 and T.H. 72; on east side of T.H. 72; north of Blackduck

Depth cm(ft)	Horizon or Zone	Description
0-11 (0-.4)	A1	black (10YR2/1) light loam or heavy silt loam; very weak, medium, breaking to fine subangular blocky; friable; noneffervescent; abrupt lower boundary; supraglacial.
11-21 (.4-.7)	A2	black (10YR2/1), with dark grayish brown (2.5Y4/2) light loam or heavy silt loam with few granules and very few pebbles; weak, fine, subangular blocky; friable; noneffervescent; one piece of uncarbonized wood; clear lower boundary; glaciofluvial.
21-38 (.7-1.2)	BE	dark grayish brown (2.5Y4/2) heavy loam with few zones of grayish brown to light olive brown (2.5Y5/3) slightly sandier heavy loam; weak to moderate, very fine to fine, dark yellowish brown (10YR3/4) mottles (5%); weak, medium, blocky to fine subangular blocky over strata, weakly expressed; friable to firm; noneffervescent; clear lower boundary; glaciofluvial.
38-62 (1.2-2.0)	Btg1	dark grayish brown to grayish brown (2.5Y4.5/2) heavy loam, with pebbly and granular stratum, 51-56 cm, possibly sedimentary break; many, very fine to fine, dark yellowish brown (10YR4/4) mottles (20%); weak, coarse, breaking to medium and fine subangular blocky and granular over strata, very weakly expressed; many, thin, discontinuous, very dark grayish brown (2.5Y3/2) clay coats on ped faces, and thin and thick clay coats, continuous, lining pores, friable; noneffervescent; clear lower boundary; glaciofluvial.
62-75 (2.0-2.5)	2Btg2	olive gray (5Y5/2) loam diamicton; many, very fine to fine and medium, light olive brown to olive brown (2.5Y4.5/4) mottles (30%); weak, coarse, breaking to medium subangular blocky; few, thin, very dark grayish brown (2.5Y3/2), discontinuous clay coats on ped faces, and common, thin to thick, continuous, very dark grayish brown (2.5Y3/2) clay coats lining pores; firm; violently effervescent with few, soft, secondary carbonates coating ped faces and lining pores in lower 6 cm; clear lower boundary; till.
75-111 (2.5-3.6)	2Bk1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, fine to coarse, grayish brown (2.5Y5/2.5) mottles (40%), many of which are horizontally trending or along very coarse and coarse ped faces - adjacent to thicker carbonates, with olive gray (5Y5/2) colors, and along vertical medium and coarse pores; many very fine oxide dots; moderate, very coarse and coarse, subangular blocky, with very weak, medium to coarse, platy within peds, possibly due to horizontal secondary carbonates; firm; violently effervescent, with many, continuous, thick, soft, secondary carbonate coats on coarse and very coarse ped faces and lining pores, very coarse ped faces coated with thin discontinuous clay coats, brown to dark brown (10YR4/3), plus many soft horizontal secondary carbonate seams; gradual lower boundary; till.
111-159 (3.6-5.2)	2Bk2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, medium and coarse, olive gray to grayish brown (5Y-2.5Y5/2) mottles, mostly vertical, associated with very coarse ped faces and vertical fine and medium pores; many very fine oxide dots; moderate, very coarse, subangular blocky, with very weak to weak, fine to medium, platy in zones - not with associated carbonates in most cases; very few discontinuous clay coats on very coarse ped faces and pores; firm; violently effervescent, with many, continuous, moderately thick, soft secondary carbonate coats on very coarse ped faces and common to few, thin, continuous coats lining pores; gradual lower boundary; till.
159-248 (5.2-8.1)	2C1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, medium and coarse, grayish brown (2.5Y5/2) mottles (30-40%), many associated with vertical pore spaces with continuous dark yellowish brown (10YR3/6) oxide halos; common, very fine oxide dots; very weak subangular blocky with zones with very weak, fine and medium, platy; firm; violently effervescent, with very few soft secondary carbonate masses and pore linings; gradual lower boundary; till.
248-321 (8.1-10.5)	2C2	olive brown (2.5Y4/3.5) loam diamicton; many medium and coarse, dark yellowish brown (10YR3/6-4/6) mottles (less than 5%), often as linings on ped faces; very weak subangular blocky, with very weak, medium and coarse, platy in lower 0.15 m; firm; violently effervescent; gradual lower boundary; till.

Depth cm(ft)	Horizon or Zone	Description
BH2 *(continued)*		
321-368 (10.5-12.1)	2Cg1	very dark grayish brown (2.5Y3/2) loam diamicton; common to none, medium and fine, olive brown (2.5Y4/3.5) mottles (<10%), and few, fine and medium, dark yellowish brown (10YR3/6-4/6) mottles often as linings on ped faces; massive; very firm; violently effervescent; clear lower boundary; till.
368-472 (12.1-15.5)	2Cg2	very dark grayish brown (2.5Y3/2) loam diamicton; many, fine and medium, dark yellowish brown to olive brown (10YR-2.5Y3/6) mottles (20%); massive, one zone with very weak, coarse and medium, platy; very firm; violently effervescent; clear lower boundary; till.
422-625 (15.5-20.5)	2Cg3	very dark grayish brown to very dark gray (2.5Y3/1.5) to very dark gray to dark olive gray (5Y-2.5Y3/1.5) loam diamicton; massive; very firm; violently effervescent; abrupt lower boundary; till.
625-761 (20.5-25.0)	3Cg4	very dark grayish brown (2.5Y3/2) heavy silt loam, with very few granules, to very dark gray to dark olive gray (5Y-2.5Y3/1.5) light silty clay loam to very dark gray (5Y-2.5Y3/1) silt, with zones with grayish brown to light brownish gray to light yellowish brown to light olive brown (2.5Y5.5/3) silt, thin laminae, disrupted, contorted, discontinuous overturned laminae more frequent with depth - not present 625-631 cm, 647-657 cm, 668-686 cm; stratified originally, with at least some thin laminae; very firm; violently effervescent, silt laminations are violently effervescent; abrupt lower boundary; glaciolacustrine.
761-766+(25.0-25.1+)	3Cg5	very dark grayish brown to very dark gray (2.5Y3/1.5) silty clay loam; stratified - possibly originally medium to thin laminae; firm to very firm; violently effervescent as above; glaciolacustrine.

Core/Profile: BL-3
Location: Red Lake Bog
Legal description: SW SW NW 7 T150N R30W
County: Beltrami
Parent material: Supraglacial/till/glaciolacustrine
Vegetation: Gass
Slope: 2-5%
Elevation: 1318 feet
Topo. Map: Borden Lake
Remarks: .48 miles south of junction of County Road 41 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-16 (0-.5)	A	black to very dark brown (10YR2/1.5) silt loam, much sand; weak granular; friable; noneffervescent; clear lower boundary; bioturbated; supraglacial.
16-36 (.5-1.2)	BEt	dark grayish brown to grayish brown (2.5Y4/2,4.5/2) silty clay loam to loam, with very few granules; few, fine to medium, dark brown (10YR3.5/3) mottles (10%); weak, medium, breaking to fine subangular blocky; common, moderately thick to thick, continuous, dark brown (10YR3.5/3) and few, moderately thick, continuous, black (10YR2/1) clay coats lining pores; friable; noneffervescent; clear lower boundary; supraglacial.
36-55 (1.2-1.8)	Bt1	dark brown (10YR3/3) and dark brown to very dark grayish brown to olive brown (10YR-2.5Y3/3) silty clay loam, less sand than above; few, fine, faint, dark brown (10YR3/3) mottles (10%); weak, coarse, columnar breaking to medium subangular blocky; many, thin, continuous, dark to very dark grayish brown (2.5Y3.5/2), clay coats on ped faces and lining pores, and many, thin to moderately thick, continuous, very dark grayish brown (10YR3/2) clay coats lining pores; friable to firm; noneffervescent; clear lower boundary; supraglacial.
55-66 (1.8-2.2)	2Bt2	olive gray to olive (5Y4.5/2.5) loam, with concretions of sand and granules in middle; many, fine, faint dark yellowish brown (10YR4/6,3/6) mottles (<10%), and few, coarse, olive gray to dark olive gray to olive to dark olive (2.5Y3.5/2.5) mottles (10%); very weak subangular blocky over single bed; many, thin, continuous, dark to very dark grayish brown (2.5Y3.5/2), clay coats on ped faces and lining pores, and many, thin to moderately thick, continuous, very dark grayish brown (10YR3/2) clay coats lining pores; friable; noneffervescent to slightly effervescent; abrupt lower boundary; supraglacial.
66-111 (2.2-3.6)	3BCk1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, horizontal, light olive gray to olive gray (5Y5.5/2) mottles adjacent to carbonate partings and ped faces and pores (40%), and few, fine to medium, yellowish brown to dark yellowish brown (10YR5/6,4/6) mottles (<5%); many very fine oxidate dots; moderate, very coarse and coarse, subangular blocky with weak to moderate, fine to medium and coarse, platy, emphasized by secondary carbonates; firm; violently effervescent, with many coarse, soft, secondary carbonate linings (thick) along ped faces, pores, horizontal partings, and associated with vertical pores; gradual lower boundary; till.
111-173 (3.6-5.7)	3BCk2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; few, fine and medium, dark yellowish brown (10YR3/4,3/6) mottles (5%) and many, fine to coarse, light olive gray to olive gray (5Y5.5/2) mottles (40%); many very fine oxide dots; weak, very coarse and coarse, subangular blocky; firm; violently effervescent, with many coarse soft, secondary carbonate linings (thick) along ped faces, pores, and associated with vertical pores; gradual lower boundary; till.
173-208 (5.7-6.8)	3Ck	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, coarse, grayish brown to light olive brown (2.5Y5/3) halos around light olive gray to olive gray (5Y5.5/2) mottles (25%), some 2.5Y halos surrounded by dark yellowish brown (10YR4/5) halos; many, very fine, oxide dots; very weak, very coarse, subangular blocky; firm; violently effervescent, with common, soft, fine and medium, secondary carbonate masses, often associated with vertical pores and mottles; gradual lower boundary; till.
208-345 (6.8-11.3)	3C1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; few, fine to medium, olive gray (5Y5/2) mottles, few horizontal, few vertical changing to weak, coarse, gray to greenish gray (5Y-5GY5/1) mottles surrounded by light olive brown (2.5Y5/5) halos; massive; firm; violently effervescent, with very few, fine, soft secondary carbonate masses associated with unoxidized mottles; abrupt lower boundary; till.

Depth cm(ft)	Horizon or Zone	Description
B13 *(continued)*		
349-403 (11.3-13.2)	4C2	dark grayish brown to olive brown (2.5Y4/3) light silty clay to silty clay, with very dark grayish brown (2.5Y3/2) strata, appears to have reworked clasts and distorted strata of the dark olive gray (5Y3/2) material; one pebble (7.5 cm) at 365 cm, the long axis vertical in core surrounded by very dark grayish brown (2.5Y3/2) clay is possible dropstone; few, coarse, gray to dark gray to greenish gray to dark greenish gray (5Y-5GY4.5/1) mottles and many, very fine to fine, dark yellowish brown (10YR4/6,3/6) mottles; thin beds but slightly distorted; firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
403-534 (13.2-17.5)	5C3	very dark grayish brown (2.5Y3/2±) silty clay with strata and laminae of heavy silt loam to silty clay loam; vertical, very coarse and coarse, platy to thin beds and fine laminae, upper part of stratified unit is discontinuously laminated and has slightly distorted laminae; firm to very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
534-653+ (17.5-21.4+)	6C4	very dark grayish brown (2.5Y3/2) silty clay with very few granules and fine pebbles, with few strata of very dark to dark grayish brown (2.5Y3.5/2) light silty clay and silty clay loam; massive, with one zone thin beds and thick laminae; firm±, violently effervescent; glaciolacustrine.

Core/Profile: BL-4
Location: Red Lake Bog
Legal description: NW NW 30 T151N R30W
County: Beltrami
Parent material: Bog/glaciolacustrine/till
Vegetation: Grass
Slope: 2-5%
Elevation: 1317 feet
Topo. Map: Borden Lake
Remarks: 0.4 miles south of junction of T.H. 1 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-17 (0-.6)	AO	black (2.5Y2/0) organic heavy silt loam; fibrous to very weak, fine, subangular blocky and granular; friable; noneffervescent; many, very fine, medium, and coarse roots; abrupt lower boundary; bog.
17-50 (.6-1.6)	2Bt	very fine and fine mottles of dark grayish brown to olive brown (2.5Y4/3) and olive gray (5Y5/2) heavy silty clay, one fine pebble near base; few, very fine to fine, dark yellowish brown (10YR3/4) mottles (10%); weak, medium, subangular blocky; many, thin, discontinuous, very dark grayish brown (2.5Y3/2), clay coats on ped faces, and continuous, moderately thick, very dark grayish brown (2.5Y3/2) clay coats lining pores; plastic; noneffervescent; many, very fine and fine pores; common, fine and medium roots; clear lower boundary; glaciolacustrine.
50-82 (1.6-2.7)	2Btg	light olive gray to olive gray (5Y5.5/2) heavy silty clay with few, fine pebbles and granules, close to heavy loam diamicton; many, very fine to fine, light olive brown (2.5Y5/4) mottles (40%); weak, coarse breaking to medium subangular blocky; few, thin, discontinuous, very dark grayish brown (2.5Y3/2), clay coat on ped faces, and common, thin, discontinuous and continuous, very dark grayish brown (2.5Y3/2), clay coats lining pores; plastic; moderately to violently effervescent; common, fine roots; common, fine and medium pores; clear lower boundary; glaciolacustrine.
82-101 (2.7-3.3)	2Bkg	olive gray (5Y5/2) heavy silty clay with few, fine pebbles and granules, close to heavy loam diamicton; many, fine to medium, light olive brown (2.5Y5/4) mottles (40%), and many, coarse, tending vertical, olive gray to light olive gray (5Y5/2,5.5/2) halos around pores; common, very fine, oxide dots; weak, very coarse, subangular blocky; coatings are very few, moderately thick, discontinuous, very dark grayish brown (2.5Y3/2), clay coats lining pores; firm; moderately to violently effervescent with few, fine to medium, soft secondary carbonate masses and filaments, often associated with medium pores; common, very fine and fine roots along ped faces; common, fine and medium pores; gradual lower boundary; glaciolacustrine.
101-154 (3.3-5.1)	2Bk	light olive brown to olive brown (2.5Y4.5/4) silty clay with very few granules and fine pebbles; many, fine to medium, gray to olive gray (5Y5/1.5) mottles, often as seams, and many, coarse, gray (5Y5/1±) mottles often along very coarse ped faces and as halos around pores; moderate, very coarse, subangular blocky; very few, moderately thick, discontinuous, very dark grayish brown (2.5Y3/2), clay coats lining pores; firm; moderately to violently effervescent with common, medium and coarse, hard secondary carbonate concretions, up to 2 cm diameter, and very few, fine, soft, secondary carbonate masses and discontinuous linings on very coarse ped faces; olive brown to light olive brown (2.5Y4.5/4) colors appear on fine to medium peds with unoxidized colors surrounding them; many, very fine, fine, and medium roots along very coarse ped faces; common, fine and medium pores; clear lower boundary; olive; glaciolacustrine.
154-170 (5.1-5.6)	3BC	dark grayish brown to olive brown (2.5Y4/3) sandy loam and loam diamicton with many granules and sand; common, fine to coarse, gray to dark gray to olive gray (5Y4.5/1, 4.5/1.5) mottles, mostly as halos along pores, and common, medium and coarse, olive brown (2.5Y4/6) halos around unoxidized halos; very weak subangular blocky over strata, very weakly expressed; very few, moderately thick, discontinuous, very dark grayish brown (2.5Y3/2), clay coats lining pores; firm; moderately to violently effervescent, with very few, fine, soft secondary carbonate masses and discontinuous linings on very coarse ped faces; common, fine and medium roots; clear to abrupt lower boundary; glaciolacustrine.
170-315 (5.6-10.3)	4C	light olive brown (2.5Y5/4) silty clay with very few granules, appear as fine and medium clasts in matrix of dark grayish brown (2.5Y4/2); few, fine oxide dots and many, medium and coarse, mostly vertical, gray (5Y5/1) mottles, often associated with pores as halos and few, coarse, dark yellowish brown (10YR3/4) mottles, in zones in lower third of horizon; angular blocky and subangular blocky, due to clayey nature, not pedogenesis; firm; moderately to violently effervescent; few, fine roots; clear lower boundary; glaciolacustrine.

Depth cm(ft)	Horizon or Zone	Description
BL 4 *(continued)*		
315->442 (10.3->14.5)	4Cg1	dark to very dark grayish brown (2.5Y3.5/2) silty clay with very few granules, sometimes in thin beds, and very few, fine pebbles; many to few, faint dark gray (5Y4/1) mottles on pressure faces, mottles are associated with fine hard oxidation concretions in some cases; angular blocky and subangular blocky, due to clayey nature, not pedogenesis, and very weak zones of weak to very weak, fine and medium, platy; very few, fine, black oxide dots on ped faces; firm; moderately to violently effervescent; few slickensides, many pressure faces; includes a fine clast of 2.5YR silty clay as seen in BL-3; glaciolacustrine.
>442-675 (>14.5-22.1)	4Cg1 (cont)	dark to very dark grayish brown (2.5Y3.5/2) silty clay with very few granules, fine pebbles up to <1 cm; angular blocky and subangular blocky due to clayey nature, not pedogenesis with few zones with strata or platyness; common, thin, discontinuous, dark yellowish brown (10YR3/6,4/6), oxidation linings on partings; firm; slightly clayier with depth overall; glaciolacustrine.
675-721 (22.1-23.7)	4Cg2	very dark grayish brown to very dark gray (2.5Y3/1.5) heavy silty clay with gray to dark gray to olive gray (5Y4.5/1.5) silt and very fine sand, with very few drop stones, fine pebbles and granules; stratified, rhythmically laminated; dark laminae are very dark grayish brown to very dark gray (2.5Y3/1.5,3/1), approximately 2mm thick; lighter laminae are very dark grayish brown (2.5Y3/2), approximately 3-4mm thick; silt and very fine sand partings; firm; violently effervescent; very abrupt lower boundary; thicker, <5mm, silty laminae at 693 cm; from base upwards several thin beds to 716 cm; thick (approximately 10-7mm) rhythmic to thin (as described above) to thick (approximately 7mm); 693 cm silt; few finer texture laminations to 690 cm capped by clay; 3-4mm rhythmites to 683 cm, laminae ± rhythmic to top of horizon; glaciolacustrine.
721-758 (23.7-24.9)	5Cg3	dark grayish brown to olive gray to very dark grayish brown (2.5Y-5Y4/2,2.5Y3/2) heavy silty clay, very fine to fine sandy loam and loamy very fine to fine sand, some laminae within common granules; stratified, thinly to thickly laminated; firm; violently effervescent; very abrupt lower boundary; lacustrine; sandy loam with very few granules 736-753 cm; silt loam, sandy loam and loamy sand, thinly laminated 753-758 cm, granular silt loam, silt, and sandy loam 721-736 cm, with reddish brown ripup clast of other fine to medium sand; glaciolacustrine.
758->770 (24.9-25.3)	6Cg4	dark olive gray to very dark grayish brown (5Y-2.5Y3/2) sandy loam diamicton; massive; very firm; violently effervescent; till.

Core/Profile: BL-5
Location: Red Lake Bog
Legal description: NW NW NW 28 T151N R30W
County: Beltrami
Parent material: Supraglacial/till/ glaciolacustrine
Vegetation: Grass
Slope: 2-5%
Elevation: 1341 feet
Topo. Map: Funkley
Remarks: 2.5 miles east of junction of T.H. 1 and T.H. 72; on south side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-13 (0-.4)	A	black (10YR2/1) loam; weak, fine, subangular breaking to blocky, granular; friable; noneffervescent; common,very fine, fine, and medium roots; clear lower boundary; bioturbated; supraglacial.
13-21 (.4-.7)	BC1/A	dark to very dark grayish brown (2.5Y4/2-3/2) silty clay loam with bioturbated fills of black (10YR2/1) A horizon, with very few granules and fine pebbles; weak to moderate, fine, platy; friable; noneffervescent; common, very fine, fine, and medium roots; clear lower boundary, bioturbated; supraglacial.
21-33 (.7-1.1)	BC2	dark grayish brown (2.5Y4/2) to dark grayish brown to olive brown (2.5Y4/3) heavy loam (more sand than above) with granular basal 6 cm; common, very fine, dark yellowish brown (10YR4/6) mottles, lower 6 cm; moderate, fine, platy; friable; noneffervescent; abrupt lower boundary; many, very fine and few medium roots; common, medium vertical pores; supraglacial.
33-54 (1.1-1.8)	2Bgb	grayish brown to dark grayish brown (2.5Y4.5/2.5) heavy loam diamicton; many, very fine to fine, dark yellowish brown (10YR4/4,4/6) mottles (10%); weak, coarse, breaking to medium subangular blocky; few, continuous and discontinuous, thin to moderately thick, dark grayish brown (2.5Y4/2) clay coats lining pores; friable; moderately to violently effervescent, with very few to few, fine, soft secondary carbonate masses and pores lining , few associated with horizon partings; common, very fine and few, fine and medium roots; many, very fine and fine pores; clear lower boundary; till.
54-103 (1.8-3.4)	2Bkb	grayish brown to light olive brown (2.5Y5/3) heavy loam diamicton; many, very fine to fine, dark yellowish brown (10YR3/6,4/6) and olive brown (2.5Y4/4) mottles (50%), and few, coarse, vertical, olive gray (5Y5/2) mottles as pore space and ped face halos; many oxide dots; moderate, very coarse, subangular blocky breaking to weak, coarse and medium, subangular blocky; few, continuous and discontinuous, moderately thick to thick, very dark brown (10YR2/2) decomposed roots filling pores; friable; violently effervescent, with many, fine and coarse, soft, thick, continuous secondary carbonates on very coarse ped faces, and masses and thick pore linings, few horizontal; many, very fine and fine pores; few, very fine roots gradual lower boundary; till.
103-136 (3.4-4.5)	2Bkb2	light olive brown to olive brown (2.5Y4.5/4) heavy loam diamicton; common, fine, dark yellowish brown (10YR4/4,4/6) mottles, and common, fine to medium, grayish brown to light olive brown (2.5Y5/3) mottles, and continuous, coarse, grayish brown to light olive brown (2.5Y5/3±) mottles, lining very coarse ped faces and pores; moderate to weak, very coarse, subangular blocky breaking to weak, coarse, subangular blocky; very few, continuous to discontinuous moderately thick to thick very dark brown (10YR2/2) decomposed roots filling pores; firm; moderately to violently effervescent, with many to few, fine to coarse, soft, thick to thin, continuous to discontinuous, secondary carbonates, few on very coarse ped faces; masses and pore linings decrease downward to few horizontal; many to common, fine and medium pores, vertical±; gradual lower boundary; till.
136-192 (4.5-6.3)	2Bwb	light olive brown to olive brown (2.5Y4.5/4) heavy loam diamicton; many, fine, dark yellowish brown (10YR4/6) mottles, and many, very fine to fine, grayish brown to light olive brown (2.5Y5/3) mottles, and continuous, coarse, light olive brown to grayish brown (2.5Y5/3,5/2) mottles lining pores; very weak, very coarse, subangular blocky, and massive, one thin zone with very weak, medium, platy; firm; moderately to violently effervescent, with very few, very fine to fine, soft secondary carbonate masses, and few soft thick pore fillings; few, fine and medium pores, vertical ±; abrupt lower boundary; till.

Depth cm(ft)	Horizon or Zone	Description
B15 *(continued)*		
192-267 (6.3-8.8)	3BCgb	dark grayish brown (2.5Y4/2) silty clay, and brown to grayish brown to light brownish gray to olive brown to light olive brown (10YR-2.5Y4.5/3±) redeposited peds; many, fine and medium, gray (5Y5/1) mottles, few, very fine, dark yellowish brown (10YR3/6) mottles, and many, coarse±, gray to olive gray (5Y5/1 and 5/2) mottles on very coarse ped faces, few zones with many oxide dots; very weak, very coarse, subangular blocky; lower 10 cm strata, very weakly expressed; plastic; violently effervescent; few, fine and medium pores; abrupt lower boundary; glaciolacustrine.
267-324 (8.8-10.6)	4C1	grayish brown to light olive brown to dark grayish brown to olive brown (2.5Y5/3,4.5/3) heavy silt loam/light silty clay loam (with very fine silt); common to none, medium and coarse, gray (5Y5/1) mottles surrounded sometimes by grayish brown (2.5Y5/2) mottles, and common, coarse, dark yellowish brown (10YR4/4,3/6) mottles, sometimes as halos around unoxidized mottles and generally associated with pores; massive to thin beds, very weakly expressed; friable; plastic; violently effervescent; few, fine and medium pores abrupt lower boundary; glaciolacustrine.
324-378 (10.6-12.4)	4C2	dark grayish brown to olive brown (2.5Y4/3) silty clay loam, grayish brown to light olive brown (2.5Y5/3) silt loam and very fine silt, and light olive brown (2.5Y5/4) very fine silt; very few coarse dark yellowish brown (10YR4/4,4/6) mottles; very fine to fine laminae, weakly to strongly expressed, some within thin beds, some possible rhythmic, most intact; friable; violently effervescent; very abrupt lower boundary; glaciolacustrine.
378-468 (12.4-15.4)	5C3	dark grayish brown (2.5Y4/2) silty clay loam, very dark grayish brown (2.5Y3/2) silty clay and clay, very few silt partings; very few, medium and coarse, faint, olive brown (2.5Y4/4) mottles in upper 0.30m; thin to thick laminae and thin beds, moderately to strongly expressed, with some rhythmites; violently effervescent, slightly slower to react than above; very abrupt lower boundary; glaciolacustrine
468-691+ (15.4-22.7+)	5Cg	dark gray (5Y4/1) very fine silt, with few granules and pebbles in some beds, sometimes as dropstones, interstratified with very dark gray (2.5Y3/1) and very dark gray (5Y3/1) silty clay and clay laminae; rhythmically laminated and bedded, moderately to strongly express, possibly varied; violently effervescent; glaciolacustrine.

Core/Profile: BL-6
Location: Red Lake Bog
Legal description: SE ¼ Section 11 T151N R30W
County: Beltrami
Parent material: Glaciofluvial/till/glaciolacustrine/till
Vegetation: Grass
Slope: <5%
Elevation: 1339 feet
Topo. Map: Kelliher
Remarks: 2.5 miles north of junction of T.H. 1 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-18 (0-.6)	A(p)	black to very dark brown (10YR2/1.5) loam, with very few, fine pebbles; weak, fine subangular blocky breaking to granular; friable; noneffervescent to very slightly effervescent; many, very fine and fine roots; very abrupt lower boundary, bioturbated; glaciofluvial.
18-54 (.6-1.8)	2Bw	light olive brown to olive brown (2.5Y4.5/4) heavy loam diamicton; many oxide dots; weak, very coarse and coarse, subangular blocky; very few, discontinuous thin to moderately thick organic coats lining pores, mostly from decomposed roots; friable to firm; violently effervescent, with few, discontinuous, thin, soft secondary carbonate coats on very coarse ped faces and few, fine, soft masses and pore linings; few, very fine roots; common, very fine and fine pores; gradual lower boundary; B horizon is truncated; till.
54-93 (1.8-3.1)	2Bk	light olive brown to olive brown (2.5Y4.5/4) to olive brown (2.5Y4/4) heavy loam diamicton with very fine sand bed at base; very few, black, discontinuous, oxide stains on ped faces, many oxide dots; weak, very coarse, subangular blocky; very few discontinuous, thin to moderately thick organic coats lining pores; friable to firm; violently effervescent with many thin to moderately thick, continuous, secondary carbonate coats on very coarse ped faces; common, fine to medium, soft carbonate masses and pore linings; common, very fine and fine pores; very abrupt lower boundary; till.
93-152 (3.1-5.0)	3CBk	light olive brown to olive brown (2.5Y4.5/4), with lesser dark grayish brown to dark grayish brown to light olive brown to olive brown (2.5Y4/2,4.5/3) and very dark grayish brown (2.5Y3/2) silty clay loam, silty clay, clay, and silt loam; few, fine, olive gray (5Y5/2) mottles in lower half (<10%); very weak subangular blocky over rhythmites, possible varves; firm; violently effervescent, with common, very fine to fine, soft masses in lower half ± parallel with bedding planes; very slightly disrupted; very abrupt lower boundary; glaciolacustrine.
152-293 (5.0-9.6)	3C	light olive brown (2.5Y5/4) and light olive brown to olive brown (2.5Y4.5/4) silt, silt loam, and silty clay loam, and dark grayish brown (2.5Y4/1.5±) silty clay and clay; common, fine to coarse, grayish brown to light brownish gray to olive gray to light olive gray (2.5Y-5Y5.5/2) mottles horizontal in zones and associated with very few pores, and common, coarse, dark yellowish brown (10YR4/6±) pore halos, and olive brown (2.5Y4/4) horizontal bands; thin beds and laminae, possibly thick rhythmites up to fine rhythmites; friable; abrupt lower boundary; glaciolacustrine.
293-452 (9.6-14.8)	4Cg1	dark gray (5Y4/1) silt loam and silty clay loam with dropstones and silt partings locally, many dropstones consist of fines including few 2.5YR silty clay pebbles, and very dark gray (5Y3/1) clay and silty clay, with few loamy and sandy strata; few, horizontal, dark yellowish brown (10YR4/6,3/6) mottles; thin beds and laminae, some disrupted; firm to friable; violently effervescent; glaciolacustrine.
452-530 (14.8-17.3)	5Cg2	very dark gray to dark olive gray (5Y3/1.5); pebbly loamy medium and fine sand, very fine sand, and, at base, medium sand; stratified; violently effervescent; very abrupt lower boundary; glaciolacustrine.
530-699 (17.3-22.9)	6Cg2	black (5Y2.5/1.5) and very dark gray (5Y3/1) loam diamicton, close to silt loam diamicton; strata, very weakly expressed to very weak, medium and coarse, platy, thin beds(?), slightly finer platy lower 0.50 m; very firm; violently effervescent; very abrupt lower boundary; till.
699-737+ (22.9-24.2+)	7Cg3	very dark gray to dark olive gray (5Y3/1.5) sandy loam to loam diamicton; strata, very weakly expressed and very weak, fine to coarse, platy, with very weak silt partings; very firm, violently effervescent; till.

Core/Profile: BL-7
Location: Red Lake Bog
Legal description: NE ¼ Section 26 T152N R30W
County: Beltrami
Parent material: Glaciofluvial/stratified till/glaciolacustrine
Vegetation: Grass
Slope: <2%
Elevation: 1351 feet
Topo. Map: Kelliher
Remarks: north of Kelliher; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-21 (0-.7)	A1	very dark brown (10YR2/2) light loam with very few, fine pebbles and granules; weak to moderate, fine to medium, platy; friable; noneffervescent; few, very fine, fine, and medium roots; very abrupt lower boundary; glaciofluvial.
21-35 (.7-1.2)	A2	very dark brown to very dark grayish brown (10YR2.5/2) light loam, close to heavy sandy loam, with very few, fine pebbles and granules, with bioturbated inclusions of underlying material; very weak to weak, medium and coarse, platy; friable; noneffervescent; at least two angular pieces charcoal at 26 cm, 33 cm; abrupt lower boundary, bioturbated; glaciofluvial.
35-62 (1.2-2.0)	BE	grayish brown to dark grayish brown to light olive brown to olive brown (2.5Y-10YR4.5/3) to brown to dark brown (2.5Y-10YR4/3) light silt loam to very fine sandy loamy, with very few granules in lower half; many, fine and medium, faint olive brown to dark yellowish brown (2.5Y-10YR4/4) mottles, weak, coarse, breaking to medium subangular blocky over very weak, platy; friable to very friable; noneffervescent; clear lower boundary; glaciofluvial.
62-≈88 (2.0-≈2.9)	2E-Bt	grayish brown to light olive brown (2.5Y5/3) loamy very fine sand to light yellowish brown (2.5Y6/4) very fine sand, with dark yellowish brown (10YR3/4) heavy sandy loam soil lamellae; many, fine, dark yellowish brown (10YR3/4±) horizontal and other mottles; weak, coarse, subangular blocky breaking to medium subangular blocky; thin, discontinuous, faint, light brownish gray to light yellowish brown (2.5Y6/3) silt coats; friable to very friable; noneffervescent; gradual lower boundary; glaciofluvial.
≈88->112 (≈2.9->3.7)	2Bw1	dark yellowish brown (10YR3/6±) loamy very fine sand and very fine sand; most of unit is oxidized mottles of color noted; very weak, very coarse, subangular blocky, tending to horizontally banded; thin discontinuous faint light brownish gray to light yellowish brown (2.5Y6/3) silt coats; friable to very friable; noneffervescent; indeterminate lower boundary; glaciofluvial.
<137-158 (<3.7-5.2)	2Bw2	dark yellowish brown (10YR3/4) loamy very fine sand, with few, fine granules in lower 7 cm; very weak, coarse, columnar, may be from freezing, with few horizontal partings; friable to very friable; noneffervescent; clear lower boundary; glaciofluvial.
158-≈186 (5.2-≈6.1)	2Bw3	dark yellowish brown (10YR3.5/4), light silt loam, much very fine sand, with little medium and coarse sand, and few granules in lower 15 cm; very weak, coarse, columnar, may be from freezing, with few horizontal partings; friable to very friable; noneffervescent; clear lower boundary;glaciofluvial.
≈186-220 (≈6.1-7.2)	3C1	olive brown (2.5Y4/4±) loam diamicton and heavy sandy loam diamicton with few bed sand laminae of very dark grayish brown (2.5Y3/2) silty clay loam with few granules; stratified; very firm; noneffervescent to slightly effervescent; gradual lower boundary; stratified till.
220->268 (7.2->8.8)	3C2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton to light loam diamicton with few , discontinuous, and partings of light yellowish brown (2.5Y6/4) silt with few very fine sand beds; few, fine to medium, dark yellowish brown (10YR3/4,3/6) mottles with few on vertical joints; massive to strata, very weakly expressed to weak, medium, platy; very firm; violently effervescent; abrupt lower boundary; glaciolacustrine..
295-467 (9.7-15.3)	3C3	light olive brown to olive brown (2.5Y4.5/4) loam diamicton and light loam, with few thin diamicton, discontinuous very fine and fine sand lenses, with few thin beds and thick laminae of silt, loamy very fine sand, very fine sand, and a basal bed of pebbly medium sand; thin beds to thick laminae, moderately expressed, with some massive beds; very firm (diamicton) and single grain, loose (sand); violently effervescent; abrupt lower boundary; glaciolacustrine.
467-600+ (15.3-19.7+)	4C4	olive brown (2.5Y4/3,4/4) light loam diamicton, with few thin beds of fine gravel and dark grayish brown (2.5Y4/2) very fine sand down to pebbly very fine sand; thin bedded, internally stratified; very firm; violently effervescent; glaciolacustrine.

Core/Profile: BL-8
Location: Red Lake Bog
Legal description: NE ¼ Section 14 T152N R30W
County: Beltrami
Parent material: Bog/shoreline
Vegetation: Peat and grass
Slope: <2%
Elevation: 1296 feet
Topo. Map: Kelliher
Remarks: north of BL-7; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-5 (0-.2)	OA	black (10YR2/1) peaty loam; granular to loose; very friable; noneffervescent; very abrupt lower boundary; root mat; bog.
5-16 (.2-.5)	2Bw	very dark grayish brown (10YR-2.5Y3/2) pebbly loam; few, medium and coarse, faint, dark brown (10YR3/3) mottles; very weak subangular blocky; friable; noneffervescent; clear to abrupt lower boundary; shoreline.
16-47 (.5-1.5)	2BC	olive brown to dark to very dark grayish brown (2.5Y3.5/3) loamy fine gravel with few thin beds of grayish brown (2.5Y5/2.5) heavy loam diamicton; few, coarse, faint, horizontal, dark yellowish brown (10YR3/6) mottles; very weak subangular blocky over thin beds; friable; violently effervescent; very abrupt lower boundary; shoreline.
47-60 (1.5-2.0)	3BCk1	olive brown (2.5Y4/4) light loam diamicton to sandy loam diamicton, with pebbly concentrations in upper 5 cm; common, fine and medium, olive gray (5Y5/2) mottles, some surrounding secondary carbonates, with or without dark yellowish brown (10YR4/6) halos; very weak subangular blocky over thin beds; friable to firm; very few, fine to medium, hard secondary oxide concretions and few, fine, soft secondary carbonates as pore fillings and horizontal and irregular masses; violently effervescent; clear lower boundary; till.
60-96 (2.0-3.1)	3BCk2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, fine to coarse, grayish brown (2.5Y5/2) mottles, horizontal and other; many oxide dots; moderate, very coarse, subangular blocky over very weak to weak, fine to medium, platy; very coarse ped faces with faint, very thin, discontinuous, reddish brown, clay coatings on secondary carbonates; friable to firm; violently effervescent with many continuous, thick, secondary carbonate coats on very coarse ped faces, and many, fine to medium, soft masses and pore linings; clear lower boundary; till.
96-130 (3.1-4.3)	3C1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, fine and medium, faint dark yellowish brown (10YR4/4), faint and common, fine to medium, grayish brown (2.5Y5/2) mottles; weak, fine and medium, platy; common, thin, discontinuous, clay coats on horizontal partings and some vertical partings; firm; violently effervescent, with few, fine, soft secondary carbonate masses and pore linings; gradual lower boundary; till.
130-177 (4.3-5.8)	3C2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; few, coarse, vertical, olive gray (5Y5/2) mottles around pores, some with oxide halos, and common, fine to medium, dark yellowish brown (10YR3/6) mottles; very weak, medium, platy; firm; violently effervescent, with very few, fine, soft secondary carbonate masses and pore linings; clear lower boundary; till.
177-270 (5.8-8.9)	3C3	light olive brown to olive brown (2.5Y4.5/4) loam diamicton to dark grayish brown to olive brown (2.5Y4/3) sandy loam diamicton; common, fine, dark yellowish brown (10YR3/6±) and olive brown (2.5Y4/4) mottles, many oxide dots; massive, with very weak platy in few upper zones; firm; violently effervescent; abrupt lower boundary; till.
270-302 (8.9-9.9)	4Cg1	dark grayish brown (2.5Y4/2) silty clay loam diamicton±, most pebbles and granules are fine; thin beds, very weakly expressed; friable; violently effervescent; abrupt lower boundary; glaciolacustrine.
302-396 (9.9-13.0)	4Cg2	very dark gray (5Y3/1) silty clay, silty clay loam diamicton, and silty clay loam, with many granules and fine pebbles; thin beds and laminae; firm to friable, soft; violently effervescent; abrupt lower boundary; stratified unit, disrupted with diamicton flows; glaciolacustrine.
396-437 (13.0-14.3)	4Cg3	very dark gray (5Y3/1) silty clay loam diamicton, with very few, dark gray (5Y4/1), silt laminations, disrupted; thin beds, very weakly expressed firm; violently effervescent; abrupt lower boundary; glaciolacustrine.
437-712+(14.3-23.4+)	5Cg4	black (5Y2.5/1) loam diamicton with common, granular, loamy sand and sandy loam thin beds, may get slightly sandier with depth; massive, except for few sandy loam and loamy sand strata; very firm; violently effervescent; till.

Core/Profile: BL-9
Location: Red Lake Bog
Legal description: NE ¼ Section 2 T152N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/stratified till/till/glaciolacustrine
Vegetation: Peat
Slope: <2%
Elevation: 1256 feet
Topo. Map: Norman Lake SW
Remarks: north of BL-8; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-5 (0-.2)	O	black (2.5Y2.5/0) fibrous peat with very few sand grains; noneffervescent; very abrupt lower boundary; bog.
5-29 (.2-1.0)	2Cg1	dark grayish brown (2.5Y4/2) to dark gray to dark grayish brown (2.5Y4/1.5) fine sand, well sorted; few, faint, dark yellowish brown (10YR4/6) mottles, vertical, probably associated with roots and pores; strata, very weakly expressed, single grain; loose; slightly effervescent; few fine, medium and coarse roots, pieces of organic matter; one thin lamina with organic matter; very abrupt lower boundary; beach and near shore sand.
29->50 (1.0->1.6)	2Cg2	dark to very dark gray to olive gray to dark olive gray (5Y3.5/1.5) fine sand, well sorted down to fine and medium sand with little fines and very few granules; strata, weakly to very weakly expressed; single grain; loose; noneffervescent; indeterminate lower boundary; common organic peaty laminae in upper half; beach and near shore sand.
<107-140 (<1.6-4.6)	2Cg3	dark to very dark grayish brown to olive brown (2.5Y3.5/3) gravel and pebbly loamy fine sand (moderately sorted), granular, coarse and medium sand, and gravelly coarse sand and coarse sandy gravel, and olive gray to olive (5Y4.5/2.5) and (5Y5/2) light silt loam; common, medium and coarse, dark yellowish brown (10YR3/4) mottles in silt loam and few, fine and medium, horizontal, dark yellowish brown (10YR3/6) mottles; thin beds; moderately expressed; sand is single grain and loose; silt loam is laminae, very weakly expressed, and friable; basal gravel unit includes angular to subangular and subrounded clasts of underlying material; possible organic matter at 119 cm, small inclusions in light silt loam; very abrupt lower boundary; beach and near shore sand.
140-178 (4.6-5.8)	3CBg	grayish brown (2.5Y5/2), grayish brown to olive gray (2.5Y-5Y5/2), and dark grayish brown (2.5Y4/2) light loam diamicton, with few silt loam strata; many, fine, very faint dark yellowish brown (10YR4/4) mottles with hints of pink colors; thin beds, very weakly expressed; friable; violently effervescent; some angular clasts consist of fines; few fine pores, vertical; very abrupt lower boundary; stratified till.
178-229 (5.8-7.5)	4C1	olive brown (2.5Y4/4) light loam to sandy loam diamicton; many, fine and medium, olive brown to light olive brown to grayish brown to dark grayish brown (2.5Y4.5/3) to grayish brown (2.5Y5/2) mottles (20%), few with darkyellowish brown (10YR4/6) halos; very weak, very coarse, subangular blocky to massive, down to very weak, medium and coarse, platy, with oxidize partings; friable to firm; violently effervescent; gradual lower boundary; till.
229-285 (7.5-9.4)	4C2	olive brown (2.5Y4/4) down to dark grayish brown to olive brown (2.5Y4/3) loam diamicton; massive; firm; violently effervescent; diffuse lower boundary; till.
285-313 (9.4-10.3)	4C3	dark grayish brown (2.5Y4/2) loam diamicton (more clay than above) down to dark to very dark grayish brown (2.5Y3.5/2) heavy loam diamicton; common, fine and medium, dark yellowish brown (10YR3/4) and dark yellowish brown (10YR3/6) mottles (<5%); massive to strata, very weakly expressed; firm; violently effervescent; gradual lower boundary; till.
313-403 (10.3-13.2)	5C4	dark to very dark grayish brown (2.5Y3.5/2) heavy loam diamicton down to dark grayish brown to olive brown (2.5Y4/3) loam diamicton and pale olive to olive (5Y5.5/3) loamy very fine sand down to very dark grayish brown to very dark gray (2.5Y3/1.5) silty clay loam with few, fine pebbles and granules, with light brownish gray (2.5Y6/2) coarse silt and very fine sand strata; few, fine and medium, some horizontal, dark yellowish brown (10YR3/6,4/6±) mottles (<5%); stratified, thick laminaedto thin beds, weakly to moderately expressed; disrupted; firm; violently effervescent; glaciolacustrine.

Core/Profile: BL-10
Location: Red Lake Bog
Legal description: NW ¼ Section 26 T153N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand
Vegetation: Peat
Slope: <2%
Elevation: 1236 feet
Topo. Map: Norman Lake SW
Remarks: north of BL-9; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-23 (0-.8)	O	black to very dark gray (2.5Y2.5/0) woody peat; noneffervescent; very abrupt to abrupt lower boundary; bog.
23->36 (.8->1.2)	2Cg1	very dark greenish gray (5BG3/1,3/2.5) fine sand, with few pieces uncarbonized wood at top and organically enriched strata; strata, very weakly expressed; single grain; loose; noneffervescent; indeterminate lower boundary; beach and near shore sand.
>36-<152 (>1.2-<5.0)		sand or woody peat. probably the latter; beach and near shore sand.
<152->169 (<5.0->5.5)	2Cg2	dark greenish gray (5GY4/1) light loamy fine sand, with few granules - possible diamicton, one strata near top of very dark gray to dark olive gray (5Y3/1.5) fine sand, little fines; indeterminate structure; single grain; loose; moderately to very slightly effervescent, variable; few, fine roots, lignified; indeterminate lower boundary; beach and near shore sand.
<304-317 (<10.0-10.4)	2Cg3	light olive gray to olive gray (5Y5.5/2) fine sand, well sorted, one 8.5 cm diameter pebble at base - faceted, with glacial striae; indeterminate structure, single grain; loose; violently effervescent; abrupt lower boundary; beach and near shore sand.
317-≈453 (10.4-≈14.9)	3Cg4	dark gray to dark greenish gray (5Y-5GY4/1) down to (5Y4.5/2) light loamy fine sand diamicton, with pebbles up to 5.5 cm diameter; massive, close to single grain when moist; firm, breaking to loose; violently effervescent, but relatively slow to react; somewhat firm, not like typical fluvial sand; (?) with ice raft pebbles; indeterminate lower boundary, but probably abrupt; beach and near shore sand.
≈453-468 (≈14.9-15.4)	3Cg5	olive gray (5Y5/2) very fine and fine sand, well sorted indeterminate stratified, single grain; loose; violently effervescent; abrupt lower boundary; beach and near shore sand.
468-527 (15.4-17.3)	3Cg6	dark gray to olive gray (5Y4/1.5) down to dark greenish gray (5GY4/1) light loamy fine sand diamicton with pebbles up to 5.5 cm in diameter; massive, close to single grain when moist; firm breaking to loose; violently effervescent; somewhat firm, not like typical fluvial sand; (?) with ice raft pebbles; clear lower boundary; beach and near shore sand.
527-532+ (17.3-17.5+)	3Cg7	dark gray to olive gray (5Y4/1.5) light loamy fine sand, with common granules; weak to moderate, medium, platy; firm breaking to loose; violently effervescent; beach and near shore sand.

Core/Profile: BL-11
Location: Red Lake Bog
Legal description: SE ¼ Section 9 T153N R30W
County: Beltrami
Parent material: Beach and near shore sand
Vegetation: Grass
Slope: <2%
Elevation: 1212 feet
Topo. Map: Norman Lake SW
Remarks: at junction of County Road 23 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-10 (0-.3)	BCg1	dark grayish brown (2.5Y4/2) down to (2.5Y4/2.5) loamy very fine sand; very weak subangular blocky, nearly single grain; nearly loose; noneffervescent; few, fine roots, <1 cm very dark brown (10YR2/2) A-horizon with few organics; clear lower boundary; beach and near shore sand.
10-26 (.3-.9)	BCg2	olive gray to olive (5Y4/2.5) loamy very fine sand with very few granules; few down to common, fine and medium, and dark yellowish brown (10YR3/6), dark yellowish brown (10YR4/6) mottles and some horizontal, very few, fine, hard, oxide concretions in lower few cm; very weak subangular blocky, possibly strata, very weakly expressed, nearly single grain; nearly loose; noneffervescent; few, fine roots in upper half; clear lower boundary; clear to abrupt lower boundary; beach and near shore sand.
26-32 (.9-1.0)	2Cg1	olive gray to olive (5Y4/2.5) fine gravel in heavy loam matrix; many, fine strong brown (7.5YR3/6) and dark yellowish brown (10YR3/6) mottles; single bed; friable; noneffervescent; very abrupt lower boundary; beach and near shore sand.
32-57 (1.0-1.9)	3Cg2	olive gray (5Y5/2) very fine sand, well sorted; common, coarse and medium, dark yellowish brown (10YR4/6) and dark yellowish brown (10YR3/6) mottles; strata, very weakly expressed, heavy minerals concentrated, single grain; loose; noneffervescent; very few, medium and fine roots in upper 10 cm, one pebble just below upper contact; diffuse lower boundary; beach and near shore sand.
57->116 (1.9->3.8) <137-172 (<3.8-5.6)	3Cg3	olive gray (5Y5/2) to light olive gray to olive gray (5Y5.5/2) very fine sand, well sorted; few, strong brown (7.5YR3/6) mottles in lower 14 cm; strata, very weakly expressed, single grain; loose; noneffervescent to strongly effervescent (gradual change at 150 cm); very abrupt lower boundary; beach and near shore sand.
172->179 (5.6->5.9)	4Cg4	very dark brown (10YR2/2) silty clay loam and gray (5Y5/1) loamy very fine sand; thin laminated, 1-2mm thick, weakly expressed; single grain; nearly loose; violently effervescent; indeterminate lower boundary; beach and near shore sand.
<290-443+ (<9.5-14.5+)	5Cg5	gray to dark gray (5Y4.5/1) very fine sand, well sorted; common, coarse, faint, dark grayish brown to olive brown (2.5Y4/3) mottles in upper 30 cm, and 370-392 cm; possibly stratified, single grain; loose; strongly to violently effervescent; beach and near shore sand.

Core/Profile: BL-12
Location: Red Lake Bog
Legal description: NW ¼ Section 4 T153N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/stratified till
Vegetation: Peat
Slope: <2%
Elevation: 1205 feet
Topo. Map: Shotley Brook
Remarks: at junction of County Road 110 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-14 (0-.5)	OA	black (10YR2/1) organic, medium and fine sandy loam; very weak, granular to single grain; very friable to loose; noneffervescent; many roots; gradual lower boundary; bog.
14-29 (.5-1.0)	Bw1	dark yellowish brown (10YR3/6) fine sand, moderately well sorted, very fine to coarse; single grain; loose; noneffervescent; clear lower boundary; beach and near shore sand.
29-69 (1.0-2.3)	Bw2	dark yellowish brown (≈10YR4/6) fine sand, moderately well sorted, very few, fine pebbles; single grain; loose; noneffervescent; clear lower boundary; beach and near shore sand.
69-77 (2.3-2.5)	Bw3	dark yellowish brown (≈10YR3/5) fine sand, moderately well sorted, very few granules; single grain; loose; noneffervescent; indeterminate lower boundary, but probably clear; beach and near shore sand.
77-141 (2.5-4.6)	C1	coarsely mottled dark yellowish brown (≈10YR4/5), yellowish brown (≈10YR5/5), and dark yellowish brown (≈10YR4/6) fine sand, moderately well sorted; strata, very weakly expressed, single grain; loose; noneffervescent; gradual lower boundary; beach and near shore sand.
141-252 (4.6-8.3)	C2	dark grayish brown to olive brown (2.5Y4/3) fine sand; many, coarse and medium, dark yellowish brown (10YR3/6) and (10YR4/6) mottles, and grayish brown to light brownish gray to light yellowish brown to light olive brown (2.5Y5.5/3) mottles; strata, weakly expressed, single grain; loose; noneffervescent; abrupt lower boundary; beach and near shore sand.
252->355 (8.3->11.6)	Cg1	olive gray (5Y4.5/2±) very fine sand, one granule just above base of recovery; few, faint, horizontal, dark yellowish brown (10YR3/6) mottles; strata, moderately expressed; single grain; loose; strongly to violently effervescent; indeterminate lower boundary; beach and near shore sand.
<426-474 (<11.6-15.6)	2Cg2	dark gray to olive gray (5Y4/1.5) sandy loam diamicton, with very dark gray to black (5Y3/1-2.5/1) silty clay loam diamicton strata and clasts; laminated and thinly bedded, disrupted; firm to loose; violently effervescent; abrupt lower boundary; beach and near shore sand.
474-551+ (15.6-18.1+)	3Cg3	dark to very dark gray (5Y3.5/1) light loam diamicton, with few interstratified beds and laminae of clay, silt loam, and sandy loam; massive to thinly bedded to very weak, coarse, platy; firm; violently effervescent; stratified till.

Core/Profile: BL-13
Location: Red Lake Bog
Legal description: SW ¼ Section 21 T154N R30W
County: Beltrami
Parent material: Bog/lacustrine/near shore sand(?) or glaciofluvial(?)/stratified till
Vegetation: Peat
Slope: <2%
Elevation: 1184 feet
Topo. Map: Waskish
Remarks: north of BL-12; on east side of T.H. 72; south of Waskish

Depth cm(ft)	Horizon or Zone	Description
0-56 (0-1.8)	O	black (10YR2/0) down to (10YR2/1±) peat, fibrous, with wood; noneffervescent; unknown lower boundary; bog.
56-107 (1.8-3.5)		no recovery.
107-176 (3.5-5.8)		same as 0-56 above except abrupt lower boundary.
176-189 (5.8-6.2)	OC	black (10YR2/1) and (5Y2.5/1) peat silty and sandy peat, and organic sandy loam; thin beds, moderately expressed; friable; noneffervescent; abrupt lower boundary; bog; wood from 184-189 cm C-14 dated at 4,470±50 BP.
189-201 (6.2-6.6)	2Cg1	very dark gray to black (5Y3/1,2.5/1) organic loamy sand, with fine pebbly and granular sand in basal units; thin beds, moderately expressed; friable; noneffervescent to strongly effervescent; very abrupt lower boundary; lacustrine or beach and near shore sand.
201-215 (6.6-7.1)	3Bg1	grayish green (5G3/1) and dark greenish gray (5GY3.5/1,4/1) silty clay loam with some sand and few, fine pebbles and granules; upper 5 cm a thin bed, then very weak, coarse, subangular blocky; plastic; violently effervescent; many fine and medium roots, mostly vertical; abrupt to clear lower boundary; lacustrine.
215-235 (7.1-7.7)	4Bg2	dark to very dark gray to dark olive gray to olive gray (5Y3.5/1.5) silty clay diamicton, with most pebbles consisting of grayish brown to light brownish gray to light yellowish brown to light olive brown (2.5Y5.5/3) silty clay; few, very fine, dark yellowish brown (10YR4/6) mottles; weak, medium and fine, subangular blocky; plastic; violently effervescent; few, fine and medium roots; with ice raft pebbles at base; clear lower boundary; lacustrine.
235-263 (7.7-8.6)	4BCg	dark olive gray to olive gray (5Y3.5/2) silty clay diamicton, with most pebbles consisting of olive brown to dark grayish brown to grayish brown to light olive brown (2.5Y4/3,5/3) silty clay; many, medium and coarse, dark yellowish brown (10YR4/6±) mottles, mostly associated with 2.5Y clasts; very weak, coarse and medium, subangular blocky over strata, very weakly expressed, thin bedsto thick laminae; plastic; violently effervescent; abrupt lower boundary, one 5 cm dropstone near basal contact; lacustrine.
263-296 (8.6-9.7)	5Cg1	olive gray (5Y4/2) heavy loam diamicton, probably very dark greenish gray (5GY3/1) originally, with fine gravel and granules; massive; plastic; violently effervescent; very few, fine vertical pores with organic coats lining pores; very abrupt lower boundary, irregular on fine scale; near shore sand.
296-399 (9.7-13.1)	6Cg2	very dark greenish gray (5GY3/1) silty clay diamicton, fine textured and comprises 80% of unit; some horizontality to clasts in beds except stones, and silty clay loam down to very dark gray (5Y3/1) with many to no very fine, fine, and medium clasts of grayish brown to light olive brown to olive brown to dark grayish brown (2.5Y5/3,4/3) silty clay, very few fine and very fine clasts of gray (5Y5/1) silt; few to common, fine pebbly and granular, and black to very dark gray to very dark grayish brown (2.5Y2.5/1,3/1) clay laminae; common, medium, olive brown (2.5Y3/4) mottles in lower third; thin beds with thick clay laminae; plastic; violently effervescent; very abrupt lower boundary; lacustrine.
399-413 (13.1-13.5)	7Cg3	black (5Y2.5/1) clay loam to very dark down to dark gray (5Y3.5/1) heavy silt loam; thin beds down to thin laminae, moderately expressed, with few clay laminae; plastic; violently effervescent; very abrupt lower boundary; near shore sand.
413-430 (13.5-14.1)	8Cg4	dark to very dark gray to dark greenish gray (5Y-5GY3.5/1) sandy loam, with loamy sand laminae, with few pebbles in lower half; thin beds and laminae, weakly expressed; friable; violently effervescent; clear to abrupt lower boundary; near shore sand.
430-453 (14.1-14.9)	9Cg5	light gray to gray to light olive gray (5Y6/1.5) down to olive gray (5Y4/2) loamy very fine and fine sand, with two main beds, upper with common, fine clasts of dark olive gray (5Y3/2±) silty clay, lower with common granules; thin beds; very friable; violently effervescent; abrupt lower boundary; near shore sand.

Depth cm(ft)	Horizon or Zone	Description
BL 13 *(continued)*		
453-531+ (14.9-17.4+)	10Cg6	dark gray (5Y4/1) sandy loam diamicton, and dark grayish brown to olive gray (2.5Y-5Y4/2) very fine sandy loam diamicton, with few, fine and medium, sand laminae; thin to medium beds, sandy loam diamicton is massive, very fine sandy loam diamicton is massive to strata, very weakly expressed; firm to friable; violently effervescent; stratified till.

Core/Profile: BL-14
Location: Red Lake Bog
Legal description: E ½ Section 17 T154N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/glaciolacustrine/near shore sand/stratified till
Vegetation: Grass
Slope: <2%
Elevation: 1179 feet
Topo. Map: Waskish
Remarks: by Waskish city limits sign on south side of town; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-25 (0-.8)	O1	black (10YR2/0) peat with roots; very weak, granular; noneffervescent; clear lower boundary; bog.
25-32 (.8-1.0)	O2	black (10YR2/0) peat; massive; noneffervescent; abrupt lower boundary; bog; wood from 26-32 cm C-14 dated at 180±40 BP.
32-58 (1.0-1.9)	2C1	grayish brown to light brownish gray to light yellowish brown to light olive brown (2.5Y5.5/3) fine sand, well sorted, with one thin bed of dark grayish brown (2.5Y4/2.5); stratified, single grain; loose; noneffervescent; abrupt lower boundary; beach and near shore sand.
58->70 (1.9->2.3) <107-116 (<2.3-3.8)	2C2	dark grayish brown to grayish brown (10YR4/2,4.5/2±) fine and medium sand down to loamy granular sand; few, medium and coarse, dark yellowish brown (10YR4/6), (10YR4/8) mottles; stratified, thin beds, single grain; loose; violently to strongly effervescent; clear lower boundary; beach and near shore sand.
116->184 (3.8->6.0) <259-270 (<8.5-8.9)	2Cg1	dark gray (5Y4/1) very fine sand, well sorted, with very few granules and fine pebbles in lower 15 cm; thin beds, based on partings - otherwise massive in appearance, single grain; loose; strongly to violently effervescent at base; very few snail shells, whole and fragmented, and bivalve shell; whole, including articulated halves, and fragmented; very abrupt lower boundary; beach and near shore sand.
270-457 (8.9-15.0)	3Cg2	dark gray (5Y4/1±) down to very dark gray (5Y3/1) silty clay or clay loam diamicton, many pebbles, overall clasts of fines decrease downward and pebble clasts increase downward, with interstratified laminae of black (5Y2.5/1) clay; zones with very few to common, medium and coarse, olive gray (5Y4/2) mottles; stratified; plastict; violently effervescent; many, very fine roots approximately 160-175 cm; very abrupt lower boundary; glaciolacustrine.
457-495 (15.0-16.2)	4Cg3	dark gray (5Y4/1) light loam to sandy loam diamicton, few to common pebbles; many faint medium and coarse, olive gray (5Y4/2) mottles; strata, very weakly expressed; friable; violently effervescent; very abrupt lower boundary; glaciolacustrine and near shore sand.
495-644 (16.2-21.1)	5Cg4	very dark gray to very dark grayish brown to dark olive gray (2.5Y-5Y3/1.5) sandy loam diamicton down to loam diamicton; strata, very weakly expressed, with few discontinuous sand partings, massive internally; very firm; violently effervescent; very abrupt lower boundary; stratified till.
644-671+ (21.1-22.0+)	6Cg5	dark grayish brown (2.5Y4/2±) sandy loam diamicton with very few granules and fine pebbles, and gray to light gray to light brownish gray (2.5Y6/1) silt; thin beds, moderately expressed, very thin laminae; very firm to firm; violently effervescent; stratified till.

Core/Profile: BL-15
Location: Red Lake Bog
Legal description: NE ¼ Section 8 T154N R30W
County: Beltrami
Parent material: Alluvium/beach and near shore sand/lagoon/glaciolacustrine/near shore sand/stratified till
Vegetation: Grass
Slope: <2%
Elevation: 1177 feet
Topo. Map: Waskish
Remarks: at milepost 36.6 on T.H. 72; on east side of T.H. 72; north of Tamarac River crossing

Depth cm(ft)	Horizon or Zone	Description
0-5 (0-.2)	A	very dark grayish brown (10YR3/2) loamy fine and medium sand; very weak subangular breaking to single grain; friable to loose; noneffervescent; many, very fine and fine roots; abrupt lower boundary; alluvium.
5-11 (.2-.4)	Bw1	dark brown (10YR3/3) fine to coarse sand, some fines; single grain; loose; noneffervescent; clear lower boundary; alluvium.
11-28 (.4-.9)	Bw2	very dark grayish brown (10YR3/2) medium and coarse sand, some fines; single grain; loose; noneffervescent; clear lower boundary; alluvium.
28-95 (.9-3.1)	C1	brown to dark brown to dark yellowish brown (10YR4/3,3/4,3.5/3.5) down to brown to grayish brown (10YR5/2.5±) medium and coarse sand, with some fine sand and coarse sand beds; stratified, single grain; loose; noneffervescent; abrupt lower boundary; alluvium.
95-180 (3.1-5.9)	C2	dark grayish brown to grayish brown (2.5Y4.5/2) very fine sand, well sorted, with few, thin olive brown to dark grayish brown to very dark grayish brown (2.5Y4/3,3/2) strata (possibly enriched in organic matter) down to olive brown to dark grayish brown (2.5Y4/3) very fine and fine sand, well sorted; strata, very weakly expressed, single grain; loose; noneffervescent; clear lower boundary; beach and near shore sand.
180->219 (5.9->7.2) <255->319 (<8.4->10.5) <411-440 (<13.5-14.4)	Cg1	dark to very dark grayish brown (2.5Y3.5/2) down to dark gray (5Y4/1) very fine and fine sand, well sorted, few granules and fine pebbles, fine and medium sand from 416-433 cm; stratified, single grain; loose; noneffervescent down to violently effervescent, except basal 10 cm are noneffervescent; very abrupt lower boundary; beach and near shore sand.
440-458 (14.4-15.0)	2Cg2	very dark gray (5Y3/1), dark gray (5Y4/1), and black (5Y2.5/1) very fine sand, loamy very fine sand, and very fine sandy loam; thin beds and thin laminae; friable; violently effervescent; some laminae with common snail and bivalve shells, whole and fragmented; very little wood and uncarbonized organic matter; wood from 451-458 cm C-14 dated at 5,890±60 BP; very abrupt lower boundary with pebbly pavement; lagoon.
458-509 (15.0-16.7)	3Cg3	dark to very dark gray (5Y3.5/1) clay loam diamicton down to loam diamicton, with one fine sand lamination over laminated silty clay loam; massive to strata, very weakly expressed; firm to very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
509->527 (16.7->17.3) <559-562 (<18.3-18.4)	4Cg4	very dark grayish brown (2.5Y3/2) and dark grayish brown to grayish brown (2.5Y4.5/2) sandy loam and sandy loam diamicton, with fine sand partings and thin laminae; thin strata, moderately expressed; friable; violently effervescent; abrupt lower boundary; near shore sand.
562-583 (18.4-19.1)	4Cg5	dark grayish brown (2.5Y4/2) fine sand down to gravely, loamy very fine and fine sand; stratified, single grain; loose, loamy sand is friable; violently effervescent; very abrupt lower boundary; near shore sand.
583-704+ (19.1-23.1)	5Cg6	very dark greenish gray (5GY3/1) loam diamicton, with interbeds of granular medium sand, medium sand, loamy very fine and fine sand, and very fine ssand loam; thin to thick beds diamicton, with thin beds to laminae interstratified; very firm; violently effervescent; stratified till.

Core/Profile: BL-16
Location: Red Lake Bog
Legal description: SE ¼ Section 31 T155N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/lagoon/glaciolacustrine
Vegetation: Peat
Slope: <2%
Elevation: 1179 feet
Topo. Map: Waskish
Remarks: at milepost 38.7 on T.H. 72; on north side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-24 (0-.8)	O	black (10YR2/0) peat; noneffervescent; very abrupt lower boundary; bog.
24->40 (.8->1.3) <122-123 (<1.3-4.0)	2C	light gray to light brownish gray (≈2.5Y6.5/1.5) fine sand, well sorted; single grain; loose; noneffervescent; indeterminate lower boundary, or if top of next core segment is in place, abrupt lower boundary; beach and near shore sand.
123-130 (4.0-4.3)	3COg	black (10YR2/0) sandy peat down to dark to very dark grayish brown (2.5Y4/2-3/2) and black (10YR2/0) organic loamy fine sand; thin beds to thin laminae; nonplastic; noneffervescent down to strongly effervescent; very abrupt lower boundary, with lag of pebbles; wood from 123-130 cm C-14 dated at 2,610±40 BP; lagoon.
130-251 (4.3-8.2)	4Cg1	greenish gray (5GY5/2) down to very dark greenish gray (5G3/1) silty clay diamicton, pebble and sand content increases with depth, clasts consisting of very dark gray and grayish brown to light olive brown (5Y3/1,2.5Y5/3), gray to dark gray (5Y5/1,5Y4/1±) silty clay, and overall clast content decreases with depth; with thin to thick laminae of black (5Y2.5/1) clay; stratified, rhythmically bedded; plastic; violently effervescent; very abrupt lower boundary; glaciolacustrine.
251-291 (8.2-9.5)	5Cg2	dark to very dark gray (5Y3.5/1) fine to very fine sandy loam, with very few granules and fine pebbles, massive, firm; olive brown (2.5Y4/4) very fine sand, strata, weakly expressed, loose, single grain; dark to very dark gray (5Y3.5/1) very fine sandy loam, with very few granules and fine pebbles, strata, very weakly expressed; firm; dark to very dark gray (5Y3.5/1) light loam or silt loam diamicton, massive, very firm; stratified grayish brown to light brownish gray to light yellowish brown to light olive brown (2.5Y5.5/3±) very fine sand and very fine sandy loam, and very dark gray (5Y3/1) light loam diamicton, thinly stratified, fine laminae, moderately expressed; friable to very firm; violently effervescent; very abrupt lower boundary, internally abrupt boundaries; glaciolacustrine.
291-430 (9.5-14.1)	6Cg3	very dark gray (5Y3/1) loam diamicton, with few light olive brown (2.5Y5/6) and light brownish gray (2.5Y6/2±) thin beds and thick laminae of loam, fine and very fine sand, very fine and fine sandy loam, and granular and pebbly fine and loamy fine sand; massive, with hints of stratification internally in zones; very firm; abrupt lower boundary; glaciolacustrine.
430->529 (14.1->17.4) <578-580 (<19.0-19.0)	7Cg4	very dark grayish brown (2.5Y3/2) heavy silt loam diamicton and dark grayish brown to grayish brown (2.5Y4.5/2) very fine and fine sand, generally well sorted; thinly bedded - 452 cm steeply dipping and disrupted, 488 cm± horizontal, steeply dipping; very firm, loose; violently effervescent; very abrupt lower boundary; glaciolacustrine.
580-661 (19.0-21.7)	8Cg5	very dark grayish brown (2.5Y3/2) loam diamicton; with some thick isolated pods of very fine to fine sand and clasts of diamicton in sand; very firm; violently effervescent; abrupt lower boundary; stratified till.
661-680+ (21.7-22.3+)	9Cg6	dark grayish brown (2.5Y4/2) silty clay and sandy clay loam diamicton down to dark grayish brown to grayish brown (2.5Y4.5/2) fine sand, with few clasts of dark grayish brown (2.5Y4/2) silty clay and grayish brown (2.5Y5/2) silt; thin to moderate laminae down to strata, very weakly expressed; single grain; firm to loose; violently effervescent; stratified till.

Core/Profile: BL-17
Location: Red Lake Bog
Legal description: NW ¼ Section 30 T155N R30W
County: Beltrami
Parent material: Lacustrine/glaciolacustrine/stratified diamicton/glaciolacustrine
Vegetation: Grass
Slope: <2%
Elevation: 1184 feet
Topo. Map: Waskish
Remarks: milepost 40.7 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-9 (0-.3)	A	black (2.5Y2/0) organic clay, with one thick laminae of dark grayish brown (2.5Y4/1.5) clay; weak, fine, subangular blocky; plastic; noneffervescent; abrupt lower boundary; lacustrine.
9-29 (.3-1.0)	BCg	grayish brown to olive gray (5Y-2.5Y5/2±) clay with very few granules, with common, thick laminae, very dark grayish brown (2.5Y3/2) clay; many, medium and coarse, dark gray (5Y4/1±), and many, fine and medium, dark yellowish brown (10Y3/4±) mottles; very weak subangular blocky over thin beds and thick laminae; continuous, thin to moderately thick, very dark grayish brown (2.5Y3/2) clay and organic coats lining pores; plastic; noneffervescent to moderately effervescent; common, fine pores and roots; gradual lower boundary; lacustrine.
29-82 (1.0-2.7)	Cg1	dark gray to olive gray (5Y4/1.5±) and light brownish gray to grayish brown to light yellowish brown to light olive brown (2.5Y5.5/3±) clay and silty clay with some laminations, with sand and/or granules, and common, thick to medium, laminae of very dark grayish brown (2.5Y3/2) clay; zones with many, medium and coarse, horizontal trending, dark yellowish brown (10Y3/6±) mottles; thin beds, medium laminated; continuous, thin to moderately thick, very dark grayish brown (2.5Y3/2) clay and organic coats lining pores; plastic; violently effervescent, very few, soft, fine and mdium, amorphous secondary carbonate masses; common to few fine pores and roots; abrupt lower boundary; lacustrine.
82-131 (2.7-4.3)	2Cg2	dark gray to gray (5Y4.5/1) to dark grayish brown (2.5Y4/2.5) loam diamicton; massive; firm to very firm; violently effervescent; very few, fine pores upper half, with organic linings; very abrupt lower boundary; glaciolacustrine.
131-143 (4.3-4.7)	3Cg3	dark grayish brown to grayish brown (2.5Y4.5/2±) medium and fine sand, moderately well sorted down to gravely coarse and very coarse sand; moderately to poorly sorted; single grain; loose; violently effervescent; very abrupt lower boundary; glaciolacustrine.
143->201 (4.7->6.6) <279-369 (<6.6-12.1)	4Cg4	dark grayish brown to olive brown (2.5Y4/3) down to very dark grayish brown to very dark gray (2.5Y3/1.5) (with a very slight hint of 10YR) loam diamicton, common pebbles and no clasts of sediment; 351-369 cm, greater sand content, but still dark to very dark grayish brown (2.5Y3.5/2) loam diamicton with better expressed bedding, includes angular large clasts of finely stratified very dark grayish brown (2.5Y3/2) loam diamicton and dark grayish brown to grayish brown (2.5Y4.5/2±) sandy loam (compacted); fine; massive, with zones stratified as noted; jointed and horizontal partings; many discontinuous, dark yellowish brown (10YR4/6±) oxide coats on joints (below 330 cm) and horizontal partings; very firm; very violently effervescent; very abrupt lower boundary; stratified diamicton.
369-409 (12.1-13.4)	5Cg5	very dark grayish brown (2.5Y3/2) clay to silty clay, with very few fine pebbles; thin beds, weakly expressed; stratified to medium laminated; firm; violently effervescent; abrupt lower boundary; glaciolacustrine.
409-477 (!3.4-15.6)	6Cg6	very dark gray (2.5Y3/1) clay to silty clay, with few fine pebbles, with very dark grayish brown to very dark gray (2.5Y3/1.5) loam diamicton beds; thin beds, weakly to very weakly expressed; firm to very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
477-510 (15.6-16.7)	7Cg7	dark to very dark grayish brown (2.5Y3.5/2) light loam diamicton, with very dark gray (2.5Y3/1) clay clasts; very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
510-608 (16.7-19.9)	8Cg8	very dark gray (5Y3/1) clay loam diamicton, with dark gray to olive gray (5Y4/1.5) loamy sand and dark to very dark gray to olive gray to dark olive gray (5Y3.5/1.5) basal sandy loam diamicton; massive, with interstratified, very fine and fine sand laminae and sandy loam diamicton bed at base; very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
608-742+ (19.9-24.3+)	9Cg9	very dark gray to dark olive gray (5Y3/1.5) and very dark gray (5Y3/1) clay; stratified, thin beds to thin laminae, mostly weakly expressed; few slickensides; firm; violently effervescent; glaciolacustrine.

Core/Profile: BL-18
Location: Red Lake Bog
Legal description: NW ¼ Section 18 T155N R30W
County: Beltrami
Parent material: Bog/lacustrine/till
Vegetation: Peat
Slope: <2%
Elevation: 1194 feet
Topo. Map: Ludlow Lookout Tower
Remarks: at milepost 42.7 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-29 (0-1.0)	O1	black (10YR2/0) fibrous peat; noneffervescent; gradual lower boundary; bog.
29-61 (1.0-2.0)	O2	black (10YR2/0) fibrous peat, with few thick laminae of peat and clastics; noneffervescent; clear to abrupt lower boundary; wood from 56-61 cm C-14 dated at 3,180±40 BP; bog.
61-82 (2.0-2.7)	2Ab	black (2.5Y2/0) organic silty clay loam; very weak, coarse, subangular blocky; firm; noneffervescent; many fine to coarse roots; abrupt lower boundary; lacustrine.
82-93 (2.7-3.1)	2ACgb	black (5Y2.5/2) silty clay loam, with very few pebbles and granules; few, medium and fine, dark olive (2.5Y3/4) mottles; very weak, thin beds to thick laminae; firm; noneffervescent; common, fine to coarse roots abrupt lower boundary; lacustrine.
93-153 (3.1-5.0)	3Cg1	dark greenish gray to greenish gray to gray to dark gray (5GY-5Y4.5/1) loam diamicton; massive; firm; violently effervescent; few, coarse lignified roots; diffuse lower boundary; till.
153-265 (5.0-8.7)	3Cg2	olive gray (5Y4/2) loam diamicton; common down to many, coarse, faint, olive brown (2.5Y4/4) mottles; massive; very firm; violently effervescent; abrupt lower boundary; till.
265-349 (8.7-11.5)	3C1	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; many, faint, horizontal, approximately 2-3mm wide, olive brown (2.5Y4/6) bands down to many, horizontal 10YR oxide stains on horizontal partings; massive, but banding suggests some stratification, to stratified, moderately expressed; very firm; violently effervescent; clear to gradual lower boundary; till.
349-407 (11.5-13.4)	4C2	dark grayish brown to olive brown (2.5Y4/3) down to (2.5Y4/2) heavy loam to clay loam diamicton; strata, weakly expressed, internally; massive; continuous, thin to moderately thick dark yellowish brown (10YR3/6±) oxide coats on horizontal partings and vertical joints; extremely firm; violently effervescent; gradual lower boundary; till.
407->452 (13.4->14.8)	4Cg	very dark grayish brown (2.5Y3/2) heavy loam to clay loam diamicton; continuous, dark yellowish brown (10YR3/4±) oxide coats on joints, no horizontal partings; extremely firm; violently effervescent; till.

Core/Profile: BL-19
Location: Red Lake Bog
Legal description: SW ¼ Section 31 T156N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/lacustrine/till/stratified drift/stratified till
Vegetation: Peat
Slope: <2%
Elevation: 1196 feet
Topo. Map: Ludlow Lookout Tower
Remarks: at milepost 44.7 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-29 (0-1.0)	O1	black (10YR2/1) fibrous peat; noneffervescent; clear lower boundary; bog.
29-41 (1.0-1.3)	O2	black (10YR2/0) fibrous peat, woody; noneffervescent; very abrupt lower boundary; bog.
41-46 (1.3-1.5)	2Cg1	very dark grayish brown to very dark gray (2.5Y3/1.5) organic loamy fine sand; one black (10YR2/1) thin silt loam lamina at top; very few, fine, dark yellowish brown (10YR3/6) mottles; single bed, internal strata, very weakly expressed; friable; noneffervescent; very abrupt lower boundary; beach and near shore sand.
46->59 (1.5->1.9)	2Cg2	very dark greenish gray (5GY3/1) and greenish gray (5GY5/1) loam and dark grayish brown (2.5Y4/2±) loamy fine sand; common, coarse, dark to very dark grayish brown to olive brown (2.5Y3.5/3) mottles; strata, weakly expressed; plastic; noneffervescent; indeterminate lower boundary; beach and near shore sand.
<91-105 (<3.0-3.4)	3Cg3	very dark greenish gray (5GY3/1) silty clay, with zone with common, fine pebbles at 98 cm; common, medium and coarse, dark grayish brown (2.5Y4/2) mottles and few, fine and medium, dark yellowish brown (10YR3/6,4/6) mottles; strata, very weakly expressed; plastic; violently effervescent; abrupt lower boundary; lacustrine.
105-159 (3.4-5.2)	3Cg4	dark greenish gray (5GY4/1) silty clay loam and silty clay loam diamicton, with many clasts of fines; many, very fine to fine, olive (5Y4/3), and common, medium and coarse, olive gray (5Y4/2) mottles; strata, very weakly expressed; firm; violently effervescent; abrupt lower boundary; lacustrine.
159-254 (5.2-8.3)	4C1	olive brown (2.5Y4/4) loam diamicton; many down to few, fine and medium, olive gray (5Y5/2) mottles; massive, with few, very weak, platy zones; very firm; violently effervescent; gradual lower boundary; till.
254-309 (8.3-10.1)	4C2	olive brown (2.5Y4/4) down to dark grayish brown (2.5Y4/2) loam diamicton; weak to moderate, medium and coarse, platy; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6,4/6) oxide coats on horizontal partings; very firm; violently effervescent; clear lower boundary; till.
309-375 (10.1-12.3)	4Cg	dark to very dark gray (5Y3.5/1) loam diamicton, with one very fine sand bed; massive, very few vertical joints; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6,4/6) oxide coats on horizontal partings; very firm; violently effervescent; abrupt lower boundary; till.
375-406 (12.3-13.3)	5C	light olive brown (≈2.5Y5/6) very fine sand, with one bed pebbly very fine sand with pebbles consisting of loam diamicton; strata, very weakly expressed; single grain; loose; very abrupt lower boundary; stratified drift.
406-550+ (13.3-18.0+)	6Cg	grayish brown to dark grayish brown (2.5Y3.5/2-3.5/1) loam diamicton down to dark to very dark grayish brown (2.5Y3.5/2) interstratified light loam diamicton and very fine sand, with few silt swirls; strata, strongly expressed, thin beds; diamicton beds are massive to strata, very weakly expressed, with sand and silt inclusions, sand is single grain; very firm, sand is loose; stratified till.

Core/Profile: BL-20
Location: Red Lake Bog
Legal description: SW ¼ Section 19 T156N R30W
County: Beltrami
Parent material: Bog/pond/lacustrine/till/stratified drift/stratified till
Vegetation: Peat
Slope: <2%
Elevation: 1193 feet
Topo. Map: Ludlow Lookout Tower
Remarks: north of BL-19; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-108 (0-3.5)	O1	black (10YR2/1) peat, fibrous, with little wood; noneffervescent; abrupt lower boundary; bog.
108-116 (3.5-3.8)	O2	black (10YR2/0) peat, fibrous, with little wood; noneffervescent; abrupt lower boundary; bog.
116-124 (3.8-4.1)	2Cg1	black (2.5Y2.5/0) organic silt loam, with very few granules; single bed, massive; friable; noneffervescent; abrupt lower boundary; wood from 116-118 cm C-14 dated at 3,240±40 BP; pond.
124-129 (4.1-4.2)	2Cg2	black (10YR2/1) fine sandy loam down to dark grayish brown (10YR4/2) fine sand, with very few granules; stratified, upward fining, single bed; friable to loose; noneffervescent; very abrupt lower boundary; pond.
129->132 (4.2->4.3) <244-323 (<8.0-10.6)	3Cg3	dark greenish gray (5BG4/1,3.5/1) clay loam laminae at top, abruptly changing to olive gray (5Y5/2) clay loam diamicton; many, coarse, olive (5Y4/3±) mottles, with at least one medium sand lamina, few silt laminae, with basal 2 cm of 3 laminae of silt, most pebble clasts are fines; strata, very weakly to weakly expressed; firm; violently effervescent; very abrupt lower boundary; lacustrine.
323-436 (10.6-14.3)	4C1	olive brown (2.5Y4/4) loam diamicton; common, medium, dark gray (5Y4/1) mottles in top 15 cm; moderate, medium and coarse, platy; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6,4/6) oxide coats on horizontal partings; very firm; violently effervescent; very abrupt lower boundary; till.
436-454 (14.3-14.9)	5C2	light olive brown (2.5Y5/4) very fine sand, with zones with more silt to very fine sand at 507->520 cm, >550 cm, 611-671 cm; single grain; loose; violently effervescent; very abrupt lower boundary; stratified drift.
454-721+ (14.9-23.7+)	6Cg	dark to very dark gray (5Y-2.5Y3.5/1) loam diamicton, with silt laminae and swirls in lower 15 cm; massive, with zones with greater silt content, with very weak to weak, fine and medium, platy; very firm; violently effervescent; stratified till.

Core/Profile: BL-21
Location: Red Lake Bog
Legal description: SW ¼ Section 7 T156N R30W
County: Beltrami
Parent material: Bog/beach and near shore sand/lacustrine(?)/till
Vegetation: Peat
Slope: <2%
Elevation: 1194 feet
Topo. Map: Ludlow Lookout Tower
Remarks: north of BL-20; on east side of T.H. 72; farthest north core in Beltrami County

Depth cm(ft)	Horizon or Zone	Description
0-15 (0-.5)	O	black (10YR2/1) peat; noneffervescent; very abrupt lower boundary; bog.
15->23 (.5->.8) <107-139 (<3.5-4.6)	2Cg1	very dark greenish gray (5G3/1) down to dark greenish gray (5G4/1) very fine and fine sand, with very fine sandy loam top 2 cm; strata, very weakly expressed; nonplastic; noneffervescent; abrupt lower boundary; beach and near shore sand.
139-153 (4.6-5.0)	3Cg2	dark greenish gray (5GY4/1±) loam diamicton and light loam diamicton, with fine sandy loam at base; strata, very weakly expressed; plastic to firm; violently effervescent; very abrupt lower boundary; lacustrine(?).
153-222 (5.0-7.3)	4C1	light olive brown to olive brown (2.5Y4.5/3.5) loam diamicton; many, fine to coarse, grayish brown to olive gray(2.5Y-5Y5/2) mottles; massive down to very weak, coarse, platy, few joints; common, discontinuous, thin, dark yellowish brown (10YR3/6) coats on joints; very firm; violently effervescent; gradual lower boundary; till.
222-427 (7.3-14.0)	4C2	dark to very dark grayish brown (2.5Y3.5/2.5) to (2.5Y3.5/2) loam diamicton; thin, very fine sand laminae at 388 cm; weak to moderate, medium and coarse, platy, few joints; many, continuous and discontinuous, thin, dark yellowish brown (10YR3/6), coats on horizontal partings and joints; very firm; violently effervescent; clear lower boundary; till.
427-481 (14.0-15.8)	4Cg1	very dark to dark gray (5Y3.5/1) loam diamicton; massive, one joint at top extending from above; coatings as above in one joint; very firm; violently effervescent; clear lower boundary; till.
481-base (15.8-base)	4Cg2	very dark grayish brown (2.5Y3/2) and very dark to dark gray (5Y3.5/1) loam diamicton; weak to moderate, fine and medium, platy down to massive or crudely stratified; very firm; violently effervescent; till.

Core/Profile: LW-11
Location: Red Lake Bog
Legal description: SW ¼ Section 31 T157N R30W
County: Lake of the Woods
Parent material: Bog/beach and nearshore sand/glaciolacustrine/till
Vegetation: Peat
Slope: <2%
Elevation: 1188 feet
Topo. Map: Ludlow Lookout Tower
Remarks: originally Red Lake Bog core LW-1; just north of County boundary; north of BL-21; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-11 (0-.4)	O	black (10YR2/1) peat and very fine sandy peat; weak, thin beds; very friable; noneffervescent; abrupt lower boundary; bog.
11-51 (.4-1.7)	2Cg1	dark gray (5Y4/1) very fine sand down to dark greenish gray (5G4/1) loamy sand with very few, fine pebbles; thin beds, moderately expressed; single grain; loose to plastic; noneffervescent, strongly effervescent near base; abrupt lower boundary; beach and near shore sand.
51->72 (1.7->2.4)	3Cg2	dark greenish gray (5GY4.5/1), greenish gray (5G4/1) and light gray (5Y7/1) silty clay with few, fine pebbles in zones; thin beds and laminated, moderately expressed; plastic; violently effervescent; indeterminate lower boundary; glaciolacustrine.
<107->220 (<3.5->7.2)	4Cg3	olive gray (5Y4.5/2) down to olive brown to dark grayish brown (2.5Y4/3) loam diamicton; few down to many, fine and medium, olive brown (2.5Y4/4) and dark yellowish brown (10YR3/6,4/6) mottles; massive over strata, very weakly expressed (oblate clasts aligned); very firm; violently effervescent; indeterminate lower boundary; till.
<244-355 (<8.0-11.6)	4Cg4	very dark grayish brown to olive brown (2.5Y3/2.5) down to very dark grayish brown (2.5Y3/1.5) loam diamicton with few sandy loam and loamy sand partings; many, fine to medium, horizontal, dark gray to dark grayish brown (2.5Y4/1) mottles in upper 40 cm; weak to moderate, medium to coarse, platy; common, continuous to discontinuous, thin, dark yellowish brown (10YR3/6) oxide coats on plates; very firm; violently effervescent; clear lower boundary; till.
355->704 (11.6->23.1)	4Cg5	very dark gray (5Y3/1) heavy loam diamicton down to loam diamicton, with zones of very dark grayish brown (2.5Y3/1.5) color; massive, with zones of very weak to moderate, fine to coarse, platy; extremely firm; violently effervescent; till.

Core/Profile: LW-12
Location: Red Lake Bog
Legal description: SW ¼ Section 19 T157N R30W
County: Lake of the Woods
Parent material: Bog/beach and near shore sand/glaciolacustrine/till
Vegetation: Peat
Slope: <2%
Elevation: 1180 feet
Topo. Map: Chase Brook NE
Remarks: originally Red Lake Bog Core LW-2; at milepost 52.9 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-9 (0-.3)	O	black to very dark gray (2.5Y2.5/0) silty peat; weak, medium to fine, subangular blocky; friable; noneffervescent; abrupt lower boundary; bog.
9-22 (.3-.7)	2AC	black to very dark grayish brown (2.5Y2.5/1) to very dark gray (2.5Y3/1) loam down to very fine sandy loam; strata, weakly expressed, thin beds; friable; noneffervescent; abrupt lower boundary; beach and near shore sand.
22-30 (.7-1.0)	3Cg1	dark grayish brown to very dark grayish brown (2.5Y3.5/2) and very dark greenish gray (5GY3/1) fine gravel with loamy sand matrix, down to grayish brown to dark grayish brown (2.5Y4.5/2) granular, very fine sand, with little fines; many, fine, dark yellowish brown (10YR3/4) mottles; moderatley stratified, thin beds; single grain; very friable to loose; noneffervescent down to violently effervescent; abrupt lower boundary; beach and near shore sand.
30-87 (1.0-2.9)	4Cg2	dark gray to olive gray (5Y4/1.5) clay, with few granules and fine pebbles at base; few, medium and coarse, light olive brown (2.5Y5/6), and few, coarse, dark greenish gray (5GY4/1) mottles; weak granular down to very weak, fine, platy; plastic; violently effervescent; very abrupt lower boundary; glaciolacustrine.
87-131 (2.9-4.3)	4Cg3	olive gray (5Y4.5/2) and very dark gray (5Y3/1) clay; common, very fine to fine, dark yellowish brown (10YR3/4,3/6) mottles; rhythmically laminated couplets approximately 1-4 mm thick; firm, plastic; violently effervescent; very abrupt lower boundary; glaciolacustrine.
131-233 (4.3-7.6)	5Cg4	olive gray (5Y5/2) heavy loam diamicton; many, fine and medium olive gray (2.5Y4/6) mottles; massive; firm; violently effervescent; abrupt lower boundary; till.
233-686+ (7.6-22.5+)	6Cg5	very dark grayish brown (2.5Y3/2) down to very dark gray to dark olive gray (5Y3/1.5) heavy sandy loam diamicton or light loam diamicton down to heavy silt loam diamicton; very weak, medium to coarse, platy; very firm; violently effervescent; possible boulder line at 508-520 cm; till.

Core/Profile: LW-13
Location: Red Lake Bog
Legal description: SW ¼ Section 7 T157N R30W
County: Lake of the Woods
Parent material: Glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1172 feet
Topo. Map: Chase Brook NE
Remarks: originally Red Lake Bog core LW-3; at milepost 54.9 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-27 (0-.9)	A	very dark brown (10YR2/2) silty clay, with few pebbles at 8 cm; one very dark greenish gray (5GY3/1) mottle; weak, fine, subangular blocky; plastic; noneffervescent down to strongly effervescent; clear lower boundary, bioturbated; probably upper 8 cm are spoil; glaciolacustrine.
27-47 (.9-1.5)	C1	dark grayish brown to olive brown (2.5Y4/3±) heavy loam diamicton; many, very fine to fine, olive gray (5Y5/2), and dark yellowish brown (10YR4/4) mottles; strata, very weakly to weakly expressed; laminated; plastic; violently effervescent; common, very fine and fine and medium roots; very abrupt lower boundary; glaciolacustrine.
47-119 (1.5-3.9)	2C2	olive brown (2.5Y4/4) loam diamicton; many, medium and coarse, grayish brown (2.5Y5/2), and many, fine and me dium, olive brown (2.5Y4/6) mottles; very weak platy; plastic down to firm; violently effervescent; common, fine and medium, pores and lignified roots; clear lower boundary; till.
119-157 (3.9-5.2)	2C3	olive brown (2.5Y4/4) loam diamicton; moderate, medium and coarse, platy, jointed; many, continuous, thin, dark yellowish brown (10YR3/6) and strong brown (7.5YR3/6) oxide coats, with black oxidation dots; very firm; violently effervescent; clear lower boundary; till.
157-274 (5.2-9.0)	2C4	olive brown (2.5Y4/4) light loam diamicton down to heavy silt loam diamicton; probably weak to moderate, platy; friable; violently effervescent; clear lower boundary; till.
274-608 (9.0-20.0)	3C5	very dark to dark grayish brown to olive brown (2.5Y3.5/2.5) heavy silt loam diamicton, fewer pebbles than above, with heavy silt loam± strata; stratified; firm to friable; violently effervescent; till.

Core/Profile: LW-14
Location: Red Lake Bog
Legal description: NE ¼ Section 1 T157N R31W
County: Lake of the Woods
Parent material: Beach and near shore sand/glaciolacustrine
Vegetation: Grass
Slope: <2%
Elevation: 1166 feet
Topo. Map: Chase Brook NE
Remarks: originally Red Lake Bog core LW-4; north of LW.3 on T.H. 72; on west side of road

Depth cm(ft)	Horizon or Zone	Description
0-28 (0-.9)	A	very dark brown (10YR2/2) loamy sand; very weak, fine, subangular blocky to single grain; very friable to loose; noneffervescent to very slightly effervescent; clear lower boundary; beach and near shore sand.
28-38 (.9-1.2)	E	grayish brown to dark grayish brown (2.5Y4.5/2) fine sand with few peds of grayish brown (2.5Y5/2) very fine sandy loam; single grain; loose; noneffervescent; clear lower boundary; beach and near shore sand.
38-85 (1.2-2.8)	Bw	light olive brown to dark yellowish brown (2.5Y-10YR4.5/4) fine sand; single grain; loose; noneffervescent; abrupt lower boundary with few pebbles at contact; beach and near shore sand.
85-177 (2.8-5.8)	2Cg1	olive gray (5Y5/2,4/2) and gray to light gray (5Y6/1) silty clay, silt loam, and silty clay diamicton with silt partings,most clasts consist of fine material, including light brown (7.5YR6/4) silty clay; many, fine and medium, olive brown (2.5Y5/4±) mottles; medium to thick laminae, weakly to moderately expressed; firm to friable; violently effervescent, with zones with many, fine, secondary carbonate masses and concretions; very abrupt lower boundary; glaciolacustrine.
177-228 (5.8-7.5)	3Cg2	olive gray (5Y5/2) and dark to very dark grayish brown to olive brown (2.5Y3.5/3) silt, silt loam, and silt loam diamicton; many, fine and medium, dark yellowish brown (10YR3/6,4/6) mottles; thin beds to laminae, weakly expressed; friable; violently effervescent; abrupt lower boundary; glaciolacustrine with few debris flows.
228-239 (7.5-7.8)	3Cg3	dark grayish brown to olive brown (2.5Y4/3) silt loam diamicton; common, medium and coarse, olive gray (5Y5/2) mottles with dark yellowish brown (10YR3/6,4/6) halos; massive, single bed; friable; violently effervescent; very abrupt lower boundary; glaciolacustrine, with subaqueous debris flow.
239-276 (7.8-9.1)	4Cg4	dark grayish brown (2.5Y4/2) to grayish brown (10YR4.5/2±) silty clay loam diamicton and loam diamicton; common, fine to medium, olive gray (5Y5/2) mottles with dark yellowish brown (10YR3/6) halos, some surrounding pores; two beds, lower one upward fining in clast content with weak, medium, platy structure; common, discontinuous, dark yellowish brown (10YR3/6), oxide stains; friable to firm; violently effervescent; very abrupt lower boundary; glaciolacustrine, with two subaqueous debris flows.
276-286 (9.1-9.4)	5Cg5	light olive brown to olive brown (2.5Y4.5/4) coarse silt; few, medium, dark yellowish brown (10YR4/6); single bed, massive internally; friable; violently effervescent; abrupt lower boundary; glaciolacustrine.
286-369 (9.4-12.1)	6Cg6	dark to very dark gray to olive gray (5Y3.5/1.5) silt diamicton, silt loam, and silty clay loam diamicton with most clasts consisting of fines, some with light brown (7.5YR4/6) colors, few pebbles, and dark to very dark grayish brown to olive brown (2.5Y3.5/3) pebbly sandy loam with common clasts of silty clay loam; thin beds, weakly to moderately expressed,; friable to firm; violently effervescent; abrupt lower boundary; glaciolacustrine.
369-434 (12.1-14.2)	7Cg7	dark gray (5Y4/1) silty clay loam and silt loam, very dark gray (5Y3/1) clay, and gray to light gray (5Y6/1) silt± diamicton, clasts when present, are shale or fines; mostly thin laminae to thin beds, moderately to strongly expressed; friable to firm to plastic; violently effervescent, not as much as above; abrupt lower boundary; glaciolacustrine.
434-482 (14.2-15.8)	8Cg8	dark gray to very dark gray (5Y4/1,3.5/1) silt ± few shale clasts, with few thin beds of silty clay loam diamicton with shale and clasts of fines; thin, massive, laminated beds; friable to plastic; violently effervescent; abrupt lower boundary; glaciolacustrine.
482-738 (15.8-24.2)	9Cg9	gray to dark gray (5Y4.5/1,4/1) silt and silt loam ± very few, very fine clasts of fines, with very few laminae of very dark gray (5Y3/1) silty clay in upper part down to gray to dark gray to olive gray (5Y4.5/1.5) very fine sand interlaminated with dark gray (5Y4/1) silt and very dark gray (5Y3/1) silty clay loam in lower part; thin beds to thin laminae, rhythmically laminated in some zones; friable; violently effervescent; glaciolacustrine.

Core/Profile: LW-15
Location: Red Lake Bog
Legal description: NW ¼ Section 30 T158N R30W
County: Lake of the Woods
Parent material: Beach and near shore sand/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1148 feet
Topo. Map: Chase Brook NE
Remarks: originally Red Lake Bog core LW-5; at milepost 58.95 on T.H. 72; on east side of road

Depth cm(ft)	Horizon or Zone	Description
0-41 (0-1.3)	CA	black (2.5Y2.5/1), very dark grayish brown (2.5Y3/2) and very dark gray (2.5Y3/1) fine sandy loam and heavy fine sandy loam, dark grayish brown (10YR4/2) fine and medium sand, and dark greenish gray (5GY4/1) silt loam; very few, fine, dark yellowish brown (10YR3/4,3/6) mottles; thin beds to laminae, weakly expressed; friable; noneffervescent to strongly effervescent; very abrupt lower boundary; possibly spoil from road construction.
41-101 (1.3-3.3)	2Cg1	olive gray (5Y5/2,4/2) clay loam diamicton; few, fine to medium, dark yellowish brown (10YR3/6,4/6) mottles; several thin beds; few, continuous to discontinuous, dark yellowish brown (10YR4/6), oxide coats lining pores; plastic to firm; violently effervescent with many, very fine to fine, plastic, secondary carbonate masses; few to common, fine pores; abrupt lower boundary; till or lacustrine debris flows.
101-133 (3.3-4.4)	3Cg2	olive gray (5Y4.5/2) down to dark greenish gray (5GY4/1) heavy silt loam with few very dark greenish gray (5GY3/1) clay laminae; common, fine and medium, olive brown (2.5Y4/4) mottles; strata, weakly expressed to thin beds with few clay laminae; few, continuous to discontinuous, dark yellowish brown (10YR4/6) oxide coat lining pores in olive gray sediment and lining roots in very dark greenish gray sediment; friable; violently effervescent with few, fine, hard secondary carbonate concretions; few, large roots; few to common fine pores; abrupt lower boundary; lacustrine.
133-190 (4.4-6.2)	4Cg3	olive gray to olive (5Y4.5/2.5) loam diamicton; common, very coarse, dark greenish gray (5GY4/1) mottles with dark yellowish brown (10YR3/6,4/6) halos; very weak, medium and coarse, platy; common, discontinuous, oxide coats on platy partings; firm; violently effervescent; diffuse lower boundary; till.
190-245 (6.2-8.0)	4C1	olive brown (2.5Y4/3.5) loam diamicton; weak to moderate, medium and coarse, platy, jointed; many, discontinuous to continuous, oxide coats on platy partings and vertical joints; very firm; violently effervescent; diffuse lower boundary.
245-316 (8.0-10.4)	4C2	very dark grayish brown (2.5Y3/2) loam diamicton; very weak, medium and coarse, platy, jointed; many, discontinuous to continuous, oxide coats on vertical joints, few on partings; very firm; violently effervescent; clear lower boundary.
316-417 (10.4-13.7)	4Cg1	dark gray to olive gray (5Y4/1.5) loam diamicton; massive; very firm; violently effervescent; abrupt lower boundary.
417-446 (13.7-14.6)	5Cg2	dark gray (5Y4/1) silty clay diamicton; very weak, medium to coarse, platy; very firm; violently effervescent; abrupt lower boundary; lacustrine(?).
446-461 (14.6-15.1)	5Cg3	dark gray (5Y4/1) silty clay diamicton, and light brownish gray to grayish brown (2.5Y5.5/2) silt; strata, moderately expressed, disrupted; very firm to friable; violently effervescent; abrupt lower boundary; lacustrine(?).
461-473 (15.1-15.5)	5Cg2'	dark gray (5Y4/1) silty clay diamicton; strata, very weakly expressed; very firm; violently effervescent; abrupt lower boundary; lacustrine(?).
473-810+ (15.5-26.6+)	6Cg4	dark olive gray to very dark grayish brown (5Y-2.5Y3/2) heavy loam diamicton,with siltier beds in lower 2.5m; massive to very weak, platy in zones, last 1-15 cm is weak to moderate, medium and coarse, platy; very firm; violently effervescent.

Core/Profile: LW-16
Location: Red Lake Bog
Legal description: NW ¼ Section12 T158N R31W
County: Lake of the Woods
Parent material: Alluvium, or beach and near shore sand/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1130 feet
Topo. Map: Baudette SE
Remarks: originally Red Lake Bog core LW-6; at milepost 61.95 on T.H. 72; on west side of road

Depth cm(ft)	Horizon or Zone	Description
0-12 (0-.4)	A	black to very dark brown (10YR2/1.5) heavy sandy loam; weak, medium, breaking to fine subangular blocky; friable; noneffervescent; many very fine to medium pores; very abrupt lower boundary; alluvium, or beach and near shore sands.
12-34 (.4-1.1)	2BCg1	dark gray to olive gray (5Y4/1.5) heavy silty clay to heavy loam, with much very fine sand; many down to few, coarse to fine, dark yellowish brown (10YR4/6) and strong brown (7.5YR4/6) mottles; very weak, coarse, breaking to medium subangular blocky over strata, very weakly expressed; friable; noneffervescent; many very fine to fine pores; clear lower boundary; lacustrine; glaciolacustrine.
34-64 (1.1-2.1)	2BCg2	olive gray (5Y4/2) silty clay, with less very fine sand than above, with few fine pebbles in lower 15 cm; common, very fine, dark yellowish brown (10YR4/6) mottles; very weak subangular blocky over strata, very weakly expressed; many, discontinuous to continuous, strong brown (7.5YR4/6) oxide coats, and few, continuous, black (10YR2/1) clay and organic coats line pores; firm to friable; noneffervescent; many very fine to fine pores; very abrupt lower boundary; glaciolacustrine.
64-164 (2.1-5.4)	3C1	olive brown (2.5Y4/4±) silty clay loam diamicton and silty clay diamicton; with clasts consisting of fines, some with 2.5YR colors; many, very fine to fine grayish brown to dark grayish brown (2.5Y5/2,4/2±), and few, coarse, grayish brown to olive gray (2.5Y-5Y5/2) mottles with dark yellowish brown (10YR4/6) halos; weak to moderate, fine to medium, platy; many, continuous, moderately thick, black (10YR2/1), clay and organic coats lining pores; firm; violently effervescent, with zones with common, very fine, plastic, secondary carbonate masses, and pore linings; many very fine to fine pores; clear lower boundary, interstratified; glaciolacustrine.
164-254 (5.4-8.3)	4C2	light olive brown (2.5Y5/4) silt, with very few to few, fine pebbles and granules; many, fine, grayish brown to light brownish gray (2.5Y5.5/2) mottles, some with dark yellowish brown (10YR4/6) halos; laminae, weakly expressed, with one diamicton bed at base; friable; violently effervescent; very abrupt lower boundary; glaciolacustrine.
254->325 (8.3->10.7) probably >548	5C3	dark grayish brown to olive brown (2.5Y4/3,4/4) silt loam diamicton; moderate, fine to coarse, platy, over massive, jointed; many, nearly continuous, dark brown (7.5YR3/3), oxide coats on joint faces, few on platy surfaces; very firm; violently effervescent; till.

Core/Profile: LW-17
Location: Red Lake Bog
Legal description: NW ¼ Section 1 T158N R31W
County: Lake of the Woods
Parent material: Alluvium/till
Vegetation: Grass
Slope: <2%
Elevation: 1119 feet
Topo. Map: Baudette SE
Remarks: originally Red Lake Bog core LW-7; at milepost 62.4 on T.H. 72; on west side of road; near Rapid River

Depth cm(ft)	Horizon or Zone	Description
0-20 (0-.7)	A	black to very dark brown (10YR2/1.5) silty clay loam, with very few, fine pebbles; very weak, fine, subangular blocky; plastic; slightly effervescent; clear lower boundary, mixed; alluvium.
20-28 (.7-.9)	2BE	dark grayish brown (2.5Y4/2.5) coarse silt, with much very fine sand; many, fine, (4/3,3/2±) mottles; very weak, subangular blocky; common, thin to moderate thick, very dark grayish brown (10YR3/2), clay coats lining pores; very friable; very slightly effervescent; common, very fine and fine pores; clear lower boundary; alluvium.
28-61 (.9-2.0)	2Bhs	finely mottled dark brown to dark yellowish brown (10YR3/3,3/4), and grayish brown to dark grayish brown (2.5Y5/2,4/2) very fine sandy loam; few, medium to coarse, gray to olive gray (5Y5/1.5) mottles; very weak subangular blocky; common, thin, very dark grayish brown (10YR3/2), clay coats lining pores, some with roots in them; very friable; very slightly effervescent; common, very fine and fine pores and roots; clear to abrupt lower boundary; alluvium.
61-101 (2.0-3.3)	2C1	dark brown (10YR3/3) loamy very fine sand, with few, dark grayish brown (2.5Y4/2), silty clay loam and silt laminae; common, fine and medium, faint, dark yellowish brown (10YR3/4) mottles; strata, weakly to moderately expressed, thin beds to thick laminae; very friable, plastic; noneffervescent; abrupt lower boundary; alluvium.
101-136 (3.3-4.5)	3C2	light olive brown to grayish brown (2.5Y5/4,5/3±) loam diamicton; many, fine and medium, olive gray to grayish brown (5Y-2.5Y5/2) mottles; strata, weakly expressed; very weak, thin, dark brown (10YR3/3±), clay coats lining pores; firm, plastic; violently effervescent, with common, fine, soft secondary carbonate masses; very few, very fine and fine pores; abrupt lower boundary; alluvium.
136-159 (4.5-5.2)	4C3	grayish brown to light olive gray (2.5Y5/3±) very fine sand, well sorted, with very few, fine pebbles in lower 15 cm; strata, very weakly expressed at base; single grain; loose; violently effervescent; abrupt lower boundary; alluvium
159-261 (5.2-8.6)	4C4	olive brown to light olive brown (2.5Y4.5/3.5) very fine sand, well sorted; single grain; loose; violently effervescent; clear lower boundary, interstratified; alluvium.
261-290+ (8.6-9.5+)	5C5	dark grayish brown to olive brown (2.5Y4/3) heavy sandy loam diamicton; strata, weakly to moderately expressed, thin beds to thick laminae; very firm; violently effervescent; till.

Core/Profile: LW-18
Location: Red Lake Bog
Legal description: SW ¼ Section 19 T159N R30W
County: Lake of the Woods
Parent material: Glaciolacustrine
Vegetation: Grass
Slope: <2%
Elevation: 1139 feet
Topo. Map: Baudette SE
Remarks: originally Red Lake Bog core LW-8; at milepost 64.9 on T.H. 72; on east side of road; near junction with County Road 81

Depth cm(ft)	Horizon or Zone	Description
0-29 (0-1.0)	A	black to very dark grayish brown (2.5Y2.5/1) silty clay, with granules; moderate granular; firm to plastic; strongly to very slightly effervescent; clear lower boundary; glaciolacustrine.
29-49 (1.0-1.6)	Bg	olive gray (5Y4/2±) silty clay, with common granules, and very few, fine pebbles; few, very fine, dark yellowish brown (10YR4/6) mottles; moderate, fine, subangular blocky to blocky to granular; firm to plastic; very slightly effervescent; clear lower boundary; glaciolacustrine.
49-98 (1.6-3.2)	Cg	light olive gray to olive gray, pale olive gray to olive, light brownish gray to grayish brown (5Y-2.5Y5.5/2.5±) down to light yellowish brown to light olive brown (2.5Y5.5/3±) silty clay loam diamicton (heavy loam); common, fine to medium, light brownish gray to grayish brown (2.5Y5.5/2) mottles; very weak subangular blocky over strata, very weakly expressed to massive over strata, very weakly expressed; common, continuous, thin, dark yellowish brown (10YR3/4), oxide coats lining pores; firm; violently effervescent, with zones with common, fine, soft, and few, fine, hard secondary carbonate masses and concretions; common to few very fine pores; abrupt lower boundary; glaciolacustrine.
98-180 (3.2-5.9)	2C1	olive brown (2.5Y4/4) heavy loam diamicton; common, medium and coarse, grayish brown (2.5Y5/2) mottles; massive, with very few hints of stratification, few laminae at 137-138 cm and 141-143 cm; very firm; violently effervescent; diffuse lower boundary; till.
180-220 (5.9-7.2)	2C2	light olive brown to olive brown (2.5Y4.5/4) loam diamicton; massive; very firm; violently effervescent; gradual lower boundary; till.
220-269 (7.2-8.8)	2C3	light olive brown to olive brown (2.5Y4.5/4) loam diamicton, with a pebble up to 8 cm in diameter; moderate, medium and coarse, platy, jointed; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6), oxide coats on horizontal partings and joints; very firm; violently effervescent; clear lower boundary; till.
269-301 (8.8-9.9)	2Cg1	dark grayish brown (2.5Y4/2) loam diamicton between horizontal partings; many, coarse, light olive brown to olive brown (2.5Y4.5/4) mottles along partings; weak, coarse, platy; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6), oxide coats on horizontal partings and joints; very firm; violently effervescent; till.
301-477 (9.9-15.6)	2Cg2	dark to very dark grayish brown (2.5Y4/2) to (2.5Y3.5/2) loam diamicton, clay less than above and below; upper 25 cm with many fine and few medium olive brown (2.5Y4/4) mottles; moderate, coarse platy, horizontal, zones with very weak, fine and medium, platy, and zones of massive, few joints; few, continuous to discontinuous, thin, dark yellowish brown (10YR3/6), oxide coats on platy surfaces and very few joints; very firm; violently effervescent; gradual lower boundary; till.
477-560 (15.6-18.4)	2Cg3	dark to very dark grayish brown (2.5Y3.5/2) to (2.5Y3/2) light loam diamicton; moderate, fine and medium, platy, very weak joints; many, continuous to discontinuous, thin, dark yellowish brown (10YR3/6) and strong brown (7.5YR3/6), oxide coats on plates and joints; very firm; violently effervescent; clear lower boundary; till.
560-612 (18.4-20.1)	2Cg4	dark to very dark gray (5Y3.5/1) light loam diamicton, almost sandy loam diamicton; weak to moderate, fine to very coarse, platy; common, continuous to discontinuous, thin, dark yellowish brown (10YR3/6) and strong brown (7.5YR3/6), oxide coats on plates and joints; extremely firm; violently effervescent; till.

Core/Profile: LW-19
Location: Red Lake Bog
Legal description: SE ¼ Section 12 T159N R31W
County: Lake of the Woods
Parent material: Beach and near shore sediment
Vegetation: Grass
Slope: <2%
Elevation: 1146 feet
Topo. Map: Baudette SE
Remarks: originally Red Lake Bog core LW-9; at milepost 67.25 on T.H. 72; on west side of road

Depth cm(ft)	Horizon or Zone	Description
0-9 (0-.3)	AC	black (10YR2/1) heavy silt loam; cloddy and stratified; very firm; noneffervescent; very abrupt lower boundary; in spoil; truncated original material; beach and near shore sediment.
9-25 (.3-.8)	2C1	light olive brown (2.5Y5/4) loam diamicton and few, faint, dark yellowish brown (10YR3/4) mottles along horizontal plates; few, thin, horizontal, grayish brown (2.5Y5/2) halos around secondary carbonates; weak, fine and medium, platy; very firm; violently effervescent, with zones with common, fine, soft secondary carbonate masses - horizontal; very abrupt lower boundary; beach and near shore sediment.
25-154 (.8-5.1)	3C2	pale olive to olive (5Y5.5/3) to (5Y5/3) silt and silt loam, with zones with common fine pebbles and granules, dropstones up to 5.5 cm long; many fine, dark yellowish brown (10YR3/4) mottles in upper 50 cm; moderate, fine, wavy, platy; common, continuous to discontinuous, thin, dark yellowish brown (10YR3/6,4/6) oxide coats on horizontal partings and vertical fractures; firm to friable; violently effervescent; gradual lower boundary; beach and near shore sediment.
154-179 (5.1-5.9)	3C3	olive gray to olive (5Y4.5/2.5) fine silt; strata, very weakly expressed, thin to thick laminae; firm; violently effervescent; clear lower boundary, interstratified; beach and near shore sediment.
179-197 (5.9-6.5)	4C4	light olive brown (2.5Y5/6,5/7) very fine sand with uppermost stratum yellowish brown (10YR5/8±), and light olive brown to olive (2.5Y5/4 to 5Y4/3) very fine sand and very fine sandy loam; cross-laminated, possibly ripple drift, single grain; loose to very friable; moderately to strongly effervescent; very abrupt lower boundary, wavy; beach and near shore sediment.
197-217 (6.5-7.1)	5C5	olive (5Y4.5/3) very fine sandy loam, and light olive brown (2.5Y5/6) very fine sand; thin beds, weakly to moderately expressed; sand is single grain; friable to loose; violently effervescent; clear lower boundary, interstratified; beach and near shore sediment.
217-260 (7.1-8.5)	6C6	light olive brown to olive brown (2.5Y4.5/6) very fine sand, little silt, few zones with medium and coarse sand grains; strata, weakly expressed; single grain; loose; violently effervescent; very abrupt lower boundary; beach and near shore sediment.
260-321 (8.5-10.5)	7C7	dark olive (5Y5/3) and gray to dark gray to olive gray (5Y4.5/1.5) interstratified silt with very few, fine pebbles, very fine sandy loam, and loamy very fine sand, and olive (5Y5/6,5/4) very fine sand and medium sand; thin beds, strongly expressed; fines have weak, internal stratification, sand is single grain; loose, friable to firm; violently effervescent; very abrupt lower boundary; beach and near shore sediment.
321-325+ (10.5-10.7+)	8Cg	dark to very dark gray (5Y3.5/1) silt, with very few granules; strata, weakly expressed; very firm; violently effervescent; beach and near shore sediment.

Core/Profile: LW-20
Location: Red Lake Bog
Legal description: SW NW SW 31 T160N R30W
County: Lake of the Woods
Parent material: Beach and near shore sand/bog/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1116 feet
Topo. Map: Baudette
Remarks: originally Red Lake Bog core LW-10

Depth cm(ft)	Horizon or Zone	Description
0->35 (0->1.1)	C	olive brown (2.5Y4/4) granular sand and loamy sand; single grain; loose; violently effervescent; indeterminate lower boundary; beach and near shore sand.
35-275 (1.1-9.0)		no recovery, but boring record indicates organics, interpreted as peat.
<275-429 (<9.0-14.1)	2C1	grayish brown to dark grayish brown (10YR4.5/2) loam diamicton to heavy silt loam diamicton, most clasts consist of fines, including abundant pinkish gray to light brown (7.5YR6/3±) clasts, with clasts of what looks like 5Cg below increasing with depth, down to dark grayish brown to olive brown (2.5Y4/3) loam diamicton, all with very dark gray (5Y3/1) thick clay laminae; common, coarse, dark gray to dark greenish gray (5Y-5GY4.5/1) mottles, some around large roots; massive diamicton beds, interstratified with thick clay laminae; very firm; violently effervescent; very abrupt lower boundary; glaciolacustrine with subaqueous debris flows.
429-441 (14.1-14.5)	3C2	very dark gray (5Y3/1) clay down to light brownish gray (2.5Y6/2) fine silt; at least 8 rhythmites; firm; violently effervescent; very fine root swarms; very abrupt lower boundary; glaciolacustrine.
441-474 (14.5-15.6)	4C3	light brownish gray to light yellowish brown (2.5Y6/3) silt diamicton and grayish brown to light olive brown (2.5Y5/3) silty clay loam diamicton, with nearly all clasts consisting of fines; laminae, some wavy, some ripples near top moderately expressed; firm to friable; violently effervescent; very abrupt lower boundary; glaciolacustrine.
474-740+ (15.6-24.3+)	5Cg	dark grayish brown to olive brown (2.5Y4/3) down to very dark grayish brown (2.5Y3/2) down to very dark gray to dark olive gray (5Y3/1.5) heavy loam diamicton, with many pebbles, some large; mostly massive, some very weak, coarse, platy; extremely firm; violently effervescent; till.

Core/Profile: LW-21
Location: Red Lake Bog
Legal description: SW SW SW T160N R30W
County: Lake of the Woods
Parent material: Beach and near shore sand/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1104 feet
Topo. Map: Baudette
Remarks: originally Red Lake Bog core LW-11; at junction of County Road 19 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-30 (0-1.0)	A	black (10YR2/1) organic very fine sandy loam with few fine pebbles; weak to moderate, medium, breaking to fine subangular blocky; friable; strongly effervescent; many very fine roots; abrupt lower boundary; beach and near shore sand.
30-57 (1.0-1.9)	C	dark grayish brown to olive brown (2.5Y4/2,4/3,4/6) very fine sand, well sorted, with very few granules; strata, very weakly to weakly expressed; friable to very friable; violently effervescent; very abrupt lower boundary, slightly mixed; slightly bioturbated; beach and near shore sand.
57-68 (1.9-2.2)	2OAb	black to very dark grayish brown (2.5Y2.5/1) peaty silt; weak, fine, subangular blocky; friable; violently effervescent; with root or wood fragments; clear lower boundary; glaciolacustrine.
68-80 (2.2-2.6)	3BCgb	very dark grayish brown to olive gray (2.5Y3/2) down to (5Y4/2) heavy loam diamicton; few, fine, dark yellowish brown (10YR4/6), oxide mottles along very fine pores; very weak subangular blocky; firm; slightly effervescent; common, very fine pores; clear lower boundary; glaciolacustrine.
80-159 (2.6-5.2)	3C1	grayish brown to light olive brown to dark grayish brown (2.5Y5/3,4/2) heavy loam diamicton with very thin, dark olive gray (5Y3/2), clay laminae; many, fine to medium, light olive brown (2.5Y5/4) and common, fine to medium, olive gray (5Y5/2) mottles, some horizontal and along pores, 50% mottled; strata, moderately expressed, thin to thick laminae; very firm; violently effervescent; common very fine pores; gradual to clear lower boundary; glaciolacustrine.
159-327 (5.2-10.7)	3C2	olive brown (2.5Y4/4) loam diamicton with few, thin, dark olive gray to olive gray (5Y3/2,4/2) clay laminae down to olive brown (2.5Y4/4) loam diamicton; many, fine and medium, olive brown (2.5Y4/6),grayish brown (2.5Y5/2), and common, fine and medium, olive gray (5Y5/2) mottles, mostly along very fine pores (50%) down to common, fine and medium, olive brown (2.5Y4/6) mottles (10%); strata, very weakly expressed down to massive down to very weak, medium to thick, platy; very firm; violently effervescent; few very fine pores; abrupt lower boundary; glaciolacustrine.
327-367 (10.7-12.0)	4C3	dark to very dark grayish brown (2.5Y3.5/2) heavy loam diamicton; moderate, fine and medium, wavy platy to very weak, medium and coarse, platy; extremly firm; violently effervescent; diffuse lower boundary; till.
367-453+ (12.0-14.9+)	4Cg	very dark grayish brown (2.5Y3/1.5) heavy loam diamicton; massive; exremely firm; violently effervescent; till.

Core/Profile: LW-22
Location: Red Lake Bog
Legal description: SW SW SW 6 T160N R30W
County: Lake of the Woods
Parent material: Lacustrine/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1094 feet
Topo. Map: Baudette
Remarks: originally Red Lake Bog core LW-12; at junction of County Road 35 and T.H. 72; on east side of T.H. 72

Depth cm(ft)	Horizon or Zone	Description
0-81 (0-2.7)	Cg1	very dark gray (2.5Y3/1) and (5Y3/1) clay and dark grayish brown (2.5Y4/2) clay; rhythmites, 3 mm ± thick; violently to moderately effervescent, variable; clear lower boundary; lacustrine.
81-257 (2.7-8.4)	Cg2	dark grayish brown to very dark grayish brown (2.5Y3.5/2±) silty clay loam diamicton to loam diamicton with most clasts consisting of fines, including few with 7.5YR colors, and very dark grayish brown to very dark gray (2.5Y3/1.5±) clay; rhythmically bedded; violently effervescent; very abrupt lower boundary; glaciolacustrine
257-279 (8.4-9.2)	Cg3	dark gray to dark grayish brown (2.5Y4/1.5) silty clay loam with very few granules, and very dark grayish brown (2.5Y3/1.5) clay; rhythmites with grading, thinning upward, clay laminae 5mm down to 1-2 mm, silty clay loam laminae 2mm-13mm; plastic; violently effervescent; very abrupt lower boundary; glaciolacustrine.
279-284 (9.2-9.3)	2C1	light olive brown (2.5Y5/4) medium and coarse sand; single grain; loose; violently effervescent; abrupt lower boundary; glaciolacustrine.
284-293 (9.3-9.6)	3C2	grayish brown (2.5Y5/2) gravely fine sand down to gravel with fine sand, with many pebble clasts consisting of fines; single grain; loose; violently effervescent; abrupt lower boundary; glaciolacustrine.
293-303 (9.6-9.9)	4Cg1	dark to very dark grayish brown (2.5Y3.5/2) gravely very fine sandy loam and gravely silt loam; strata, weakly expressed, thin beds (several beds); friable; violently effervescent; abrupt lower boundary; glaciolacustrine.
303-333 (9.9-10.9)	5Cg2	very dark grayish brown (2.5Y3/2,3/1.5) very fine sandy loam diamicton and very fine sandy loam interstratified with grayish brown to dark grayish brown (2.5Y4.5/2) very fine sand and loamy very fine sand; strata, moderately expressed; friable to firm; violently effervescent; very abrupt lower boundary, interstratified; glaciolacustrine
333-441 (10.9-14.5)	6Cg3	dark gray to dark grayish brown (2.5Y4/1.5) light loam diamicton with lighter silt swirls locally; strata, very weakly expressed; very firm; violently effervescent; till.

Core/Profile: LW-23
Location: Red Lake Bog
Legal description: NW NW 6 T160N R30W
County: Lake of the Woods
Parent material: Lacustrine/glaciolacustrine/till
Vegetation: Grass
Slope: <2%
Elevation: 1089 feet
Topo. Map: Baudette
Remarks: originally Red Lake Bog core LW-13; 0.9 miles east of junction of T.H. 72 and T.H. 11; on north side of T.H. 11; near Rainy River

Depth cm(ft)	Horizon or Zone	Description
0-15 (0-.5)	A	black to very dark grayish brown (2.5Y2.5/1) down to very dark grayish brown (2.5Y3/2) clay, with very few fine pebbles; weak, fine, subangular blocky over strata, very weakly expressed; plastic; slightly to violently effervescent; many very fine to fine roots clear lower boundary; lacustrine.
15-31 (.5-1.0)	BCg	olive gray (5Y4.5/2±) clay; very weak, medium and coarse, subangular blocky over laminae, weakly expressed; plastic; violently effervescent; abrupt lower boundary; lacustrine.
31-108 (1.0-3.5)	Cg	very dark grayish brown (2.5Y3/1.5) clay, with yellowish brown (10YR5/4) inclusions or mottles, and brown to yellowish brown (10YR5/3,5/4) clay and silty clay loam; fine and medium, moderate down to strongly expressed rhythmically laminated; firm, plastic; violently effervescent with common, fine, secondary carbonate masses in upper 30 cm; abrupt lower boundary, marked by first diamicton; lacustrine.
108-233 (3.5-7.6)	C1	grayish brown (2.5Y5/3±) down to light olive brown to olive brown to (2.5Y4.5/4) loam diamicton with most clasts consisting of fines, with 7.5YR colors, and very dark grayish brown (2.5Y3/2) and olive gray (5Y5/2) clay; many, fine to medium, light olive brown (2.5Y5/4) mottles; rhythmically bedded and laminated; firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
233-260 (7.6-8.5)	C2	light olive brown to olive brown (2.5Y4.5/4,5/4) silty clay loam, with very fine pebbles, silt loam, and loam; thin to medium laminae, moderately to strongly expressed; firm; violently effervescent; very abrupt lower boundary; glaciolacustrine.
260-420+ (8.5-13.8+)	2C3	light olive brown to olive brown (2.5Y4.5/4) light loam diamicton; few, fine to coarse, horizontal, dark yellowish brown (10YR4/6) and light olive brown (2.5Y5/6) mottles; strata, thin beds, very weakly to moderately expressed; with few very weak, wavy, platy zones; very firm; violently effervescent; till.