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| Supplementary MaterialTable 1: Geographical coordinates, topographical and limnological properties, water temperature, pH, conductivity and water chemistry for Swamp Lake and Moss Lake. Water chemistry includes the concentrations of: Total Organic Carbon (TOC), Total Carbon (TC), Inorganic Carbon (IC), Total Nitrates (TN), Chlorides, Nitrites, Nitrates, phosphates, Sulphates, Aluminium (Al), Calcium (Ca), Copper (Cu), Iron (Fe), Potassium (K), Lithium (Li), Magnesium (Mg), Manganese (Mn), Sodium (Na), Nickel (Ni), Lead (Pb) and Zinc (Zn).

|  |  |  |
| --- | --- | --- |
| **Variable** | **Units** | **Moss Lake**  |
| Latitude | (N) | 47o 41’ 35.7”  |
| Longitude | (w) | 121o 50’ 48.6” |
| Distance from Mazama | (km) | 530 |
| Altitude | (m asl) | 158 |
| Max depth | (m) | 4.5 |
| Area (approx.) | (m2) | 13,275 |
|  | **July 2013** | **May 2014** |
| pH |  | 6.15 | 6.3 |
| Conductivity | (µS cm-1) | 14 | 22 |
| Water temp | (oC) | - | 18.3 |
| TOC | (ppm) | 15.07 | - |
| TC | (ppm) | 17.12 | - |
| IC | (ppm) | 2.049 | - |
| TN | (ppm) | 0.4697 | - |
| Chloride | (ppm) | 2.284 | 3.834 |
| Nitrite | (ppm) | - | 0.029 |
| Nitrate | (ppm) | - | 0.353 |
| Phosphate | (ppm) | 0.849 | - |
| Sulphate | (ppm) | 0.146 | 0.458 |
| Al | (ppm) | 0.28 | 0.163 |
| Ca | (ppm) | 4.035 | 2.741 |
| Cu | (ppm) | 0.011 | 0.012 |
| Fe | (ppm) | 0.281 | 0.061 |
| K | (ppm) | 1.692 | 0.046 |
| Li | (ppm) | 0.041 | 0.023 |
| Mg | (ppm) | 0.969 | 0.694 |
| Mn | (ppm) | 0.002 | 0.003 |
| Na | (ppm) | 2.254 | 1.412 |
| Ni | (ppm) | 0.002 | 0.005 |
| Pb | (ppm) | 0.011 | 0.01 |
| Zn | (ppm) | 0.253 | 0.02 |

 |
| Table 2. Locations and references of point provided in Figure 1 of the main document. |
| **Point** | **Site name** | **Reference** |
| 1 | Swamp Lake | (Street et al., 2012) |
| 2 | Osgood Swamp | (Adam, 1967) |
| 3 | Virgin Creek | (Davis, 1978) |
| 4 | Wildhorse Lake | (Blinman et al., 1979) |
| 5 | Wildcat Canyon | (Randle et al., 1971) |
| 6 | Upper Klamath Lake | (Bradbury et al., 2004) |
| 7 | Paisley Cave | (Preston et al., 1955) |
| 8 | Crater Lake Vicinity | (Bacon, 1983) |
| 9 | Sparks Lake | (Kittleman, 1973) |
| 10 | Diamond Lake | (Kittleman, 1973) |
| 11 | Toketee Falls | (Rubin & Alexander, 1960) |
| 12 | Fort Rock Cave | (Randle et al., 1971) |
| 13 | North Umpqua River Valley | (Bacon, 1983) |
| 14 | Paulina Lake | (Kittleman, 1973) |
| 15 | East Lake | (Kittleman, 1973) |
| 16 | Hobo Cave | (Randle et al., 1971) |
| 17 | Tumalo Lake | (Long et al., 2014) |
| 18 | Three Creek | (Long et al., 2014) |
| 19 | Round Lake | (Long et al., 2014) |
| 20 | Breitenbush Lake | (Long et al., 2014) |
| 21 | Lower Decker Lake | (Whitlock et al., 2011) |
| 22 | McCall Fen | (Doerner & Carrara , 2001) |
| 23 | Muir Creek  | (Arnold and Libby, 1951; Crane, 1956; Kittleman, 1973; Valastro et al., 1968) |
| 24 | Lost Trail Pass Bog | (Blinman et al., 1979; Mehringer et al., 1977a) |
| 25 | Mount Rainer National Park | (Mullineaux, 1974) |
| 26 | Bear Swamp | (Blackford, Pers. Comm)  |
| 27 | Davis Lake | (Barnosky, 1981) |
| 28 | Swamp Lake | (Blackford pers comm; Egan, Unpublished) |
| 29 | Covington | (Broecker et al., 1956) |
| 30 | Moss Lake | This paper |
| 31 | Bow Lake  | (Rubin & Alexander, 1960) |
| 32 | Arrow Lake  | (Rubin & Alexander, 1960) |
| 33 | Lake Washington  | (Abella, 1988; Leopold et al., 1982) |
| 34 | Skykomish River  | (Tabor et al., 1963) |
| 35 | Wildcat Lake  | (Blinman et al., 1979) |
| 36 | Bogachiel River | (Heusser, 1983) |
| 37 | Rithets Bog | (Lowdon & Blake, 1970) |
| 38 | Pike Lake  | (James et al., 2009) |
| 39 | Maltby Lake  | (James et al., 2009) |
| 40 | Portage Inlet  | (Buckley & Willis, 1970) |
| 41 | Bonaparte Meadows  | (Mack et al., 1979) |
| 42 | Big Meadow Lake  | (Powers & Wilcox, 1964) |
| 43 | Huff Lake  | (Moseley et al., 1992) |
| 44 | Hager Lake  | (Moseley et al., 1992) |
| 45 | Tepee Lake | (Mack et al., 1983) |
| 46 | Foy Lake | (Power et al., 2011) |
| 47 | Swiftcurrent Lake | (MacGregor et al., 2011) |
| 48 | Burnaby Lake  | (Dyck et al., 1966) |
| 49 | Lake Mike  | (Brown et al., 1989) |
| 50 | Marion Lake | (Mathewes, 1973) |
| 51 | Surprise Lake  | (Mathewes, 1973) |
| 52 | Fraser Canyon  | (Lowdon et al., 1969) |
| 53 | Squeah Lake  | (Mathewes et al., 1972) |
| 54 | Lower Jaffre Lake  | (Filippelli et al., 2006) |
| 55 | Drynoch Slide  | (Sanger, 1967) |
| 56 | Drynoch Slide  | (Lowdon et al., 1969) |
| 57 | Kilpoola Lake | (Heinrichs et al., 1999) |
| 58 | Green Lake  | (Filippelli et al., 2006) |
| 59 | Dunn Peak  | (Duford & Osborn, 1978) |
| 60 | Chase  | (Lowdon & Blake, 1973) |
| 61 | Lavington  | (Lowdon & Blake, 1970) |
| 62 | Deep Creek  | (Dyck et al., 1965) |
| 63 | Lower Arrow Lake  | (Dyck et al., 1965) |
| 64 | Mount Revelstoke  | (Lowdon et al., 1971) |
| 65 | Cartwright Lake  | (Beierle & Smith, 1998) |
| 66 | Copper Lake  | (Beierle & Smith, 1998) |
| 67 | Johnson Lake  | (Beierle & Smith, 1998) |
| 68 | Crowsnest Pass  | (Driver, 1982) |
| 69 | Dog Lake  | (Hallett et al., 1997) |
| 70 | Cobb Lake  | (Hallett et al., 1997) |
| 71 | Upper Kananaskis Lake  | (Beierle & Smith, 1998) |
| 72 | Frederick Lake  | (Beierle & Smith, 1998) |
| 73 | Mary lake  | (Hickman & Reasoner, 1994) |
| 74 | Opabin Lake  | (Hickman & Reasoner, 1994) |
| 75 | Copper Lake  | (White & Osborn, 1992) |
| 76 | Lake O’Hara | (Hickman & Reasoner, 1994) |
| 77 | Columbia River Valley  | (Fulton, 1971) |
| 78 | Columbia River  | (Buckley & Willis, 1969) |
| 79 | Tonquinn Pass  | (Luckman et al., 1986) |
| 80 | Upper Pinto Fen  | (Yu, 2007) |
| 81 | Goldeneye Lake Fen  | (Yu, 2007) |
| 82 | Keephills Fen  | (Chagué-Goff et al., 1996) |
| 83 | Quesnel Lake  | (Gilbert & Desloges, 2012) |
| 84 | Nordans Pond Bog  | (Pyne-O’Donnell et al., 2012) |
| 85 | Camp Century | (Hammer et al., 1980) |
| 86 | GISP 2  | (Zdanowicz et al., 1999) |

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Table 3: Conventional (14­C years BP) and calibrated (cal. years BP) radiocarbon ages for MLF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab no.  | Depth (cm) | Material | Age (14C years BP ± 1 SD | Age range (cal. years BP 2 SD) |
| SUERC-52705 | 147 | Organic sediment | 5645 ± 36 | 6496-6319 |
| SUERC- 55693 | 147 (re-submission) | Organic sediment | 5796 ± 38 | 6713-6491 |
| SUERC-52704 | 151 | Organic sediment directly above MLF-T158 | 4948 ± 37 | 5745-5599 |
| SUERC-55690 | 151 (re-submission) | Organic sediment directly above MLF-T158 | 5705 ± 35 | 6626-6407 |
| SUERC-52703 | 161 | Organic sediment below MLF-T158 | 7049 ± 41 | 7958-7795 |