Paleohydrology of the Wabasca River and relations with past flood regimes at the downstream Peace-Athabasca Delta

by

Caleb Lloyd Girard

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis,

including any required final revisions, as accepted by my examiners.

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Abstract

The Peace-Athabasca Delta (PAD; northern Alberta) is internationally recognized for its ecological, historical, and cultural significance, yet controversy persists over the roles of hydroelectric regulation of Peace River flow versus climate on reduced ice-jam flood influence and drawdown of water levels in the delta's abundant perched lakes. The unregulated Wabasca River, located ~350 river-km upstream, is a key 'trigger tributary' for generation of ice-jams on the Peace River that flood the PAD, yet its long-term influence remains poorly understood due to a paucity of hydrometric data. Here, past variation in Wabasca River flood influence is reconstructed using paleolimnological analyses on sediment cores from two oxbow lakes (WAB 1, WAB 2) adjacent to the Wabasca River that flood likely when spring discharge is high and ice-jams form. Results are compared to paleohydrological records from two oxbow lakes near the Peace River at the PAD to infer the extent to which variation in regional hydroclimatic conditions influence shifts in flood regimes at the PAD. Stratigraphic analyses at oxbow lake WAB 1 revealed the lake is too flood-prone to detect marked temporal variation in flood influence. Stratigraphic profiles of mineral matter content from loss-on-ignition analysis, trace element concentration from X-ray fluorescence analysis, and grain size distribution at WAB 2, however, reveal four zones of marked variation in flood influence during the past ~250 years. Sediment deposited during Zone 1 (~1765-1825) and Zone 3 (~1880-1930) possesses relatively high mineral matter content and high concentrations of elements indicative of detrital input and is interpreted to record intervals of relatively strong flood influence associated with high spring discharge on the Wabasca River. In contrast, sediment deposited during Zone 2 (~1825-1880) and Zone 4 (~1930-2019) consists of lower mineral matter content and lower

concentrations of elements indicative of detrital input and is interpreted to reflect intervals of weaker flood influence and lower spring discharge. Correspondence of the zone boundaries identified at WAB 2 with changes in stratigraphic variation in magnetic susceptibility of sediment at the two oxbow lakes in the PAD identifies that variation in hydroclimate has been an influential driver of flood regimes at both the Lower Wabasca River and the Lower Peace River at the PAD for at least the past ~250 years. Sediment records from all three oxbow lakes reveal that flood influence began to decline since at least ~1930, several decades before regulation of Peace River flow by the W.A.C. Bennett Dam. Furthermore, the 20-year interval (~1975-1995) without major ice-jam floods at the PAD since regulation of the Peace River by the W.A.C. Bennett Dam coincides with a shift to consistently low maximum single-day spring discharge on the Wabasca River, a decrease in snowpack depth within much of the Wabasca and Peace river basins, an interval of consistently low mineral matter content and low concentrations of detrital elements in the sediment core from WAB 2, and an interval of low C/N ratios in sediment cores from the two oxbow lakes in the PAD. This provides further evidence of the strong role of climatic conditions on the hydrological regimes of both rivers during spring of the W.A.C. Bennett Dam era. This information can enable environmental stewardship by focusing mitigative and adaptive decisions towards anticipated effects of future climatic conditions.

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Lastly, thank you to all the organizations that have financially supported me and made my research possible: BC Hydro, Natural Sciences and Engineering Research Council of Canada, Polar Knowledge Canada's Northern Scientific Training Program, University of Waterloo, and Wilfrid Laurier University.

Dedication

This thesis is dedicated to my grandpa, Mort Duesling, who's beaming smile, kind words, and warm chuckles never failed to show me how 'super' proud he always was of me and my endeavors.

Table of Contents

List of Figures

List of Tables

Chapter 1: Introduction

1.1 Hydrologic stressors in western Canada

Mounting effects of climate change and human activities are raising concerns worldwide over the security of water resources, which are essential to biodiversity, landscapes, economies, and cultures (Dudgeon et al., 2006; Wheater, 2015; Anis et al., 2021). Security of freshwater supply is particularly threatened in mid- and high-latitude river basins because these regions have experienced some of the most rapid warming on Earth (Woodward et al., 2010; Bonsal et al., 2020). Warming has led to decreases in snowpack depth and glacier volume, shorter duration of seasonal snow and ice cover, and shifts in the proportion of precipitation falling as snow (Schindler and Smol, 2006; Bawden et al., 2015; Mudryk et al., 2018). In western Canada, regulation of river flow for hydroelectric production, and agricultural and consumptive water uses also add to concerns of security of freshwater supply in the face of shifting climatic conditions (Dudgeon et al., 2006; Wheater, 2015; Baird et al., 2021). The cumulative effects of human activities and climate-mediated hydrological changes pose threats to downstream landscapes dependent on meltwater discharge and river flooding, and to societies that have long utilized their ecosystem services (Rood et al., 2005; Schindler and Donahue, 2006; Wolfe et al., 2008b; Marshall et al., 2011; IEC, 2018; Newton et al., 2019; Bonsal et al., 2020; Chernos et al., 2020). Shallow lakes and wetlands located within downstream floodplains are particularly threatened by declining river flows and can exhibit direct effects such as water-level drawdown, wildlife habitat deterioration, and impairment of navigation routes utilized by Indigenous communities (Prowse et al., 2006; Schindler and Donahue, 2006; Wolfe et al., 2008b; IEC, 2018; Newton et al., 2019; Bonsal et al., 2020; Chernos et al., 2020).

1.2 Peace-Athabasca Delta

The Peace-Athabasca Delta (PAD, Alberta; Figure 1-1) is a Ramsar Wetland of International Importance in northwestern Canada facing concerns of increasing water scarcity. These concerns were highlighted in a petition to designate Wood Buffalo National Park (WBNP), which contains 80% of the PAD, as Canada's first UNESCO World Heritage Site 'in Danger' (MCFN, 2014). The PAD is a ~6000 km^2 hydrologically complex landscape where the Peace and Athabasca rivers create a vast floodplain. The hundreds of shallow and productive lakes and other wetland habitat contained within the PAD support an abundance of fish and wildlife (e.g., Wood Bison, Western Moose, beaver, muskrat, and waterfowl), and sustain harvesting activities by local Indigenous communities (Mikisew Cree First Nation, Athabasca Chipewyan First Nation, Métis Nation of Alberta; Timoney, 2013; MCFN, 2014).

Drawdown of water levels in the abundant shallow lakes of the PAD is a particular concern. Most of these lakes are perched, closed-drainage basins and are highly sensitive to hydrological changes of the Peace and Athabasca rivers since their water balance is strongly influenced by inundation during episodic ice-jam flood events that offset evaporative water losses (Prowse and Lalonde, 1996; Prowse and Conly, 1998; Wolfe et al., 2020). Drawdown of PAD perched basin water levels has been observed in recent decades and is widely to a reduction in frequency and magnitude of spring ice-jam flooding on the Peace River (MCFN, 2014; IEC, 2018; Beltaos and Peters, 2020). It is widely considered that regulation of the Peace River by the W.A.C. Bennett Dam is the primary cause of this decline in ice-jam flood influence and that the decline began coincident with operation of the dam beginning in 1968 (e.g.,

Prowse and Conly, 1998, 2002; Peters and Prowse, 2001; Beltaos, 2012, 2018a; MCFN, 2014; Beltaos and Peters, 2020). Previous studies that have relied on hydrometric data from gauging stations along the Peace River have provided support for this causal mechanism (Prowse and Conly, 1998, 2002; Peters and Prowse, 2001; Beltaos and Carter, 2009; Beltaos and Peters, 2020). However, other studies have contended that available hydrometric records, which extend only 8 years before construction of the dam at a gauging station located 85 km upstream of the PAD, are too short and sparse to adequately characterize natural variability in ice-jam flood regimes at the PAD (Prowse and Conly, 1998; Timoney, 2002; Wolfe et al., 2006, 2012, 2020; Hall et al., 2019). Information spanning broader temporal and spatial scales is needed to improve understanding of the extent to which ice-jam flood influence has been altered by the W.A.C. Bennett Dam and to determine the role of variation in climatic conditions on ice-jam flood regimes and episodes of perched lake drying at the PAD.

Multiple sources of longer temporal data provided from natural archives (e.g., lake sediments, riverbank exposures), meteorological records, and written observations and oral histories regarding hydrological changes have identified climate variation as a primary factor causing changes in ice-jam flood frequency and perched basin drying at the PAD (e.g., Timoney, 2002, 2009, 2022; Wolfe et al., 2005, 2011, 2012, 2020; Hugenholtz et al., 2009). For example, paleohydrological reconstructions using lake sediment cores at multiple basins within the PAD reveal that trends towards drying of perched basins and declining flood influence began decades before the installation of the W.A.C. Bennett Dam (Wolfe et al., 2005, 2006, 2012, 2020; Sinnatamby et al., 2010). However, uncertainty about the relative roles of river regulation

and climatic variations among scientists and stakeholders persists (MCFN, 2014; Beltaos, 2018a; Hall et al., 2019; WBNP, 2019; Wolfe et al., 2020). Development of effective water resource management strategies, however, requires a firm understanding of the causes of decline in freshwater availability (WHC/IUCN, 2017; WBNP, 2019).

1.3 Ice-jam flooding in the Peace-Athabasca Delta

Ice-jam floods on the Peace River at the PAD have been recognized as the primary mechanism that can raise water levels sufficiently to inundate the numerous perched basins and wetlands of the delta (Prowse and Lalonde, 1996; Prowse and Conly, 1998, 2000; Peters et al., 2006). Ice-jam floods typically occur at the PAD during a 3-week window spanning the last week of April through the first two weeks of May (Beltaos and Peters, 2020). Several factors must align in the weeks to months prior to this critical 3-week period to generate sufficient river discharge and trigger mechanical break-up of the river ice cover at the PAD. Recent research has identified that the strongest predictive factors for the occurrence of a large ice-jam flood capable of inundating the perched basins of the PAD are sustained low winter temperatures and high winter precipitation in tributary watersheds of the Peace River located downstream of the W.A.C. Bennett Dam (Lamontagne et al., 2021). Key Peace River tributaries include the unregulated Smoky and Wabasca rivers (Figure 1-1). These rivers capture almost 40% of the Peace River's catchment area between the W.A.C. Bennett Dam and Peace Point (Figure 1-1) and have long been recognized as 'trigger tributaries' because they contribute substantial and rising spring flow to the Peace River at the time of ice-jam flood occurrences at the PAD (Prowse and Lalonde, 1996; Prowse and Conly, 1998). In these regions, thick snowpack

can accumulate under low winter temperatures which, when combined with rapid melt during spring, can lead to a sudden and substantial rise in river level and discharge (hereafter referred to as the "freshet"). Meltwater flow during the freshet in the Peace River tributaries can then dislodge the still intact ice cover on the Peace River and push the breakup downriver (Prowse and Lalonde, 1996; Prowse and Conly, 1998; de Rham et al., 2020; Lamontagne et al., 2021). Once the cascading breakup of river ice reaches the PAD, and if sustained low winter temperatures have allowed for high ice resistance in this section of the Peace River, a large ice-jam may form and generate substantial flooding of the PAD (Prowse and Conly, 1998; Peters et al., 2006; Lamontagne et al., 2021).

1.4 The Wabasca River

The unregulated Wabasca River is one of the largest tributaries of the Peace River and contributes spring discharge critical for ice-jam flood formation on the Peace River (Prowse and Conly, 1998). Figure 1-1 depicts the importance of Wabasca River flow to spring discharge on the Peace River at Peace Point during the 3-week interval of ice-jam floods at the PAD for the recorded past half century. Maximum single-day discharge, measured at various hydrometric stations within the Peace River watershed between the W.A.C. Bennett Dam and the PAD during the 3-week period from April 24 to May 14 (Figure 1-1 A-B), when ice-jam floods can occur at the PAD, can be used as an indicator of the maximum energy generated by the freshet surge that is available to trigger ice break-up, which can lead to ice-jams (Beltaos et al., 2006; Beltaos and Peters, 2020). Peaks in Wabasca River maximum single-day discharge align with maximum single-day discharge peaks downstream on the Peace River at Peace Point as well as with reconstructed flood events at PAD 15, a river-proximal oxbow lake in the northern Peace

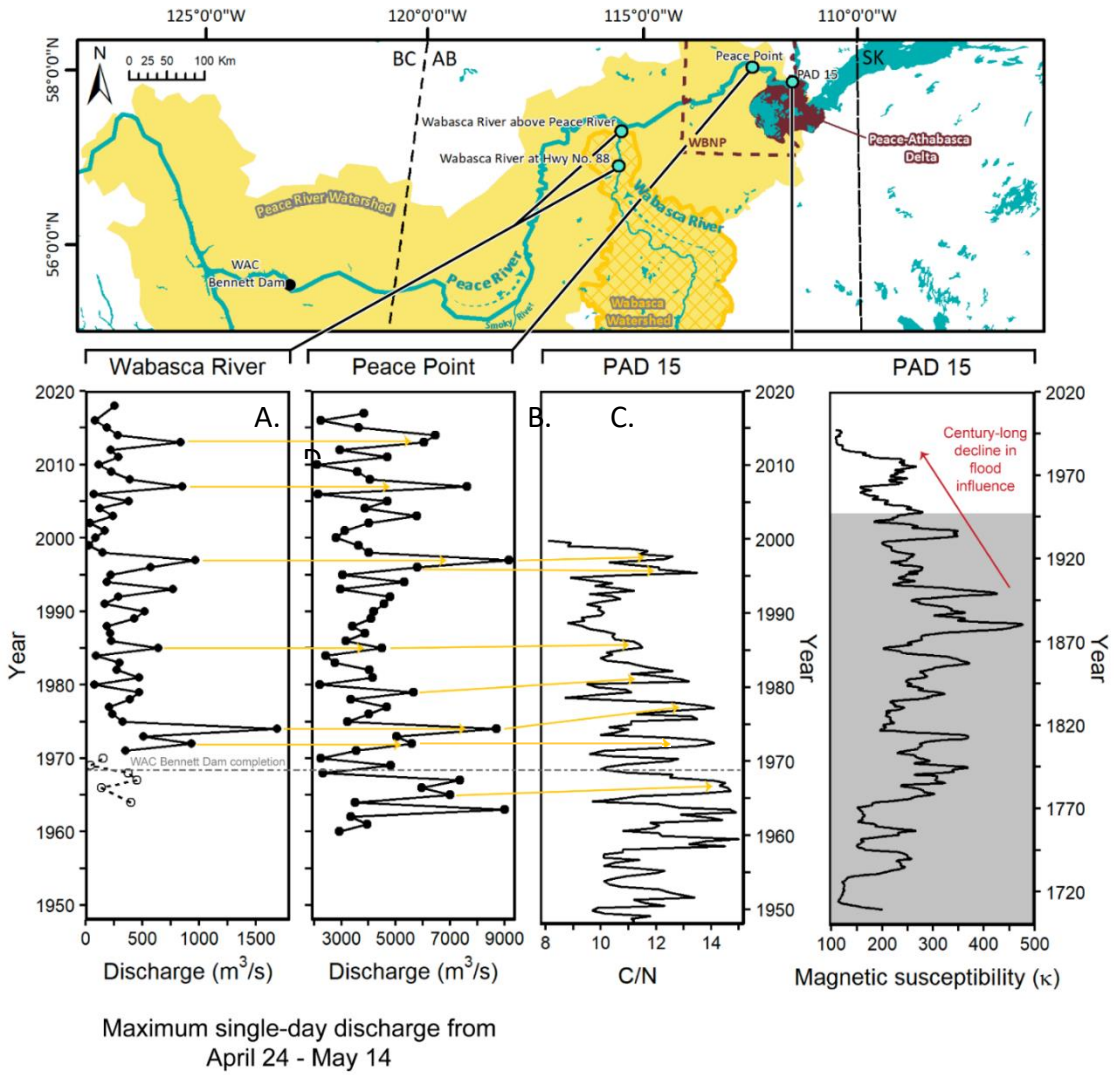

Figure 1-1. Location map and a series of graphs showing temporal variation in river discharge (A-B) and inferred floods (C-D) from sites along the Wabasca and Peace rivers, and a map showing locations of interest (top). Graphs A-B show maximum single-day discharge (m^3/s) from April 24 – May 14. Graph A shows the record at the 'Wabasca River at Highway No. 88' (filled circles, solid line) and 'Wabasca River above Peace River' hydrometric stations (open circles, dashed line). Graph B shows the record at the Peace Point hydrometric station on the Peace River. Stratigraphic profiles C-D show a C/N record (C) and magnetic susceptibility (five-year running average) record (D) from a sediment core obtained at PAD 15, an oxbow lake located in the PAD near the Peace River (as reported in Wolfe et al., 2006). The unshaded interval in graph (D) corresponds to the temporal extent captured by the hydrometric data and upper strata (A-C; i.e., post-1950) and the grey shaded interval represents stratigraphic data from before ~1950. Horizontal arrows between graphs A-B highlight a selection of discharge peaks in the Wabasca River that correspond with peaks downstream at Peace Point. Arrows between graphs B-C then correlate these peaks to corresponding peaks in the C/N record at PAD 15 (C), acknowledging minor dating uncertainties.

sector of the PAD that has been used to reconstruct temporal variation in ice-jam flood frequency at the Peace sector of the PAD (Wolfe et al., 2006). At PAD 15, flood events are inferred from higher C/N ratios and magnetic susceptibility measurements (Wolfe et al., 2006; Figure 1-1 C-D). These proxies are representative of flood conditions because high C/N ratios are associated with input of terrestrial organic matter and high magnetic susceptibility values are associated with input of terrigenous detrital material (Wolfe et al., 2006). Moreover, discharge records at both the Wabasca River at Hwy. No. 88 and Peace River at Peace Point gauging stations demonstrate a 20-year period between ~1975-1995 when maximum single-day discharge was low during the spring freshet, which corresponds to a period when ice-jam flooding is known to have been infrequent to absent at the PAD (Prowse and Conly, 1998; Wolfe et al., 2006; Timoney, 2021), and to an interval when C/N ratios were low in the PAD 15 sediment record. The inferred decrease in flooding during this interval has often raised concerns over the potential influence of Peace River flow regulation by the W.A.C. Bennett Dam despite that reduced spring discharge is also evident at the unregulated Wabasca River (Keller, 1997; Prowse and Conly, 1998; Wolfe et al., 2006; Beltaos, 2018a; Timoney, 2021). Collectively, these lines of evidence suggest strong influence of spring discharge from the Wabasca River on downstream ice-jam floods at the PAD. Notably, the 300-yr record at PAD 15 demonstrates a century-long decline in flood frequency that began several decades before installation of the W.A.C. Bennett Dam (Figure 1-1 D; Wolfe et al., 2006). The hydrometric records along the Wabasca River are informative, but they are incomplete and barely extend into the pre-W.A.C. Bennett Dam period (Figure 1-1 A). As a result, it is difficult to evaluate the long-term influence the Wabasca River has had on changes to the ice-jam flood regime of the Peace River at the

PAD and the role it has played in the identified century-long decline in flood frequency at the PAD. Determining the role of the Wabasca River tributary on the ice-jam flood regime at the PAD will improve ability to delineate the relative roles of climatic variation and regulation of Peace River flow on the observed decline in flood frequency at the PAD.

1.5 Paleolimnology

Paleolimnological analyses performed on lake sediment cores can provide long temporal records of environmental change when direct measurements are too short and sparse (e.g., Douglas and Smol, 1999; Smol et al, 2005; Brock et al., 2010; Wolfe et al., 2011). Paleolimnological analyses of a wide variety of physical, chemical, and biological variables in lake sediment cores can be used to reconstruct past variation in flood influence at flood-prone oxbow lakes (Wolfe et al., 2006, 2012; Oliva et al., 2016; Hodgson and Ward, 2018; Kay et al., 2021). The success of paleolimnological studies in revealing past changes in hydrological processes and events not previously captured by direct monitoring in the PAD (e.g., Wolfe et al. 2012, 2020; Kay et al., 2019, 2021; Timoney, 2021) and elsewhere (i.e., Last and Smol, 2002; Buczkó et al., 2009) suggests that these methods could prove useful in the lesser studied region of the Wabasca watershed.

1.6 Study approach and objectives

This study uses a multiproxy paleolimnological approach to improve understanding of the role of the Wabasca watershed on ice-jam flood occurrence at the PAD by reconstructing past variation in hydrological conditions at oxbow lakes adjacent to the Wabasca River that are prone to flooding when discharge is high during the spring freshet. This assumption is supported by the mean daily discharge record for the Wabasca River, which displays maximum

values during the 3-week interval (April 24 to May 14) when ice-jam floods may occur at the PAD (Figure 1-2). Paleolimnological reconstructions based on analyses of sediment cores retrieved from two flood-prone oxbow lakes along the Wabasca River aim to provide long-term information regarding periods of stronger and weaker flood influence of the Wabasca River during the ice-jam season. These reconstructions are compared to paleolimnological records at the PAD, specifically those of ice-jam flooding recorded during the past ~300 years at lake 'PAD 15' and the past ~200 years at lake 'PAD 54' (Wolfe et al., 2006). These comparisons aim to determine if declining flood frequency at the PAD since the early 1900s coincides with a reduction in flood influence from the upstream Wabasca River and to assess their relations beyond the past century. Correspondence of paleohydrological records from flood-prone oxbow lakes along the unregulated Wabasca River and along the regulated Peace River at the PAD identify a strong role for climate on flood regimes. Such knowledge contributes to deciphering the relative roles of Peace River regulation and climate, as needed to inform a federal action plan and natural resource stewardship decisions aimed at protecting the future of hydro-ecological conditions at the PAD.

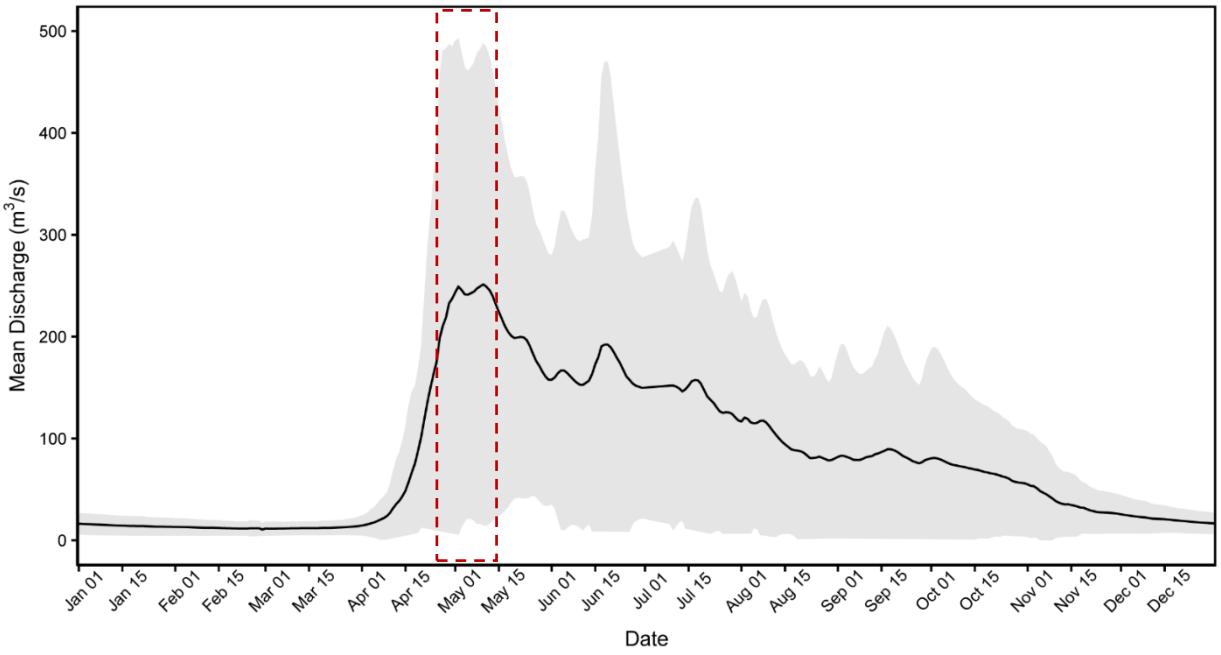

Figure 2-2. Time series showing mean daily discharge (m^3/s; black line) and standard deviation (grey band) of the Wabasca River at the 'Wabasca River at Highway No. 88' gauging station using hydrometric data from 1970-2022. The dark red dashed box indicates the 3-week period (April 24 to May 14) when ice-jam floods may occur at the PAD (Beltaos and Peters, 2020).

Chapter 2: Methods

2.1 Site descriptions

This study focuses on the northernmost (downstream) portion of the Wabasca River watershed near its confluence with the Peace River (Figure 2-1). The Wabasca watershed includes an area of 35,800 km² that ranges in elevation from ~250 to ~650 m asl and comprises foothills and lowland plains that produce snowmelt runoff at the time of ice-jam flood generation on the Lower Peace River at the PAD (Prowse and Conly, 1998). There is a time lag of only 1.5 - 2 days before Wabasca River waters at the confluence of the Peace River flow eastwardly down the Peace River and reach the PAD (Prowse and Conly, 1998; Peters and Prowse, 2001).

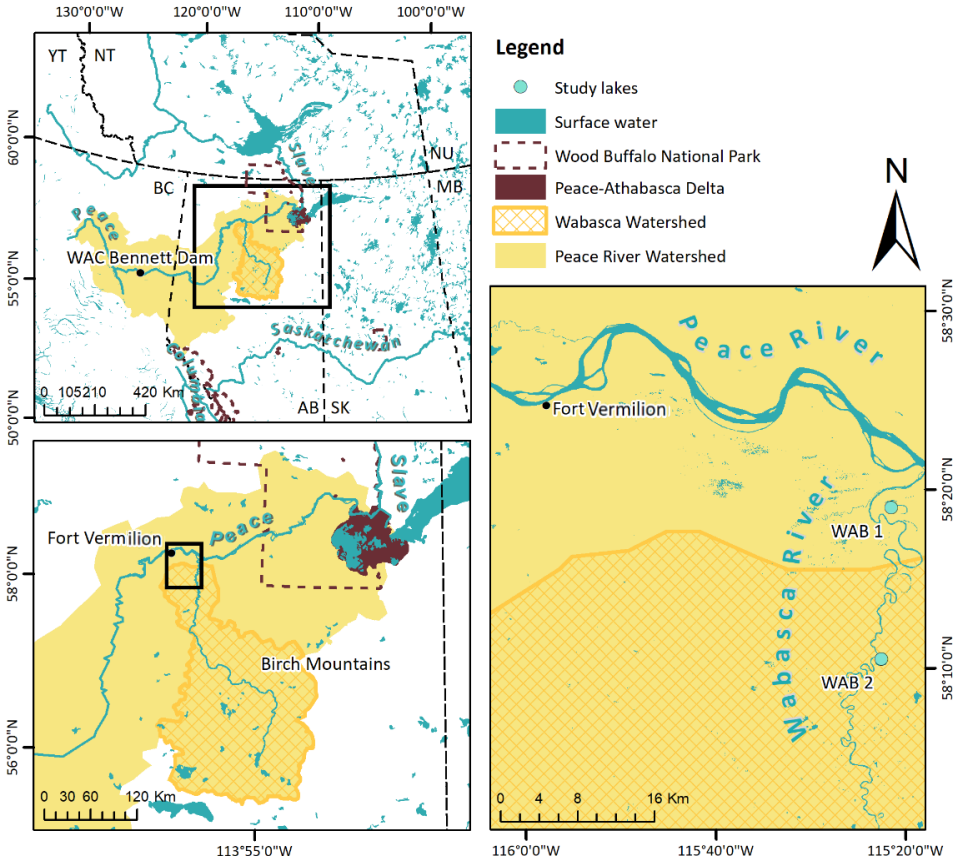

Figure 2-1. Map of the Wabasca River and its watershed, northern Alberta, and the location of the two oxbow lakes from which sediment cores were collected and are the focus of this study. The Wabasca River flows north into the Peace River, which then flows ~350 km east to the PAD.

2.1.1 Lake Wabasca 1

'Wabasca 1' (WAB 1; unofficial name; 58°18'52.10" N, 115°23'44.00" W) is an oxbow lake located adjacent to the Wabasca River ~11 km upstream from the Peace River confluence and ~37.5 km ESE of the nearest town of Fort Vermilion, AB (Figure 2-1, 2-2). The lake is surrounded by forest and is suspected to readily receive floodwaters when the Wabasca River overflows its banks (Figure 2-2 B). The visible more disturbed and less-established vegetation pattern of the ~200 m wide northern arm in comparison to its southern arm suggests that floodwaters frequently and preferentially enter the northern arm (Figure 2-2 B). The visible lack of vegetation establishment in the northern arm strongly suggests this lake is highly prone to flooding and provides indication that ice-jams often form at the bend in the Wabasca River located just downstream of the northern arm. Evidence of receding shorelines, indicated by changing vegetation type, suggests the lake level was higher in the past (Figure 2-2). During field sampling in September 2019, the lake water was visually observed to be relatively clear, and the depth of the water at the coring location was 1 m.

Figure 2-2. Photograph of oxbow lake, Wabasca 1 (WAB 1), looking west (A), and Google Earth image from September 2013 revealing lake shape and proximity to Wabasca River (B). Location of core collection is indicated by the red marker.

2.1.2 Lake Wabasca 2

'Wabasca 2' (WAB 2; unofficial name; 58°10'21.70" N, 115°23'28.70" W) is an oxbow lake located adjacent to the Wabasca River ~41 km upstream from the Peace River confluence and ~44 km SE of the town of Fort Vermilion, AB (Figure 2-1, 2-3). The lake is surrounded by dense forest. Observations during fieldwork in September 2019 revealed channels in both arms likely connect the Wabasca River to the lake during flood events. Both arms appeared equally likely to receive floodwaters due to similar disturbance patterns and the presence of younger, less established vegetation in the areas between the lake arms and the river. The two arms are located close to, and upstream of, a sharp bend in the Wabasca River, which may provide a location for ice-jam formation. Observations of receding shorelines, indicated by changing vegetation type, age and density along the lake, suggests the lake level was higher in the past. The depth of the water at the coring location was 0.4 m.

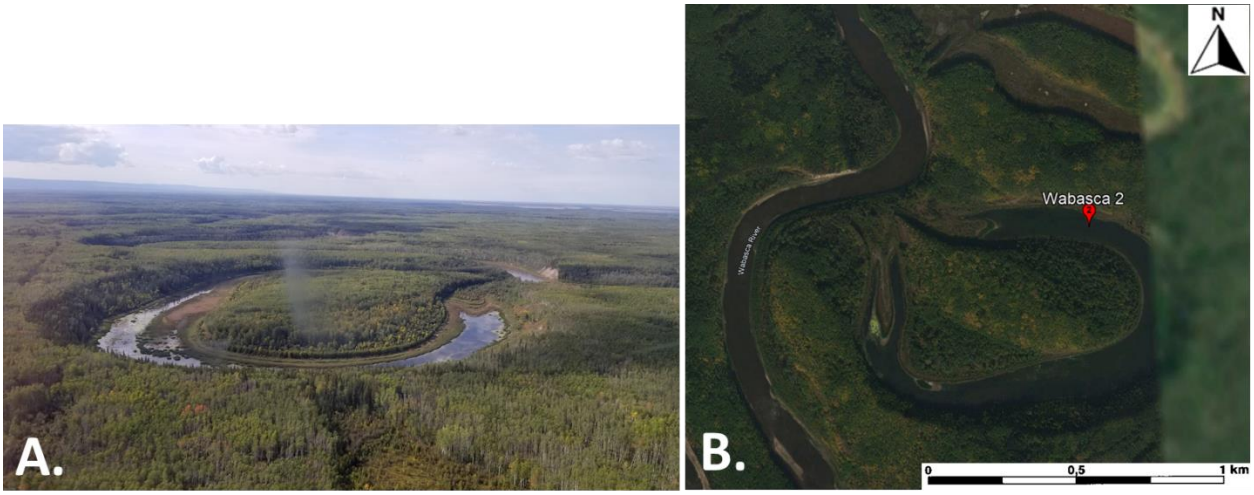

Figure 2-3. Photograph of oxbow lake, Wabasca 2 (WAB 2), looking west, with the Wabasca River visible in background (A), and Google Earth image from September 2013 revealing lake shape and proximity to Wabasca River (B). Location of core collection is indicated by the red marker.

2.2 Sediment core collection

Lake sediment cores from WAB 1 and WAB 2 were obtained on September 6th, 2019 (Table 2-1). On September 9th, sediment cores were collected from three upland lakes that are not included in this Thesis (Table A-1). Three sediment cores were collected from each lake using a hammer-driven gravity corer (Telford et al., 2021) deployed from the floats of a helicopter. The sediment cores were transferred to a field base where they were sectioned into 0.5-cm intervals using a vertical sectioner (Telford et al., 2021). The 0.5-cm sediment intervals

Table 2-1. Lakes sampled in the Wabasca watershed, their respective sediment cores and analyses performed.

Lake: **WAB 1** (Sampled September 6, 2019)			
Location of Coring Site	Working Core	Archived Core	Archived Core
58°18'52.10"N, 115°23'44.00"W	 C3	 C1	 C2
	Length: 64.5 cm	Length: 55.5 cm	Length: 66.5 cm
	Analyses: Radiometric dating, LOI, Grain size, XRF	Analyses: None	Analyses: None
Lake: **WAB 2** (Sampled September 6, 2019)			
Location of Coring Site	Working Core	Archived Core	Archived Core
58°10'21.70"N, 115°23'28.70"W	 C1	 C2	 C3
	Length: 87 cm	Length: 82.5 cm	Length: 76.5 cm
	Analyses: Radiometric dating, LOI, Grain size, XRF	Analyses: None	Analyses: None

were individually sealed into labeled Whirl-Pak bags. Samples were then placed on ice and shipped to the University of Waterloo where they were kept in a cold room at 4°C until analysis.

2.3 Radiometric dating (^{137}Cs and ^{210}Pb)

Chronologies of the working sediment core from WAB 1 and WAB 2 (Table 2-1) were determined using radiometric dating methods by measuring activities of ^{210}Pb, ^{226}Ra (as weighted mean of ^{214}Bi and ^{214}Pb activity), ^{241}Am and ^{137}Cs on select samples throughout the cores. ^{210}Pb is a radioactive isotope in the natural decay series for ^{238}U. The isotope ^{226}Ra ($t_{1/2}$ = 1600 years) is formed along this series, which decays to gaseous ^{222}Rn and can enter the atmosphere. ^{222}Rn decays with a half-life of 3.8 days to a series of short-lived isotopes including ^{214}Pb and ^{214}Bi ($t_{1/2}$ of 27 and 20 minutes, respectively) before decaying to ^{210}Pb with a half life of 22.2 years. As all decay products after ^{222}Rn are heavy metals, they return from the atmosphere via precipitation and dry fall-out and become immobilized in terrestrial soils and lake sediments (Appleby, 2001). The ^{210}Pb that formed from atmospheric-derived ^{222}Rn is classified as “unsupported ^{210}Pb”.

In contrast, “supported ^{210}Pb” is non-atmospheric sourced ^{210}Pb, produced at a constant rate from ^{226}Ra that has decayed from ^{238}U found within lithogenic material deposited in a lake (Appleby and Oldfield, 1978; Appleby, 2001). Supported ^{210}Pb can be determined by using the weighted mean of ^{214}Bi and ^{214}Pb activity. Sediment in a sealed container will give rise to ^{222}Rn from ^{226}Ra decay and, after about five ^{222}Rn half lives (~3 weeks), ^{222}Rn and its short-lived decay products (^{214}Pb and ^{214}Bi) will be in equilibrium with their supply from the *in-situ* decay of the

^{226}Ra. As ^{214}Pb and ^{214}Bi have very short half lives, the activity that is measured can only be from that created within the sample.

As total ^{210}Pb activity measured by gamma ray spectrometry will be the sum of both unsupported and supported ^{210}Pb, the unsupported ^{210}Pb activity is equal to total ^{210}Pb activity minus ^{226}Ra activity which is equivalent to supported ^{210}Pb activity (Appleby and Oldfield, 1978; Appleby, 2001). Since unsupported ^{210}Pb is not replenished in a sediment profile, its activity decreases with time since deposition, at a half-life rate of 22.26 years. The distribution of unsupported ^{210}Pb activity with respect to sediment depth measured in terms of cumulative dry mass (g cm^{-2}) can therefore be used to infer sediment age. When the measured total ^{210}Pb activity is equal to the calculated supported ^{210}Pb activity, background ^{210}Pb activity has been reached, and ^{210}Pb-calculated ages can be directly determined only above this depth (Appleby and Oldfield, 1978).

A preliminary suite of 0.5-cm intervals spanning the length of the sediment cores were selected for radiometric analysis, with extra intervals added later at chosen depths to increase the accuracy of the dating methods. Subsamples of wet sediment from the selected intervals were freeze-dried and ~4 g were compacted into pre-weighed polystyrene tubes to a height of 35 mm, capped with a silicone septum and 1 cc of epoxy resin, and then left for at least 3 weeks to allow atmospheric-derived unsupported ^{222}Rn to decay before the measurement of ^{210}Pb activity. The samples were then analyzed by an Ortec co-axial HPGe Digital Gamma Ray Spectrometer and measurements of ^{210}Pb, ^{214}Bi, ^{214}Pb, ^{241}Am and ^{137}Cs activity were recorded.

For the core from WAB 2, ages of stratigraphic profiles were determined using the Constant Rate of Supply (CRS) model based on ^{210}Pb activity, and accuracy was improved by constraining the excess ^{210}Pb inventory using the Reference Date Method (Appleby, 2001). An independent reference date of 1963, corresponding to when maximum nuclear fallout occurred in the northern hemisphere (Appleby, 2001) and assumed to be identified by a peak in ^{137}Cs activity, was used to first determine the excess ^{210}Pb inventory between 1963 and 2019 (i.e., the date of coring). The remaining excess ^{210}Pb inventory below the 1963 depth horizon was then calculated using Equations 35-36 from Appleby (2001). After constraining the total excess ^{210}Pb inventory using this Reference Date Method, the CRS age model was applied. A mean sedimentation rate for the period between the surface of the core and the 1963 reference date horizon was determined and a linear extrapolation, which assumes a constant sedimentation rate based on cumulative dry sediment mass, was applied below the lowermost horizon of excess ^{210}Pb inventory to estimate the chronology for the remainder of the core.

Due to high and variable sedimentation rates that inconsistently diluted ^{210}Pb activities, the chronology for the WAB 1 sediment core was determined solely by constraining observed peaks in ^{137}Cs and ^{241}Am activity to the year 1963. ^{241}Am is another isotope associated with nuclear weapons testing fallout and is known to be far less mobile than ^{137}Cs, making it a more trustworthy fallout marker, yet it typically occurs in lower quantities (Appleby et al., 1991). A mean sedimentation rate for the interval above this peak was then determined and a linear extrapolation, which assumes a constant sedimentation rate based on cumulative dry sediment mass, was applied below this peak to estimate the chronology for the remainder of the core.

2.4 Loss-On-Ignition (LOI)

Analysis by LOI was performed on the working sediment cores from WAB 1 and WAB 2 to reveal stratigraphic variations in the moisture, organic matter, carbonate, and carbonate-free mineral matter content, following methods developed by Dean (1974) and modified by Heiri et al. (2001). Subsamples of ~0.5-1 g wet mass from each 0.5 cm sediment interval were added to pre-weighed crucibles and dried in an oven at 90 °C for 24 hours, then cooled to room temperature in a desiccator for 2 hours and weighed to estimate the water content lost. The crucibles were then heated in a muffle furnace at 550 °C for 2 hours, cooled to room temperature in the desiccator for 2 hours and weighed again to estimate the loss of organic matter content. The crucibles were then returned to the muffle furnace and heated to 950 °C for 2 hours, and again cooled to room temperature in a desiccator for 2 hours before they were weighed to estimate the loss of carbonate content. Carbonate-free mineral matter was determined as the mass remaining in the crucible and is the mineral matter values reported throughout this document. Mineral matter content is commonly used to interpret the influence of river floodwater into lakes where high mineral matter content is indicative of periods of stronger flood influence as river floodwaters typically deposit large amounts of mineral-rich sediment (Lobo et al., 2001; Gasiorowski and Hercman, 2005; Wolfe et al., 2006, 2012; Lintern et al., 2016; Oliva et al., 2016; Kay et al., 2019).

2.5 X-Ray Fluorescence (XRF)

Energy-dispersive X-ray fluorescence spectrometry (XRF) was performed on the oxbow lake sediment cores to determine the trace elemental composition of the sediment. Elemental

composition of the sediment can provide insight on the source of the sediment (Oldfield et al., 1983; Sandgren and Snowball, 2001; Kylander et al., 2011; Davies et al., 2015; Evans et al., 2020; Kay et al., 2021; Peti and Augustinus, 2022). For this research, the presence of allochthonous elements serve as an indicator for river floodwater entering the lakes as inorganic detrital constituents are likely eroded by the Wabasca River and deposited in the lakes during flood events. Methods for preparing samples followed those described by Gregory et al. (2017). Subsamples of wet sediment from every 0.5-cm interval of the working sediment cores from WAB 1 and WAB 2 (Table 2-1) were packed sequentially into individual ~3 cc acrylic Itrax Sequential Sample Reservoir vessels (1.5 x 1 x 1 cm) within a labeled tray. Subsamples were ensured to be packed flush with the top of the vessels and securely wrapped during transport to the analytical facility at McMaster University. Following procedures described in Croudace et al. (2006), samples were readied for scanning and passed through the Cox Itrax-XRF core scanner. Preparation for scanning included a preliminary topographic scan of the samples by the Cox Itrax-XRF core scanner. This scan established an accurate position for the XRF detector where it would avoid collision with the sediment surface and ensure that the detector-sample distance remained constant. Once the setup was complete, the Cox Itrax-XRF core scanner analyzed the samples at a resolution of 15 seconds/point at 15 mA and 30 kV every 0.5 mm or 2 mm along the tray, using a Mo-anode X-ray tube.

After analysis in the Cox Itrax-XRF core scanner, measurements corresponding to the sediment sample were distinguished from measurements of the acrylic borders separating the sample reservoirs by analyzing the series of data points. Using knowledge of the dimensions of

the reservoirs, sequential points that demonstrated a considerable decrease in the ratio of coherent/incoherent backscatter and showed a major decrease in Fe concentration were identified as the acrylic border (Gregory et al., 2017). The remaining points were assumed to be measurements of the sediment samples. Using the identified location of the acrylic borders, sediment data points were constrained to their respective 0.5-cm sediment core intervals and the mean value of the intervals was determined for each measured element. These mean values, hereafter referred to as 'element concentrations', were then used in the subsequent data analysis.

Principal component analysis (PCA) was used to assess relations among a multivariate dataset of elements measured by XRF in the stratigraphic profiles from WAB 1 and WAB 2. A PCA was performed for each lake individually using concentrations of 20 elements (Al, Ba, Br, Ca, Cr, Cu, Fe, K, Mn, Ni, Rb, Sb, Si, Sr, Th, Ti, V, W, Zn, and Zr) measured at each interval of the sediment core. Elements included in the PCA were selected based on their expansive use and known association with flood events and environmental changes in lakes and surrounding catchments (Kylander et al., 2011; Aufgebauer et al., 2012; Kämpf et al., 2012; Davies et al., 2015; Chagué-Goff et al., 2016; Evans et al., 2020; Kemp et al., 2020; Peti and Augustinus, 2022). Mineral matter and organic matter content were included as supplementary variables in the PCA to assess their relations with the selected elements. Element concentrations (net counts/15 seconds), mineral matter content and organic matter content were centered and standardized. PCA analyses were performed using R version 3.5.3 (R Core Team, 2020).

2.6 Grain Size analysis

Grain size analysis was performed on continuous 0.5-cm intervals from working sediment cores from WAB 1 and WAB 2 (Table 2-1) and served as a complementary method to reconstruct past variation in flood influence. Sub-samples of sediment (~0.3-0.5 g wet mass) were placed into test tubes and organic matter was removed by submersing the samples in 5% sodium hypochlorite solution (household bleach) for 24 hours at room temperature (Mikutta et al., 2005). The samples were then repeatedly aspirated and rinsed with deionized water until the bleach residues were removed and the pH of deionized water was reached. Aspirations and subsequent rinsing proceeded once the sediment had settled to the bottom of the tube, which could take several days to weeks between aspirations. The samples were then dispersed in 0.1% sodium hexametaphosphate solution and passed through a Horiba Partica LA-950V2 Laser Particle Size Analyzer to determine grain size distributions. Distributions were then displayed on a surface plot (adapted from Beierle et al., 2002) and organized by the Udden-Wentworth grain-size classification (Wentworth, 1922). The geometric mean of the grain size was calculated for each sample and plotted onto the surface plot. Grain size analysis can be used for sediments of flood-prone lakes to assess temporal variation in energy conditions caused by past flood events (Wolfe et al., 2006). Typically, an increase in abundance of coarser grains is associated with higher energy conditions during flood events.

Chapter 3: Results

3.1 Radiometric dating

The measured total ^{210}Pb activities in cores from WAB 2 and WAB 1 are low (~40-100 Bq/kg) and only slightly above values of supported ^{210}Pb activities (~40-60 Bq/kg; represented by ^{226}Ra activity), with separation between the total and supported activities increasing slightly near the top of the cores (Figure 3-1). For WAB 2, supported ^{210}Pb activity is estimated to be reached at ~32 cm, where total ^{210}Pb activity declines down-core to ~54 Bq/kg and is close to the estimated supported ^{210}Pb (~51 Bq/kg). For WAB 1, total and supported ^{210}Pb activities remain similar throughout the length of the core with the total ^{210}Pb activity (~48-96 Bq/kg) fluctuating just above the values of the supported ^{210}Pb activity (~44-60 Bq/kg). The low and fluctuating total ^{210}Pb activities throughout both cores can be attributed to high and variable sedimentation rates from frequent input of sediment conveyed by river floodwaters, which is consistent with high mineral matter content (typically 85-93% of dry mass) (Figure 3-1). Flooding increases the sedimentation rate and dilutes the atmospheric flux of unsupported ^{210}Pb activity, which complicates generation of a chronology based solely on ^{210}Pb dating (Appleby et al., 1991). ^{137}Cs activity profiles were therefore used to support chronology development.

For the core from WAB 2, the initital rise in ^{137}Cs activity at 30 cm is interpreted to be associated with the expected onset of global atmospheric fallout following early thermonuclear bomb detonation that began in November 1952, while the first small peak in ^{137}Cs at 27 cm is interpreted to represent the peak of above-ground nuclear weapons testing in 1963 (Figure 3-1; Appleby, 2001). Values for ^{241}Am activity were below detection limit throughout the sediment

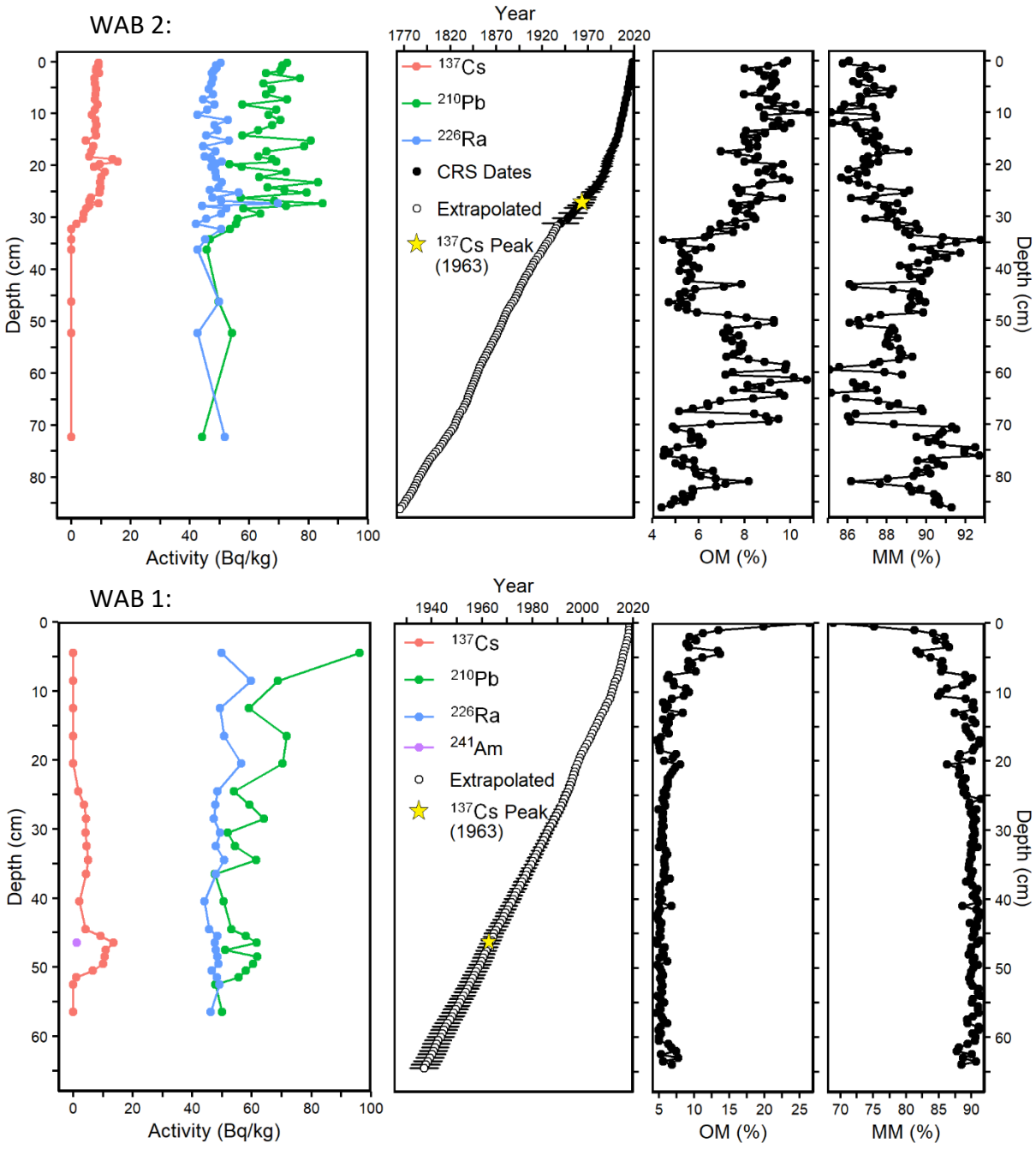

Figure 3-1. Graphs showing results for radiometric dating and sediment composition by loss-on-ignition analysis for cores from WAB 2 (top row) and WAB 1 (bottom row). From left to right, the graphs show 1) radiometric activity profiles (^{137}Cs, ^{210}Pb, ^{226}Ra and ^{241}Am), 2) age-depth relations (including both CRS-estimated (closed circle) and CRS- or ^{137}Cs-extrapolated (open circle) values, where error bars = ±2 SD; star indicates the 1963 ^{137}Cs peak), 3) organic matter content (OM) profiles and 4) carbonate-free mineral matter (MM) content profiles.

core and thus not available to support identification of the ^{137}Cs peak. The CRS model incorporating the Reference Date Method, where the chonology is constrained based on the ^{137}Cs peak (Appleby, 2001), was used to generate a chronology for WAB 2. Below the depth where background ^{210}Pb activity was reached (32 cm), the age-depth relation for WAB 2 was extrapolated assuming a constant rate of sedimentation based on cumulative dry mass. This resulted in a basal date of ~1765 for the 86.5 cm long WAB 2 sediment core. For WAB 1, a chronology was determined solely based on the ^{137}Cs activity peak. This method was performed because of insufficient statistical separation between supported and total ^{210}Pb activities which inhibits the ability to determine unsupported ^{210}Pb activity and a CRS ^{210}Pb-based chronology (Binford, 1990). An observed peak in activity of ^{137}Cs and ^{241}Am (one measurement was above the detection limit) occurs lower in the stratigraphic record (46.5 cm) compared to at WAB 2, and is interpreted to represent the peak of above-ground nuclear weapon testing in 1963 (Figure 3-1; Appleby, 2001). This suggests a higher sedimentation rate for the core from WAB 1 compared to WAB 2. The high sedimentation rate is supported by the consistently high mineral matter content (typically 88-91%) throughout the core, and the visible, broad flood pathways between the Wabasca River and the northern arm of WAB 1 (Figure 2-2). Linear extrapolation from the ^{137}Cs peak, assuming a constant sedimentation rate based on cumulative dry mass, resulted in a basal date of ~1937 for the 64.5 cm long WAB 1 sediment core.

3.2 Principal Component Analysis (PCA) of the XRF data

For both oxbow lakes, PCAs of the trace element concentrations capture similar amounts of variation, including along the first two axes (WAB 2: PC1 = 42.7%, PC2 = 16.1%, Total = 58.8%; WAB 1: PC1 = 41.1%, PC2 = 19.6%, Total = 60.7%), and vectors of the element

concentrations reveal consistent associations with the first two axes (Figure 3-2). The consistency between the PCA ordinations suggests that similar processes have influenced the associations among trace elements at both lakes. Concentrations of most trace elements are strongly associated with PC1, as are vectors for mineral matter and organic matter content. Elements that are positively correlated with PC1 in both lakes (primarily Al, Ba, Cr, K, Rb, Si, Sr, Ti, V, Zn) are positively correlated with the vector for carbonate-free mineral matter content and they have been used elsewhere to identify flood deposits and allochthonous input in sediment cores (synthesized in Davies et al., 2015). For example, Metcalfe et al. (2010) successfully used Ti to track changes in runoff conditions and suggest temporal changes in climate, while Kämpf et al. (2012) found Al, and the metals it was strongly correlated with (Si, K and Ti), to be a representative proxy for detrital matter. Al, Si, K, Ti along with Rb were also used in studies by Kylander et al. (2011), Aufgebauer et al. (2012), Chagué-Goff et al. (2016), Evans et al. (2020), and Peti and Augustinus (2022) to indicate detrital input to lake sediment. Ti is argued to be the most widely used element in XRF-based lake sediment studies as it is an unambiguous indicator of allochthonous inputs (Cohen, 2003). Br is strongly associated with PC1 but in the opposite (leftward) direction, near the passive vector for organic matter content. Br has been used in previous lake sediment XRF analyses as an indicator of autochthonous organic material (Fedotov et al., 2012; Chagué-Goff et al., 2016). Overall, PC1 is inferred to capture variation in influence of Wabasca River floodwaters with positive values indicating periods of increased deposition of allochthonous sediment due to a stronger influence of floodwaters and was employed in the stratigraphic analysis presented below.

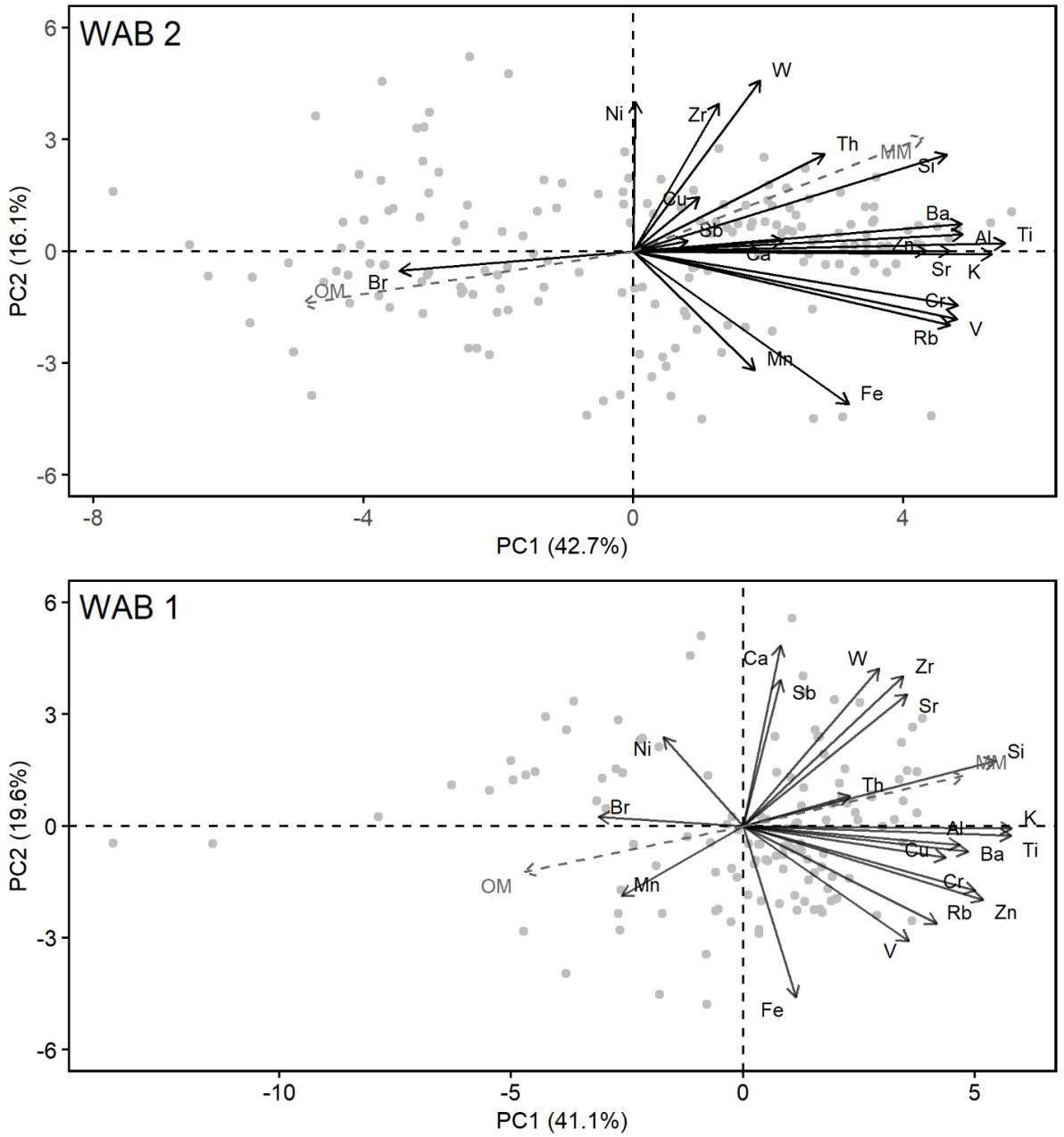

Figure 3-2. Principal component analysis ordination diagrams showing variation in concentrations of 20 trace elements in lake sediment core samples from WAB 2 (top) and WAB 1 (bottom), as determined from analysis by XRF. Sample scores for the individual sediment core samples are shown by grey dots, the 20 elements (active vectors) are shown by black arrows, and mineral matter (MM) and organic matter (OM) content, added as passive variables, are shown by grey dashed arrows.

Elements strongly correlated with PC2 in the cores from both WAB 2 and WAB 1 include W, an element not typically associated with allochthonous materials (Meijer et al., 1998), as well as Fe and to a lesser degree Mn. Both Fe and Mn can be indicative of detrital input but their concentrations are also strongly influenced by redox conditions in lake systems (Haberzettl et al., 2007; Cuven et al., 2011; Kylander et al., 2011; Chagué-Goff et al., 2016; Evans et al., 2020; Peti and Augustinus, 2022). In the cores from WAB 1 and WAB 2, redox conditions likely regulate the stratigraphic variations in concentrations of Fe and Mn because they align less strongly with the detrital elements along PC1 and are more strongly correlated with PC2. Zr is also strongly correlated with PC2 and increases in Zr concentration have been inferred to indicate a shift to coarser grained sediment (Cuven et al., 2010). However, stratigraphic profiles of Zr concentration can be variable in intervals consisting of coarser grained sediment and will sometimes be negatively correlated with concentrations of Ti and K (Cuven et al., 2010).

3.3 Comparison between Wabasca River discharge and stratigraphic variation in mineral matter content and PCA Axis 1 scores at WAB 2

The maximum single-day spring discharge record for the Lower Wabasca River was compared to stratigraphic variations in the primary methods used to reconstruct flood influence, mineral matter content and trace element PC1 scores, at oxbow lake WAB 2 (Figure 3-3). When comparing the records, peaks of similar relative magnitude were considered to correspond if the timing of the stratigraphic event differed from the timing of the discharge record event by no greater than the standard deviation of the estimated date in the stratigraphic record (Figure 3-1). Known years of major ice-jam flood events at the PAD (1972,

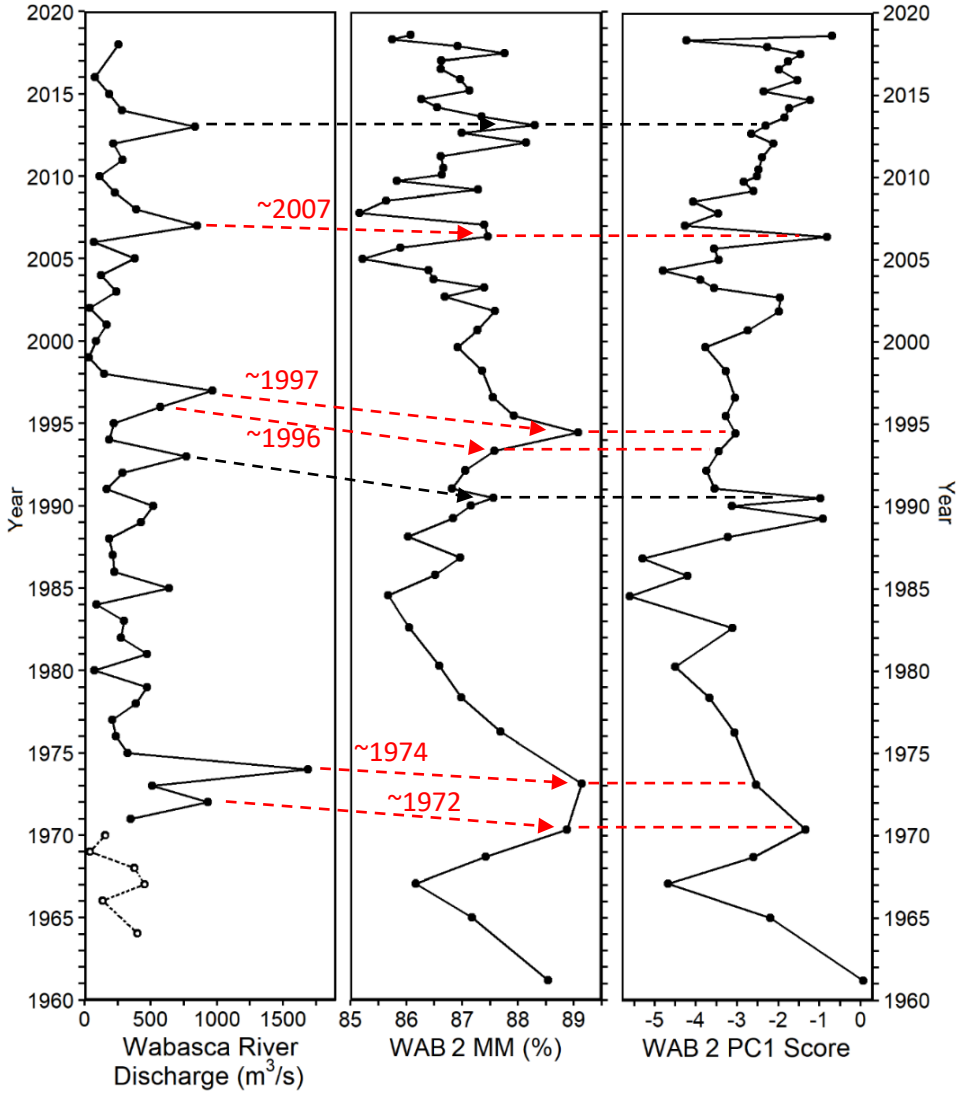

Figure 3-3. Graphs showing associations between maximum single-day spring discharge of the Lower Wabasca River and stratigraphic variation in mineral matter content and PCA axis 1 (PC1) scores (based on trace element concentrations) at oxbow lake WAB 2. Left panel shows annual single-day maximum discharge (m^3/s) for the Wabasca River at hydrometric station 'Wabasca River at Highway No. 88' (filled circles, solid line) and 'Wabasca River above Peace River' hydrometric stations (open circles, dashed line) during the 3-week period when ice-jam floods typically occur at the PAD (April 24-May 14). Middle panel shows stratigraphic variation during the past ~60 years in mineral matter (MM) content (%) at oxbow lake WAB 2. The right panel shows stratigraphic variation in PC1 scores of the elemental concentration data in the sediment core from WAB 2. Black and red arrows are used to correlate matching peaks among the three data sets and may deviate from horizontal due to uncertainties in radiometric dating of the sediment core. The red arrows specifically indicate known years of major ice-jam flood events at the PAD (1972, 1974, 1996, 1997, 2007; Prowse and Lalonde, 1996; Prowse and Conly, 1998, 2002; Wolfe et al., 2006; Timoney, 2009; Beltaos, 2019; Beltaos and Peters, 2020). Black arrows further identify two other matching peaks in the data.

1974, 1996, 1997, 2007; Prowse and Lalonde, 1996; Prowse and Conly, 1998, 2002; Wolfe et al., 2006; Timoney, 2009; Beltaos, 2019; Beltaos and Peters, 2020) correspond with peaks in the Wabasca River discharge record and align well with several peak values in the stratigraphic records at WAB 2 (red dashed lines in Figure 3-3). Visible peak values of mineral matter content and PC1 scores are considered indicative of epsiodes of strong flood influence since river floodwaters deposit inorganic sediment comprised of terrigenous elements that plot positively along PC1. Notably, the highest peak value in the Wabasca River discharge record corresponds with 1974, a year when one of the largest recorded ice-jam flood events occurred at the PAD (Prowse and Conly, 1998). This event is captured well by the mineral matter content record at WAB 2 as it corresponds to the maximum mineral matter content during this portion of the stratigraphic record. Also captured in the WAB 2 mineral matter content and PC1 scores records is a lack of substantial peaks during the interval of low maximum discharge for the Wabasca River after 1974 and during the 1980s and early 1990s (Figure 3-3), which also corresponds with an interval without substantial ice-jam flooding at the PAD (Prowse and Conly, 1998; Wolfe et al., 2006; Timoney, 2021). Some peaks in maximum single-day discharge corresponded well with peaks in mineral matter content of sediment at WAB 2 but were not represented by peaks in PC1 scores (~1993-1996, ~2013). Also, high mineral matter content and PC1 scores in the WAB 2 core did not always correspond with high maximum single-day discharge in the Wabasca River record (e.g., ~2001-2003, ~2009, ~2012). Clearly other hydrological processes are at play based on these discrepancies, but correspondence of peaks in stratigraphic values of mineral matter content and PC1 scores with several known major ice-jam flood events and with intervals of low maxmum single-day discharge provide confidence in

the ability of these variables from the WAB 2 sediment core to reconstruct past variation in Wabasca River flood influence during the spring freshet. Unlike WAB 2, the mineral matter content and PC1 score records from WAB 1 do not appear to be sufficiently sensitive to variations in Wabasca River flood influence at this temporal scale (see Appendix; Figure B-1).

3.4 Stratigraphic variation in mineral matter content, PCA Axis 1 scores and grain size for the full stratigraphic record at WAB 2

Stratigraphic variations in mineral matter content, PC1 scores based on the trace element concentrations, and grain size demonstrate visually robust correspondence throughout most of the record for WAB 2 (Figure 3-4). Temporal patterns of variation are used to designate four zones that capture distinct intervals of stronger and weaker flood influence. Zone 1 (~1765 to 1825) is characterized by relatively high mineral matter content (86.2-92.7%; mean = 90.23%) and high PC1 scores (-0.8-7.7; mean = 3.28). Medium silt, which represents at most 6%, is the most common grain size category during Zone 1, and the geometric mean reaches its highest value of the entire record (15.3 µm). Some divergence between values for mineral matter content and PC1 scores occurs during the ~1790s and ~1810s. Overall, Zone 1 is interpreted to reflect a period of relatively strong flood influence, especially during ~1790-1820 when all three variables reach peak values. Zone 2 (~1825 to 1880) is characterized by some of the lowest mineral matter content of the entire record (83.8-89.8%; mean = 87.25%) and low PC1 values (-4.4-4.8; mean = -0.06). In this zone, very fine silt, which represents at most 8%, is the most common grain size category, but medium silt becomes the most prevalent grain size in the ~1860s, as is captured by a peak in geometric mean grain size. Some divergence between values for mineral matter content and PC1 scores occurs during the ~1850s and ~1860s.

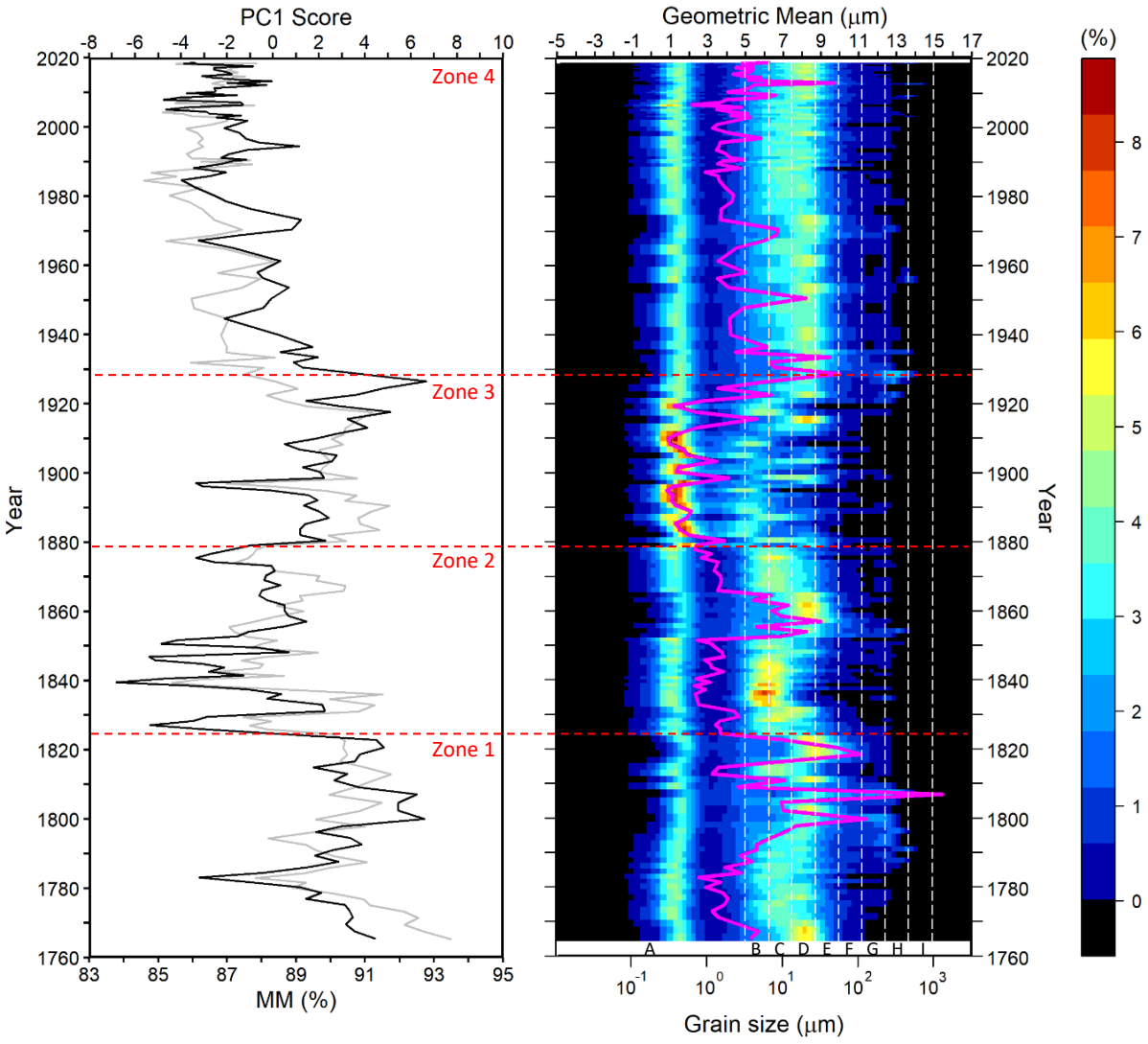

Figure 3-4. The left panel shows stratigraphic profiles of mineral matter (MM) content (%, black line) and PC1 scores based on elemental concentrations determined by analysis using XRF (grey line) for the sediment core from WAB 2. The right panel displays stratigraphic variation in sediment grain size. The vertical white dotted lines indicate separation between Udden-Wentworth grain size categories: A = clay, B = very fine silt, C = fine silt, D = medium silt, E = coarse silt, F = very fine sand, G = fine sand, H = medium sand, and I = coarse sand. The pink line represents the geometric mean of the grain size data (μm). Stratigraphic variation in these identified metrics were used to delineate four distinctive zones of differing influence of river floodwaters, as illustrated by the horizontal dashed red lines and described in the text.

Overall, Zone 2 is interpreted as an interval of relatively weak flood influence. Zone 3 (~1880 to 1930) is characterized by an increase in mineral matter content (86.1-92.8%; mean = 89.70%) and PC1 scores (-2.0-5.1; mean = 2.34) that attain some of their highest values in the core. A substantial shift in the grain size composition also occurs in this zone, and the geometric mean declines to its lowest values (~1.5 µm) and clay-sized grains, which represent at most 8%, becomes the most common grain-size category. Some divergence between values for mineral matter content and PC1 scores occurs during the ~1920s. The shift to greater abundance of finer grained sediment is interpreted to reflect a period of weaker flood influence, however high mineral matter content and high PC1 scores suggests a period of stronger flood influence. This apparent contradiction may be due to frequent ice-jam flooding at a time when the ice-jams were located farther downstream and lower energy flooding occurred at WAB 2, thus influencing the grain size record. Zone 4 (~1930 to 2019) is characterized by declining mineral matter content (85.2-89.6%; mean = 87.25%) and PC1 scores (-5.6-0.1; mean = -2.66), which reach the lowest sustained values of the record. In this zone, the most prevalent grain sizes are clay and medium silt, with the geometric mean values varying between these two grain size categories (2.1-9.5 µm). Some divergence between values for mineral matter content and PC1 scores occurs during the ~1940s and ~1990s. Overall, data for Zone 4 are interpreted to reflect a period of relatively weak flood influence.

3.5 Stratigraphic variation in mineral matter content, PCA Axis 1 scores and grain size for the full stratigraphic record at WAB 1

Stratigraphic variations in mineral matter content, PC1 scores based on the trace element concentrations, and grain size demonstrate visibly strong correspondence throughout

most of the record at WAB 1, which captures a considerably shorter record than the core from WAB 2 (Figure 3-5). Temporal patterns of variation in the records are used to designate two zones that both capture intervals of strong flood influence but display differences in variability of values within each zone. Zone 1 (~1937 to 1990) is characterized by stable and high mineral matter content (87.8-91.1%; mean = 90.21%) and PC1 scores (-4.8-3.8 mean = 0.92), although the latter are lower during the 1940s. Some divergence between values for mineral matter content and PC1 scores occurs during ~1938-1963. In this zone, medium silt, which represents at most 7%, is the most common grain size category. Grain size variation reveals some discrepancies from the overall trends in mineral matter content and PC1 scores during ~1949-1952. Overall, Zone 1 is interpreted to reflect a period of relatively consistent and strong flood influence. Zone 2 (~1990 to 2019) is characterized by high, but more variable, mineral matter content (68.9-91.3%; mean = 87.31%) and PC1 scores (-13.6-3.9; mean = -1.28), and both variables demonstrate a sharp decline during the past few years. Some divergence between values for mineral matter content and PC1 scores occurs from ~1991-2000. In this zone, the grain size composition demonstrates a sudden decline in abundance of medium silt and variability increases markedly, ranging from clay to coarse silt. The geometric mean shows a decreasing trend through this zone with values falling largely within the clay size category. Grain size variation reveals some discrepancies from the overall trends in mineral matter content and PC1 scores during ~1990-1995. Overall, Zone 2 is interpreted to reflect a period of strong but variable flood influence. The abrupt declines in mineral matter content and PC1 scores, reflective of trace element concentrations, during the most recent ~3 years are likely due to dilution by organic matter that has not yet fully decayed, thus the trends may not be

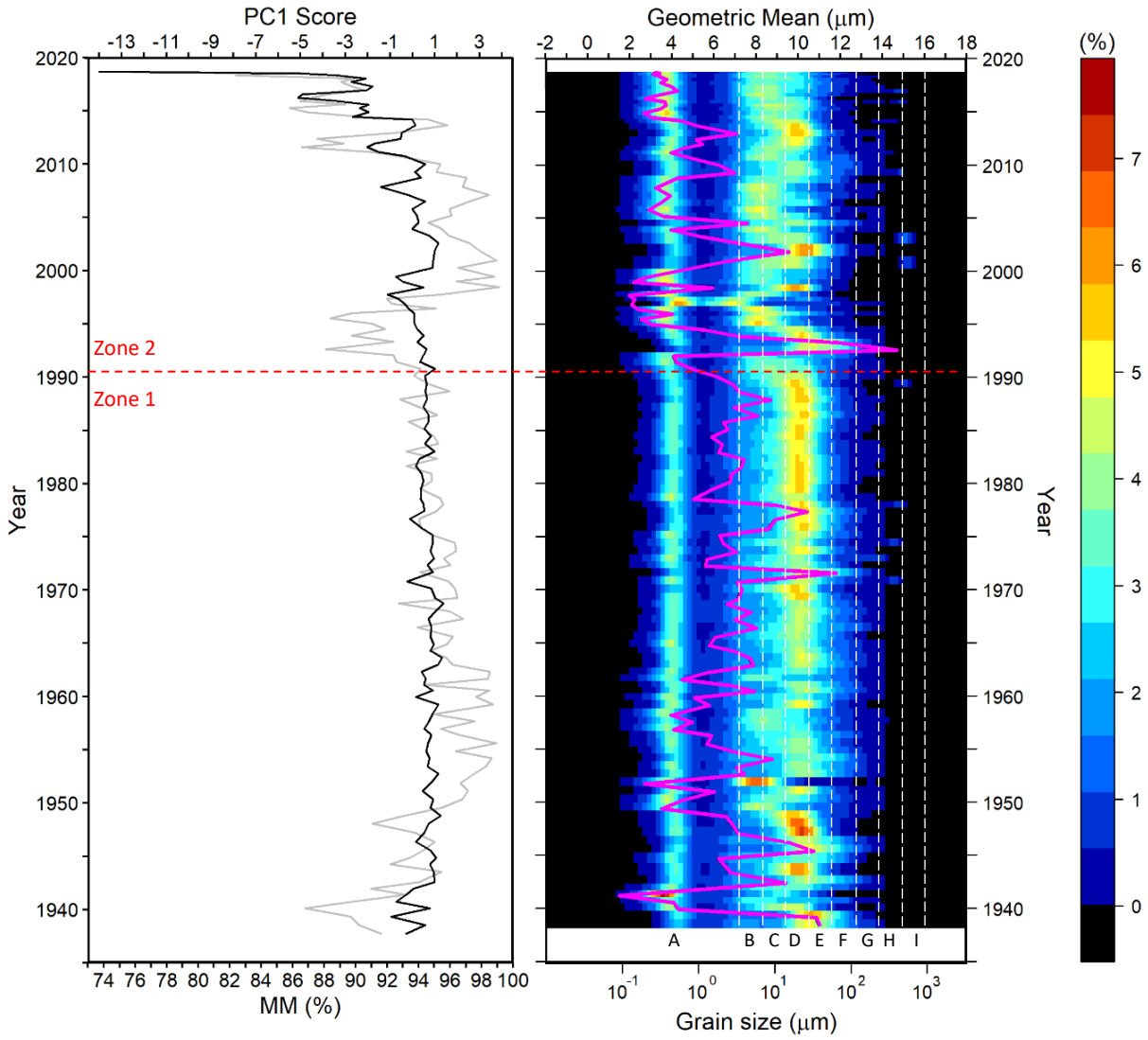

Figure 3-5. The left panel shows stratigraphic profiles of mineral matter (MM) content (%, black line) and PC1 scores based on elemental concentrations determined by analysis using XRF (grey line) for the sediment core from WAB 1. The right panel displays stratigraphic variation in sediment grain size. The vertical white dotted lines indicate separation between Wentworth grain size categories: A = clay, B = very fine silt, C = fine silt, D = medium silt, E = coarse silt, F = very fine sand, G = fine sand, H = medium sand, and I = coarse sand. The pink line represents the geometric mean of the grain size data (μm). Stratigraphic variation in these identified metrics were used to delineate two distinctive zones of differing influence of river floodwaters, as illustrated by the horizontal dashed red line and described in the text.

indicative of a sharp decline in flood influence. Geometric mean grain size attains two markedly high peaks in the 1970s and one in the early 1990s, which may be attributed high Wabasca River discharge contributing to known ice-jam flood events at the PAD in 1972, 1974, 1996 and 1997.

Chapter 4: Discussion

Insufficient long-term hydrometric data to address controversy over the effects of Peace River flow regulation versus climate on the decline in ice-jam flooding at the PAD motivated this investigation of past variation in spring flood influence at the Lower Wabasca River, one of the largest unregulated tributaries of the Peace River. The Wabasca River contributes discharge that is critical for the generation of downstream ice-jam floods that recharge the floodplain landscape of the PAD (Prowse and Lalonde, 1996; Prowse and Conly, 1998; Lamontagne et al., 2021). Thus, deciphering the long-term influence of the Wabasca River from paleolimnological reconstructions of past variation in flood influence during spring at flood-prone oxbow lakes adjacent to the Lower Wabasca River offers a critically missing perspective to address this controversy. The resulting ~250-year record of past variation in Wabasca River flood influence fosters enhanced understanding of a strong role for climate on the ice-jam flood regime of the Peace River at the PAD. Below, I discuss the effectiveness of stratigraphic measurements of mineral matter content, trace element concentrations, and grain size distributions on sediment cores from oxbow lakes to reconstruct a record of flood influence from the Wabasca River. I also discuss how differences in lake-specific features and ice-jam locations can influence these measurements and subsequent interpretation of the data. Then, I compare the reconstructed record of Wabasca River flood influence obtained from WAB 2 to stratigraphic records of Peace River flood influence developed from two oxbow lakes previously obtained in the PAD (Wolfe et al., 2006).

4.1 The effectiveness of multiple proxies in reconstructing past variation of flood influence and differing sensitivity of the Wabasca River oxbow lakes to flooding

Paleolimnological reconstructions of variation in flood influence at two oxbow lakes adjacent to the Wabasca River relied on three well-established sediment core analyses: 1) LOI to determine content of mineral matter (carbonate-free), 2) XRF to determine concentrations of trace elements, and 3) grain size distribution. Measurement of mineral matter content by LOI is effective in reconstructing past variation in flood influence because river floodwaters deliver mineral-rich suspended sediment to lakes (Lobo et al., 2001; Gasiorowski and Hercman, 2005; Wolfe et al., 2006, 2012; Lintern et al., 2016; Oliva et al., 2016; Kay et al., 2019). Measurement of concentrations of trace elements abundant in the Earth's crust (including Al, Ba, Cr, K, Rb, Si, Sr, Ti, V, Zn) by XRF is also useful to reconstruct past variation in flood influence because the elements are typically abundant within the mineral-rich sediment suspended in, and deposited by, river floodwaters (Cohen, 2003; Metcalfe et al., 2010; Kylander et al., 2011, Aufgebauer et al., 2012; Kämpf et al., 2012; Davies et al., 2015; Chagué-Goff et al., 2016; Evans et al., 2020; Peti and Augustinus, 2022). Indeed, use of PCA identified strong positive correlations between concentrations of crustal trace elements and mineral matter content in sediment profiles from the two oxbow lakes adjacent to the Wabasca River, which was captured along the first PCA axis. Other studies have also analyzed the same parameters in lake sediment cores using PCA and have found similar results, where concentrations of allochthonous elements and mineral matter are strongly and positively correlated along the first PCA axis (e.g., Giralt et al., 2011; Wilson et al., 2014; Kaboth-Bahr et al., 2019; Peti and Augustinus, 2022). These results support rationale for interpreting stratigraphic variation of PC1 scores as indicative of past variation in

flood influence. Lastly, quantification of grain size distribution also provides useful information on past variation of flood influence, with a distinct ability to infer past variation in energy of floodwaters (Sly, 1978; Teller and Last, 1990; Saarinen and Petterson, 2001; Wolfe et al., 2006).

In the stratigraphic profiles generated for WAB 2 and WAB 1, mineral matter content and PC1 scores of trace element concentrations covaried, with grain size distributions largely displaying correspondence whilst also providing unique variations. Consequently, mineral matter content and PC1 scores of trace element concentrations were mainly used for paleohydrological reconstruction and establishment of stratigraphic zones that distinguish intervals of stronger and weaker flood influence at the locations of the oxbow lakes. At WAB 2, four zones of marked variation in flood influence were discerned during the past ~250 years. Zone 1 (~1765-1825) and Zone 3 (~1880-1930) were interpreted as intervals when flood influence was relatively strong, whereas Zone 2 (~1825-1880) and Zone 4 (~1930-2019) were interpreted as intervals when flood influence was weaker. At WAB 1, there was no interval of weak flood influence; rather this location has remained strongly influenced by river floodwaters throughout the entire ~80-year period captured by the sediment core. As such, two zones were identified based on differing temporal variability of flood influence. Zone 1 (~1937-1990) was interpreted as an interval consisting of relatively stable and strong flood influence, whereas Zone 2 (~1990-2019) was interpreted as an interval consisting of strong but more variable flood influence.

Marked differences between the paleohydrological records obtained from the two river-proximal oxbow lakes reveal that lake-specific features at WAB 1 and WAB 2 affect the signals

of flood influence captured by the sediment records. During the period from ~1937-present, high mineral matter content and PC1 scores (Figure 3-5), and rapid sedimentation (Figure 3-1) indicate that WAB 1 has remained highly flood-prone, which is in contrast with variables that indicate weaker flood influence at WAB 2 during this period. This contrast is likely a consequence of continuous and strong connectivity between the river and WAB 1, potentially due to a connecting channel or sill threshold that is readily overspilled by river floodwaters during moderate to high discharge events on the Wabasca River. WAB 1 may also be located close to a location where ice-jams frequently form on the Wabasca River and raise the river stage proximal to WAB 1. Due to apparent lower sensitivity of WAB 1 to detect temporal variation in the strength of Wabasca River flood influence, the record from WAB 2 is relied upon for assessment of temporal variation in high spring discharge events on the Wabasca River and its relations with flood regimes at the PAD.

Paleolimnological analyses of the WAB 2 sediment core demonstrated that this oxbow lake provides an informative record of temporal variation in influence of Wabasca River floodwaters, which may be attributed to at least three characteristics of this lake. Firstly, WAB 2 is located near a bend in the river (Figure 2-3) where ice-jams are likely to form and direct river floodwaters into the basin. Secondly, WAB 2 appears to have a sill threshold that is exceeded only during high spring discharge events of the Wabasca River. This observation is evidenced by stratigraphic variation in mineral matter content and PC1 scores at WAB 2 since 1964, which correspond well with the record of maximum single-day spring discharge of the Wabasca River during the spring freshet (Figure 3-3). Peaks in these records closely align with known years of

major ice-jam flood events at the PAD (Figure 3-3). Thirdly, although oxbow lakes possess challenging sedimentary environments for paleolimnological studies due to high rates of variable sediment influx associated with episodic river flood events, WAB 2 fortunately had a sediment core record that could be dated with confidence by constraining the CRS model based on the ^{210}Pb activity profile to a peak in ^{137}Cs activity using the Reference Date Method.

Correspondence between stratigraphic variation in mineral matter content and PC1 scores at WAB 2 and the hydrometric record of maximum single-day spring discharge for the Wabasca River provides confidence that paleohydrological records from WAB 2 reflect past variation in influence of Wabasca River floodwaters during the past ~250 years. However, during two brief intervals (~2001-2003, ~2009-2012), variations in both mineral matter content and PC1 scores did not compare well with the maximum single-day spring discharge record for the Wabasca River. Such discrepancies may occur if, in some years, ice-jams form on the Wabasca River near enough to WAB 2 to cause flooding at WAB 2 but river flow was not high enough at the hydrometric station to record a marked peak in spring discharge. Additional intervals where PC1 scores of the trace element concentrations did not covary with the hydrometric record suggest that mineral matter content is the more reliable reflection of variation in maximum single-day spring discharge of the Wabasca River than the PC1 scores. For example, spring discharge peaks recorded at the gauging station on the Wabasca River in 1996 and 1997, when major ice-jam flood events are known to have occurred at the PAD, and in 2013, appear to correspond with a rise of mineral matter content and geometric mean of the grain size data but with little change in PC1 scores (Figure 3-3, 3-4). Inconsistencies between

the mineral matter content and PC1 scores records may be due to influence of some elements that are weakly correlated with PCA axis 1 (e.g., Ni, Sb, Zr, Ca, Cu, W, Mn; Figure 3-2).

Information about the location of ice-jam formation during periods of strong flood influence (i.e., Zone 1 and Zone 3) can be speculated on by comparing grain size distribution to mineral matter content and PC1 scores. Zone 1, a period with high mineral matter content, high PC1 scores, and relatively coarser grained sediment (Figure 3-4), may indicate ice-jams formed relatively close to WAB 2, allowing high energy floodwaters to deliver coarser grained sediment to the lake. In contrast, Zone 3, a period with high mineral matter content and PC1 scores but lower abundance of coarser grained sediment and higher abundance of clay sized sediment (Figure 3-4), may indicate ice-jams formed at a greater distance from WAB 2, resulting in dissipation of flow energy and deposition of coarser grained sediment before the floodwaters entered WAB 2. The weight of evidence based on PC1 scores derived from numerous XRF elements and mineral matter content supports interpretation that more distant ice-jam flood locations may be responsible for the high proportion of clay-sized sediment during a flood-prone period. Nonetheless, sedimentation in floodplain lakes is complex, and sediment sources and depositional processes beyond those mentioned in this scenario are possible. In conclusion, while grain size analysis can be used to track past variation in floodwater energy and spring discharge, the potential influence of ice-jam location on grain size variation supports its use as a supporting metric to mineral matter and trace element concentrations.

4.2 Comparison of temporal shifts in spring-flood influence at the Wabasca watershed and Peace River at the PAD inferred from oxbow lake sediment cores

If climatic conditions are driving the influence of the Wabasca River as a 'trigger tributary' for formation of ice-jam floods at the PAD, then coherent temporal patterns of variation in river flood influence should be apparent between flood-prone lakes adjacent to the Wabasca and Peace rivers. Indeed, this is observed when comparing the timing of four zones of stronger and weaker flood influence among stratigraphic profiles of mineral matter content and PC1 scores at WAB 2, and stratigraphic profiles of magnetic susceptibility from oxbow lakes PAD 15 and PAD 54 in the northern Peace sector of the PAD, ~350 km downstream of where the Wabasca River drains into the Peace River (Wolfe et al., 2006; Figure 4-1). The zones of stronger flood influence that were identified at WAB 2, Zone 1 (late 1700s-early 1800s) and Zone 3 (~late 1800s-early 1900s), align well with intervals of relatively high magnetic susceptibility at the PAD oxbow lakes, noting that the shorter PAD 54 record does not extend into Zone 1. In addition, the two zones of weaker flood influence that were identified at WAB 2, Zone 2 (~mid-1800s) and Zone 4 (~1930-onwards), align well with periods of lower magnetic susceptibility at both PAD oxbow lakes. Notably, all three oxbow lakes at the PAD and Wabasca watershed demonstrate a trend of declining influence of river floodwaters since at least ~1930, preceding the onset of Peace River flow regulation by the W.A.C. Bennett Dam by almost four decades.

Among the oxbow lake paleohydrological records, some minor discrepancies in correspondence are observed and can likely be accounted for by chronological uncertainties, differences in lake sill elevation, and temporally shifting locations of ice-jam formation. The timing of zone boundaries among the three oxbow lake records are offset by at most ten years

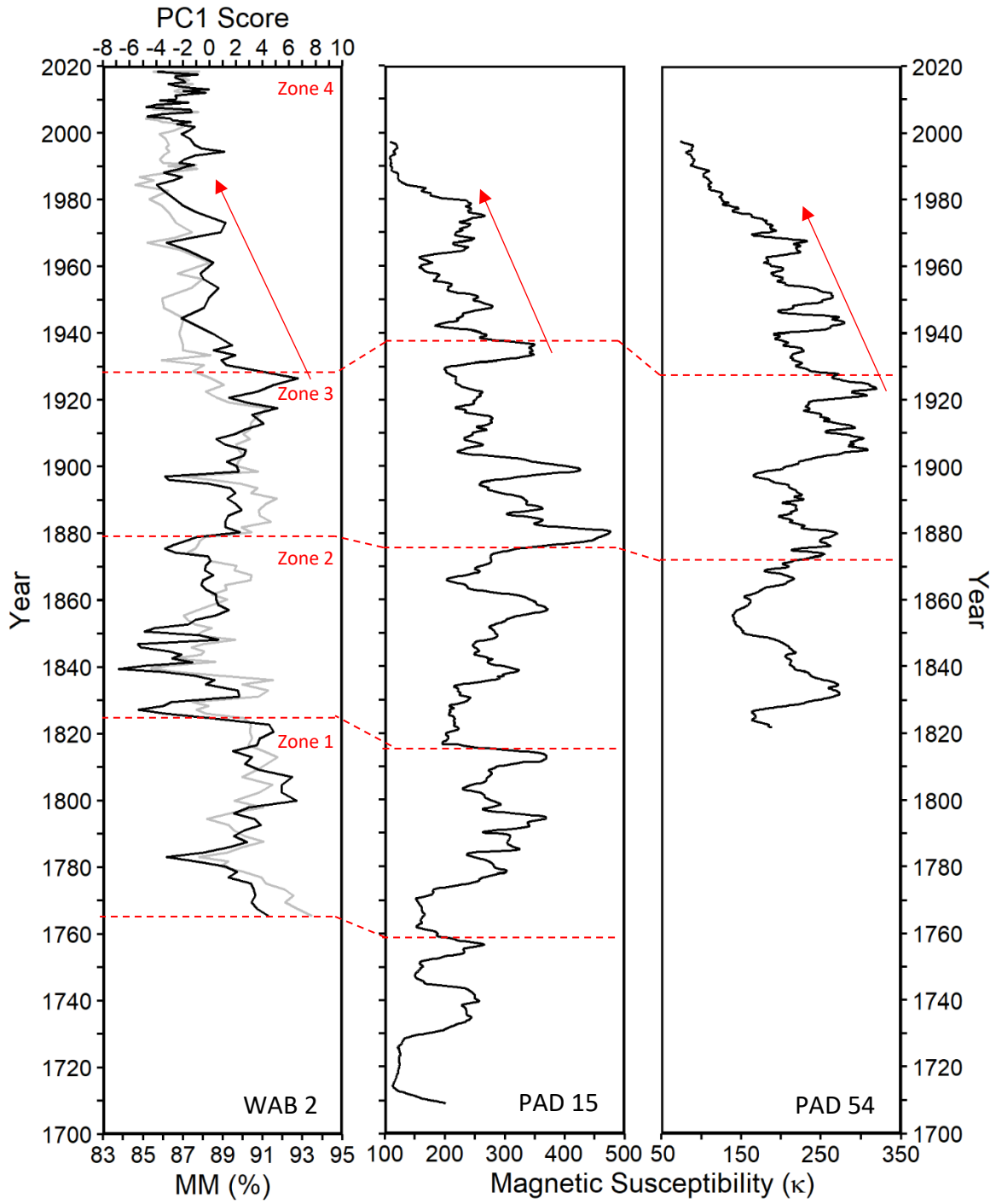

Figure 4-1. Comparison of stratigraphic profiles of mineral matter (MM) content (%, black line) and PC1 scores (grey line) at oxbow lake WAB 2 adjacent to the Wabasca River (presented in Figure 3-4) to paleoflood records based on measurements of magnetic susceptibility (five-year running average) at oxbow lakes PAD 15 and PAD 54 in the Peace-Athabasca Delta (Wolfe et al., 2006). Horizontal red dashed lines correlate the zone boundaries identified at WAB 2 with similar intervals of inferred flood influence based on the records at PAD 15 and PAD 54. Red arrows convey a declining trend in flood influence since ~1930 observed at all three lakes.

(Figure 4-1), which is likely the product of chronological uncertainties resulting from variable sedimentation that is characteristic of oxbow lakes subjected to variations in river flood influence (Wolfe et al., 2006). Other causes of slight temporal inconsistencies in the stratigraphic records are differences in sill elevations, which could result in spring floodwaters surpassing the sill threshold and entering one lake, but not entering other lakes with slightly higher sill elevations. This phenomenon resulted in a lower frequency of river flooding at PAD 15 compared to PAD 54 because the former has a higher sill elevation (Wolfe et al., 2006). Also, locations of ice-jams can shift between years (Beltaos, 2018b). This could affect the magnitude and duration of flooding received at one oxbow lake relative to another, and the associated paleohydrological signal preserved in the sediments. Although these factors have potential to generate slight differences among the paleohydrological records, the ability to identify similar zonal boundaries among the records suggests reconstructions of intervals of river flood influence at these sites are robust.

Close correspondence among stratigraphic profiles for the three oxbow lakes provides evidence that, during the past ~250 years, temporal variation in climatic conditions has generated distinct zones of varying ice-jam flood influence at both the Lower Wabasca River and the Lower Peace River adjacent to the PAD, and reinforces the key role of Wabasca River spring discharge in generating ice-jam floods on the Lower Peace River at the PAD. Furthermore, other regional instrumental and paleoenvironmental evidence supports the decadal-scale intervals of varying flood influence. For example, the period of inferred strong flood influence during Zone 3 (~late 1800s-early 1900s) is consistent with high precipitation and

discharge in major rivers of the Canadian Prairies during ~1880-1920 (Case and MacDonald, 1995; Sauchyn and Beaudoin, 1998; Watson and Luckman, 2001, Case and MacDonald, 2003). At the PAD during the early 1900s, higher-than-average flood frequency is captured by Traditional Knowledge and historical records (Timoney et al., 1997), and tree-ring and lake sediment records reconstructed high water levels at Lake Athabasca (Stockton and Fritts, 1973; Wolfe et al., 2011). In addition, weak flood influence during Zone 2 (~mid-1800s) coincides with drought and low river streamflow in the Canadian Prairies (Thomas, 1965; Case and MacDonald, 2003), and lower-than-average flood frequency at the PAD (Timoney et al., 1997). Lastly, weak flood influence during Zone 4 (~1930-onwards) coincides with declining flood frequency captured by Traditional Knowledge and historical records (Timoney, 2002) and water level drawdown at several perched basins within the PAD inferred from paleohydrological reconstructions (Wolfe et al., 2005, 2008a, 2012; Remmer et al., 2018).

4.3 Comparison of stratigraphic records from oxbow lakes along the Lower Wabasca and Peace rivers during the past 100 years to assess the role of Peace River flow regulation by the W.A.C. Bennett Dam on the flood regime at the PAD

The complete ~250-year oxbow lake paleohydrological records inform on the long-term influence of climate on spring discharge of the Wabasca and Peace rivers. Closer examination of the role of Peace River flow regulation on the ice-jam flood regime at the PAD can be achieved by considering a pre-regulation period that is about equal in duration to the post-regulation period (Beltaos, 2018b; Figure 4-2). In accordance with this recommendation, if regulation of Peace River flow by the W.A.C. Bennett Dam has reduced the frequency and magnitude of ice-jam flood events at the PAD, then directional change to weaker river flood influence at the onset of regulation in 1968 would be observed in stratigraphic records from oxbow lakes at PAD

15 and PAD 54, but not at WAB 2. However, if variation in climatic conditions drives the frequency and magnitude of ice-jam flood events at the PAD by regulating the influence of the Wabasca River as a trigger tributary, then stratigraphic records from all three oxbow lakes should correspond closely both before and since regulation of Peace River flow by the W.A.C. Bennett Dam.

Comparison among the oxbow lake records since ~1920, and also the hydrometric records of maximum single-day spring discharge for the Wabasca River at Highway No. 88 and the Peace River at Peace Point, display corresponding approximately decadal shifts both prior to and since regulation of Peace River flow by the W.A.C. Bennett Dam (Figure 4-2). These decadal shifts are approximated by the blue and orange arrows in Figure 4-2 for visual and illustrative purposes to demonstrate corresponding trends among panels. As illustrated by the blue arrows in Figure 4-2, the early portion of Zone 4 at WAB 2, PAD 15 and PAD 54 provides evidence of declining flood influence during the ~1930s to 1940s followed by an increase during the ~1940s and 1950s. Similarly, after onset of regulation of Peace River flow, all three records reveal a decline in flood influence after the major ice-jam flood event in 1974 until the next major ice-jam flood events in 1996 and 1997, as indicated by the orange arrows in Panels A-C of Figure 4-2. This corresponds well with an interval of low maximum single-day spring discharge at the two hydrometric stations between 1974 and 1996 without known major ice-jam flood events at the PAD (Prowse and Conly, 1998; Wolfe et al., 2006; Timoney, 2021). The 1975-1995 interval closely followed the onset of river regulation in 1968 and has been used as evidence that the W.A.C. Bennett Dam caused reduction of ice-jam floods at the PAD and, by inference,

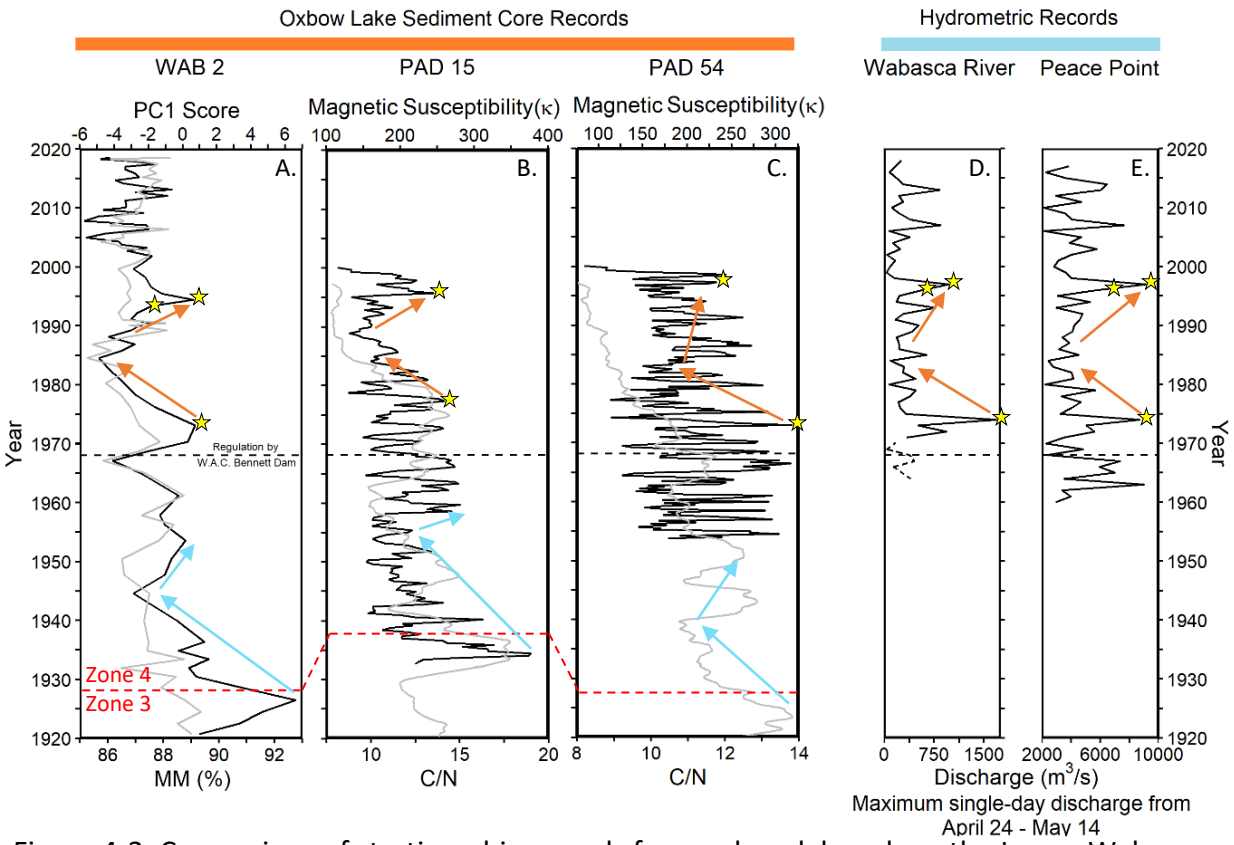

Figure 4-2. Comparison of stratigraphic records from oxbow lakes along the Lower Wabasca and Peace rivers during the past 100 years to assess the role of Peace River flow regulation by the W.A.C. Bennett Dam on the flood regime at the PAD. The stratigraphic records include profiles of mineral matter content (black line) and PC1 scores (grey line) at oxbow lake WAB 2 adjacent to the Lower Wabasca River (A), and profiles of magnetic susceptibility (five-year running average; grey lines) and C/N ratios (black lines) at oxbow lakes PAD 15 (B) and PAD 54 (C) along the Lower Peace River at the Peace-Athabasca Delta (Wolfe et al., 2006). C/N ratios are included because they are relatively unaffected by confounding influence of rising water content and declining sediment compaction in the upper sediments, factors which affect the magnetic susceptibility measurements. The records from the three oxbows have varying temporal resolution, with the coarsest resolution at WAB 2 and the finest resolution at PAD 54. Horizontal red dashed lines correlate the beginning of Zone 4 among all three oxbow lakes and blue arrows indicate corresponding river flood influence trends prior to W.A.C. Bennett Dam regulation, acknowledging minor dating uncertainties. Graphs D-E show maximum single-day discharge (m^3/s) from April 24 – May 14. Graph D shows the record at the 'Wabasca River at Highway No. 88' (solid line) and 'Wabasca River above Peace River' hydrometric stations (dashed line). Graph E shows the record at the Peace Point hydrometric station on the Peace River. For all five records, yellow stars indicate the 1974, 1996 and 1997 major ice-jam flood events at the PAD and orange arrows reveal the mid-1970s to early-1990s interval without substantial ice-jam flooding at the PAD (Prowse and Conly, 1998; Wolfe et al., 2006; Timoney, 2021).

drying of the delta's perched basins (i.e., Prowse and Conly, 1998; Peters and Prowse, 2001; Beltaos, 2018a). However, common decadal-scale variation spanning from before installation of the W.A.C. Bennett Dam to after dam operation at both the unregulated Wabasca River and the regulated Peace River identifies climate as the main driver of ice-jam flood frequency at the PAD. Consistent with this conclusion is a decline in snowpack depth and rise in winter temperature in the mid-1970s across much of the Peace River watershed, including the Wabasca and Smoky river basins, associated with a change in atmospheric circulation patterns (Graham et al., 1994; Keller, 1995, 1997; Moore and McKendry, 1996; Lamontagne et al., 2021).

Chapter 5: Conclusions, Recommendations, and Implications

5.1 Key findings

Using multi-proxy paleolimnological reconstructions at an oxbow lake adjacent to the unregulated Wabasca River (WAB 2), this research aimed to improve understanding of the temporal variation in influence of spring discharge from the Wabasca River watershed on the ice-jam flood regime at the PAD. This enabled evaluation of the relative roles of climate and regulation of Peace River flow by the W.A.C. Bennett Dam on the decline of ice-jam flood influence and perched lake drawdown at the PAD during recent decades. Since the 1960s, when Wabasca River hydrometric records began, there is strong correspondence among peaks in maximum single-day spring discharge, stratigraphic changes in mineral matter content and PC1 scores of trace element concentrations in sediment at WAB 2, and years of known major ice-jam flood events at the PAD. This coherence provides confidence that key paleohydrological variables measured in the WAB 2 ~250-yr sediment record capture signals associated with temporal variation in maximum single-day spring discharge of the Wabasca River. The paleohydrological records at WAB 2 and two previously studied oxbow lakes (PAD 15, PAD 54; Wolfe et al., 2006) located ~350 river-km downstream at the PAD distinguish four similar zones of inferred flood influence. This finding suggests that climate has long exerted a dominant influence on ice-jam flood regimes of the Wabasca and Peace rivers. Furthermore, paleohydrological records revealed comparable decadal-scale variation in inferred flood influence at the three oxbow lakes both before (since ~1920) and after regulation of Peace River flow, providing additional evidence that climatic variation is the main driver of change to

ice-jam flood regimes at the PAD and that the Wabasca River continues to be an important trigger tributary for ice-jam floods at the PAD.

5.2 Recommendations

Paleohydrological interpretations of stratigraphic variation in variables measured in sediment cores from oxbow lakes relies on adequate characterization of sediment delivered by floodwaters and of the physiography of the basin and surrounding landscape. To strengthen characterization of sediment delivered by floodwaters, trace element signatures and grain size distributions could be examined in Wabasca River riverbank and surface sediment samples. These measurements would increase confidence in identifying allochthonous elements and sediment sources. It could also be beneficial to sample suspended sediment in river floodwaters at a range of distances along the flood pathway from the Wabasca River to actively flooding oxbow lakes during an ice-jam flood event to better inform interpretations of flood influence from grain-size analysis. Moreover, to strengthen characterization of the basin and surrounding landscape physiography, sill elevation and distances between the Wabasca River and the oxbow lakes could be measured. These measurements would enhance understanding of the likelihood that river floodwaters will enter the basin and could thus help rationalize potential differences in flood influence reconstructions among oxbow lakes in a watershed (i.e., WAB 1 and WAB 2). These recommendations are applicable to potential future studies aimed at building on findings from this study of the Wabasca watershed, but also applicable to paleolimnological studies conducted at flood-prone oxbow lakes elsewhere to improve interpretation of sediment core records.

Additional paleohydrological studies conducted in the Wabasca watershed would be helpful to corroborate the paleo-flood influence record at WAB 2. This could be accomplished by obtaining and analyzing sediment cores from additional oxbow lakes along the Wabasca River. Also, reconstruction of past variation in lake water balance at upland lakes within the Wabasca watershed to infer a record of climate-driven hydrological change without the confounding influence of river floodwater inputs is currently being conducted by fellow MSc student, Hannah Thibault. Thibault's work will provide insight to past climatic conditions in the Wabasca watershed by analyzing variation in snowmelt runoff, an important input to upland shallow lakes such as these (Schindler and Donahue, 2006; Wolfe et al., 2008a). Results will be compared to the paleo-flood influence record at WAB 2 to investigate past relations between climatic conditions and spring flooding triggered by snowmelt runoff of the Wabasca River.

5.3 Implications

This study's overarching finding that variation in climatic conditions, not Peace River flow regulation, is the main determinant of shifts in the ice-jam flood regime of the Peace River at the PAD can guide the WBNP Action Plan and improve environmental stewardship decisions aimed at protecting the PAD. In contrast to past and current efforts to raise water levels in the PAD by mitigating the effects of river regulation through weir installations and timed discharge releases (IEC, 2018), future efforts need to address the effects of changing climatic conditions. Although there is no quick fix for combatting climatic changes responsible for diminishing water levels at the PAD, strategies for effective natural resource stewardship should emphasize focus on mitigating effects of ongoing and projected future climatic variations.

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Appendices

Appendix A: Information on the Wabasca watershed upland lakes

Table A-1. Upland lakes sampled in the Wabasca watershed, their respective sediment cores and analyses performed.

Upland Lake				
Wabasca 3		C2 	C1 	C3 
	Sampled September 9, 2019	Length: 78.5 cm	Length: 69.5 cm	Length: 68.5 cm
	Location of coring site: 58°00'15.60"N, 115°24'36.70"W	Analyses: Radiometric dating, LOI, Organic Carbon and Nitrogen Elemental and Isotope Composition	Analyses: None	Analyses: None
	Water depth at coring location: 0.7 m			
Wabasca 4		C3 	C1 	C2 
	Sampled September 9, 2019	Length: 62 cm	Length: 63.5 cm	Length: 53.5 cm
	Location of coring site: 58°14'42.70"N, 115°36'58.20"W	Analyses: LOI	Analyses: None	Analyses: None
	Water depth at coring location: 1.2 m			
Wabasca 5		C2 	C1 	C3 
	Sampled September 9, 2019	Length: 52 cm	Length 43 cm	Length: 35.5 cm
	Location of coring site: 58°00'55.90"N, 115°25'31.20"W	Analyses: LOI	Analyses: None	Analyses: None
	Water depth at coring location: 1.5 m			

Appendix B: Comparison between Wabasca River discharge and stratigraphic variation in mineral matter content and PCA Axis 1 scores at WAB 1

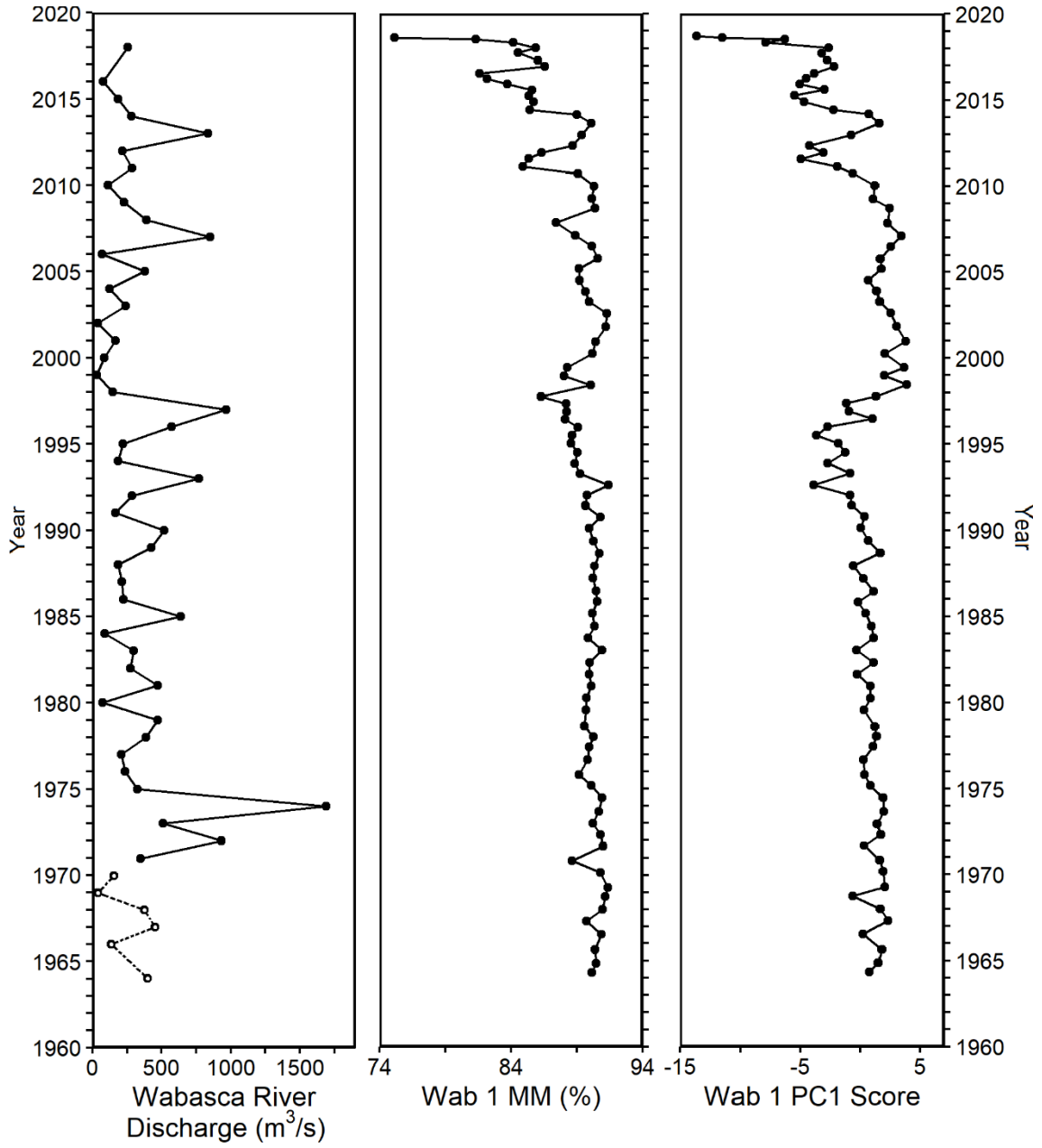

Figure B-1. Graphs showing maximum single-day spring discharge of the Wabasca River and stratigraphic variation in mineral matter content and PCA axis 1 (PC1) scores at oxbow lake WAB 1. Left panel shows annual single-day maximum discharge (m^3/s) for the Wabasca River at hydrometric station 'Wabasca River at Highway No. 88' (filled circles, solid line) and 'Wabasca River above Peace River' hydrometric stations (open circles, dashed line) during the 3-week period when ice-jam floods typically occur at the PAD (April 24-May 14). Middle panel shows stratigraphic variation during the past ~55 years in mineral matter (MM) content (%) at oxbow lake WAB 1. The right panel shows stratigraphic variation in PCA Axis 1 scores of the elemental concentration data in the sediment core from WAB 1.

Appendix C: Loss-on-ignition and C&N isotope and elemental data

Table C-1. WAB 1 Sediment Core.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	%H_2O	%OM	%MM	%$CaCO_3$
2018.62	0.0	0.5	94.22	26.33	68.93	4.74
2018.51	0.5	1.0	86.88	19.87	75.14	4.98
2018.33	1.0	1.5	77.11	13.47	81.29	5.23
2018.03	1.5	2.0	68.75	11.26	84.15	4.59
2017.73	2.0	2.5	55.61	9.34	85.87	4.79
2017.31	2.5	3.0	59.65	10.28	84.50	5.22
2016.95	3.0	3.5	59.63	8.94	86.04	5.03
2016.54	3.5	4.0	55.09	9.29	86.56	4.15
2016.24	4.0	4.5	64.89	13.41	81.61	4.98
2015.93	4.5A	5.0A	63.35	12.85	82.16	4.99
2015.93	4.5B	5.0B	63.29	14.48	80.56	4.95
2015.60	5.0	5.5	63.11	11.20	83.72	5.08
2015.26	5.5	6.0	63.77	9.18	85.57	5.25
2014.89	6.0	6.5	59.55	9.75	85.35	4.90
2014.44	6.5	7.0	60.99	9.16	85.71	5.13
2014.17	7.0	7.5	60.75	10.20	85.42	4.38
2013.67	7.5	8.0	48.30	6.38	88.99	4.62
2012.96	8.0	8.5	43.34	6.20	90.10	3.69
2012.36	8.5	9.0	47.07	7.06	89.34	3.60
2011.95	9.0	9.5	52.66	7.15	88.65	4.20
2011.59	9.5A	10.0B	59.34	8.85	86.30	4.85
2011.59	9.5B	10.0B	57.58	8.75	86.47	4.78
2011.14	10.0	10.5	57.96	9.25	85.32	5.43
2010.74	10.5	11.0	56.09	8.56	84.90	6.54
2010.02	11.0	11.5	42.95	6.88	89.08	4.03
2009.26	11.5	12.0	39.16	5.57	90.28	4.15
2008.71	12.0	12.5	42.46	6.23	90.12	3.65
2007.86	12.5	13.0	34.74	5.86	90.37	3.77
2007.10	13.0	13.5	40.99	8.39	87.42	4.19
2006.48	13.5	14.0	44.38	6.69	88.87	4.44
2005.78	14.0	14.5	40.41	5.58	90.13	4.29
2005.17	14.5A	15.0A	36.92	6.01	90.58	3.41
2005.17	14.5B	15.0B	47.05	6.82	88.76	4.42
2004.51	15.0	15.5	41.12	6.12	89.14	4.73
2003.89	15.5	16.0	40.55	5.99	89.19	4.81
2003.27	16.0	16.5	43.33	6.42	89.64	3.94
2002.60	16.5	17.0	42.21	5.33	89.94	4.73
2001.83	17.0	17.5	33.39	4.74	91.26	4.00
2000.95	17.5	18.0	35.07	4.97	91.18	3.85
2000.25	18.0	18.5	34.66	5.08	90.42	4.50
1999.44	18.5	19.0	39.94	5.12	90.19	4.69
1998.97	19.0	19.5	52.86	7.44	88.24	4.31
1998.44	19.5A	20.0A	50.47	6.63	88.04	5.33

1998.44	19.5B	20.0B	52.46	7.34	87.43	5.23
1997.77	20.0	20.5	42.61	5.71	90.05	4.25
1997.36	20.5	21.0	61.34	8.00	86.27	5.73
1996.89	21.0	21.5	54.52	7.31	88.16	4.53
1996.46	21.5	22.0	55.79	6.89	88.22	4.89
1995.99	22.0	22.5	53.80	6.64	88.12	5.25
1995.52	22.5	23.0	53.91	6.28	89.08	4.64
1995.05	23.0	23.5	56.90	6.27	88.64	5.10
1994.52	23.5	24.0	54.30	6.25	88.55	5.20
1993.89	24.0	24.5	43.65	6.07	89.04	4.90
1993.30	24.5A	25.0A	43.81	5.80	88.83	5.37
1993.30	24.5B	25.0B	43.17	5.54	89.73	4.73
1992.63	25.0	25.5	44.99	6.07	89.25	4.68
1992.04	25.5	26.0	39.47	5.49	91.38	3.13
1991.46	26.0	26.5	45.53	5.71	89.77	4.52
1990.78	26.5	27.0	43.45	5.90	89.65	4.45
1990.13	27.0	27.5	36.77	4.94	90.78	4.27
1989.39	27.5	28.0	37.79	5.62	89.91	4.47
1988.67	28.0	28.5	39.05	5.50	90.25	4.24
1987.94	28.5	29.0	35.88	5.59	90.69	3.72
1987.21	29.0	29.5	41.08	5.46	90.32	4.22
1986.45	29.5A	30.0A	37.54	5.45	90.22	4.33
1986.45	29.5B	30.0B	37.17	5.94	90.09	3.96
1985.83	30.0	30.5	41.22	5.38	90.46	4.16
1985.17	30.5	31.0	38.73	5.37	90.54	4.09
1984.44	31.0	31.5	40.77	5.63	90.19	4.17
1983.74	31.5	32.0	37.44	5.21	90.35	4.44
1983.02	32.0	32.5	38.16	5.62	89.86	4.52
1982.33	32.5	33.0	40.74	4.97	90.88	4.14
1981.63	33.0	33.5	42.43	5.94	89.95	4.10
1980.96	33.5	34.0	40.96	6.17	89.91	3.93
1980.25	34.0	34.5	38.43	5.82	90.08	4.10
1979.56	34.5A	35.0A	39.11	5.97	89.73	4.30
1979.56	34.5B	35.0B	40.11	5.44	90.60	3.95
1978.61	35.0	35.5	39.42	5.85	89.69	4.47
1978.03	35.5	36.0	39.30	5.88	89.57	4.55
1977.44	36.0	36.5	38.20	5.71	90.25	4.05
1976.69	36.5	37.0	37.38	5.64	89.93	4.43
1975.82	37.0	37.5	39.41	6.57	89.81	3.62
1975.18	37.5	38.0	38.30	5.78	89.15	5.07
1974.47	38.0	38.5	35.77	5.14	90.09	4.76
1973.66	38.5	39.0	38.96	5.11	90.92	3.96
1972.97	39.0	39.5	37.99	5.24	90.68	4.08
1972.33	39.5A	40.0A	41.17	4.68	90.20	5.12
1972.33	39.5B	40.0B	42.92	5.32	90.82	3.86
1971.68	40.0	40.5	41.17	5.43	90.80	3.77

1970.82	40.5	41.0	31.58	5.09	90.99	3.93
1970.16	41.0	41.5	43.27	6.75	88.64	4.61
1969.27	41.5	42.0	39.52	5.18	90.78	4.04
1968.75	42.0	42.5	39.79	4.94	91.35	3.71
1967.98	42.5	43.0	36.52	4.43	91.15	4.42
1967.30	43.0	43.5	36.55	4.96	90.93	4.11
1966.52	43.5	44.0	40.60	5.37	89.74	4.89
1965.63	44.0	44.5	31.81	5.18	90.87	3.96
1964.86	44.5A	45.0A	38.23	5.12	90.38	4.50
1964.86	44.5B	45.0B	40.49	5.39	90.14	4.47
1964.32	45.0	45.5	39.76	5.05	90.45	4.50
1963.67	45.5	46.0	38.75	5.26	90.12	4.62
1963.00	46.0	46.5	36.25	4.50	91.35	4.15
1962.35	46.5	47.0	42.38	4.79	90.83	4.37
1961.69	47.0	47.5	40.85	5.82	89.99	4.19
1961.10	47.5	48.0	48.97	5.54	89.86	4.61
1960.57	48.0	48.5	41.61	5.67	89.57	4.76
1959.94	48.5	49.0	43.26	5.10	90.43	4.47
1959.25	49.0	49.5	40.58	6.16	90.24	3.60
1958.34	49.5A	50.0A	39.29	4.65	91.00	4.35
1958.34	49.5B	50.0B	40.38	4.85	91.06	4.09
1957.70	50.0	50.5	42.81	5.12	90.28	4.60
1956.98	50.5	51.0	39.02	5.35	89.95	4.69
1956.39	51.0	51.5	41.12	5.63	89.87	4.50
1955.62	51.5	52.0	39.04	5.19	89.68	5.13
1954.88	52.0	52.5	37.62	5.40	89.81	4.79
1954.23	52.5	53.0	39.21	5.51	90.10	4.39
1953.43	53.0	53.5	38.25	5.30	91.07	3.63
1952.75	53.5	54.0	35.71	5.44	90.99	3.57
1951.87	54.0	54.5	32.79	4.75	91.38	3.88
1951.15	54.5A	55.0A	33.74	5.12	90.25	4.63
1951.15	54.5B	55.0B	34.84	5.30	90.74	3.95
1950.36	55.0	55.5	38.04	5.76	90.03	4.21
1949.58	55.5	56.0	37.15	5.07	91.00	3.93
1948.83	56.0	56.5	33.34	5.24	91.02	3.75
1948.08	56.5	57.0	32.79	4.61	91.09	4.30
1947.24	57.0	57.5	33.14	5.36	90.21	4.43
1946.36	57.5	58.0	35.56	5.63	89.36	5.01
1945.58	58.0	58.5	40.69	6.16	89.41	4.43
1944.88	58.5	59.0	35.16	5.26	91.09	3.65
1944.25	59.0	59.5	39.49	4.90	91.10	3.99
1943.54	59.5A	60.0A	37.37	5.16	90.15	4.69
1943.54	59.5B	60.0B	37.87	5.43	90.26	4.31
1942.60	60.0	60.5	34.54	5.04	90.59	4.37
1941.97	60.5	61.0	37.48	4.99	90.54	4.47
1941.41	61.0	61.5	45.84	6.32	89.39	4.29

1940.73	61.5	62.0	42.39	6.80	88.09	5.11
1940.13	62.0	62.5	46.60	7.41	87.78	4.81
1939.34	62.5	63.0	34.82	5.27	90.05	4.68
1938.52	63.0	63.5	35.01	7.75	88.74	3.50
1937.71	63.5	64.0	33.72	5.57	90.66	3.77
1937.07	64.0	64.5	41.07	6.84	88.44	4.72

Table C-2. WAB 2 Sediment Core.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	%H_2O	%OM	%MM	%$CaCO_3$
2018.60	0.0	0.5	83.13	9.87	86.08	4.05
2018.33	0.5	1.0	74.18	9.69	85.75	4.56
2017.92	1.0	1.5	69.20	9.03	86.91	4.05
2017.50	1.5	2.0	67.47	8.00	87.76	4.25
2017.05	2.0	2.5	61.92	8.63	86.63	4.75
2016.56	2.5	3.0	66.26	9.33	86.62	4.05
2015.93	3.0	3.5	58.82	8.88	86.97	4.15
2015.24	3.5	4.0	63.48	9.21	87.13	3.66
2014.71	4.0	4.5	62.11	9.37	86.27	4.36
2014.22	4.5	5.0	61.22	9.24	86.55	4.21
2013.66	5.0	5.5	65.12	9.15	87.35	3.50
2013.14	5.5	6.0	64.63	8.79	88.30	2.91
2012.67	6.0	6.5	64.36	8.69	86.99	4.32
2012.08	6.5	7.0	56.45	7.98	88.14	3.88
2011.24	7.0	7.5	58.21	9.39	86.62	3.99
2010.50	7.5	8.0	60.34	9.01	86.66	4.33
2010.10	8.0	8.5	62.21	9.25	86.63	4.11
2009.73	8.5	9.0	63.12	10.22	85.83	3.95
2009.19	9.0	9.5	64.97	8.66	87.28	4.06
2008.54	9.5	10.0	64.09	9.66	85.64	4.70
2007.81	10.0	10.5	64.00	10.81	85.16	4.03
2007.08	10.5	11.0	60.45	8.86	87.40	3.74
2006.38	11.0	11.5	54.13	8.86	87.46	3.68
2005.69	11.5	12.0	60.83	9.49	85.89	4.62
2005.00	12.0	12.5	63.80	10.01	85.22	4.77
2004.34	12.5	13.0	59.69	9.24	86.40	4.36
2003.79	13.0	13.5	64.96	9.72	86.49	3.79
2003.29	13.5	14.0	57.04	8.06	87.40	4.55
2002.71	14.0	14.5	58.35	8.91	86.69	4.40
2001.85	14.5	15.0	57.27	7.98	87.58	4.44
2000.71	15.0	15.5	55.54	8.56	87.27	4.16
1999.68	15.5	16.0	62.31	8.02	86.92	5.06
1998.24	16.0	16.5	57.39	8.18	87.35	4.47
1996.61	16.5	17.0	55.38	8.56	87.55	3.89
1995.51	17.0	17.5	57.11	8.20	87.93	3.87
1994.46	17.5	18.0	51.23	6.98	89.08	3.94
1993.36	18.0	18.5	59.27	7.72	87.58	4.71

1992.18	18.5	19.0	60.42	8.58	87.05	4.37
1991.09	19.0	19.5	62.16	8.48	86.82	4.70
1990.50	19.5	20.0	59.12	8.01	87.56	4.43
1990.06	20.0	20.5	58.33	9.67	87.15	3.17
1989.28	20.5	21.0	52.16	9.24	86.84	3.93
1988.14	21.0	21.5	64.22	8.94	86.03	5.02
1986.86	21.5	22.0	61.87	8.60	86.96	4.44
1985.80	22.0	22.5	63.45	9.26	86.52	4.22
1984.57	22.5	23.0	60.31	9.69	85.68	4.63
1982.64	23.0	23.5	59.09	9.96	86.05	4.00
1980.29	23.5	24.0	58.15	8.78	86.59	4.63
1978.38	24.0	24.5	57.59	8.66	86.98	4.36
1976.27	24.5	25.0	53.34	7.67	87.69	4.64
1973.12	25.0	25.5	45.38	7.86	89.14	3.00
1970.37	25.5	26.0	54.82	7.77	88.88	3.35
1968.71	26.0	26.5	58.70	8.70	87.42	3.88
1967.10	26.5	27.0	65.45	9.65	86.17	4.18
1965.03	27.0	27.5	56.87	8.56	87.17	4.26
1961.20	27.5	28.0	52.46	7.47	88.54	3.99
1957.87	28.0	28.5	54.83	8.28	87.87	3.85
1956.26	28.5	29.0	51.12	7.73	88.04	4.23
1953.55	29.0	29.5	49.92	7.62	88.79	3.59
1950.42	29.5	30.0	56.24	8.13	88.28	3.58
1947.71	30.0	30.5	60.40	8.39	88.05	3.56
1944.60	30.5	31.0	55.72	8.48	86.92	4.60
1939.94	31.0	31.5	48.66	7.59	88.49	3.92
1936.38	31.5	32.0	48.47	6.95	89.48	3.57
1934.87	32.0	32.5	47.87	8.04	88.54	3.42
1933.41	32.5	33.0	48.17	6.53	89.64	3.83
1931.93	33.0	33.5	49.60	7.50	88.93	3.57
1930.45	33.5	34.0	49.72	6.48	89.18	4.34
1928.62	34.0	34.5	36.98	6.27	90.85	2.88
1926.46	34.5	35.0	34.32	4.46	92.77	2.77
1924.50	35.0	35.5	41.68	5.32	91.54	3.14
1922.55	35.5	36.0	38.69	5.19	90.75	4.06
1920.76	36.0	36.5	50.08	6.55	89.29	4.15
1919.29	36.5	37.0	45.93	5.88	90.21	3.91
1917.65	37.0	37.5	42.24	5.26	91.73	3.01
1915.53	37.5	38.0	34.44	5.40	90.48	4.13
1913.05	38.0	38.5	37.62	5.58	91.06	3.36
1911.19	38.5	39.0	48.13	5.53	90.11	4.36
1909.90	39.0	39.5	49.89	5.27	89.60	5.13
1908.31	39.5	40.0	44.94	5.79	88.66	5.54
1906.66	40.0	40.5	48.71	6.02	89.11	4.87
1905.09	40.5	41.0	43.92	5.17	90.17	4.66
1903.31	41.0	41.5	39.48	5.62	90.04	4.34

1901.61	41.5	42.0	51.76	5.69	89.20	5.11
1900.25	42.0	42.5	53.15	5.66	89.69	4.65
1898.58	42.5	43.0	40.05	5.49	89.81	4.70
1897.09	43.0	43.5	59.27	7.86	86.10	6.04
1896.06	43.5	44.0	61.28	7.11	86.30	6.60
1894.94	44.0	44.5	56.91	5.86	88.29	5.84
1893.56	44.5	45.0	49.45	5.40	89.35	5.25
1892.08	45.0	45.5	51.52	5.18	89.62	5.20
1890.54	45.5	46.0	46.79	5.72	89.22	5.06
1888.82	46.0	46.5	44.89	5.22	89.66	5.12
1887.01	46.5	47.0	41.80	4.71	89.95	5.34
1885.30	47.0	47.5	49.62	5.49	89.27	5.24
1883.61	47.5	48.0	43.01	5.12	89.10	5.78
1881.97	48.0	48.5	47.07	5.50	89.13	5.38
1880.40	48.5	49.0	46.39	5.94	89.85	4.21
1879.00	49.0	49.5	55.81	7.28	87.68	5.03
1877.80	49.5	50.0	54.72	8.10	87.13	4.77
1876.62	50.0	50.5	58.41	9.29	86.54	4.16
1875.41	50.5	51.0	57.82	9.27	86.09	4.64
1874.26	51.0	51.5	58.23	8.59	86.62	4.79
1873.09	51.5	52.0	53.39	7.26	88.29	4.45
1871.74	52.0	52.5	50.93	7.35	88.39	4.26
1870.39	52.5	53.0	54.02	7.09	88.13	4.78
1869.00	53.0	53.5	48.78	7.76	88.07	4.16
1867.52	53.5	54.0	50.94	7.17	88.54	4.29
1866.06	54.0	54.5	48.39	7.46	88.01	4.53
1864.58	54.5	55.0	49.93	7.93	87.93	4.14
1863.18	55.0	55.5	55.33	7.81	88.16	4.03
1861.74	55.5	56.0	45.26	7.90	88.66	3.44
1860.18	56.0	56.5	50.40	7.77	88.67	3.56
1858.66	56.5	57.0	47.42	7.54	88.78	3.68
1857.09	57.0	57.5	45.29	7.22	89.30	3.48
1855.51	57.5	58.0	47.96	8.19	88.63	3.19
1854.08	58.0	58.5	53.62	8.88	87.61	3.50
1852.75	58.5	59.0	52.67	9.82	87.30	2.89
1851.61	59.0	59.5	61.90	9.79	85.57	4.64
1850.64	59.5	60.0	62.05	9.77	85.08	5.15
1849.52	60.0	60.5	57.26	7.49	87.87	4.64
1848.13	60.5	61.0	47.34	7.18	88.78	4.03
1846.87	61.0	61.5	62.48	10.16	84.74	5.10
1845.86	61.5	62.0	58.89	10.72	84.90	4.38
1844.79	62.0	62.5	62.39	9.13	86.28	4.60
1843.71	62.5	63.0	58.52	8.13	86.92	4.95
1842.59	63.0	63.5	59.95	8.74	86.46	4.80
1841.49	63.5	64.0	60.65	7.54	87.49	4.97
1840.48	64.0	64.5	64.19	9.53	85.15	5.32

1839.51	64.5	65.0	60.88	9.73	83.78	6.50
1838.53	65.0	65.5	63.51	8.39	85.91	5.70
1837.44	65.5	66.0	54.48	6.94	87.57	5.49
1836.10	66.0	66.5	50.85	6.39	88.58	5.04
1834.72	66.5	67.0	51.26	6.44	88.15	5.40
1833.06	67.0	67.5	39.08	5.77	89.76	4.47
1831.09	67.5	68.0	38.16	5.16	89.84	5.00
1829.50	68.0	68.5	52.64	8.43	86.41	5.16
1828.31	68.5	69.0	56.89	8.94	86.01	5.05
1827.14	69.0	69.5	54.86	9.49	84.76	5.76
1825.96	69.5	70.0	56.95	9.05	86.15	4.80
1824.66	70.0	70.5	53.63	6.55	88.35	5.10
1822.81	70.5	71.0	37.06	4.90	91.33	3.76
1820.63	71.0	71.5	34.52	5.03	91.54	3.43
1818.57	71.5	72.0	38.31	5.68	90.84	3.47
1816.69	72.0	72.5	36.99	5.69	90.70	3.60
1814.84	72.5	73.0	42.67	6.01	89.50	4.48
1813.04	73.0	73.5	41.97	5.67	90.48	3.84
1811.07	73.5	74.0	42.55	6.18	90.10	3.72
1809.17	74.0	74.5	41.47	6.06	90.84	3.10
1807.11	74.5	75.0	29.23	5.10	92.50	2.40
1804.74	75.0	75.5	35.36	4.54	91.97	3.50
1802.43	75.5	76.0	33.85	4.73	91.97	3.31
1799.96	76.0	76.5	30.33	4.49	92.72	2.79
1797.89	76.5	77.0	41.16	5.37	90.30	4.32
1796.21	77.0	77.5	46.70	5.81	89.57	4.62
1794.41	77.5	78.0	39.25	4.99	90.58	4.43
1792.60	78.0	78.5	46.99	5.29	90.90	3.81
1790.95	78.5	79.0	43.69	5.82	90.06	4.12
1789.30	79.0	79.5	46.28	6.64	89.55	3.81
1787.62	79.5	80.0	45.81	5.89	90.22	3.89
1786.02	80.0	80.5	51.42	6.09	89.34	4.57
1784.46	80.5	81.0	47.87	6.76	88.04	5.20
1783.02	81.0	81.5	56.15	8.19	86.19	5.62
1781.70	81.5	82.0	52.07	7.17	87.66	5.18
1780.20	82.0	82.5	47.39	6.77	89.12	4.11
1778.60	82.5	83.0	47.81	5.74	89.73	4.52
1776.93	83.0	83.5	45.66	5.77	89.28	4.94
1775.17	83.5	84.0	43.60	5.32	90.42	4.26
1773.35	84.0	84.5	43.38	5.70	90.55	3.74
1771.47	84.5	85.0	39.45	4.95	90.64	4.41
1769.53	85.0	85.5	39.71	5.41	90.44	4.15
1767.46	85.5	86.0	37.74	4.81	90.70	4.49
1765.32	86.0	86.5	36.13	4.40	91.30	4.30

Table C-3. WAB 3 Sediment Core.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	%H_2O	%OM	%MM	%$CaCO_3$	C/N	%C_{org}	%N	$\delta^{13}C_{org}$	$\delta^{15}N$
2019.49	0.0	0.5	99.43	72.73	12.85	14.42	8.85	39.92	4.51	-22.14	0.49
2019.13	0.5	1.0	98.97	75.00	22.17	2.83	8.74	38.98	4.46	-22.82	1.29
2018.76	1.0	1.5	98.14	65.79	24.37	9.84	8.92	38.24	4.29	-22.60	1.01
2018.31	1.5	2.0	97.65	61.65	25.05	13.29	9.41	36.94	3.92	-22.86	1.85
2017.79	2.0	2.5	98.10	75.98	24.02	0.00					
2017.20	2.5	3.0	97.19	74.27	14.50	11.22	9.19	36.70	3.99	-22.68	1.36
2016.57	3.0	3.5	97.73	70.64	23.00	6.37	8.85	37.81	4.27	-22.85	0.92
2015.94	3.5	4.0	97.69	74.47	21.91	3.62	9.57	36.69	3.84	-23.11	1.28
2015.24	4.0	4.5	97.39	73.89	20.08	6.03	10.39	49.65	4.78	-23.32	1.20
2014.54	4.5	5.0	97.77	81.34	13.45	5.21	11.06	49.19	4.45	-23.67	1.70
2013.79	5.0A	5.5A	97.55	84.12	12.96	2.92	10.90	50.46	4.63	-24.01	0.95
2013.79	5.0B	5.5B					10.98	50.23	4.58	-23.93	0.98
2012.95	5.5	6.0	97.51	83.40	11.97	4.63	11.55	50.36	4.36	-24.20	1.52
2011.97	6.0	6.5	97.41	81.52	13.30	5.17	11.34	51.74	4.56	-24.47	1.08
2010.88	6.5	7.0	97.70	86.86	11.41	1.73	11.78	47.90	4.07	-24.68	1.31
2009.84	7.0	7.5	97.48	85.84	12.96	1.20	11.73	51.41	4.38	-25.06	0.85
2008.65	7.5	8.0	97.15	86.88	9.43	3.69	12.00	51.18	4.27	-25.22	1.78
2007.28	8.0	8.5	96.89	87.14	11.56	1.30	11.87	52.13	4.39	-25.17	1.01
2005.83	8.5	9.0	96.76	81.39	12.66	5.96	12.16	51.42	4.23	-25.15	1.58
2004.41	9.0	9.5	97.15	86.50	11.21	2.30	11.83	52.55	4.44	-25.18	1.45
2002.88	9.5	10.0	96.31	78.55	17.44	4.01	11.99	50.50	4.21	-24.83	1.33
2001.21	10.0A	10.5A	96.67	71.25	15.72	13.03	11.51	51.95	4.52	-24.92	1.48
2001.21	10.0B	10.5B					11.70	52.10	4.45	-24.79	1.35
1999.50	10.5	11.0	96.38	83.94	15.43	0.62	11.68	49.22	4.21	-24.63	1.86
1997.90	11.0	11.5	97.34	86.67	12.77	0.57	11.59	51.16	4.41	-24.66	1.00
1996.46	11.5	12.0	96.97	85.02	13.45	1.53	11.86	49.73	4.19	-24.40	1.58
1994.97	12.0	12.5	96.56	80.19	10.97	8.83	11.55	50.72	4.39	-24.59	1.15
1993.55	12.5	13.0	97.05	86.28	8.30	5.42	11.85	50.14	4.23	-24.64	1.87
1992.07	13.0	13.5	96.51	84.44	7.70	7.86	11.84	51.34	4.33	-24.66	1.57
1990.45	13.5	14.0	96.90	81.43	9.96	8.61	11.86	50.21	4.23	-24.43	1.67
1989.10	14.0	14.5	97.48	85.49	10.98	3.52	11.74	50.93	4.34	-24.34	1.57
1987.80	14.5	15.0	96.72	85.50	10.42	4.08	11.87	49.74	4.19	-24.19	1.11
1986.20	15.0A	15.5A	96.91	85.06	10.79	4.15	11.51	50.35	4.37	-24.16	1.50
1986.20	15.0B	15.5B					11.67	50.63	4.34	-24.08	1.48
1984.59	15.5	16.0	96.95	85.17	9.07	5.76	11.38	49.53	4.35	-24.03	1.62
1983.08	16.0	16.5	96.83	84.08	12.50	3.42	11.58	50.43	4.35	-24.21	1.52
1981.57	16.5	17.0	96.76	82.01	16.52	1.47	11.68	50.02	4.28	-24.00	1.74
1980.12	17.0	17.5	96.10	85.06	9.96	4.98	11.76	50.96	4.33	-23.92	1.79
1978.63	17.5	18.0	96.36	87.50	6.13	6.37					
1977.04	18.0	18.5	95.95	84.96	12.24	2.81	12.06	50.88	4.22	-23.94	1.56
1975.39	18.5	19.0	96.09	85.11	11.59	3.31	12.18	51.18	4.20	-23.89	1.60
1973.67	19.0	19.5	96.05	86.57	11.40	2.03	12.47	51.86	4.16	-23.84	1.49
1972.03	19.5	20.0	95.81	84.75	9.76	5.49	12.55	51.52	4.10	-23.72	1.65

1970.32	20.0	20.5	95.50	85.53	10.60	3.88	12.47	51.11	4.10	-23.52	1.59
1968.46	20.5	21.0	95.32	84.29	11.34	4.37	12.17	51.51	4.23	-23.48	1.86
1966.59	21.0	21.5	95.19	84.05	11.61	4.34	12.57	51.22	4.07	-23.58	1.91
1964.51	21.5	22.0	95.25	84.68	12.03	3.29	12.63	50.65	4.01	-23.37	1.64
1962.35	22.0	22.5	94.94	85.43	12.86	1.71	13.00	50.92	3.92	-23.31	1.58
1960.48	22.5	23.0	95.29	83.37	12.64	3.99	13.41	51.00	3.80	-23.54	1.69
1958.65	23.0	23.5	94.52	85.80	11.33	2.87	13.67	51.68	3.78	-23.48	1.73
1956.95	23.5	24.0	94.10	85.59	10.33	4.08	13.35	50.31	3.77	-23.56	1.96
1955.42	24.0	24.5	93.14	85.92	11.66	2.42	13.72	51.12	3.73	-23.53	1.91
1953.58	24.5	25.0	93.06	84.03	12.93	3.04	13.82	50.40	3.65	-23.58	2.03
1951.13	25.0A	25.5A	93.49	85.90	11.66	2.44	13.81	51.32	3.71	-23.74	1.52
1951.13	25.0B	25.5B					13.41	51.58	3.85	-23.82	2.03
1948.50	25.5	26.0	93.43	85.03	10.49	4.49	13.80	51.03	3.70	-23.76	1.52
1945.98	26.0	26.5	92.49	85.40	11.62	2.98	13.76	51.11	3.71	-23.75	1.89
1943.43	26.5	27.0	92.90	86.19	11.93	1.88	13.95	50.54	3.62	-23.59	1.90
1940.75	27.0	27.5	92.67	87.12	11.57	1.31	13.72	51.00	3.72	-23.97	2.02
1937.83	27.5	28.0	93.16	85.66	12.43	1.90	13.70	50.81	3.71	-23.89	1.88
1934.60	28.0	28.5	92.34	86.52	10.73	2.75	13.93	51.35	3.69	-24.08	1.52
1931.10	28.5	29.0	92.17	85.42	12.51	2.08	14.09	50.93	3.61	-23.94	2.01
1927.59	29.0	29.5	90.95	85.76	11.60	2.64	14.25	51.14	3.59	-24.11	1.86
1923.36	29.5	30.0	89.35	87.51	9.15	3.34	14.03	50.39	3.59	-24.13	2.18
1919.11	30.0A	30.5A	92.70	86.68	11.49	1.83	14.19	51.31	3.61	-24.28	1.94
1919.11	30.0B	30.5B					14.26	51.45	3.61	-24.32	1.88
1915.62	30.5	31.0	91.71	82.61	13.67	3.72	14.06	50.96	3.62	-24.39	2.18
1912.09	31.0	31.5	92.32	83.30	13.50	3.20	14.19	51.27	3.61	-24.37	2.12
1908.95	31.5	32.0	92.59	85.68	10.75	3.57	14.33	51.05	3.56	-24.40	1.91
1906.42	32.0	32.5	91.96	86.61	11.53	1.86	14.09	51.81	3.68	-24.46	1.59
1904.24	32.5	33.0	92.52	86.21	11.66	2.13	13.93	51.25	3.68	-24.46	1.53
1902.20	33.0	33.5	91.86	85.67	13.60	0.73	13.83	51.09	3.69	-24.30	2.15
1900.02	33.5	34.0	92.58	87.48	11.74	0.79	13.90	50.76	3.65	-24.16	1.64
1897.73	34.0	34.5	91.79	86.81	11.49	1.70	13.89	51.42	3.70	-24.03	2.00
1895.48	34.5	35.0	92.47	87.03	9.72	3.26	13.83	50.77	3.67	-24.01	1.72
1892.84	35.0A	35.5A	91.28	85.74	12.85	1.40	14.34	50.90	3.55	-23.45	2.27
1892.84	35.0B	35.5B					14.75	51.46	3.49	-23.44	2.02
1889.75	35.5	36.0	91.68	86.89	11.15	1.95	14.41	51.02	3.54	-23.56	2.21
1885.79	36.0	36.5	90.40	84.74	11.80	3.46	14.59	50.88	3.49	-23.38	1.94
1881.47	36.5	37.0	90.73	85.43	12.99	1.57	14.39	51.06	3.55	-23.52	1.96
1877.52	37.0	37.5	90.19	85.17	12.79	2.04	15.21	51.44	3.38	-23.00	2.13
1873.69	37.5	38.0	90.48	86.35	11.62	2.03	14.97	49.77	3.32	-23.38	1.69
1870.04	38.0	38.5	90.50	85.71	12.89	1.40	15.48	50.60	3.27	-22.70	2.33
1863.40	38.5	39.0	75.65	90.12	6.92	2.97	15.29	50.61	3.31	-22.69	2.46
1856.12	39.0	39.5	88.01	85.44	11.93	2.63	15.22	50.69	3.33	-22.50	2.19
1851.37	39.5	40.0	88.65	85.63	12.46	1.91	15.60	50.85	3.26	-22.23	2.18
1846.99	40.0	40.5	88.29	85.27	10.47	4.27	16.00	51.47	3.22	-22.33	1.55
1842.56	40.5	41.0	89.20	84.75	12.24	3.01	15.54	50.69	3.26	-22.60	1.80
1838.09	41.0	41.5	88.43	85.37	12.49	2.15	15.59	50.96	3.27	-22.46	2.21

1833.63	41.5	42.0	88.82	85.13	11.76	3.11	16.02	50.97	3.18	-22.34	1.75
1828.99	42.0	42.5	88.15	84.54	11.08	4.38	16.27	51.75	3.18	-22.33	2.08
1824.36	42.5	43.0	88.89	85.81	11.73	2.46	16.10	51.44	3.20	-22.21	1.69
1819.59	43.0	43.5	87.45	83.53	14.39	2.08	16.21	51.21	3.16	-22.21	1.77
1814.88	43.5	44.0	89.51	85.28	11.43	3.29	16.46	51.14	3.11	-22.48	1.05
1810.20	44.0	44.5	88.19	84.71	12.49	2.81	16.20	51.26	3.16	-22.36	1.65
1805.57	44.5	45.0	88.52	85.57	12.13	2.30	16.43	50.62	3.08	-22.02	1.21
1801.08	45.0A	45.5A	88.51	82.77	12.86	4.37	16.81	50.30	2.99	-21.93	1.50
1801.08	45.0B	45.5B					16.88	50.27	2.98	-21.71	0.83
1796.61	45.5	46.0	89.13	82.83	14.36	2.81					
1792.11	46.0	46.5	88.59	81.46	13.85	4.70					
1787.52	46.5	47.0	88.24	83.07	13.71	3.22					
1781.97	47.0	47.5	84.27	68.31	12.50	19.20					
1776.43	47.5	48.0	88.54	80.66	15.21	4.14					
1771.34	48.0	48.5	87.23	73.69	19.60	6.71					
1765.93	48.5	49.0	87.35	71.70	16.90	11.40					
1761.20	49.0	49.5	89.27	66.11	22.47	11.42					
1756.27	49.5	50.0	86.71	64.71	22.76	12.52					
1750.83	50.0	50.5	86.14	61.30	24.42	14.28					
1745.40	50.5	51.0	87.41	56.85	26.28	16.87					
1739.61	51.0	51.5	84.92	61.59	24.12	14.29					
1733.12	51.5	52.0	83.93	50.62	26.54	22.84					
1726.54	52.0	52.5	84.84	60.66	26.16	13.18					
1720.37	52.5	53.0	85.32	57.95	25.61	16.44					
1714.00	53.0	53.5	84.16	48.47	28.85	22.68					
1707.46	53.5	54.0	84.27	45.28	30.33	24.38					
1700.63	54.0	54.5	83.82	52.74	27.44	19.83					
1693.67	54.5	55.0	83.96	49.17	29.16	21.67					
1686.93	55.0	55.5	83.56	42.59	31.31	26.10					
1680.42	55.5	56.0	85.37	54.28	27.12	18.60					
1673.83	56.0	56.5	84.18	48.00	29.44	22.56					
1666.72	56.5	57.0	83.05	45.18	30.61	24.21					
1659.92	57.0	57.5	83.45	53.21	25.74	21.05					
1653.04	57.5	58.0	84.20	56.13	25.79	18.08					
1645.74	58.0	58.5	84.09	40.96	30.75	28.29					
1637.90	58.5	59.0	82.34	43.24	30.40	26.36					
1630.10	59.0	59.5	83.77	51.57	28.32	20.11					
1623.30	59.5	60.0	83.91	52.28	28.97	18.75					
1616.64	60.0	60.5	83.87	49.72	30.11	20.16					
1609.72	60.5	61.0	83.70	53.12	27.23	19.65					
1603.09	61.0	61.5	85.38	60.68	24.90	14.42					
1596.43	61.5	62.0	83.90	56.63	26.99	16.38					
1589.68	62.0	62.5	85.25	65.53	24.69	9.78					
1583.08	62.5	63.0	84.06	60.44	25.31	14.25					
1576.50	63.0	63.5	84.45	62.34	25.81	11.86					
1569.90	63.5	64.0	84.69	56.04	26.57	17.39					

1562.94	64.0	64.5	84.25	59.32	25.85	14.83					
1556.08	64.5	65.0	84.11	61.80	24.61	13.59					
1549.12	65.0	65.5	83.78	57.77	26.27	15.96					
1541.86	65.5	66.0	83.51	57.98	25.94	16.08					
1534.64	66.0	66.5	83.75	61.38	24.60	14.03					
1527.49	66.5	67.0	83.15	55.34	27.12	17.55					
1520.09	67.0	67.5	82.71	56.37	27.75	15.88					
1512.51	67.5	68.0	82.59	56.96	26.27	16.78					
1505.52	68.0	68.5	83.67	59.74	24.98	15.28					
1498.13	68.5	69.0	81.38	53.39	27.40	19.21					
1489.86	69.0	69.5	81.95	51.37	27.65	20.98					
1480.95	69.5	70.0	81.01	53.80	27.59	18.61					
1470.76	70.0	70.5	80.43	52.36	28.04	19.60					
1461.13	70.5	71.0	79.98	49.35	29.18	21.47					
1453.36	71.0	71.5	79.90	48.67	29.16	22.17					
1444.75	71.5	72.0	76.91	46.71	29.71	23.58					
1434.97	72.0	72.5	78.40	48.65	29.21	22.14					
1424.62	72.5	73.0	78.50	50.49	28.25	21.26					
1414.29	73.0	73.5	77.01	41.26	31.11	27.63					
1403.98	73.5	74.0	77.41	46.98	29.24	23.78					
1391.37	74.0	74.5	75.62	44.04	30.54	25.43					
1379.51	74.5	75.0	74.76	40.78	31.40	27.82					
1368.07	75.0	75.5	73.58	40.40	31.46	28.14					
1354.91	75.5	76.0	69.41	33.12	34.54	32.34					
1341.77	76.0	76.5	70.80	34.87	34.07	31.07					
1327.77	76.5	77.0	68.56	30.28	35.87	33.84					
1312.32	77.0	77.5	68.83	32.36	35.10	32.54					
1297.81	77.5	78.0	68.73	31.03	36.00	32.97					
1284.20	78.0	78.5	68.55	28.18	36.67	35.14					

Table C-4. WAB 4 Sediment Core.

Depth-cm (Top)	Depth-cm (Bottom)	%H_2O	%OM	%MM	%$CaCO_3$
0.0	0.5	99.59	66.67	20.38	12.95
0.5	1.0	98.09	57.61	37.96	4.43
1.0	1.5	98.25	62.64	32.88	4.48
1.5	2.0	98.04	57.45	39.66	2.89
2.0	2.5	98.47	58.97	37.54	3.49
2.5	3.0	98.09	58.59	31.80	9.62
3.0	3.5	97.57	61.67	37.20	1.13
3.5	4.0	97.04	59.59	36.68	3.73
4.0	4.5	97.58	57.72	35.64	6.63
4.5	5.0	97.63	60.00	34.33	5.67
5.0	5.5	97.40	57.14	35.70	7.16
5.5	6.0	96.25	60.73	36.42	2.85
6.0	6.5	96.57	57.14	41.24	1.62
6.5	7.0	96.16	56.19	38.91	4.91

7.0	7.5	95.77	55.87	39.66	4.47
7.5	8.0	94.77	56.06	40.33	3.61
8.0	8.5	95.71	54.67	39.61	5.72
8.5	9.0	95.04	55.33	40.21	4.46
9.0	9.5	94.66	54.09	42.21	3.70
9.5	10.0	95.72	57.01	39.29	3.69
10.0	10.5	95.35	53.78	42.22	4.00
10.5	11.0	95.18	55.33	41.89	2.79
11.0	11.5	95.57	54.34	42.56	3.11
11.5	12.0	95.51	54.75	40.94	4.31
12.0	12.5	94.18	53.10	44.08	2.81
12.5	13.0	94.50	51.47	44.53	4.00
13.0	13.5	94.25	51.86	43.53	4.61
13.5	14.0	94.00	56.91	36.38	6.71
14.0	14.5	94.41	49.48	45.31	5.21
14.5	15.0	93.55	49.06	44.53	6.42
15.0	15.5	93.76	49.53	44.96	5.51
15.5	16.0	93.74	49.19	45.97	4.84
16.0	16.5	93.07	49.28	47.19	3.53
16.5	17.0	92.65	46.40	47.80	5.80
17.0	17.5	91.55	45.68	49.06	5.25
17.5	18.0	92.05	47.52	48.44	4.04
18.0	18.5	92.07	47.09	47.40	5.51
18.5	19.0	90.62	46.42	47.68	5.90
19.0	19.5	94.15	48.26	48.90	2.83
19.5	20.0	88.26	48.03	47.08	4.88
20.0	20.5	89.15	47.87	47.59	4.54
20.5	21.0	88.85	48.63	45.16	6.22
21.0	21.5	87.89	49.34	44.84	5.82
21.5	22.0	88.12	48.89	45.32	5.79
22.0	22.5	87.17	46.17	47.09	6.75
22.5	23.0	86.63	46.20	49.25	4.55
23.0	23.5	87.12	47.56	47.51	4.93
23.5	24.0	86.86	46.70	47.38	5.92
24.0	24.5	86.06	49.35	45.56	5.09
24.5	25.0	87.40	46.38	47.75	5.87
25.0	25.5	86.80	50.98	43.71	5.32
25.5	26.0	86.20	49.42	44.06	6.52
26.0	26.5	86.70	49.47	43.98	6.54
26.5	27.0	83.15	50.18	44.50	5.31
27.0	27.5	84.76	51.27	43.21	5.52
27.5	28.0	83.58	50.06	44.20	5.74
28.0	28.5	86.48	51.19	42.94	5.87
28.5	29.0	85.55	50.72	43.54	5.73
29.0	29.5	82.03	63.72	32.32	3.95
29.5	30.0	84.07	50.25	44.25	5.50

30.0	30.5	82.80	50.23	44.27	5.50
30.5	31.0	81.92	49.62	45.04	5.34
31.0	31.5	83.17	50.90	43.40	5.70
31.5	32.0	81.88	52.75	44.94	2.31
32.0	32.5	80.72	50.00	44.36	5.64
32.5	33.0	78.89	48.91	45.56	5.53
33.0	33.5	79.76	48.45	46.11	5.45
33.5	34.0	79.52	49.90	44.72	5.37
34.0	34.5	80.12	49.59	45.29	5.11
34.5	35.0	78.07	50.27	44.51	5.22
35.0	35.5	79.32	49.48	44.74	5.78
35.5	36.0	85.24	55.51	39.79	4.70
36.0	36.5	76.86	46.94	47.51	5.55
36.5	37.0	74.63	44.77	49.62	5.61
37.0	37.5	77.90	48.76	45.13	6.11
37.5	38.0	77.14	52.24	42.47	5.29
38.0	38.5	77.29	45.43	48.96	5.61
38.5	39.0	76.41	44.71	49.72	5.57
39.0	39.5	76.80	46.69	48.63	4.68
39.5	40.0	76.09	46.94	48.11	4.95
40.0	40.5	75.85	45.18	48.32	6.50
40.5	41.0	76.83	47.52	46.85	5.63
41.0	41.5	75.70	44.97	48.89	6.14
41.5	42.0	76.12	43.31	50.92	5.77
42.0	42.5	75.60	45.01	49.78	5.21
42.5	43.0	75.91	45.61	48.76	5.63
43.0	43.5	75.84	43.68	50.55	5.76
43.5	44.0	71.97	43.79	50.61	5.60
44.0	44.5	75.37	43.64	50.52	5.84
44.5	45.0	73.49	42.86	51.82	5.33
45.0	45.5	73.40	39.85	54.03	6.13
45.5	46.0	68.02	41.98	52.33	5.69
46.0	46.5	73.96	41.79	52.45	5.75
46.5	47.0	71.44	38.92	55.58	5.51
47.0	47.5	73.54	40.96	52.62	6.42
47.5	48.0	74.17	40.28	53.32	6.40
48.0	48.5	71.72	37.48	55.83	6.69
48.5	49.0	72.73	39.42	54.96	5.62
49.0	49.5	72.11	37.90	56.02	6.08
49.5	50.0	71.47	37.94	56.15	5.91
50.0	50.5	72.63	39.50	54.37	6.14
50.5	51.0	71.08	35.56	58.44	6.00
51.0	51.5	68.39	33.55	59.56	6.89
51.5	52.0	68.65	37.24	56.36	6.39
52.0	52.5	65.22	27.62	65.72	6.66
52.5	53.0	62.99	23.83	67.66	8.51

53.0	53.5	68.88	34.10	59.27	6.63
53.5	54.0	66.43	31.36	62.12	6.52
54.0	54.5	49.07	14.90	78.44	6.67
54.5	55.0	62.56	27.51	65.53	6.96
55.0	55.5	64.43	33.56	60.42	6.02
55.5	56.0	55.00	15.33	77.14	7.53
56.0	56.5	49.24	7.37	84.36	8.26
56.5	57.0	59.44	19.01	73.13	7.86
57.0	57.5	49.97	4.34	90.79	4.87
57.5	58.0	50.32	4.78	88.49	6.73
58.0	58.5	51.49	9.14	85.31	5.55
58.5	59.0	68.30	40.01	53.98	6.01
59.0	59.5	56.30	28.25	67.33	4.42
59.5	60.0	68.87	54.47	41.10	4.44
60.0	60.5	68.04	59.14	36.39	4.47
60.5	61.0	65.20	51.97	42.84	5.19
61.0	61.5	61.79	45.26	50.12	4.61
61.5	62.0	64.14	50.62	44.25	5.13

Table C-5. WAB 5 Sediment Core.

Depth-cm (Top)	Depth-cm (Bottom)	%H_2O	%OM	%MM	%$CaCO_3$
0.0	0.5	99.81	100.00	0.00	0.00
0.5	1.0	98.77	81.74	14.71	3.55
1.0	1.5	98.60	84.71	12.09	3.20
1.5	2.0	98.04	74.38	15.50	10.12
2.0	2.5	97.92	75.00	19.17	5.83
2.5	3.0	97.44	65.05	17.40	17.55
3.0	3.5	97.36	72.60	19.95	7.45
3.5	4.0	97.74	80.43	13.65	5.91
4.0	4.5	96.65	68.51	24.73	6.76
4.5	5.0	95.40	52.51	26.49	21.00
5.0	5.5	94.33	51.47	26.77	21.76
5.5	6.0	94.11	47.38	28.05	24.57
6.0	6.5	93.56	45.30	28.40	26.30
6.5	7.0	93.99	47.32	28.92	23.75
7.0	7.5	91.23	42.28	28.21	29.51
7.5	8.0	91.62	42.08	32.42	25.50
8.0	8.5	92.56	39.24	26.30	34.46
8.5	9.0	92.38	45.76	29.87	24.37
9.0	9.5	92.14	51.02	27.24	21.74
9.5	10.0	92.72	55.45	24.94	19.61
10.0	10.5	92.47	51.81	23.83	24.36
10.5	11.0	92.28	61.46	22.53	16.02
11.0	11.5	91.75	65.65	21.44	12.90
11.5	12.0	90.93	70.99	19.08	9.93
12.0	12.5	90.52	76.66	15.91	7.43

12.5	13.0	90.64	77.05	20.44	2.51
13.0	13.5	89.34	76.22	18.43	5.35
13.5	14.0	89.50	73.52	18.19	8.29
14.0	14.5	88.13	72.13	18.58	9.29
14.5	15.0	87.21	73.29	20.57	6.14
15.0	15.5	88.45	72.65	22.72	4.62
15.5	16.0	88.43	75.00	17.54	7.46
16.0	16.5	88.00	75.42	18.31	6.27
16.5	17.0	88.88	74.70	17.88	7.42
17.0	17.5	88.51	76.52	18.55	4.93
17.5	18.0	88.85	76.10	17.91	5.99
18.0	18.5	88.30	73.48	21.88	4.63
18.5	19.0	88.76	75.72	19.49	4.79
19.0	19.5	88.93	76.08	21.68	2.24
19.5	20.0	87.98	74.47	18.13	7.40
20.0	20.5	88.92	75.95	18.68	5.38
20.5	21.0	87.37	73.81	19.14	7.05
21.0	21.5	87.56	75.97	20.28	3.76
21.5	22.0	87.32	72.24	20.65	7.12
22.0	22.5	86.86	72.51	19.61	7.88
22.5	23.0	87.34	73.38	19.60	7.03
23.0	23.5	87.60	72.21	20.31	7.48
23.5	24.0	86.69	72.92	18.41	8.66
24.0	24.5	86.56	67.94	22.81	9.25
24.5	25.0	86.91	71.36	20.69	7.95
25.0	25.5	87.22	67.23	20.34	12.43
25.5	26.0	87.35	71.53	24.05	4.41
26.0	26.5	87.15	71.15	18.71	10.14
26.5	27.0	86.82	71.02	22.77	6.20
27.0	27.5	86.83	64.70	23.00	12.30
27.5	28.0	86.29	68.65	20.65	10.70
28.0	28.5	86.66	70.15	21.20	8.65
28.5	29.0	86.51	69.78	20.36	9.86
29.0	29.5	87.04	76.21	17.89	5.90
29.5	30.0	87.55	73.64	18.80	7.56
30.0	30.5	86.62	77.10	19.20	3.69
30.5	31.0	87.35	77.12	19.55	3.33
31.0	31.5	86.80	74.01	20.13	5.86
31.5	32.0	87.28	75.07	20.14	4.79
32.0	32.5	87.15	76.08	19.37	4.56
32.5	33.0	87.22	74.49	21.33	4.18
33.0	33.5	86.83	76.11	20.70	3.19
33.5	34.0	87.17	75.39	20.32	4.29
34.0	34.5	86.29	71.71	21.55	6.74
34.5	35.0	86.35	64.63	25.78	9.58
35.0	35.5	85.99	63.98	24.89	11.13

35.5	36.0	85.84	59.51	26.69	13.80
36.0	36.5	86.01	65.87	25.13	9.00
36.5	37.0	85.44	57.84	28.27	13.89
37.0	37.5	84.92	54.72	27.16	18.12
37.5	38.0	85.27	56.10	27.80	16.10
38.0	38.5	85.06	56.89	29.54	13.57
38.5	39.0	84.87	53.68	28.60	17.72
39.0	39.5	83.83	51.83	28.54	19.63
39.5	40.0	84.05	50.63	30.84	18.53
40.0	40.5	84.05	53.48	28.17	18.36
40.5	41.0	81.01	40.41	33.20	26.39
41.0	41.5	80.61	40.79	32.88	26.33
41.5	42.0	83.88	48.97	31.54	19.49
42.0	42.5	83.79	49.13	31.73	19.13
42.5	43.0	83.80	46.01	31.98	22.01
43.0	43.5	83.29	47.49	31.87	20.64
43.5	44.0	84.47	49.23	30.71	20.06
44.0	44.5	84.26	49.50	30.79	19.71
44.5	45.0	83.12	45.29	34.89	19.82
45.0	45.5	83.92	49.16	31.64	19.20
45.5	46.0	82.83	50.35	26.14	23.51
46.0	46.5	83.63	47.83	31.19	20.98
46.5	47.0	83.11	51.48	30.55	17.97
47.0	47.5	81.43	42.65	32.50	24.86
47.5	48.0	83.03	44.18	33.32	22.50
48.0	48.5	82.82	54.47	20.88	24.64
48.5	49.0	81.88	43.57	33.11	23.31
49.0	49.5	80.49	38.33	34.33	27.33
49.5	50.0	82.11	43.70	32.84	23.46
50.0	50.5	80.20	36.05	35.46	28.49
50.5	51.0	81.28	40.25	33.43	26.32
51.0	51.5	80.23	37.48	34.79	27.73
51.5	52.0	80.86	39.07	34.72	26.21

Appendix D: Radioisotope and CRS-inferred ^{210}Pb chronology

Table D-1. WAB 1 Sediment Core 137Cs-based chronology. Interpolated and extrapolated values highlighted in grey.

^{137}Cs-based Raw Date	Age uncertainty (2 SD)	^{210}Pb (Bq/kg)	^{210}Pb Error (Bq/kg)	^{226}Ra (Bq/kg)	^{226}Ra Error (Bq/kg)	^{137}Cs (Bq/kg)	^{137}Cs Error (Bq/g)	^{241}Am (Bq/kg)	^{241}Am error (Bq/kg)	Total Core Cumulative dry weight (g)
2018.62	0.01									2.98
2018.51	0.01									7.37
2018.33	0.03									14.19
2018.03	0.05									25.65
2017.73	0.07									37.05
2017.31	0.09									52.79
2016.95	0.12									66.51
2016.54	0.15									82.12
2016.24	0.17	96.21	9.62	49.80	6.38	0.00				93.64
2015.93	0.19									105.67
2015.60	0.21									118.02
2015.26	0.23									131.19
2014.89	0.26									145.18
2014.44	0.29									162.34
2014.17	0.31									172.64
2013.67	0.34									191.79
2012.96	0.39	68.74	9.82	59.67	7.19	0.00				218.71
2012.36	0.43									241.61
2011.95	0.46									257.35
2011.59	0.49									271.02
2011.14	0.52									288.13
2010.74	0.54									303.42
2010.02	0.59									330.74
2009.26	0.64									359.71
2008.71	0.68	59.13	8.06	49.33	6.06	0.00				380.50
2007.86	0.74									412.91
2007.10	0.79									441.77
2006.48	0.83									465.66
2005.78	0.88									492.16
2005.17	0.92									515.48
2004.51	0.97									540.46
2003.89	1.01									564.27
2003.27	1.05	71.72	8.78	50.65	6.48	0.00				587.87
2002.60	1.10									613.54
2001.83	1.15									642.83
2000.95	1.21									676.07
2000.25	1.26									702.89

1999.44	1.31									733.62
1998.97	1.35									751.88
1998.44	1.38									771.91
1997.77	1.43	70.31	8.83	56.42	6.94	0.00				797.23
1997.36	1.46									813.19
1996.89	1.49									830.87
1996.46	1.52									847.33
1995.99	1.55									865.05
1995.52	1.58									883.17
1995.05	1.61									901.03
1994.52	1.65									921.27
1993.89	1.69	53.97	8.30	48.49	6.14	1.78	0.81			945.15
1993.30	1.73									967.63
1992.63	1.78									993.09
1992.04	1.82									1015.66
1991.46	1.86	59.29	8.40	47.75	5.84	3.59	0.78			1037.94
1990.78	1.91									1063.59
1990.13	1.95									1088.52
1989.39	2.00									1116.78
1988.67	2.05	64.04	8.18	47.32	5.95	4.42	0.72			1144.05
1987.94	2.10									1171.80
1987.21	2.15									1199.89
1986.45	2.20									1228.55
1985.83	2.24	51.92	7.59	49.32	5.89	4.18	0.64			1252.35
1985.17	2.29									1277.63
1984.44	2.34									1305.15
1983.74	2.39									1331.93
1983.02	2.43	54.38	8.26	47.96	6.24	4.47	0.77			1359.18
1982.33	2.48									1385.48
1981.63	2.53									1412.14
1980.96	2.58									1437.89
1980.25	2.62	61.53	8.17	50.64	6.42	4.99	0.72			1464.81
1979.56	2.67									1491.14
1978.61	2.74									1527.46
1978.03	2.78									1549.31
1977.44	2.82	47.57	7.86	47.94	5.76	4.34	0.69			1572.02
1976.69	2.87									1600.72
1975.82	2.93									1633.66
1975.18	2.97									1658.05
1974.47	3.02									1685.26
1973.66	3.07									1715.98
1972.97	3.12									1742.40

1972.33	3.16									1766.63
1971.68	3.21	50.47	7.66	44.08	5.80	2.01	0.74			1791.48
1970.82	3.27									1824.09
1970.16	3.31									1849.46
1969.27	3.37									1883.21
1968.75	3.41									1903.22
1967.98	3.46									1932.30
1967.30	3.51									1958.11
1966.52	3.56									1987.93
1965.63	3.62	53.17	7.97	45.70	5.50	4.13	0.69			2022.07
1964.86	3.67									2051.08
1964.32	3.71	58.05	7.80	48.48	6.26	9.19	0.76			2071.65
1963.67	3.76									2096.58
1963.00	3.80	61.65	8.82	47.62	6.96	13.50	0.96	1.19	0.81	2122.11
1962.35	3.85									2146.69
1961.69	3.89	51.08	8.27	47.88	6.19	10.96	0.83			2172.07
1961.10	3.93									2194.52
1960.57	3.97	61.78	7.88	48.54	6.08	10.62	0.73			2214.59
1959.94	4.01									2238.51
1959.25	4.06	60.39	7.90	48.73	5.80	10.14	0.75			2264.90
1958.34	4.12									2299.59
1957.70	4.16	57.95	7.55	46.59	5.88	6.67	0.68			2324.13
1956.98	4.21									2351.51
1956.39	4.25	55.62	7.67	48.33	6.57	1.02	0.79			2373.94
1955.62	4.30									2403.09
1954.88	4.36	47.78	8.33	49.08	6.27	0.00				2431.47
1954.23	4.40									2456.18
1953.43	4.45									2486.86
1952.75	4.50									2512.67
1951.87	4.56									2546.17
1951.15	4.61									2573.66
1950.36	4.66									2603.84
1949.58	4.72									2633.51
1948.83	4.77	50.04	7.92	46.18	6.16	0.00				2662.11
1948.08	4.82									2690.54
1947.24	4.88									2722.68
1946.36	4.94									2756.16
1945.58	4.99									2785.85
1944.88	5.04									2812.37
1944.25	5.08									2836.59
1943.54	5.13									2863.44
1942.60	5.19									2899.44

1941.97	5.24									2923.15
1941.41	5.27									2944.70
1940.73	5.32									2970.73
1940.13	5.36									2993.40
1939.34	5.42									3023.35
1938.52	5.47									3054.64
1937.71	5.53									3085.71
1937.07	5.57									3110.07

Table D-2. WAB 2 Sediment Core CRS-inferred 210Pb chronology. Interpolated and extrapolated values highlighted in grey.

CRS Raw Date	Age uncertainty (2 SD)	^{210}Pb (Bq/kg)	^{210}Pb Error (Bq/kg)	^{226}Ra (Bq/kg)	^{226}Ra error (Bq/kg)	^{137}Cs (Bq/kg)	^{137}Cs Error (Bq/kg)	Total dry mass sedimentation (g/cm^2 yr)
2018.60	0.18	72.77	10.53	50.43	2.39	9.25	1.55	0.44
2018.33	0.36	71.27	7.36	48.72	1.66	9.16	1.11	0.43
2017.92	0.57	71.04	9.25	48.96	2.79	8.46	1.28	0.44
2017.50	0.69	70.48	7.80	48.15	1.82	8.29	1.17	0.43
2017.05	0.84	65.59	7.27	47.37	1.75	9.32	1.18	0.51
2016.56	0.99	71.22						0.40
2015.93	1.12	77.15	7.67	47.84	1.68	7.89	1.06	0.31
2015.24	1.29	70.78						0.39
2014.71	1.37	64.76	6.55	47.22	1.54	8.00	0.98	0.50
2014.22	1.51	66.19						0.44
2013.66	1.61	67.65	7.37	46.41	1.68	8.27	1.10	0.40
2013.14	1.71	66.67						0.42
2012.67	1.80	65.71	7.54	47.81	1.74	8.12	1.11	0.46
2012.08	1.97	69.19						0.36
2011.24	2.11	72.79	7.75	44.55	1.68	8.06	1.08	0.28
2010.50	2.24	64.93						0.45
2010.10	2.30	57.67	7.53	48.32	1.80	8.80	1.19	0.80
2009.73	2.41	63.27						0.49
2009.19	2.49	69.22	7.42	45.84	1.78	7.89	1.06	0.31
2008.54	2.62	67.89						0.30
2007.81	2.72	66.58	7.08	42.64	1.57	6.99	0.98	0.29
2007.08	2.87	68.56						0.33
2006.38	2.99	70.57	7.82	52.81	1.87	8.18	1.13	0.38
2005.69	3.12	69.11						0.35
2005.00	3.24	67.66	7.72	48.20	3.06	8.54	1.17	0.33
2004.34	3.36	65.33						0.38
2003.79	3.43	63.05	7.34	49.26	1.76	7.91	1.10	0.45
2003.29	3.54	60.35						0.47
2002.71	3.64	57.72	7.08	45.59	1.88	8.31	1.08	0.49

2001.85	3.85	68.62						0.31
2000.71	4.03	80.82	8.50	53.21	1.93	4.83	1.00	0.21
1999.68	4.16	79.63						0.18
1998.24	4.48	78.45	8.13	44.52	1.76	7.52	1.12	0.16
1996.61	4.68	71.94						0.20
1995.51	4.84	65.81	7.19	48.59	1.72	6.80	1.02	0.28
1994.46	5.03	64.43						0.27
1993.36	5.21	63.06	6.84	44.98	1.60	6.11	0.94	0.25
1992.18	5.43	67.72	7.26	47.18	2.14	13.81	1.42	0.21
1991.09	5.60	69.13	7.29	50.80	1.75	15.57	1.56	0.23
1990.50	5.64	53.27	5.82	48.64	1.49	9.63	1.04	0.88
1990.06	5.74	57.44	6.52	47.32	1.63	7.61	1.01	0.40
1989.28	5.91	64.67						0.25
1988.14	6.16	72.47	7.77	48.71	1.79	11.31	1.32	0.16
1986.86	6.38	67.86						0.20
1985.80	6.55	63.45	7.72	48.86	1.90	10.11	1.28	0.24
1984.57	6.84	72.89						0.15
1982.64	7.36	83.23	8.22	50.79	1.85	9.72	1.26	0.10
1980.29	7.82	74.40						0.13
1978.38	8.14	66.21	7.55	49.70	1.83	9.88	1.24	0.17
1976.27	8.87	71.89	6.88	46.70	1.55	9.55	1.09	0.11
1973.12	9.70	79.39	8.69	56.41	2.12	9.52	1.35	0.11
1970.37	9.98	67.69						0.15
1968.71	10.28	57.20	6.59	47.59	1.67	6.58	0.98	0.22
1967.10	10.86	68.51	7.24	50.57	2.04	6.15	0.94	0.11
1965.03	11.37	84.80	9.42	69.62	2.43	9.13	1.43	0.13
1961.20	13.34	72.36	6.91	44.03	1.50	6.11	0.89	0.06
1957.87	13.56	58.00	6.37	52.30	1.67	5.02	0.84	0.26
1956.26	13.83	60.82						0.16
1953.55	14.89	63.73	7.11	50.50	1.74	4.19	0.88	0.10
1950.42	15.44	59.85						0.10
1947.71	16.31	56.14	7.01	45.59	1.64	4.00	0.84	0.11
1944.60	17.23	55.81						0.09
1939.94	19.74	55.50	5.63	41.98	1.34	1.77	0.60	0.07
1936.38		54.50						
1934.87		53.52	6.65	50.50	1.76	0.00	0.00	
1933.41		51.76						
1931.93		50.05						
1930.45		48.37						
1928.62		46.73	5.90	45.15	1.56	0.00	0.00	
1926.46		46.47						
1924.50		46.21						

1922.55		45.96						
1920.76		45.70	5.46	42.61	1.38	0.00	0.00	
1919.29								
1917.65								
1915.53								
1913.05								
1911.19								
1909.90								
1908.31								
1906.66								
1905.09								
1903.31								
1901.61								
1900.25								
1898.58								
1897.09								
1896.06								
1894.94								
1893.56								
1892.08								
1890.54								
1888.82		49.67	7.25	49.80	1.85	0.00	0.00	
1887.01								
1885.30								
1883.61								
1881.97								
1880.40								
1879.00								
1877.80								
1876.62								
1875.41								
1874.26								
1873.09								
1871.74		54.27	7.52	42.52	1.76	0.00	0.00	
1870.39								
1869.00								
1867.52								
1866.06								
1864.58								
1863.18								
1861.74								
1860.18								

1858.66								
1857.09								
1855.51								
1854.08								
1852.75								
1851.61								
1850.64								
1849.52								
1848.13								
1846.87								
1845.86								
1844.79								
1843.71								
1842.59								
1841.49								
1840.48								
1839.51								
1838.53								
1837.44								
1836.10								
1834.72								
1833.06								
1831.09								
1829.50								
1828.31								
1827.14								
1825.96								
1824.66								
1822.81								
1820.63								
1818.57								
1816.69		44.04	6.81	51.84	2.07	0.00	0.00	
1814.84								
1813.04								
1811.07								
1809.17								
1807.11								
1804.74								
1802.43								
1799.96								
1797.89								
1796.21								

1794.41								
1792.60								
1790.95								
1789.30								
1787.62								
1786.02								
1784.46								
1783.02								
1781.70								
1780.20								
1778.60								
1776.93								
1775.17								
1773.35								
1771.47								
1769.53								
1767.46								
1765.32								

Table D-3. WAB 3 Sediment Core CRS-inferred 210Pb chronology. Interpolated and extrapolated values highlighted in grey.

CRS Raw Date	Age uncertainty (2 SD)	^{210}Pb (Bq/kg)	^{210}Pb Error (Bq/kg)	^{226}Ra (Bq/kg)	^{226}Ra error (Bq/kg)	^{137}Cs (Bq/kg)	^{137}Cs Error (Bq/kg)	Total dry mass sedimentation (g/cm^2 yr)
2019.49	0.08	288.72	27.48	-0.15	0.15	38.11	4.85	0.03
2019.13	0.11	405.65	45.30	1.58	1.21	59.13	8.40	0.02
2018.76	0.15	363.30	43.95	17.36	6.17	48.56	8.01	0.02
2018.31	0.22	404.86	65.39					0.02
2017.79	0.25	449.47	48.42	-5.59	6.89	55.91	8.45	0.02
2017.20	0.32	432.31	62.52					0.02
2016.57	0.34	415.60	39.55	-4.35	2.11	47.26	6.63	0.02
2015.94	0.38	426.31	56.96					0.02
2015.24	0.42	437.20	40.99	3.89	1.23	64.33	7.72	0.02
2014.54	0.45	462.85	58.82					0.02
2013.79	0.48	489.48	42.19	-7.23	3.46	73.71	8.15	0.01
2012.95	0.52	535.16	61.50					0.01
2011.97	0.56	583.59	44.75	7.37	2.63	89.48	8.93	0.01
2010.88	0.61	579.12	62.09					0.01
2009.84	0.65	574.67	43.04	-0.94	0.89	101.47	9.62	0.01
2008.65	0.71	575.08	61.57					0.01
2007.28	0.77	575.50	44.03	0.18	0.08	97.65	9.51	0.01
2005.83	0.84	529.82	59.94					0.01
2004.41	0.89	486.63	40.67	-0.20	0.18	107.75	10.32	0.01

2002.88	0.97	491.65	58.76					0.01
2001.21	1.04	496.70	42.42	-2.10	3.25	108.18	10.50	0.01
1999.50	1.12	468.74	55.01					0.01
1997.90	1.18	441.86	35.03	0.13	0.18	111.30	10.12	0.01
1996.46	1.24	406.81	48.99					0.01
1994.97	1.31	373.67	34.25	12.29	4.17	117.70	10.84	0.01
1993.55	1.37	368.51	50.82					0.01
1992.07	1.45	363.39	37.55	-2.70	2.43	129.19	12.13	0.01
1990.45	1.52	336.77	48.88					0.01
1989.10	1.58	311.47	31.29	2.78	9.93	111.98	10.39	0.01
1987.80	1.65	315.23	45.28					0.01
1986.20	1.74	319.01	32.73	-0.88	2.09	102.73	9.88	0.01
1984.59	1.82	293.53	46.52					0.01
1983.08	1.90	269.46	33.06	8.40	5.22	90.15	9.25	0.01
1981.57	1.97	237.75	43.16					0.01
1980.12	2.06	208.64	27.74	-1.01	1.03	100.38	9.51	0.01
1978.63	2.14	203.74	36.43					0.01
1977.04	2.24	198.92	23.61	-0.70	0.47	93.40	8.63	0.01
1975.39	2.34	186.70	30.58					0.01
1973.67	2.47	175.00	19.44	6.19	1.54	85.56	7.67	0.01
1972.03	2.59	156.52	20.77	1.82	2.67	85.06	7.88	0.01
1970.32	2.73	152.38	20.07	17.40	3.19	78.39	7.33	0.01
1968.46	2.88	126.89	17.02	5.09	1.34	78.22	7.08	0.01
1966.59	3.04	154.52	20.15	15.45	3.35	68.03	6.57	0.01
1964.51	3.20	138.90	26.07					0.01
1962.35	3.39	124.37	16.55	14.10	2.69	52.51	5.15	0.01
1960.48	3.54	103.74	20.25					0.01
1958.65	3.74	85.53	11.68	6.40	1.45	39.21	3.76	0.02
1956.95	3.88	68.43	15.07					0.02
1955.42	4.05	53.78	9.52	6.22	1.28	25.37	2.68	0.02
1953.58	4.24	69.11	14.84					0.02
1951.13	4.60	87.11	11.39	0.32	0.21	25.89	2.82	0.01
1948.50	4.87	72.23	15.22					0.01
1945.98	5.21	59.15	10.10	0.06	0.04	22.24	2.54	0.02
1943.43	5.51	59.25	13.98					0.01
1940.75	5.95	59.36	9.67	7.49	1.46	19.02	2.28	0.01
1937.83	6.37	58.16	13.45					0.01
1934.60	7.00	56.97	9.35	5.13	1.18	13.92	1.98	0.01
1931.10	7.52	48.87	13.10					0.01
1927.59	8.18	41.58	9.18	7.95	3.14	12.00	1.90	0.01
1923.36	8.83	41.75	12.76					0.01
1919.11	9.70	41.92	8.86	2.30	0.82	11.70	1.85	0.01

1915.62	10.22	34.84	14.59					0.01
1912.09	10.79	28.60	11.59					0.01
1908.95	10.97	23.16	13.79					0.01
1906.42	11.42	18.46	7.47	5.54	1.19	7.52	1.58	0.02
1904.24	11.45	17.24	12.65					0.02
1902.20	11.54	16.08	10.21					0.02
1900.02	11.09	14.98	12.36					0.02
1897.73	11.15	13.92	6.96	2.80	1.09	8.85	1.58	0.02
1895.48	10.63	14.36	11.76					0.02
1892.84	9.77	14.82	9.48					0.01
1889.75	8.10	15.28	11.45					0.01
1885.79	5.63	15.75	6.43	2.59	0.82	6.21	1.33	0.01
1881.47								0.01
1877.52								0.01
1873.69								0.01
1870.04								0.01
1863.40								0.01
1856.12								0.01
1851.37								0.01
1846.99		5.12	4.58	4.87	0.96	6.50	1.23	0.01
1842.56								0.01
1838.09								0.01
1833.63								0.01
1828.99								0.01
1824.36								0.01
1819.59								0.01
1814.88								0.01
1810.20								0.01
1805.57								0.01
1801.08								0.01
1796.61								0.01
1792.11								0.01
1787.52								0.01
1781.97								0.01
1776.43								0.01
1771.34								0.01
1765.93								0.01
1761.20								0.01
1756.27								0.01
1750.83								0.01
1745.40								0.01
1739.61								0.01

1733.12								0.01
1726.54								0.01
1720.37								0.01
1714.00								0.01
1707.46								0.01
1700.63								0.01
1693.67								0.01
1686.93								0.01
1680.42								0.01
1673.83								0.01
1666.72								0.01
1659.92								0.01
1653.04								0.01
1645.74								0.01
1637.90								0.01
1630.10								0.01
1623.30								0.01
1616.64								0.01
1609.72								0.01
1603.09								0.01
1596.43								0.01
1589.68								0.01
1583.08								0.01
1576.50								0.01
1569.90								0.01
1562.94								0.01
1556.08								0.01
1549.12								0.01
1541.86								0.01
1534.64								0.01
1527.49								0.01
1520.09								0.01
1512.51								0.01
1505.52								0.01
1498.13								0.01
1489.86								0.01
1480.95								0.01
1470.76								0.01
1461.13								0.01
1453.36								0.01
1444.75								0.01
1434.97								0.01

1424.62								0.01
1414.29								0.01
1403.98								0.01
1391.37								0.01
1379.51								0.01
1368.07								0.01
1354.91								0.01
1341.77								0.01
1327.77								0.01
1312.32								0.01
1297.81								0.01
1284.20								0.01

Appendix E: Grain Size data

Table E-1. WAB 1 Sediment Core, Grain Size (µm) analysis.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																			
			≤0.09	0.09≤0.10	0.10≤0.12	0.12≤0.13	0.13≤0.15	0.15≤0.17	0.17≤0.20	0.20≤0.23	0.23≤0.26	0.26≤0.30	0.30≤0.34	0.34≤0.39	0.39≤0.45	0.45≤0.51	0.51≤0.58	0.58≤0.67	0.67≤0.77	0.77≤0.88	0.88≤1.01	1.01≤1.15
2018.70	0	0.5	0.00	0.14	0.24	0.39	0.61	0.94	1.40	2.00	2.70	3.49	4.36	4.83	4.19	3.14	2.09	1.28	0.76	0.46	0.30	0.26
2018.62	0.5	1	0.00	0.18	0.30	0.47	0.73	1.11	1.63	2.28	3.00	3.71	4.26	4.25	3.36	2.37	1.56	0.99	0.63	0.42	0.31	0.28
2018.51	1	1.5	0.00	0.18	0.29	0.46	0.71	1.09	1.59	2.23	2.96	3.70	4.36	4.57	3.88	2.95	2.05	1.34	0.86	0.57	0.41	0.36
2018.33	1.5	2	0.00	0.15	0.25	0.40	0.62	0.94	1.39	1.95	2.59	3.27	3.93	4.26	3.74	2.94	2.09	1.38	0.88	0.56	0.39	0.34
2018.03	2	2.5	0.00	0.14	0.23	0.37	0.57	0.87	1.28	1.82	2.45	3.15	3.90	4.27	3.71	2.83	1.95	1.25	0.79	0.52	0.37	0.33
2017.73	2.5	3	0.00	0.15	0.25	0.40	0.61	0.93	1.37	1.93	2.57	3.27	3.97	4.35	3.89	3.09	2.22	1.49	0.97	0.65	0.46	0.41
2017.31	3	3.5	0.00	0.13	0.21	0.33	0.51	0.76	1.12	1.59	2.15	2.76	3.38	3.73	3.40	2.79	2.10	1.46	0.98	0.65	0.46	0.40
2016.95	3.5	4	0.00	0.14	0.23	0.36	0.55	0.82	1.21	1.70	2.30	2.94	3.56	3.83	3.34	2.59	1.84	1.24	0.81	0.54	0.39	0.35
2016.54	4	4.5	0.00	0.16	0.26	0.40	0.61	0.92	1.34	1.89	2.52	3.18	3.77	3.93	3.38	2.70	2.05	1.46	1.00	0.68	0.48	0.40
2016.24	4.5	5	0.00	0.19	0.31	0.49	0.76	1.16	1.70	2.39	3.17	3.95	4.58	4.71	3.90	2.94	2.07	1.38	0.90	0.60	0.43	0.37
2015.93	5	5.5	0.00	0.13	0.22	0.34	0.53	0.81	1.20	1.71	2.33	3.05	3.88	4.46	4.11	3.33	2.42	1.63	1.06	0.70	0.50	0.44
2015.60	5.5	6	0.00	0.14	0.23	0.36	0.56	0.86	1.27	1.81	2.47	3.19	3.89	4.17	3.57	2.65	1.78	1.13	0.70	0.44	0.31	0.27
2015.26	6	6.5	0.00	0.18	0.29	0.46	0.71	1.08	1.60	2.26	3.01	3.78	4.41	4.44	3.50	2.45	1.59	1.01	0.64	0.43	0.32	0.29
2014.89	6.5	7	0.00	0.19	0.32	0.51	0.81	1.24	1.85	2.62	3.50	4.41	5.25	5.46	4.47	3.21	2.09	1.28	0.78	0.49	0.33	0.29
2014.44	7	7.5	0.00	0.16	0.27	0.42	0.66	1.01	1.48	2.09	2.80	3.55	4.30	4.66	4.09	3.18	2.23	1.45	0.91	0.58	0.40	0.34
2014.17	7.5	8	0.00	0.00	0.14	0.23	0.35	0.54	0.82	1.21	1.73	2.43	3.33	4.05	3.97	3.22	2.28	1.46	0.90	0.56	0.40	0.36
2013.67	8	8.5	0.00	0.00	0.00	0.11	0.17	0.26	0.41	0.63	0.96	1.49	2.32	3.17	3.60	3.26	2.49	1.68	1.07	0.67	0.47	0.43
2012.96	8.5	9	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.27	0.44	0.77	1.40	2.25	3.01	3.22	2.74	1.98	1.28	0.80	0.54	0.46
2012.36	9	9.5	0.00	0.00	0.00	0.11	0.18	0.28	0.43	0.68	1.06	1.68	2.68	3.64	4.06	3.55	2.60	1.69	1.03	0.63	0.44	0.39
2011.95	9.5	10	0.00	0.00	0.00	0.11	0.17	0.27	0.42	0.66	1.03	1.63	2.59	3.52	3.91	3.40	2.48	1.60	0.97	0.59	0.41	0.36
2011.59	10	10.5	0.00	0.00	0.13	0.21	0.33	0.52	0.79	1.16	1.68	2.39	3.33	4.08	3.99	3.16	2.16	1.34	0.79	0.47	0.32	0.29
2011.14	10.5	11	0.00	0.15	0.25	0.40	0.62	0.95	1.41	2.00	2.71	3.48	4.20	4.39	3.59	2.54	1.65	1.02	0.63	0.41	0.30	0.27
2010.74	11	11.5	0.00	0.12	0.20	0.30	0.47	0.71	1.04	1.48	2.02	2.63	3.28	3.64	3.25	2.52	1.76	1.15	0.73	0.47	0.34	0.31
2010.02	11.5	12	0.00	0.00	0.00	0.00	0.14	0.21	0.33	0.53	0.84	1.37	2.26	3.16	3.68	3.41	2.63	1.80	1.16	0.75	0.55	0.51
2009.26	12	12.5	0.00	0.00	0.00	0.00	0.10	0.16	0.26	0.41	0.67	1.12	1.90	2.73	3.29	3.18	2.54	1.80	1.19	0.78	0.59	0.55
2008.71	12.5	13	0.00	0.12	0.21	0.32	0.50	0.77	1.14	1.63	2.25	2.98	3.75	4.10	3.57	2.67	1.82	1.17	0.75	0.50	0.38	0.34
2007.86	13	13.5	0.00	0.17	0.28	0.42	0.65	0.97	1.41	1.98	2.63	3.30	3.87	3.93	3.32	2.59	1.92	1.38	0.96	0.66	0.48	0.40

2007.10	13.5	14	0.00	0.14	0.22	0.34	0.51	0.77	1.13	1.58	2.12	2.70	3.26	3.54	3.19	2.65	2.04	1.45	0.98	0.66	0.46	0.40
2006.48	14	14.5	0.00	0.15	0.23	0.36	0.54	0.82	1.19	1.67	2.23	2.84	3.40	3.62	3.24	2.70	2.14	1.60	1.15	0.82	0.61	0.53
2005.78	14.5	15	0.10	0.19	0.31	0.48	0.73	1.09	1.58	2.22	2.96	3.72	4.35	4.41	3.56	2.56	1.73	1.14	0.76	0.53	0.40	0.37
2005.17	15	15.5	0.00	0.14	0.23	0.35	0.54	0.81	1.19	1.67	2.23	2.84	3.40	3.62	3.26	2.70	2.09	1.52	1.05	0.72	0.51	0.43
2004.51	15.5	16	0.00	0.00	0.00	0.00	0.00	0.14	0.21	0.32	0.49	0.76	1.23	1.85	2.42	2.56	2.25	1.71	1.19	0.80	0.59	0.55
2003.89	16	16.5	0.00	0.14	0.22	0.34	0.52	0.77	1.12	1.57	2.09	2.63	3.13	3.31	2.94	2.44	1.91	1.41	1.00	0.70	0.51	0.44
2003.27	16.5	17	0.00	0.00	0.11	0.17	0.27	0.41	0.62	0.92	1.32	1.87	2.62	3.29	3.39	2.88	2.14	1.44	0.92	0.60	0.44	0.41
2001.83	17.5	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.24	0.46	0.93	1.68	2.39	2.71	2.41	1.78	1.16	0.72	0.46	0.38
2000.95	18	18.5	0.00	0.00	0.00	0.00	0.15	0.22	0.33	0.49	0.71	1.03	1.51	2.12	2.50	2.43	2.00	1.44	0.95	0.61	0.43	0.39
1999.44	19	19.5	0.10	0.20	0.31	0.48	0.73	1.10	1.61	2.26	3.04	3.86	4.58	4.75	4.01	3.06	2.21	1.57	1.13	0.85	0.68	0.63
1998.97	19.5	20	0.12	0.23	0.37	0.58	0.89	1.34	1.96	2.74	3.62	4.49	5.17	5.21	4.32	3.27	2.36	1.65	1.16	0.85	0.66	0.61
1998.44	20	20.5	0.00	0.00	0.00	0.00	0.11	0.16	0.26	0.40	0.62	1.00	1.68	2.54	3.25	3.27	2.68	1.88	1.19	0.73	0.49	0.43
1997.77	20.5	21	0.12	0.23	0.36	0.57	0.87	1.32	1.93	2.71	3.60	4.48	5.18	5.24	4.34	3.34	2.45	1.73	1.19	0.84	0.62	0.54
1997.36	21	21.5	0.00	0.00	0.11	0.16	0.24	0.36	0.51	0.72	0.97	1.34	1.93	2.94	4.10	4.98	5.10	4.50	3.58	2.74	2.15	1.96
1996.89	21.5	22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.49	1.31	3.08	4.98	6.27	6.34	5.44	4.24	3.20	2.50	2.37
1996.46	22	22.5	0.11	0.20	0.33	0.50	0.76	1.14	1.65	2.32	3.09	3.90	4.57	4.65	3.82	2.80	1.93	1.31	0.89	0.63	0.48	0.44
1995.99	22.5	23	0.00	0.14	0.23	0.36	0.55	0.82	1.21	1.71	2.31	2.95	3.55	3.79	3.21	2.41	1.65	1.06	0.66	0.42	0.29	0.25
1995.52	23	23.5	0.11	0.20	0.32	0.48	0.74	1.10	1.61	2.26	3.03	3.83	4.52	4.65	3.84	2.83	1.95	1.31	0.89	0.62	0.47	0.42
1995.05	23.5	24	0.00	0.17	0.28	0.43	0.65	0.97	1.41	1.98	2.63	3.29	3.84	3.89	3.18	2.38	1.71	1.19	0.82	0.57	0.41	0.35
1994.52	24	24.5	0.00	0.00	0.00	0.11	0.17	0.27	0.42	0.64	0.98	1.52	2.38	3.26	3.72	3.36	2.56	1.73	1.09	0.69	0.49	0.44
1993.89	24.5	25	0.00	0.00	0.00	0.00	0.00	0.10	0.17	0.29	0.52	0.98	1.87	2.88	3.56	3.58	2.91	2.05	1.33	0.85	0.59	0.52
1993.30	25	25.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.28	0.66	1.43	2.30	2.88	2.83	2.29	1.61	1.07	0.71	0.58
1992.63	25.5	26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.25	0.56	1.01	1.47	1.68	1.54	1.19	0.83	0.57	0.48
1992.04	26	26.5	0.00	0.14	0.23	0.35	0.53	0.79	1.16	1.62	2.17	2.75	3.32	3.60	3.32	2.84	2.26	1.68	1.19	0.84	0.63	0.55
1991.46	26.5	27	0.00	0.14	0.23	0.36	0.57	0.86	1.27	1.80	2.43	3.13	3.82	4.06	3.44	2.55	1.74	1.13	0.73	0.49	0.37	0.34
1990.78	27	27.5	0.00	0.00	0.14	0.22	0.33	0.50	0.74	1.06	1.47	1.98	2.59	3.11	3.06	2.60	1.98	1.39	0.94	0.64	0.48	0.44
1990.13	27.5	28	0.00	0.00	0.00	0.00	0.13	0.21	0.33	0.52	0.81	1.31	2.12	2.96	3.40	3.08	2.32	1.53	0.95	0.58	0.41	0.37
1989.39	28	28.5	0.00	0.00	0.00	0.00	0.00	0.14	0.21	0.34	0.53	0.88	1.51	2.34	3.05	3.12	2.58	1.81	1.15	0.70	0.47	0.41
1988.67	28.5	29	0.00	0.00	0.00	0.00	0.00	0.10	0.16	0.26	0.44	0.77	1.43	2.32	3.12	3.33	2.81	2.01	1.29	0.79	0.52	0.44
1987.94	29	29.5	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.30	0.53	1.03	1.75	2.45	2.76	2.46	1.84	1.23	0.78	0.53	0.45

1987.21	29.5	30	0.00	0.00	0.00	0.00	0.00	0.13	0.20	0.33	0.57	1.01	1.82	2.71	3.32	3.29	2.65	1.86	1.21	0.77	0.55	0.49
1986.45	30	30.5	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.24	0.44	0.84	1.66	2.66	3.35	3.39	2.76	1.93	1.24	0.78	0.53	0.46
1985.83	30.5	31	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.39	0.66	1.16	2.06	3.02	3.63	3.50	2.76	1.90	1.22	0.77	0.55	0.49
1985.17	31	31.5	0.00	0.00	0.00	0.00	0.00	0.14	0.23	0.37	0.62	1.09	1.94	2.86	3.46	3.35	2.64	1.82	1.16	0.72	0.50	0.45
1984.44	31.5	32	0.00	0.00	0.00	0.00	0.12	0.19	0.30	0.48	0.78	1.30	2.20	3.13	3.68	3.42	2.62	1.76	1.10	0.68	0.47	0.42
1983.74	32	32.5	0.00	0.00	0.00	0.00	0.00	0.16	0.25	0.41	0.69	1.19	2.08	3.02	3.61	3.44	2.67	1.81	1.13	0.70	0.49	0.43
1983.02	32.5	33	0.00	0.00	0.00	0.00	0.11	0.18	0.29	0.46	0.76	1.29	2.21	3.15	3.69	3.41	2.59	1.72	1.06	0.65	0.45	0.40
1982.33	33	33.5	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.25	0.41	0.70	1.27	2.03	2.75	3.00	2.62	1.94	1.30	0.83	0.58	0.51
1981.63	33.5	34	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.27	0.43	0.73	1.30	2.07	2.78	2.99	2.58	1.90	1.26	0.80	0.56	0.49
1980.96	34	34.5	0.00	0.00	0.00	0.00	0.00	0.13	0.21	0.34	0.60	1.09	1.99	2.97	3.59	3.49	2.74	1.87	1.18	0.74	0.51	0.45
1980.25	34.5	35	0.00	0.00	0.00	0.00	0.00	0.13	0.22	0.36	0.62	1.11	2.03	3.00	3.58	3.41	2.61	1.74	1.07	0.65	0.44	0.38
1979.56	35	35.5	0.00	0.00	0.00	0.00	0.12	0.19	0.30	0.48	0.77	1.27	2.13	3.03	3.57	3.34	2.59	1.77	1.12	0.70	0.50	0.44
1978.61	35.5	36	0.00	0.00	0.00	0.13	0.21	0.33	0.51	0.78	1.20	1.86	2.89	3.86	4.25	3.69	2.72	1.78	1.10	0.68	0.48	0.43
1978.03	36	36.5	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.32	0.58	1.14	1.92	2.66	2.96	2.61	1.94	1.29	0.82	0.56	0.48
1977.44	36.5	37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.23	0.44	0.91	1.66	2.40	2.76	2.49	1.86	1.22	0.76	0.49	0.40
1976.69	37	37.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.28	0.52	1.04	1.81	2.59	2.98	2.73	2.10	1.44	0.94	0.65	0.57
1975.82	37.5	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.29	0.55	1.11	1.95	2.78	3.18	2.88	2.18	1.48	0.95	0.65	0.55
1975.18	38	38.5	0.00	0.00	0.00	0.00	0.12	0.19	0.31	0.53	0.91	1.63	2.82	3.77	4.10	3.61	2.66	1.77	1.13	0.73	0.54	0.49
1974.47	38.5	39	0.00	0.00	0.00	0.00	0.15	0.23	0.36	0.56	0.88	1.41	2.27	3.12	3.55	3.20	2.41	1.61	1.01	0.63	0.45	0.41
1973.66	39	39.5	0.00	0.00	0.00	0.00	0.00	0.11	0.19	0.32	0.56	1.03	1.93	2.90	3.53	3.50	2.82	1.98	1.29	0.83	0.59	0.53
1972.97	39.5	40	0.00	0.00	0.00	0.14	0.22	0.35	0.55	0.85	1.32	2.08	3.17	3.95	4.06	3.34	2.38	1.57	1.01	0.66	0.51	0.47
1972.33	40	40.5	0.00	0.00	0.00	0.13	0.19	0.30	0.46	0.69	1.03	1.55	2.33	3.10	3.45	3.10	2.39	1.66	1.10	0.73	0.55	0.51
1971.68	40.5	41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.35	0.76	1.44	2.14	2.51	2.33	1.79	1.20	0.77	0.50	0.42
1970.82	41	41.5	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.42	0.76	1.42	2.56	3.55	3.96	3.62	2.75	1.86	1.20	0.77	0.56	0.51
1970.16	41.5	42	0.00	0.00	0.00	0.00	0.00	0.12	0.18	0.28	0.44	0.69	1.15	1.77	2.35	2.50	2.17	1.62	1.09	0.70	0.49	0.44
1969.27	42	42.5	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.29	0.51	0.95	1.78	2.73	3.40	3.42	2.78	1.96	1.27	0.80	0.56	0.49
1968.75	42.5	43	0.00	0.00	0.00	0.00	0.00	0.14	0.23	0.38	0.65	1.17	2.12	3.09	3.69	3.60	2.85	1.99	1.30	0.84	0.62	0.58
1967.98	43	43.5	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.27	0.48	0.91	1.74	2.66	3.29	3.33	2.76	1.99	1.33	0.88	0.65	0.60
1967.30	43.5	44	0.00	0.00	0.00	0.00	0.00	0.12	0.19	0.32	0.56	1.01	1.86	2.77	3.41	3.45	2.83	2.04	1.36	0.90	0.67	0.62
1966.52	44	44.5	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.30	0.53	0.98	1.82	2.70	3.26	3.18	2.51	1.72	1.09	0.68	0.47	0.42

1965.63	44.5	45	0.00	0.00	0.00	0.00	0.14	0.22	0.34	0.54	0.85	1.39	2.27	3.15	3.64	3.33	2.55	1.74	1.11	0.71	0.52	0.47
1964.86	45	45.5	0.00	0.00	0.00	0.10	0.16	0.26	0.42	0.68	1.12	1.88	3.07	3.97	4.24	3.62	2.63	1.75	1.12	0.74	0.56	0.52
1964.32	45.5	46	0.00	0.00	0.00	0.00	0.00	0.13	0.21	0.35	0.61	1.11	2.03	2.99	3.61	3.53	2.81	1.95	1.26	0.81	0.58	0.53
1963.67	46	46.5	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.46	0.90	1.75	2.73	3.42	3.49	2.92	2.10	1.40	0.92	0.66	0.59
1963.00	46.5	47	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.27	0.49	0.92	1.74	2.65	3.27	3.30	2.73	1.96	1.30	0.86	0.63	0.57
1962.35	47	47.5	0.00	0.00	0.00	0.13	0.20	0.31	0.48	0.73	1.10	1.68	2.55	3.38	3.77	3.36	2.59	1.81	1.21	0.82	0.64	0.61
1961.69	47.5	48	0.00	0.12	0.20	0.31	0.47	0.71	1.04	1.46	1.97	2.54	3.14	3.55	3.32	2.81	2.15	1.52	1.02	0.69	0.49	0.44
1961.10	48	48.5	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.31	0.55	1.04	1.94	2.89	3.53	3.56	2.94	2.13	1.44	0.97	0.73	0.69
1960.57	48.5	49	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.24	0.43	0.84	1.65	2.58	3.25	3.38	2.90	2.15	1.48	1.00	0.75	0.69
1959.94	49	49.5	0.00	0.00	0.12	0.19	0.29	0.45	0.69	1.05	1.56	2.34	3.34	4.03	4.01	3.25	2.34	1.58	1.05	0.73	0.59	0.56
1959.25	49.5	50	0.00	0.00	0.00	0.00	0.12	0.18	0.29	0.48	0.79	1.36	2.36	3.37	4.00	3.80	2.98	2.07	1.35	0.88	0.64	0.58
1958.34	50	50.5	0.00	0.15	0.25	0.39	0.61	0.92	1.35	1.90	2.54	3.23	3.90	4.12	3.51	2.63	1.81	1.18	0.77	0.52	0.38	0.35
1957.70	50.5	51	0.00	0.11	0.17	0.27	0.41	0.62	0.90	1.28	1.75	2.30	2.90	3.30	3.08	2.52	1.87	1.30	0.87	0.60	0.45	0.42
1956.98	51	51.5	0.00	0.14	0.23	0.35	0.55	0.83	1.22	1.72	2.32	2.99	3.69	4.03	3.57	2.79	1.99	1.35	0.90	0.62	0.46	0.42
1956.39	51.5	52	0.00	0.00	0.00	0.13	0.20	0.31	0.47	0.71	1.06	1.61	2.44	3.25	3.66	3.29	2.55	1.78	1.19	0.79	0.61	0.57
1955.62	52	52.5	0.00	0.00	0.00	0.11	0.18	0.27	0.42	0.65	1.00	1.56	2.45	3.32	3.76	3.38	2.59	1.77	1.15	0.75	0.56	0.51
1954.88	52.5	53	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.39	0.63	1.07	1.84	2.66	3.22	3.16	2.55	1.82	1.21	0.80	0.60	0.56
1954.23	53	53.5	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.23	0.41	0.74	1.37	2.09	2.62	2.71	2.30	1.69	1.16	0.78	0.58	0.55
1953.43	53.5	54	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.42	0.74	1.37	2.46	3.39	3.79	3.48	2.65	1.81	1.18	0.77	0.58	0.53
1952.75	54	54.5	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.29	0.50	0.94	1.74	2.63	3.27	3.37	2.85	2.10	1.45	0.98	0.75	0.69
1951.87	54.5	55	0.00	0.17	0.27	0.40	0.59	0.87	1.24	1.73	2.32	2.97	3.59	3.83	3.28	2.48	1.72	1.15	0.77	0.53	0.40	0.37
1951.15	55	55.5	0.00	0.00	0.00	0.00	0.12	0.19	0.30	0.48	0.78	1.31	2.21	3.16	3.74	3.53	2.75	1.90	1.22	0.78	0.56	0.50
1950.36	55.5	56	0.00	0.10	0.19	0.29	0.45	0.70	1.05	1.52	2.13	2.91	3.79	4.26	3.79	2.85	1.92	1.23	0.77	0.51	0.38	0.35
1949.58	56	56.5	0.00	0.16	0.26	0.40	0.61	0.91	1.33	1.86	2.48	3.13	3.71	3.89	3.38	2.74	2.10	1.51	1.03	0.70	0.49	0.41
1948.83	56.5	57	0.00	0.00	0.00	0.00	0.00	0.14	0.21	0.34	0.53	0.87	1.50	2.32	3.05	3.18	2.69	1.94	1.26	0.78	0.53	0.45
1948.08	57	57.5	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.27	0.44	0.77	1.41	2.28	3.08	3.30	2.81	2.03	1.30	0.80	0.52	0.44
1947.24	57.5	58	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.21	0.36	0.68	1.34	2.31	3.24	3.64	3.24	2.42	1.62	1.03	0.69	0.57
1946.36	58	58.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.23	0.43	0.83	1.44	2.06	2.43	2.30	1.85	1.33	0.92	0.67	0.62
1945.58	58.5	59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.38	0.85	1.67	2.52	3.03	2.88	2.27	1.58	1.04	0.70	0.59
1944.88	59	59.5	0.00	0.00	0.00	0.15	0.24	0.36	0.56	0.86	1.34	2.12	2.90	3.37	3.15	2.51	1.80	1.23	0.84	0.66	0.63

1943.54	60	60.5	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.28	0.45	0.77	1.37	2.20	2.96	3.20	2.78	2.05	1.36	0.86	0.58	0.49
1942.60	60.5	61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.31	0.61	1.24	2.07	2.75	2.99	2.66	2.03	1.42	0.97	0.71	0.65
1941.97	61	61.5	0.00	0.00	0.11	0.17	0.26	0.40	0.61	0.90	1.32	1.92	2.76	3.56	3.78	3.28	2.47	1.68	1.09	0.72	0.54	0.49
1941.41	61.5	62	0.12	0.23	0.41	0.65	1.02	1.58	2.46	3.77	5.53	6.88	7.42	7.09	5.86	4.12	2.71	1.77	1.19	0.86	0.68	0.59
1940.73	62	62.5	0.00	0.13	0.21	0.33	0.50	0.75	1.09	1.53	2.06	2.65	3.24	3.59	3.40	2.99	2.45	1.88	1.37	0.98	0.72	0.63
1940.13	62.5	63	0.00	0.00	0.13	0.20	0.31	0.48	0.73	1.09	1.58	2.27	3.20	4.05	4.13	3.48	2.55	1.69	1.07	0.68	0.49	0.43
1939.34	63	63.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.28	0.63	1.33	2.14	2.73	2.78	2.33	1.71	1.17	0.80	0.66
1938.52	63.5	64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.31	0.66	1.27	1.95	2.43	2.44	2.04	1.50	1.04	0.74	0.65

Table E-1. Continued.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																			
			1.15≤1.32	1.32≤1.51	1.51≤1.73	1.73≤1.98	1.98≤2.27	2.27≤2.60	2.60≤2.98	2.98≤3.41	3.41≤3.91	3.91≤4.47	4.47≤5.12	5.12≤5.87	5.87≤6.72	6.72≤7.70	7.70≤8.82	8.82≤10.10	10.10≤11.57	11.57≤13.25	13.25≤15.17	15.17≤17.38
2018.70	0	0.5	0.29	0.36	0.44	0.55	0.74	1.02	1.41	1.88	2.40	2.90	3.34	3.67	3.89	4.03	4.12	4.12	3.97	3.87	3.84	3.77
2018.62	0.5	1	0.31	0.39	0.48	0.61	0.82	1.13	1.55	2.08	2.66	3.20	3.63	3.91	4.04	4.07	4.05	3.91	3.59	3.33	3.14	2.98
2018.51	1	1.5	0.40	0.49	0.59	0.73	0.96	1.28	1.70	2.19	2.68	3.10	3.40	3.56	3.60	3.58	3.53	3.41	3.17	2.99	2.91	2.87
2018.33	1.5	2	0.38	0.47	0.57	0.71	0.94	1.27	1.71	2.24	2.78	3.27	3.63	3.84	3.92	3.92	3.87	3.74	3.48	3.29	3.20	3.13
2018.03	2	2.5	0.37	0.46	0.55	0.68	0.89	1.19	1.59	2.05	2.53	2.97	3.32	3.54	3.65	3.70	3.71	3.65	3.46	3.33	3.29	3.27
2017.73	2.5	3	0.45	0.55	0.65	0.79	1.01	1.32	1.71	2.15	2.58	2.94	3.19	3.32	3.36	3.35	3.33	3.25	3.07	2.96	2.94	2.97
2017.31	3	3.5	0.44	0.54	0.63	0.78	1.00	1.32	1.74	2.23	2.75	3.22	3.58	3.81	3.92	3.93	3.89	3.74	3.41	3.14	3.01	2.96
2016.95	3.5	4	0.38	0.47	0.55	0.69	0.90	1.21	1.62	2.13	2.69	3.22	3.65	3.94	4.07	4.08	4.02	3.83	3.43	3.09	2.87	2.73
2016.54	4	4.5	0.43	0.53	0.64	0.79	1.05	1.42	1.92	2.53	3.17	3.73	4.13	4.32	4.34	4.23	4.05	3.76	3.27	2.89	2.65	2.51
2016.24	4.5	5	0.40	0.49	0.58	0.71	0.91	1.22	1.62	2.10	2.60	3.07	3.44	3.70	3.85	3.94	3.98	3.93	3.69	3.52	3.40	3.29
2015.93	5	5.5	0.48	0.58	0.67	0.80	1.01	1.28	1.62	2.00	2.37	2.70	2.95	3.13	3.24	3.32	3.39	3.42	3.33	3.32	3.39	3.47
2015.60	5.5	6	0.30	0.36	0.43	0.53	0.70	0.94	1.29	1.73	2.24	2.79	3.32	3.76	4.10	4.34	4.49	4.50	4.25	4.00	3.84	3.73
2015.26	6	6.5	0.31	0.37	0.45	0.55	0.71	0.95	1.28	1.68	2.14	2.60	3.01	3.34	3.59	3.78	3.94	4.02	3.88	3.79	3.75	3.68
2014.89	6.5	7	0.31	0.37	0.44	0.54	0.70	0.93	1.25	1.63	2.06	2.47	2.84	3.13	3.35	3.52	3.66	3.71	3.60	3.53	3.51	3.47
2014.44	7	7.5	0.37	0.45	0.53	0.66	0.85	1.14	1.52	1.97	2.45	2.90	3.27	3.54	3.71	3.81	3.87	3.84	3.66	3.54	3.50	3.45
2014.17	7.5	8	0.39	0.45	0.54	0.65	0.83	1.06	1.35	1.67	2.03	2.42	2.82	3.20	3.54	3.84	4.09	4.27	4.31	4.31	4.37	4.41
2013.67	8	8.5	0.47	0.54	0.64	0.78	0.99	1.24	1.52	1.78	2.02	2.25	2.49	2.75	3.03	3.35	3.68	4.00	4.37	4.72	5.13	5.47
2012.96	8.5	9	0.49	0.56	0.64	0.78	0.98	1.23	1.49	1.72	1.89	2.00	2.09	2.20	2.37	2.60	2.90	3.23	3.69	4.26	4.89	5.47

2012.36	9	9.5	0.43	0.50	0.59	0.73	0.92	1.17	1.44	1.71	1.95	2.17	2.40	2.64	2.89	3.16	3.43	3.69	4.00	4.30	4.65	4.95
2011.95	9.5	10	0.40	0.47	0.56	0.70	0.90	1.15	1.44	1.73	1.99	2.23	2.48	2.73	2.99	3.26	3.52	3.77	4.06	4.32	4.63	4.89
2011.59	10	10.5	0.32	0.38	0.46	0.58	0.76	1.00	1.31	1.67	2.07	2.49	2.91	3.29	3.61	3.87	4.06	4.19	4.18	4.14	4.17	4.18
2011.14	10.5	11	0.30	0.36	0.44	0.55	0.73	0.99	1.34	1.77	2.26	2.75	3.18	3.50	3.70	3.82	3.88	3.86	3.67	3.50	3.39	3.26
2010.74	11	11.5	0.35	0.42	0.52	0.65	0.86	1.16	1.57	2.07	2.63	3.18	3.64	3.96	4.11	4.13	4.07	3.89	3.51	3.18	2.97	2.84
2010.02	11.5	12	0.57	0.65	0.76	0.93	1.15	1.41	1.67	1.89	2.07	2.24	2.39	2.56	2.72	2.87	3.01	3.14	3.32	3.51	3.72	3.91
2009.26	12	12.5	0.61	0.70	0.82	1.00	1.23	1.49	1.74	1.95	2.09	2.21	2.32	2.45	2.60	2.75	2.91	3.05	3.28	3.53	3.80	4.06
2008.71	12.5	13	0.38	0.45	0.55	0.68	0.87	1.14	1.48	1.88	2.31	2.71	3.05	3.29	3.44	3.52	3.58	3.61	3.50	3.43	3.43	3.43
2007.86	13	13.5	0.43	0.52	0.64	0.80	1.06	1.46	2.00	2.66	3.36	3.99	4.44	4.64	4.64	4.47	4.22	3.82	3.26	2.78	2.44	2.21
2007.10	13.5	14	0.43	0.53	0.64	0.79	1.04	1.41	1.89	2.47	3.08	3.62	4.02	4.23	4.27	4.20	4.05	3.79	3.35	3.00	2.79	2.69
2006.48	14	14.5	0.57	0.68	0.82	0.98	1.24	1.60	2.04	2.53	3.00	3.37	3.62	3.73	3.75	3.72	3.68	3.54	3.24	3.02	2.95	3.00
2005.78	14.5	15	0.41	0.52	0.64	0.82	1.11	1.54	2.13	2.86	3.63	4.30	4.75	4.91	4.82	4.56	4.20	3.72	3.06	2.51	2.10	1.80
2005.17	15	15.5	0.46	0.56	0.66	0.81	1.04	1.38	1.83	2.35	2.91	3.43	3.83	4.10	4.23	4.27	4.23	4.05	3.68	3.38	3.19	3.10
2004.51	15.5	16	0.63	0.75	0.89	1.10	1.39	1.72	2.05	2.32	2.51	2.63	2.72	2.81	2.92	3.04	3.18	3.28	3.44	3.60	3.79	3.95
2003.89	16	16.5	0.47	0.58	0.71	0.87	1.14	1.52	2.03	2.63	3.25	3.79	4.17	4.36	4.38	4.28	4.12	3.83	3.36	2.99	2.76	2.64
2003.27	16.5	17	0.47	0.57	0.68	0.84	1.08	1.37	1.70	2.05	2.40	2.73	3.04	3.30	3.52	3.69	3.82	3.91	3.90	3.88	3.95	4.05
2001.83	17.5	18	0.40	0.48	0.54	0.66	0.84	1.07	1.34	1.57	1.74	1.83	1.85	1.87	1.92	2.03	2.23	2.47	2.83	3.37	4.08	4.88
2000.95	18	18.5	0.45	0.56	0.68	0.87	1.15	1.52	1.95	2.38	2.76	3.08	3.33	3.55	3.74	3.91	4.08	4.18	4.22	4.24	4.30	4.33
1999.44	19	19.5	0.67	0.78	0.90	1.05	1.28	1.59	1.98	2.40	2.80	3.12	3.33	3.42	3.41	3.35	3.28	3.12	2.79	2.52	2.36	2.30
1998.97	19.5	20	0.66	0.78	0.91	1.08	1.33	1.66	2.06	2.49	2.87	3.16	3.32	3.36	3.32	3.23	3.14	2.98	2.71	2.51	2.37	2.28
1998.44	20	20.5	0.46	0.53	0.61	0.75	0.94	1.19	1.46	1.72	1.94	2.12	2.29	2.51	2.80	3.16	3.59	4.04	4.59	5.19	5.80	6.24
1997.77	20.5	21	0.58	0.71	0.85	1.04	1.33	1.75	2.28	2.88	3.45	3.89	4.13	4.15	4.03	3.81	3.55	3.22	2.78	2.42	2.15	1.93
1997.36	21	21.5	2.13	2.50	2.84	3.16	3.55	3.90	4.09	4.03	3.73	3.26	2.74	2.27	1.89	1.61	1.43	1.28	1.18	1.17	1.27	1.45
1996.89	21.5	22	2.67	3.21	3.61	4.04	4.49	4.81	4.83	4.47	3.80	2.99	2.23	1.63	1.21	0.94	0.78	0.68	0.61	0.61	0.64	0.71
1996.46	22	22.5	0.48	0.60	0.75	0.95	1.28	1.76	2.41	3.18	3.96	4.61	5.00	5.08	4.90	4.55	4.12	3.59	2.92	2.36	1.96	1.67
1995.99	22.5	23	0.28	0.35	0.43	0.54	0.74	1.04	1.47	2.03	2.68	3.36	3.95	4.38	4.62	4.70	4.67	4.47	4.00	3.58	3.28	3.07
1995.52	23	23.5	0.47	0.57	0.70	0.88	1.18	1.61	2.20	2.92	3.67	4.32	4.75	4.91	4.83	4.57	4.22	3.74	3.10	2.54	2.13	1.83
1995.05	23.5	24	0.38	0.48	0.60	0.78	1.07	1.52	2.16	2.97	3.85	4.64	5.19	5.42	5.35	5.07	4.67	4.13	3.40	2.80	2.37	2.06
1994.52	24	24.5	0.49	0.56	0.66	0.81	1.02	1.28	1.57	1.84	2.08	2.31	2.53	2.74	2.96	3.17	3.37	3.56	3.78	3.98	4.25	4.51
1993.89	24.5	25	0.54	0.60	0.67	0.80	0.97	1.17	1.37	1.52	1.61	1.66	1.70	1.76	1.86	2.02	2.23	2.47	2.83	3.36	3.98	4.63

1993.30	25	25.5	0.60	0.69	0.76	0.86	1.01	1.19	1.36	1.49	1.54	1.51	1.42	1.33	1.26	1.25	1.30	1.41	1.57	1.87	2.34	2.97
1992.63	25.5	26	0.52	0.63	0.73	0.87	1.08	1.35	1.64	1.88	2.01	2.03	1.95	1.85	1.77	1.75	1.81	1.92	2.09	2.42	2.91	3.50
1992.04	26	26.5	0.60	0.72	0.85	1.02	1.27	1.62	2.04	2.49	2.90	3.21	3.37	3.40	3.32	3.19	3.05	2.84	2.52	2.29	2.19	2.19
1991.46	26.5	27	0.38	0.46	0.55	0.68	0.88	1.16	1.51	1.93	2.37	2.79	3.11	3.34	3.46	3.52	3.55	3.53	3.36	3.25	3.21	3.18
1990.78	27	27.5	0.50	0.61	0.73	0.90	1.14	1.45	1.83	2.23	2.64	3.02	3.33	3.55	3.68	3.75	3.78	3.75	3.57	3.43	3.42	3.48
1990.13	27.5	28	0.42	0.49	0.59	0.76	0.98	1.28	1.60	1.92	2.20	2.44	2.66	2.89	3.12	3.34	3.56	3.75	3.99	4.21	4.47	4.68
1989.39	28	28.5	0.44	0.52	0.60	0.75	0.96	1.23	1.54	1.82	2.05	2.23	2.39	2.57	2.80	3.09	3.42	3.76	4.18	4.63	5.10	5.44
1988.67	28.5	29	0.46	0.53	0.60	0.73	0.91	1.15	1.41	1.63	1.80	1.91	2.00	2.10	2.25	2.47	2.75	3.06	3.50	4.06	4.69	5.29
1987.94	29	29.5	0.48	0.56	0.63	0.77	0.97	1.22	1.48	1.71	1.86	1.94	1.97	2.02	2.12	2.29	2.54	2.81	3.21	3.78	4.45	5.13
1987.21	29.5	30	0.53	0.60	0.69	0.84	1.04	1.28	1.52	1.72	1.85	1.93	2.01	2.10	2.24	2.42	2.64	2.88	3.24	3.71	4.25	4.78
1986.45	30	30.5	0.49	0.56	0.62	0.75	0.92	1.13	1.34	1.51	1.62	1.67	1.69	1.73	1.80	1.93	2.12	2.34	2.68	3.19	3.82	4.52
1985.83	30.5	31	0.53	0.59	0.68	0.83	1.02	1.25	1.48	1.68	1.81	1.90	1.99	2.10	2.25	2.44	2.68	2.93	3.30	3.77	4.30	4.83
1985.17	31	31.5	0.48	0.55	0.63	0.78	0.98	1.21	1.46	1.68	1.83	1.95	2.05	2.18	2.34	2.55	2.80	3.07	3.46	3.95	4.50	5.03
1984.44	31.5	32	0.45	0.52	0.61	0.75	0.95	1.19	1.46	1.70	1.90	2.06	2.22	2.40	2.62	2.87	3.16	3.46	3.86	4.32	4.82	5.28
1983.74	32	32.5	0.47	0.53	0.62	0.76	0.96	1.20	1.46	1.68	1.86	1.99	2.12	2.26	2.44	2.66	2.91	3.17	3.55	4.00	4.50	4.98
1983.02	32.5	33	0.44	0.50	0.59	0.73	0.93	1.18	1.45	1.69	1.90	2.06	2.22	2.39	2.59	2.82	3.08	3.34	3.70	4.10	4.55	4.95
1982.33	33	33.5	0.55	0.64	0.73	0.89	1.12	1.38	1.65	1.88	2.03	2.11	2.17	2.26	2.40	2.59	2.85	3.12	3.50	3.99	4.53	5.03
1981.63	33.5	34	0.52	0.60	0.70	0.85	1.07	1.34	1.61	1.85	2.01	2.12	2.20	2.30	2.45	2.66	2.93	3.21	3.60	4.10	4.64	5.13
1980.96	34	34.5	0.48	0.54	0.62	0.75	0.93	1.16	1.38	1.58	1.72	1.81	1.89	1.99	2.13	2.33	2.58	2.85	3.25	3.78	4.38	4.98
1980.25	34.5	35	0.41	0.47	0.54	0.68	0.86	1.10	1.35	1.57	1.75	1.87	1.98	2.10	2.26	2.47	2.73	3.01	3.42	3.96	4.56	5.15
1979.56	35	35.5	0.48	0.55	0.65	0.80	1.00	1.25	1.51	1.74	1.93	2.08	2.22	2.38	2.58	2.82	3.10	3.39	3.79	4.25	4.77	5.26
1978.61	35.5	36	0.46	0.52	0.60	0.73	0.91	1.13	1.38	1.62	1.84	2.06	2.28	2.51	2.73	2.96	3.20	3.42	3.69	3.93	4.24	4.55
1978.03	36	36.5	0.51	0.59	0.67	0.81	1.00	1.24	1.48	1.69	1.81	1.87	1.90	1.95	2.04	2.20	2.44	2.70	3.08	3.61	4.23	4.85
1977.44	36.5	37	0.42	0.49	0.55	0.66	0.83	1.05	1.29	1.51	1.67	1.74	1.77	1.79	1.84	1.96	2.15	2.37	2.70	3.20	3.84	4.53
1976.69	37	37.5	0.60	0.67	0.75	0.89	1.08	1.31	1.52	1.69	1.77	1.79	1.77	1.78	1.83	1.95	2.13	2.34	2.66	3.14	3.75	4.40
1975.82	37.5	38	0.57	0.64	0.71	0.83	1.01	1.22	1.42	1.59	1.68	1.70	1.70	1.72	1.78	1.90	2.10	2.33	2.68	3.20	3.86	4.58
1975.18	38	38.5	0.53	0.59	0.67	0.81	0.99	1.20	1.40	1.57	1.70	1.79	1.87	1.95	2.04	2.17	2.33	2.51	2.81	3.20	3.66	4.13
1974.47	38.5	39	0.47	0.55	0.65	0.81	1.04	1.32	1.61	1.89	2.13	2.35	2.55	2.75	2.95	3.13	3.31	3.46	3.65	3.82	4.03	4.21
1973.66	39	39.5	0.56	0.63	0.71	0.85	1.05	1.26	1.46	1.62	1.71	1.76	1.79	1.86	1.95	2.10	2.29	2.50	2.84	3.32	3.88	4.46
1972.97	39.5	40	0.53	0.59	0.70	0.85	1.04	1.27	1.51	1.74	1.95	2.14	2.32	2.47	2.61	2.74	2.87	3.01	3.21	3.39	3.64	3.86

1972.33	40	40.5	0.57	0.66	0.78	0.96	1.19	1.46	1.75	2.02	2.26	2.47	2.65	2.81	2.94	3.06	3.17	3.27	3.38	3.48	3.67	3.90
1971.68	40.5	41	0.44	0.52	0.59	0.71	0.89	1.11	1.36	1.57	1.72	1.77	1.77	1.75	1.77	1.84	1.98	2.15	2.41	2.83	3.38	4.00
1970.82	41	41.5	0.55	0.60	0.68	0.82	1.00	1.19	1.39	1.54	1.64	1.71	1.76	1.82	1.90	2.03	2.19	2.37	2.67	3.10	3.58	4.07
1970.16	41.5	42	0.49	0.58	0.69	0.86	1.10	1.41	1.74	2.05	2.28	2.46	2.62	2.80	3.04	3.32	3.65	3.98	4.38	4.80	5.22	5.51
1969.27	42	42.5	0.51	0.58	0.65	0.78	0.95	1.16	1.37	1.54	1.66	1.73	1.79	1.87	2.00	2.19	2.45	2.74	3.16	3.75	4.42	5.11
1968.75	42.5	43	0.63	0.71	0.81	0.98	1.20	1.43	1.65	1.81	1.90	1.96	2.02	2.10	2.21	2.34	2.49	2.64	2.89	3.24	3.60	3.96
1967.98	43	43.5	0.65	0.73	0.83	1.00	1.21	1.43	1.64	1.77	1.83	1.84	1.85	1.88	1.95	2.07	2.21	2.37	2.62	3.01	3.46	3.91
1967.30	43.5	44	0.68	0.76	0.87	1.04	1.25	1.48	1.69	1.83	1.91	1.94	1.98	2.04	2.14	2.28	2.43	2.59	2.85	3.22	3.62	4.01
1966.52	44	44.5	0.47	0.53	0.62	0.78	0.99	1.25	1.51	1.72	1.88	1.98	2.06	2.17	2.31	2.48	2.67	2.85	3.12	3.49	3.86	4.18
1965.63	44.5	45	0.53	0.60	0.71	0.88	1.10	1.37	1.64	1.88	2.08	2.24	2.39	2.53	2.68	2.83	2.97	3.11	3.33	3.55	3.83	4.11
1964.86	45	45.5	0.57	0.63	0.72	0.88	1.06	1.27	1.49	1.67	1.82	1.95	2.06	2.17	2.28	2.39	2.52	2.66	2.90	3.17	3.49	3.80
1964.32	45.5	46	0.58	0.65	0.75	0.91	1.12	1.36	1.59	1.76	1.87	1.94	2.00	2.08	2.19	2.33	2.50	2.66	2.92	3.27	3.65	4.02
1963.67	46	46.5	0.64	0.71	0.79	0.93	1.12	1.33	1.51	1.64	1.69	1.69	1.69	1.71	1.77	1.88	2.04	2.21	2.49	2.93	3.46	4.03
1963.00	46.5	47	0.63	0.70	0.80	0.97	1.18	1.41	1.62	1.76	1.83	1.85	1.85	1.89	1.96	2.07	2.21	2.36	2.61	2.99	3.43	3.88
1962.35	47	47.5	0.67	0.76	0.88	1.05	1.26	1.49	1.72	1.92	2.08	2.23	2.36	2.47	2.55	2.62	2.68	2.74	2.84	2.91	3.09	3.34
1961.69	47.5	48	0.48	0.60	0.71	0.87	1.12	1.47	1.91	2.41	2.89	3.29	3.55	3.65	3.62	3.51	3.36	3.14	2.80	2.54	2.42	2.40
1961.10	48	48.5	0.75	0.83	0.94	1.11	1.32	1.54	1.72	1.83	1.88	1.89	1.91	1.95	2.04	2.15	2.29	2.42	2.65	3.00	3.38	3.74
1960.57	48.5	49	0.75	0.83	0.92	1.08	1.29	1.49	1.65	1.75	1.76	1.73	1.70	1.70	1.73	1.81	1.93	2.05	2.27	2.63	3.07	3.54
1959.94	49	49.5	0.62	0.70	0.83	0.99	1.19	1.43	1.67	1.90	2.11	2.29	2.42	2.51	2.56	2.59	2.62	2.67	2.75	2.82	2.97	3.16
1959.25	49.5	50	0.62	0.68	0.77	0.91	1.09	1.30	1.49	1.64	1.74	1.81	1.88	1.98	2.10	2.27	2.46	2.68	3.02	3.45	3.95	4.50
1958.34	50	50.5	0.39	0.47	0.56	0.70	0.91	1.20	1.59	2.04	2.51	2.94	3.27	3.48	3.58	3.60	3.59	3.51	3.29	3.13	3.05	2.99
1957.70	50.5	51	0.48	0.58	0.70	0.86	1.10	1.42	1.82	2.27	2.73	3.15	3.48	3.67	3.75	3.73	3.67	3.54	3.24	3.00	2.89	2.86
1956.98	51	51.5	0.47	0.56	0.65	0.79	1.00	1.28	1.63	2.02	2.42	2.77	3.04	3.22	3.31	3.36	3.39	3.38	3.24	3.16	3.16	3.18
1956.39	51.5	52	0.64	0.72	0.84	1.01	1.23	1.48	1.74	1.98	2.19	2.37	2.54	2.67	2.77	2.83	2.88	2.91	2.95	2.97	3.09	3.24
1955.62	52	52.5	0.57	0.65	0.77	0.93	1.15	1.40	1.66	1.90	2.10	2.27	2.44	2.59	2.73	2.86	2.98	3.10	3.26	3.40	3.63	3.89
1954.88	52.5	53	0.63	0.72	0.84	1.04	1.28	1.55	1.81	2.01	2.14	2.23	2.31	2.41	2.52	2.63	2.75	2.86	3.05	3.29	3.55	3.82
1954.23	53	53.5	0.63	0.74	0.87	1.08	1.36	1.66	1.93	2.12	2.20	2.22	2.21	2.23	2.27	2.33	2.41	2.47	2.61	2.85	3.10	3.37
1953.43	53.5	54	0.58	0.65	0.75	0.90	1.10	1.32	1.54	1.70	1.81	1.88	1.93	1.99	2.06	2.16	2.28	2.41	2.64	2.98	3.35	3.71
1952.75	54	54.5	0.75	0.82	0.93	1.10	1.30	1.51	1.68	1.78	1.82	1.81	1.81	1.84	1.91	2.00	2.12	2.25	2.47	2.82	3.22	3.65
1951.87	54.5	55	0.42	0.55	0.70	0.94	1.32	1.93	2.79	3.88	5.07	6.10	6.73	6.86	6.51	5.84	5.01	4.10	3.10	2.25	1.59	1.12

1951.15	55	55.5	0.55	0.62	0.72	0.87	1.08	1.32	1.57	1.77	1.93	2.05	2.16	2.29	2.44	2.61	2.80	3.01	3.31	3.65	4.06	4.49
1950.36	55.5	56	0.39	0.46	0.55	0.68	0.87	1.13	1.44	1.80	2.18	2.53	2.83	3.04	3.18	3.26	3.32	3.36	3.30	3.27	3.32	3.36
1949.58	56	56.5	0.44	0.54	0.66	0.81	1.07	1.46	1.98	2.59	3.23	3.77	4.12	4.25	4.19	4.00	3.76	3.42	2.93	2.54	2.30	2.18
1948.83	56.5	57	0.48	0.55	0.63	0.77	0.96	1.21	1.48	1.73	1.93	2.10	2.27	2.47	2.72	3.04	3.41	3.79	4.26	4.79	5.31	5.68
1948.08	57	57.5	0.45	0.51	0.57	0.68	0.85	1.06	1.29	1.51	1.67	1.79	1.90	2.04	2.25	2.54	2.93	3.37	3.97	4.74	5.60	6.36
1947.24	57.5	58	0.56	0.61	0.65	0.75	0.88	1.04	1.20	1.32	1.40	1.43	1.45	1.50	1.60	1.78	2.06	2.41	2.93	3.70	4.70	5.81
1946.36	58	58.5	0.67	0.79	0.90	1.08	1.33	1.60	1.85	2.02	2.09	2.06	2.01	1.98	2.01	2.09	2.24	2.40	2.65	3.05	3.53	4.04
1945.58	58.5	59	0.61	0.69	0.75	0.86	1.02	1.20	1.38	1.50	1.55	1.53	1.47	1.41	1.39	1.42	1.52	1.66	1.87	2.24	2.77	3.43
1944.88	59	59.5	0.71	0.80	0.95	1.15	1.39	1.65	1.90	2.09	2.24	2.35	2.44	2.51	2.56	2.60	2.64	2.67	2.77	2.86	3.03	3.27
1943.54	60	60.5	0.51	0.58	0.65	0.78	0.96	1.19	1.43	1.64	1.80	1.90	2.00	2.13	2.31	2.58	2.93	3.33	3.87	4.54	5.29	5.95
1942.60	60.5	61	0.70	0.80	0.90	1.06	1.27	1.49	1.68	1.79	1.81	1.77	1.71	1.68	1.68	1.74	1.84	1.94	2.14	2.47	2.90	3.38
1941.97	61	61.5	0.54	0.62	0.73	0.88	1.08	1.33	1.61	1.89	2.17	2.43	2.66	2.85	2.98	3.07	3.14	3.18	3.18	3.17	3.26	3.39
1941.41	61.5	62	0.56	0.60	0.68	0.77	0.87	0.98	1.12	1.28	1.46	1.65	1.84	2.03	2.19	2.35	2.52	2.71	2.83	2.81	2.73	2.58
1940.73	62	62.5	0.66	0.78	0.90	1.05	1.28	1.58	1.95	2.34	2.69	2.96	3.12	3.16	3.13	3.05	2.97	2.82	2.56	2.37	2.31	2.36
1940.13	62.5	63	0.46	0.52	0.60	0.71	0.88	1.09	1.34	1.61	1.90	2.21	2.53	2.86	3.17	3.46	3.74	3.99	4.14	4.26	4.46	4.62
1939.34	63	63.5	0.66	0.75	0.81	0.91	1.05	1.21	1.37	1.47	1.50	1.45	1.37	1.29	1.24	1.25	1.33	1.46	1.67	2.05	2.63	3.41
1938.52	63.5	64	0.68	0.79	0.87	1.01	1.20	1.42	1.62	1.75	1.79	1.75	1.67	1.60	1.58	1.62	1.73	1.87	2.10	2.49	3.02	3.66

Table E-1. Continued.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																									
			17.38≤19.90	19.90≤22.80	22.80≤26.11	26.11≤29.91	29.91≤34.26	34.26≤39.23	39.23≤44.94	44.94≤51.47	51.47≤58.95	58.95≤67.52	67.52≤77.34	77.34≤88.58	88.58≤101.46	101.46≤116.21	116.21≤133.10	133.10≤152.45	152.45≤174.62	174.62≤200.00	200.00≤229.08	229.08≤262.38	262.38≤300.52	300.52≤344.21	344.21≤394.24	394.24≤451.56	451.56≤517.20	517.20≤592.39	592.39≤678.50
2018.70	0	0.5	3.55	3.14	2.59	2.02	1.49	1.07	0.75	0.51	0.34	0.22	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018.62	0.5	1	2.77	2.49	2.19	1.88	1.60	1.38	1.19	1.04	0.89	0.76	0.64	0.54	0.42	0.23	0.15	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018.51	1	1.5	2.79	2.62	2.38	2.10	1.81	1.55	1.31	1.08	0.86	0.66	0.49	0.36	0.23	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018.33	1.5	2	2.98	2.72	2.35	1.95	1.56	1.23	0.98	0.79	0.64	0.53	0.43	0.36	0.28	0.17	0.13	0.13	0.13	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2018.03	2	2.5	3.16	2.92	2.59	2.22	1.86	1.57	1.34	1.14	0.97	0.82	0.69	0.58	0.46	0.27	0.18	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017.73	2.5	3	2.93	2.79	2.54	2.23	1.90	1.61	1.37	1.17	1.00	0.85	0.72	0.61	0.48	0.29	0.20	0.18	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017.31	3	3.5	2.92	2.79	2.56	2.23	1.87	1.54	1.28	1.07	0.90	0.77	0.64	0.53	0.41	0.24	0.18	0.19	0.21	0.23	0.24	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016.95	3.5	4	2.62	2.45	2.23	1.97	1.70	1.46	1.25	1.08	0.93	0.79	0.66	0.53	0.39	0.21	0.15	0.15	0.16	0.18	0.21	0.25	0.32	0.43	0.57	0.68	0.38	0.00	0.00	0.00
2016.54	4	4.5	2.42	2.30	2.12	1.88	1.63	1.37	1.15	0.96	0.79	0.64	0.51	0.39	0.26	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016.24	4.5	5	3.10	2.77	2.34	1.86	1.38	0.96	0.61	0.36	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015.93	5	5.5	3.42	3.18	2.76	2.24	1.72	1.28	0.95	0.71	0.54	0.42	0.32	0.25	0.20	0.13	0.00	0.11	0.12	0.15	0.18	0.22	0.00	0.39	0.51	0.59	0.33	0.00	0.00	0.00
2015.60	5.5	6	3.57	3.26	2.82	2.32	1.82	1.39	1.05	0.78	0.57	0.41	0.29	0.19	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015.26	6	6.5	3.51	3.19	2.78	2.34	1.91	1.54	1.23	0.96	0.74	0.56	0.41	0.31	0.21	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014.89	6.5	7	3.30	2.96	2.50	1.99	1.52	1.13	0.83	0.60	0.43	0.30	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014.44	7	7.5	3.28	2.95	2.49	1.98	1.49	1.10	0.82	0.62	0.47	0.37	0.29	0.24	0.19	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014.17	7.5	8	4.27	3.85	3.20	2.47	1.78	1.25	0.88	0.62	0.45	0.34	0.25	0.19	0.15	0.00	0.00	0.00	0.00	0.11	0.16	0.22	0.32	0.45	0.53	0.00	0.00	0.00	0.00	0.00
2013.67	8	8.5	5.52	5.13	4.33	3.33	2.37	1.62	1.08	0.73	0.51	0.36	0.26	0.19	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012.96	8.5	9	5.78	5.70	5.21	4.42	3.53	2.71	2.03	1.50	1.10	0.81	0.59	0.43	0.32	0.24	0.16	0.11	0.10	0.11	0.13	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012.36	9	9.5	5.03	4.77	4.17	3.38	2.58	1.91	1.40	1.03	0.77	0.57	0.43	0.32	0.24	0.18	0.12	0.00	0.00	0.00	0.12	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011.95	9.5	10	4.92	4.62	4.02	3.25	2.50	1.89	1.42	1.09	0.85	0.67	0.53	0.42	0.34	0.26	0.18	0.14	0.14	0.15	0.16	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011.59	10	10.5	4.04	3.69	3.15	2.55	1.99	1.55	1.23	0.99	0.82	0.68	0.56	0.47	0.38	0.26	0.16	0.15	0.15	0.15	0.14	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011.14	10.5	11	3.04	2.72	2.35	1.98	1.66	1.40	1.21	1.04	0.90	0.79	0.68	0.59	0.50	0.33	0.25	0.27	0.30	0.33	0.36	0.37	0.37	0.38	0.00	0.00	0.00	0.00	0.00	0.00
2010.74	11	11.5	2.71	2.52	2.27	2.01	1.75	1.55	1.42	1.34	1.28	1.22	1.16	1.08	0.93	0.62	0.43	0.44	0.41	0.35	0.25	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010.02	11.5	12	3.96	3.80	3.44	2.96	2.48	2.11	1.83	1.65	1.52	1.41	1.31	1.20	1.08	0.92	0.67	0.46	0.41	0.37	0.33	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2009.26	12	12.5	4.17	4.05	3.69	3.19	2.67	2.23	1.90	1.65	1.47	1.31	1.17	1.03	0.90	0.76	0.58	0.39	0.34	0.32	0.31	0.31	0.33	0.39	0.47	0.54	0.00	0.00	0.00
2008.71	12.5	13	3.34	3.13	2.84	2.52	2.25	2.03	1.84	1.64	1.41	1.15	0.89	0.66	0.44	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007.86	13	13.5	2.03	1.84	1.64	1.43	1.22	1.03	0.89	0.78	0.70	0.63	0.56	0.49	0.39	0.22	0.18	0.19	0.19	0.19	0.16	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007.10	13.5	14	2.61	2.46	2.24	1.97	1.68	1.43	1.24	1.10	0.99	0.90	0.80	0.69	0.54	0.30	0.21	0.19	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006.48	14	14.5	3.08	3.11	3.01	2.76	2.36	1.85	1.30	0.82	0.46	0.23	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005.78	14.5	15	1.57	1.37	1.18	1.02	0.88	0.76	0.69	0.63	0.59	0.55	0.51	0.48	0.41	0.24	0.20	0.25	0.30	0.32	0.29	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005.17	15	15.5	3.00	2.80	2.48	2.07	1.64	1.25	0.94	0.71	0.55	0.43	0.34	0.26	0.19	0.11	0.00	0.00	0.10	0.11	0.11	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004.51	15.5	16	4.01	3.90	3.63	3.25	2.82	2.45	2.13	1.88	1.68	1.49	1.32	1.16	1.01	0.84	0.60	0.46	0.45	0.44	0.40	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003.89	16	16.5	2.55	2.41	2.20	1.92	1.63	1.34	1.12	0.94	0.80	0.70	0.61	0.53	0.43	0.27	0.23	0.27	0.29	0.29	0.26	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003.27	16.5	17	4.06	3.85	3.43	2.86	2.26	1.72	1.27	0.93	0.67	0.47	0.33	0.23	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.68	1.09	0.60	0.34
2001.83	17.5	18	5.60	6.06	6.14	5.82	5.19	4.39	3.56	2.78	2.10	1.53	1.08	0.74	0.50	0.34	0.23	0.15	0.11	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000.95	18	18.5	4.25	4.02	3.63	3.14	2.60	2.09	1.64	1.26	0.95	0.70	0.50	0.35	0.23	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.58	0.61	0.34
1999.44	19	19.5	2.28	2.23	2.13	1.98	1.76	1.52	1.26	1.02	0.79	0.58	0.42	0.28	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998.97	19.5	20	2.16	2.00	1.79	1.54	1.28	1.03	0.79	0.59	0.42	0.29	0.19	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998.44	20	20.5	6.28	5.79	4.83	3.65	2.53	1.64	1.04	0.65	0.42	0.27	0.18	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997.77	20.5	21	1.71	1.48	1.23	0.98	0.75	0.54	0.37	0.24	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997.36	21	21.5	1.65	1.81	1.85	1.74	1.49	1.16	0.84	0.59	0.41	0.28	0.19	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996.89	21.5	22	0.78	0.85	0.90	0.92	0.91	0.87	0.82	0.76	0.68	0.60	0.50	0.40	0.32	0.25	0.22	0.20	0.20	0.19	0.17	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996.46	22	22.5	1.45	1.25	1.08	0.92	0.77	0.65	0.54	0.45	0.38	0.31	0.25	0.19	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995.99	22.5	23	2.86	2.61	2.30	1.98	1.66	1.39	1.17	0.98	0.83	0.69	0.57	0.46	0.34	0.19	0.13	0.14	0.14	0.15	0.15	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1995.52	23	23.5	1.60	1.38	1.19	1.01	0.87	0.75	0.65	0.57	0.49	0.41	0.34	0.26	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995.05	23.5	24	1.82	1.60	1.39	1.19	1.00	0.83	0.70	0.59	0.50	0.42	0.35	0.28	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994.52	24	24.5	4.60	4.41	3.94	3.30	2.63	2.05	1.60	1.26	1.01	0.81	0.65	0.53	0.43	0.34	0.23	0.19	0.19	0.20	0.20	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993.89	24.5	25	5.14	5.33	5.14	4.61	3.90	3.21	2.61	2.11	1.72	1.39	1.12	0.90	0.72	0.59	0.46	0.32	0.23	0.21	0.19	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993.30	25	25.5	3.66	4.29	4.73	4.92	4.86	4.65	4.40	4.12	3.80	3.43	3.00	2.52	2.02	1.53	1.16	0.84	0.61	0.45	0.32	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992.63	25.5	26	4.06	4.46	4.64	4.59	4.38	4.13	3.94	3.77	3.61	3.41	3.13	2.79	2.37	1.88	1.46	1.06	0.77	0.55	0.39	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992.04	26	26.5	2.25	2.29	2.28	2.20	2.07	1.93	1.82	1.73	1.65	1.55	1.44	1.28	0.99	0.54	0.36	0.29	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991.46	26.5	27	3.09	2.89	2.63	2.32	2.03	1.77	1.55	1.35	1.17	1.01	0.87	0.75	0.63	0.41	0.31	0.32	0.34	0.34	0.31	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990.78	27	27.5	3.52	3.43	3.18	2.82	2.40	2.00	1.66	1.37	1.13	0.92	0.74	0.59	0.44	0.28	0.18	0.17	0.18	0.18	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990.13	27.5	28	4.70	4.45	3.94	3.30	2.65	2.12	1.69	1.37	1.13	0.92	0.74	0.60	0.48	0.37	0.25	0.19	0.18	0.18	0.18	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989.39	28	28.5	5.50	5.18	4.54	3.72	2.88	2.15	1.58	1.15	0.84	0.61	0.44	0.32	0.24	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.50	0.64	0.36	0.00
1988.67	28.5	29	5.64	5.62	5.21	4.53	3.73	2.98	2.34	1.82	1.41	1.08	0.82	0.62	0.46	0.34	0.22	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987.94	29	29.5	5.63	5.77	5.52	4.94	4.18	3.44	2.77	2.21	1.75	1.37	1.05	0.81	0.62	0.47	0.34	0.22	0.18	0.16	0.14	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987.21	29.5	30	5.15	5.20	4.90	4.31	3.61	2.94	2.38	1.92	1.55	1.24	0.99	0.78	0.61	0.47	0.34	0.20	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986.45	30	30.5	5.10	5.41	5.34	4.92	4.29	3.61	3.00	2.46	2.01	1.63	1.29	1.01	0.79	0.61	0.47	0.33	0.25	0.23	0.22	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985.83	30.5	31	5.19	5.21	4.87	4.24	3.48	2.78	2.18	1.71	1.34	1.04	0.80	0.62	0.47	0.36	0.25	0.16	0.13	0.12	0.11	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985.17	31	31.5	5.36	5.34	4.94	4.26	3.48	2.76	2.17	1.71	1.35	1.05	0.82	0.63	0.48	0.36	0.25	0.15	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984.44	31.5	32	5.50	5.32	4.75	3.91	3.03	2.27	1.67	1.23	0.91	0.68	0.51	0.38	0.29	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983.74	32	32.5	5.25	5.17	4.74	4.06	3.29	2.60	2.04	1.59	1.25	0.98	0.76	0.58	0.45	0.34	0.24	0.15	0.12	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983.02	32.5	33	5.13	4.98	4.49	3.78	3.03	2.38	1.87	1.47	1.17	0.93	0.74	0.59	0.47	0.37	0.26	0.17	0.15	0.15	0.14	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1982.33	33	33.5	5.31	5.27	4.90	4.28	3.55	2.87	2.28	1.80	1.42	1.11	0.86	0.66	0.51	0.39	0.28	0.18	0.15	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981.63	33.5	34	5.40	5.34	4.93	4.27	3.52	2.82	2.23	1.76	1.38	1.08	0.83	0.64	0.50	0.37	0.25	0.15	0.12	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980.96	34	34.5	5.38	5.44	5.10	4.44	3.66	2.92	2.30	1.81	1.42	1.11	0.85	0.66	0.51	0.39	0.29	0.19	0.15	0.14	0.13	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980.25	34.5	35	5.53	5.56	5.18	4.51	3.72	2.97	2.34	1.82	1.41	1.08	0.80	0.59	0.42	0.29	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979.56	35	35.5	5.53	5.40	4.87	4.06	3.17	2.39	1.76	1.28	0.92	0.66	0.46	0.31	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978.61	35.5	36	4.68	4.51	4.04	3.37	2.68	2.08	1.61	1.26	1.00	0.79	0.63	0.50	0.39	0.28	0.16	0.12	0.11	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978.03	36	36.5	5.28	5.38	5.10	4.53	3.82	3.13	2.53	2.03	1.62	1.29	1.01	0.80	0.63	0.51	0.40	0.30	0.26	0.27	0.29	0.33	0.38	0.46	0.55	0.57	0.31	0.00	0.00	0.00
1977.44	36.5	37	5.11	5.40	5.34	4.96	4.40	3.81	3.28	2.81	2.41	2.06	1.72	1.43	1.19	0.98	0.80	0.60	0.49	0.44	0.38	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976.69	37	37.5	4.94	5.22	5.17	4.81	4.25	3.66	3.12	2.64	2.23	1.86	1.53	1.25	1.01	0.81	0.63	0.42	0.28	0.23	0.18	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975.82	37.5	38	5.19	5.51	5.45	5.04	4.41	3.73	3.11	2.56	2.09	1.69	1.34	1.06	0.82	0.64	0.47	0.31	0.21	0.18	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975.18	38	38.5	4.44	4.49	4.25	3.81	3.29	2.82	2.42	2.10	1.82	1.56	1.32	1.10	0.90	0.75	0.56	0.36	0.28	0.23	0.18	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974.47	38.5	39	4.25	4.05	3.63	3.07	2.51	2.04	1.66	1.37	1.15	0.96	0.79	0.65	0.54	0.43	0.30	0.24	0.25	0.29	0.34	0.42	0.53	0.63	0.66	0.37	0.00	0.00	0.00	0.00
1973.66	39	39.5	4.92	5.10	4.94	4.47	3.85	3.23	2.68	2.22	1.85	1.52	1.23	0.98	0.77	0.60	0.43	0.26	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972.97	39.5	40	3.91	3.72	3.31	2.79	2.28	1.85	1.52	1.28	1.10	0.95	0.84	0.75	0.70	0.67	0.57	0.60	0.76	0.94	1.01	0.90	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972.33	40	40.5	4.05	4.01	3.78	3.39	2.96	2.58	2.24	1.93	1.62	1.29	0.97	0.69	0.45	0.25	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971.68	40.5	41	4.54	4.85	4.87	4.63	4.23	3.83	3.51	3.23	2.98	2.74	2.46	2.16	1.82	1.49	1.18	0.85	0.61	0.47	0.36	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970.82	41	41.5	4.42	4.50	4.28	3.84	3.30	2.80	2.38	2.02	1.72	1.45	1.20	0.99	0.81	0.68	0.57	0.42	0.37	0.39	0.42	0.46	0.53	0.59	0.62	0.34	0.00	0.00	0.00	0.00
1970.16	41.5	42	5.49	5.09	4.38	3.53	2.70	2.03	1.54	1.20	0.96	0.78	0.64	0.53	0.45	0.37	0.27	0.21	0.21	0.22	0.22	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969.27	42	42.5	5.58	5.67	5.31	4.61	3.77	2.98	2.33	1.82	1.44	1.13	0.88	0.69	0.54	0.43	0.33	0.23	0.18	0.18	0.17	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968.75	42.5	43	4.21	4.25	4.05	3.64	3.15	2.71	2.32	2.01	1.76	1.53	1.32	1.13	0.96	0.81	0.64	0.44	0.35	0.33	0.31	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1967.98	43	43.5	4.27	4.42	4.31	3.98	3.52	3.08	2.69	2.35	2.07	1.82	1.58	1.36	1.16	0.99	0.84	0.63	0.47	0.42	0.39	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967.30	43.5	44	4.29	4.35	4.16	3.76	3.25	2.79	2.38	2.05	1.78	1.55	1.34	1.16	0.99	0.86	0.71	0.51	0.40	0.37	0.34	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966.52	44	44.5	4.34	4.26	3.95	3.49	3.00	2.61	2.31	2.09	1.94	1.81	1.68	1.57	1.43	1.30	1.11	0.79	0.56	0.43	0.30	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965.63	44.5	45	4.28	4.23	3.95	3.52	3.04	2.62	2.27	1.99	1.73	1.46	1.19	0.92	0.68	0.45	0.24	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964.86	45	45.5	3.96	3.88	3.58	3.14	2.67	2.29	1.99	1.76	1.59	1.41	1.26	1.12	1.00	0.90	0.71	0.52	0.51	0.50	0.47	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964.32	45.5	46	4.26	4.30	4.09	3.68	3.20	2.76	2.37	2.06	1.80	1.56	1.35	1.16	0.99	0.85	0.71	0.52	0.44	0.43	0.43	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963.67	46	46.5	4.52	4.78	4.75	4.42	3.90	3.36	2.85	2.40	2.03	1.70	1.42	1.18	0.98	0.83	0.71	0.55	0.43	0.42	0.41	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963.00	46.5	47	4.24	4.40	4.32	4.02	3.59	3.16	2.78	2.44	2.15	1.88	1.63	1.40	1.19	1.02	0.85	0.62	0.45	0.40	0.35	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962.35	47	47.5	3.55	3.63	3.53	3.27	2.92	2.58	2.28	2.02	1.80	1.59	1.38	1.18	0.98	0.74	0.42	0.31	0.27	0.23	0.19	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961.69	47.5	48	2.41	2.38	2.29	2.15	1.98	1.83	1.72	1.63	1.55	1.46	1.35	1.21	0.97	0.58	0.40	0.38	0.34	0.29	0.23	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961.10	48	48.5	4.01	4.09	3.96	3.64	3.24	2.86	2.53	2.25	2.01	1.78	1.56	1.34	1.12	0.94	0.75	0.51	0.34	0.28	0.24	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960.57	48.5	49	3.96	4.23	4.28	4.10	3.77	3.40	3.05	2.71	2.41	2.11	1.83	1.57	1.32	1.11	0.92	0.68	0.46	0.38	0.32	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959.94	49	49.5	3.27	3.26	3.11	2.88	2.62	2.38	2.17	1.97	1.77	1.55	1.33	1.12	0.93	0.71	0.43	0.35	0.33	0.31	0.29	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959.25	49.5	50	4.92	5.05	4.83	4.29	3.59	2.89	2.28	1.77	1.37	1.05	0.79	0.59	0.43	0.31	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958.34	50	50.5	2.87	2.67	2.40	2.12	1.84	1.62	1.43	1.27	1.13	0.99	0.86	0.76	0.63	0.40	0.30	0.31	0.31	0.31	0.29	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957.70	50.5	51	2.85	2.77	2.62	2.40	2.15	1.92	1.72	1.54	1.38	1.21	1.04	0.88	0.69	0.43	0.28	0.29	0.31	0.34	0.36	0.38	0.40	0.00	0.00	0.00	0.00	0.00	0.00
1956.98	51	51.5	3.13	2.96	2.68	2.35	2.01	1.71	1.48	1.29	1.12	0.97	0.84	0.73	0.61	0.40	0.29	0.29	0.28	0.26	0.23	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956.39	51.5	52	3.36	3.35	3.19	2.91	2.59	2.31	2.08	1.90	1.75	1.61	1.46	1.31	1.14	0.92	0.57	0.45	0.43	0.40	0.35	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955.62	52	52.5	4.06	4.04	3.79	3.37	2.88	2.43	2.05	1.73	1.47	1.23	1.02	0.84	0.67	0.51	0.31	0.22	0.21	0.19	0.17	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954.88	52.5	53	4.00	4.00	3.79	3.43	3.02	2.64	2.31	2.04	1.81	1.59	1.38	1.19	1.01	0.85	0.66	0.45	0.41	0.40	0.38	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1954.23	53	53.5	3.59	3.70	3.69	3.58	3.40	3.24	3.08	2.91	2.72	2.49	2.21	1.89	1.56	1.26	0.97	0.63	0.40	0.30	0.23	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953.43	53.5	54	3.95	3.99	3.81	3.48	3.09	2.76	2.49	2.27	2.09	1.89	1.69	1.48	1.28	1.11	0.92	0.66	0.52	0.47	0.41	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952.75	54	54.5	4.01	4.20	4.18	3.94	3.57	3.20	2.85	2.53	2.26	2.00	1.75	1.50	1.27	1.06	0.84	0.54	0.33	0.25	0.18	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951.87	54.5	55	0.81	0.61	0.48	0.39	0.32	0.28	0.25	0.23	0.21	0.21	0.20	0.19	0.16	0.00	0.00	0.00	0.10	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951.15	55	55.5	4.77	4.78	4.48	3.92	3.26	2.63	2.09	1.66	1.32	1.04	0.81	0.63	0.49	0.37	0.25	0.16	0.14	0.14	0.13	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950.36	55.5	56	3.31	3.13	2.84	2.52	2.21	1.95	1.74	1.56	1.38	1.20	1.03	0.88	0.74	0.50	0.31	0.30	0.28	0.26	0.23	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949.58	56	56.5	2.10	2.01	1.88	1.73	1.56	1.40	1.26	1.14	1.03	0.92	0.81	0.68	0.52	0.27	0.21	0.22	0.23	0.24	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948.83	56.5	57	5.69	5.25	4.47	3.54	2.67	2.00	1.52	1.19	0.97	0.79	0.66	0.55	0.46	0.36	0.24	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948.08	57	57.5	6.72	6.48	5.67	4.53	3.35	2.36	1.63	1.12	0.78	0.55	0.39	0.29	0.21	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947.24	57.5	58	6.76	7.18	6.88	5.92	4.62	3.31	2.24	1.46	0.94	0.59	0.37	0.24	0.16	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946.36	58	58.5	4.45	4.66	4.63	4.37	3.98	3.57	3.18	2.81	2.47	2.13	1.80	1.50	1.22	0.98	0.77	0.55	0.39	0.35	0.31	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945.58	58.5	59	4.10	4.65	4.95	4.96	4.70	4.33	3.94	3.56	3.18	2.81	2.42	2.04	1.68	1.35	1.08	0.79	0.56	0.43	0.32	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944.88	59	59.5	3.49	3.60	3.57	3.41	3.18	2.96	2.74	2.52	2.28	1.99	1.65	1.30	0.96	0.63	0.32	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943.54	60	60.5	6.28	6.10	5.43	4.47	3.44	2.55	1.85	1.32	0.93	0.64	0.43	0.28	0.18	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942.60	60.5	61	3.82	4.13	4.24	4.15	3.90	3.63	3.36	3.10	2.84	2.57	2.27	1.97	1.65	1.38	1.14	0.87	0.58	0.46	0.37	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941.97	61	61.5	3.47	3.41	3.20	2.88	2.53	2.22	1.97	1.77	1.59	1.42	1.25	1.08	0.90	0.65	0.37	0.30	0.27	0.23	0.19	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941.41	61.5	62	2.34	2.04	1.73	1.43	1.12	0.83	0.56	0.33	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940.73	62	62.5	2.45	2.50	2.49	2.38	2.21	2.01	1.84	1.69	1.56	1.43	1.28	1.12	0.86	0.47	0.33	0.30	0.25	0.20	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940.13	62.5	63	4.60	4.24	3.60	2.82	2.08	1.49	1.07	0.79	0.59	0.45	0.34	0.27	0.21	0.14	0.00	0.00	0.00	0.00	0.11	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939.34	63	63.5	4.31	5.14	5.73	5.96	5.80	5.35	4.76	4.11	3.45	2.80	2.19	1.64	1.17	0.81	0.54	0.35	0.23	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1938.52	63.5	64	4.29	4.76	4.97	4.89	4.58	4.16	3.73	3.31	2.91	2.52	2.14	1.78	1.47	1.21	1.01	0.81	0.63	0.56	0.48	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table E-2. WAB 2 Sediment Core, Grain Size (µm) analysis.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																						
			≤0.09	0.09≤0.10	0.10≤0.12	0.12≤0.13	0.13≤0.15	0.15≤0.17	0.17≤0.20	0.20≤0.23	0.23≤0.26	0.26≤0.30	0.30≤0.34	0.34≤0.39	0.39≤0.45	0.45≤0.51	0.51≤0.58	0.58≤0.67	0.67≤0.77	0.77≤0.88	0.88≤1.01	1.01≤1.15	1.15≤1.32	1.32≤1.51
2018.60	0	0.5	0.00	0.00	0.00	0.00	0.10	0.17	0.27	0.43	0.72	1.26	2.20	3.18	3.82	3.71	2.95	2.07	1.36	0.89	0.65	0.59	0.64	0.70
2018.33	0.5	1	0.00	0.00	0.00	0.16	0.25	0.39	0.61	0.95	1.47	2.28	3.46	4.30	4.36	3.51	2.45	1.57	0.98	0.62	0.45	0.41	0.44	0.50
2017.92	1	1.5	0.00	0.00	0.00	0.11	0.18	0.28	0.44	0.67	1.04	1.62	2.56	3.49	3.94	3.53	2.68	1.80	1.14	0.72	0.52	0.46	0.50	0.57
2017.50	1.5	2	0.00	0.00	0.00	0.00	0.15	0.24	0.37	0.59	0.94	1.53	2.52	3.51	4.07	3.74	2.88	1.96	1.26	0.80	0.58	0.52	0.56	0.62
2017.05	2	2.5	0.00	0.00	0.11	0.17	0.28	0.43	0.68	1.04	1.59	2.43	3.62	4.45	4.42	3.52	2.43	1.55	0.96	0.61	0.44	0.39	0.43	0.48
2016.56	2.5	3	0.00	0.00	0.00	0.00	0.16	0.25	0.41	0.67	1.10	1.87	3.10	4.07	4.33	3.67	2.62	1.69	1.04	0.65	0.46	0.41	0.43	0.49
2015.93	3	3.5	0.00	0.00	0.00	0.10	0.16	0.26	0.43	0.69	1.14	1.93	3.19	4.18	4.43	3.73	2.66	1.70	1.05	0.65	0.46	0.40	0.43	0.48
2015.24	3.5	4	0.00	0.00	0.14	0.22	0.35	0.55	0.84	1.27	1.88	2.76	3.92	4.63	4.38	3.35	2.26	1.42	0.87	0.55	0.40	0.36	0.39	0.44
2014.71	4	4.5	0.00	0.00	0.00	0.16	0.25	0.39	0.61	0.95	1.45	2.23	3.35	4.17	4.23	3.44	2.43	1.58	0.99	0.64	0.47	0.42	0.46	0.52
2014.22	4.5	5	0.00	0.00	0.00	0.00	0.12	0.19	0.31	0.51	0.84	1.45	2.50	3.54	4.11	3.77	2.84	1.89	1.17	0.72	0.51	0.45	0.48	0.54
2013.66	5	5.5	0.00	0.00	0.00	0.12	0.19	0.30	0.48	0.77	1.25	2.05	3.30	4.23	4.39	3.62	2.53	1.61	0.98	0.61	0.43	0.39	0.42	0.47
2013.14	5.5	6	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.40	0.69	1.24	2.25	3.28	3.89	3.70	2.86	1.93	1.21	0.75	0.52	0.46	0.49	0.55
2012.67	6.5	7	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.20	0.37	0.73	1.52	2.52	3.24	3.33	2.73	1.92	1.23	0.77	0.51	0.45	0.48	0.56
2012.08	7	7.5	0.00	0.00	0.00	0.10	0.16	0.25	0.39	0.61	0.95	1.52	2.45	3.39	3.91	3.59	2.78	1.92	1.24	0.81	0.59	0.54	0.58	0.65
2011.24	7.5	8	0.00	0.00	0.00	0.12	0.19	0.30	0.47	0.74	1.14	1.80	2.85	3.83	4.21	3.62	2.62	1.67	1.01	0.61	0.42	0.37	0.41	0.47
2010.50	8	8.5	0.00	0.00	0.11	0.18	0.28	0.44	0.69	1.04	1.57	2.36	3.46	4.23	4.22	3.39	2.38	1.54	0.97	0.63	0.47	0.42	0.46	0.52
2010.10	8.5	9	0.00	0.00	0.18	0.28	0.44	0.68	1.02	1.51	2.16	3.01	4.03	4.61	4.17	3.15	2.12	1.35	0.84	0.55	0.41	0.36	0.40	0.45
2009.73	9	9.5	0.00	0.00	0.00	0.12	0.19	0.31	0.49	0.77	1.23	2.00	3.17	4.07	4.32	3.67	2.68	1.79	1.16	0.76	0.58	0.53	0.58	0.64
2009.19	9.5	10	0.00	0.00	0.00	0.00	0.12	0.19	0.32	0.55	0.98	1.78	3.12	4.12	4.31	3.60	2.47	1.52	0.89	0.53	0.36	0.32	0.35	0.39
2008.54	10	10.5	0.00	0.00	0.00	0.00	0.11	0.18	0.29	0.48	0.82	1.44	2.52	3.59	4.16	3.83	2.87	1.89	1.16	0.71	0.50	0.44	0.47	0.53
2007.81	10.5	11	0.00	0.10	0.19	0.29	0.46	0.72	1.10	1.62	2.32	3.24	4.30	4.83	4.28	3.14	2.05	1.26	0.77	0.49	0.35	0.32	0.34	0.39
2007.08	11	11.5	0.00	0.16	0.27	0.43	0.67	1.03	1.53	2.17	2.93	3.74	4.46	4.59	3.70	2.60	1.68	1.04	0.65	0.42	0.30	0.27	0.29	0.35
2006.38	11.5	12	0.14	0.27	0.44	0.70	1.10	1.68	2.47	3.46	4.54	5.52	6.12	5.78	4.22	2.78	1.75	1.10	0.72	0.49	0.37	0.33	0.35	0.41
2005.69	12	12.5	0.00	0.00	0.00	0.16	0.26	0.40	0.62	0.96	1.45	2.21	3.29	4.09	4.17	3.41	2.44	1.60	1.02	0.67	0.50	0.46	0.50	0.56
2005.00	12.5	13	0.00	0.15	0.26	0.41	0.64	0.98	1.46	2.07	2.79	3.59	4.37	4.63	3.90	2.86	1.90	1.19	0.74	0.48	0.34	0.31	0.33	0.40

2004.34	13	13.5	0.00	0.12	0.21	0.32	0.50	0.77	1.14	1.64	2.26	3.00	3.81	4.21	3.71	2.81	1.93	1.26	0.81	0.54	0.40	0.37	0.41	0.48
2003.79	13.5	14	0.00	0.00	0.00	0.15	0.24	0.37	0.57	0.88	1.35	2.08	3.13	3.94	4.09	3.40	2.47	1.65	1.07	0.71	0.54	0.49	0.54	0.61
2003.29	14	14.5	0.00	0.00	0.17	0.27	0.43	0.66	1.00	1.46	2.07	2.86	3.80	4.36	3.95	3.01	2.05	1.31	0.83	0.54	0.40	0.36	0.40	0.47
2002.71	14.5	15	0.00	0.00	0.00	0.11	0.18	0.28	0.44	0.68	1.06	1.69	2.69	3.66	4.12	3.64	2.71	1.79	1.11	0.69	0.49	0.43	0.47	0.54
2001.85	15	15.5	0.00	0.17	0.29	0.45	0.70	1.06	1.57	2.21	2.97	3.77	4.47	4.59	3.78	2.75	1.87	1.24	0.83	0.58	0.44	0.40	0.42	0.49
2000.71	15.5	16	0.00	0.15	0.25	0.39	0.61	0.93	1.37	1.95	2.64	3.39	4.15	4.51	3.91	2.99	2.08	1.36	0.88	0.58	0.41	0.37	0.39	0.47
1999.68	16	16.5	0.00	0.12	0.20	0.32	0.49	0.76	1.13	1.63	2.27	3.04	3.90	4.33	3.83	2.89	1.96	1.25	0.79	0.52	0.38	0.34	0.38	0.44
1998.24	16.5	17	0.00	0.00	0.00	0.00	0.14	0.21	0.34	0.53	0.84	1.37	2.26	3.18	3.71	3.43	2.63	1.78	1.12	0.70	0.50	0.45	0.49	0.57
1996.61	17	17.5	0.00	0.17	0.28	0.45	0.71	1.08	1.61	2.29	3.09	3.94	4.68	4.73	3.74	2.55	1.61	0.98	0.60	0.39	0.29	0.26	0.28	0.34
1995.51	17.5	18	0.00	0.16	0.26	0.41	0.64	0.98	1.45	2.05	2.77	3.55	4.28	4.46	3.68	2.65	1.76	1.11	0.71	0.47	0.34	0.30	0.33	0.39
1994.46	18	18.5	0.00	0.16	0.27	0.42	0.65	0.99	1.46	2.07	2.79	3.58	4.36	4.66	4.01	3.03	2.09	1.37	0.89	0.60	0.44	0.39	0.42	0.49
1993.36	18.5	19	0.00	0.11	0.19	0.31	0.48	0.73	1.09	1.58	2.20	2.95	3.79	4.23	3.77	2.86	1.95	1.25	0.80	0.52	0.38	0.35	0.38	0.45
1992.18	19	19.5	0.00	0.11	0.19	0.30	0.47	0.72	1.07	1.55	2.15	2.89	3.72	4.14	3.67	2.77	1.87	1.18	0.74	0.48	0.35	0.32	0.35	0.42
1991.09	19.5	20	0.00	0.00	0.00	0.15	0.23	0.36	0.56	0.86	1.31	2.01	3.04	3.86	4.06	3.44	2.54	1.72	1.13	0.75	0.57	0.52	0.57	0.64
1990.50	20	20.5	0.00	0.13	0.23	0.36	0.56	0.87	1.30	1.88	2.60	3.45	4.35	4.70	3.98	2.87	1.87	1.15	0.71	0.46	0.33	0.29	0.32	0.37
1990.06	20.5	21	0.00	0.14	0.24	0.36	0.56	0.85	1.26	1.78	2.42	3.11	3.80	4.12	3.62	2.84	2.03	1.35	0.88	0.58	0.40	0.35	0.37	0.45
1989.28	21	21.5	0.00	0.00	0.12	0.18	0.28	0.43	0.65	0.97	1.40	2.02	2.87	3.66	3.82	3.28	2.46	1.67	1.09	0.71	0.52	0.47	0.52	0.59
1988.14	21.5	22	0.00	0.18	0.30	0.47	0.73	1.12	1.65	2.34	3.13	3.95	4.67	4.80	3.92	2.82	1.87	1.18	0.74	0.49	0.35	0.30	0.32	0.38
1986.86	22	22.5	0.00	0.17	0.29	0.46	0.71	1.08	1.60	2.26	3.02	3.80	4.47	4.53	3.60	2.53	1.64	1.03	0.66	0.44	0.32	0.28	0.31	0.37
1985.80	22.5	23	0.00	0.15	0.26	0.41	0.63	0.96	1.43	2.02	2.73	3.50	4.22	4.42	3.66	2.66	1.77	1.13	0.73	0.49	0.36	0.33	0.36	0.43
1984.57	23	23.5	0.00	0.13	0.21	0.34	0.53	0.81	1.20	1.73	2.37	3.14	3.94	4.30	3.72	2.76	1.85	1.18	0.74	0.49	0.36	0.32	0.36	0.42
1982.64	23.5	24	0.00	0.00	0.15	0.23	0.36	0.57	0.87	1.30	1.90	2.73	3.79	4.44	4.14	3.16	2.12	1.32	0.80	0.51	0.37	0.33	0.36	0.42
1980.29	24	24.5	0.00	0.00	0.16	0.25	0.39	0.60	0.89	1.30	1.82	2.48	3.28	3.90	3.77	3.10	2.27	1.52	0.99	0.65	0.47	0.42	0.46	0.53
1978.38	24.5	25	0.00	0.17	0.28	0.44	0.69	1.05	1.54	2.18	2.92	3.71	4.39	4.51	3.69	2.67	1.79	1.17	0.77	0.53	0.40	0.36	0.39	0.46
1976.27	25	25.5	0.00	0.14	0.23	0.36	0.56	0.85	1.26	1.79	2.44	3.18	3.97	4.36	3.85	2.95	2.06	1.35	0.87	0.58	0.43	0.38	0.41	0.49
1973.12	25.5	26	0.00	0.00	0.00	0.00	0.00	0.13	0.21	0.35	0.60	1.06	1.91	2.83	3.45	3.42	2.76	1.95	1.28	0.83	0.60	0.54	0.58	0.65
1970.37	26	26.5	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.40	0.67	1.17	2.06	2.99	3.63	3.59	2.92	2.10	1.41	0.95	0.72	0.67	0.72	0.79
1968.71	26.5	27	0.00	0.00	0.00	0.00	0.13	0.21	0.34	0.57	0.97	1.70	2.90	3.86	4.24	3.80	2.86	1.96	1.29	0.86	0.66	0.61	0.66	0.71
1967.10	27	27.5	0.00	0.00	0.15	0.23	0.35	0.53	0.78	1.14	1.60	2.18	2.91	3.54	3.54	3.03	2.32	1.62	1.09	0.74	0.55	0.50	0.55	0.64
1965.03	27.5	28	0.00	0.15	0.25	0.40	0.62	0.94	1.40	1.98	2.68	3.45	4.20	4.48	3.81	2.84	1.93	1.24	0.79	0.52	0.38	0.33	0.36	0.43

1961.20	28	28.5	0.00	0.00	0.00	0.11	0.17	0.26	0.41	0.64	0.98	1.55	2.46	3.40	3.95	3.66	2.89	2.03	1.34	0.89	0.66	0.60	0.64	0.72
1957.87	28.5	29	0.00	0.14	0.24	0.37	0.57	0.87	1.29	1.84	2.50	3.26	4.08	4.54	4.07	3.19	2.27	1.52	0.99	0.67	0.49	0.43	0.46	0.54
1956.26	29	29.5	0.00	0.12	0.22	0.34	0.54	0.83	1.26	1.84	2.58	3.49	4.43	4.79	4.04	2.87	1.84	1.12	0.69	0.44	0.33	0.30	0.33	0.39
1953.55	29.5	30	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.23	0.40	0.76	1.48	2.34	3.00	3.12	2.63	1.90	1.26	0.82	0.58	0.51	0.56	0.64
1950.42	30	30.5	0.00	0.00	0.00	0.16	0.24	0.38	0.57	0.86	1.27	1.89	2.78	3.65	3.97	3.52	2.70	1.87	1.24	0.83	0.62	0.57	0.62	0.69
1947.71	30.5	31	0.00	0.00	0.17	0.26	0.40	0.61	0.91	1.32	1.85	2.50	3.30	3.91	3.77	3.11	2.29	1.55	1.02	0.67	0.49	0.44	0.48	0.55
1944.60	31	31.5	0.00	0.00	0.17	0.27	0.42	0.64	0.96	1.40	1.98	2.74	3.63	4.22	3.93	3.12	2.23	1.51	1.00	0.69	0.53	0.49	0.53	0.60
1939.94	31.5	32	0.00	0.00	0.00	0.00	0.11	0.17	0.27	0.43	0.71	1.21	2.09	3.03	3.67	3.58	2.87	2.04	1.35	0.89	0.66	0.60	0.64	0.71
1936.38	32	32.5	0.00	0.00	0.14	0.21	0.32	0.50	0.74	1.09	1.55	2.17	2.99	3.72	3.81	3.27	2.48	1.72	1.14	0.76	0.57	0.51	0.56	0.63
1934.87	32.5	33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.33	0.69	1.48	2.55	3.39	3.61	3.10	2.27	1.52	0.98	0.68	0.59	0.62	0.70
1933.41	33	33.5	0.00	0.00	0.00	0.00	0.10	0.17	0.27	0.46	0.82	1.49	2.66	3.68	4.14	3.83	2.94	2.03	1.33	0.88	0.65	0.59	0.62	0.67
1930.45	34	34.5	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.43	0.80	1.52	2.79	3.88	4.35	4.02	3.06	2.08	1.34	0.86	0.63	0.56	0.59	0.63
1928.62	34.5	35	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.29	0.59	1.23	2.48	3.65	4.19	3.95	3.15	2.20	1.44	0.94	0.69	0.62	0.65	0.70
1926.46	35	35.5	0.00	0.00	0.00	0.00	0.13	0.21	0.35	0.59	1.01	1.80	3.07	4.06	4.43	3.95	2.93	1.97	1.27	0.84	0.65	0.60	0.65	0.70
1924.50	35.5	36	0.00	0.13	0.22	0.34	0.53	0.81	1.20	1.72	2.36	3.12	4.03	4.68	4.38	3.57	2.59	1.74	1.13	0.74	0.53	0.46	0.49	0.57
1922.55	36	36.5	0.00	0.00	0.00	0.00	0.00	0.16	0.27	0.46	0.83	1.53	2.75	3.81	4.28	3.97	3.05	2.09	1.37	0.89	0.65	0.58	0.61	0.65
1920.76	36.5	37	0.12	0.23	0.38	0.59	0.91	1.38	2.02	2.82	3.72	4.59	5.22	5.13	4.06	2.91	1.98	1.32	0.90	0.64	0.49	0.44	0.46	0.55
1919.29	37	37.5	0.00	0.00	0.19	0.32	0.51	0.80	1.26	2.00	3.21	5.00	6.62	7.55	7.36	5.83	4.12	2.79	1.90	1.43	1.23	1.19	1.20	1.31
1917.65	37.5	38	0.11	0.21	0.33	0.51	0.78	1.17	1.70	2.37	3.15	3.96	4.64	4.69	3.89	2.95	2.15	1.54	1.11	0.81	0.62	0.55	0.58	0.70
1915.53	38	38.5	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.41	0.71	1.28	2.33	3.47	4.22	4.14	3.29	2.28	1.45	0.91	0.62	0.52	0.52	0.56
1913.05	38.5	39	0.12	0.23	0.37	0.58	0.89	1.35	1.98	2.78	3.70	4.60	5.31	5.32	4.31	3.17	2.21	1.51	1.05	0.76	0.59	0.52	0.54	0.61
1911.19	39	39.5	0.00	0.15	0.28	0.45	0.71	1.11	1.74	2.70	4.15	5.93	7.35	7.95	7.14	5.36	3.74	2.56	1.81	1.40	1.19	1.10	1.08	1.13
1909.90	39.5	40	0.12	0.23	0.40	0.63	0.99	1.52	2.30	3.39	4.87	6.59	7.91	8.30	7.06	5.21	3.64	2.56	1.90	1.55	1.39	1.37	1.45	1.60
1908.31	40	40.5	0.00	0.17	0.31	0.49	0.76	1.16	1.76	2.60	3.78	5.39	6.91	7.68	6.98	5.30	3.70	2.52	1.76	1.35	1.18	1.19	1.32	1.54
1906.66	40.5	41	0.00	0.00	0.00	0.17	0.26	0.41	0.65	1.05	1.74	2.99	5.07	6.88	7.72	6.99	5.44	3.91	2.75	2.00	1.65	1.57	1.64	1.72
1905.09	41	41.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.68	1.77	3.95	5.93	6.98	6.68	5.49	4.12	3.01	2.25	2.02	2.16	2.51
1903.31	41.5	42	0.00	0.13	0.21	0.33	0.51	0.77	1.14	1.62	2.21	2.88	3.66	4.22	4.00	3.37	2.57	1.82	1.25	0.86	0.63	0.56	0.59	0.69
1901.61	42	42.5	0.00	0.00	0.10	0.19	0.31	0.49	0.80	1.34	2.29	3.93	5.68	6.95	7.30	6.51	4.99	3.58	2.54	1.92	1.66	1.60	1.60	1.66
1900.25	42.5	43	0.00	0.13	0.24	0.37	0.57	0.88	1.32	1.95	2.86	4.21	5.79	6.96	6.95	5.87	4.55	3.42	2.62	2.13	1.95	1.95	2.07	2.20
1898.58	43	43.5	0.00	0.00	0.16	0.25	0.39	0.60	0.89	1.30	1.84	2.52	3.36	4.02	3.87	3.14	2.24	1.46	0.91	0.57	0.40	0.35	0.38	0.44

1897.09	43.5	44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.32	0.86	2.25	4.96	7.13	7.90	7.01	5.28	3.60	2.38	1.61	1.33	1.34	1.52
1896.06	44	44.5	0.00	0.15	0.27	0.44	0.69	1.08	1.69	2.63	4.08	5.83	7.26	7.92	7.23	5.48	3.83	2.60	1.82	1.40	1.19	1.11	1.11	1.21
1894.94	44.5	45	0.11	0.20	0.36	0.55	0.84	1.28	1.90	2.76	3.93	5.47	6.95	7.79	7.17	5.66	4.16	2.99	2.22	1.79	1.62	1.66	1.87	2.22
1893.56	45	45.5	0.00	0.16	0.29	0.47	0.74	1.16	1.80	2.76	4.19	5.96	7.40	8.05	7.22	5.39	3.73	2.53	1.77	1.37	1.17	1.09	1.11	1.21
1892.08	45.5	46	0.00	0.18	0.33	0.52	0.81	1.26	1.91	2.87	4.24	5.95	7.36	7.98	7.11	5.38	3.82	2.69	1.97	1.58	1.41	1.37	1.42	1.56
1890.54	46	46.5	0.00	0.00	0.12	0.20	0.32	0.49	0.76	1.17	1.83	2.95	4.78	6.50	7.40	6.86	5.55	4.15	3.03	2.27	1.92	1.89	2.05	2.23
1888.82	46.5	47	0.00	0.00	0.14	0.22	0.33	0.50	0.71	0.99	1.35	1.86	2.72	4.10	5.27	5.72	5.22	4.13	2.98	2.10	1.52	1.32	1.42	1.69
1887.01	47	47.5	0.13	0.24	0.39	0.61	0.95	1.44	2.11	2.96	3.91	4.85	5.56	5.52	4.47	3.29	2.28	1.53	1.02	0.70	0.51	0.44	0.46	0.55
1885.30	47.5	48	0.00	0.00	0.12	0.20	0.31	0.49	0.77	1.20	1.92	3.17	5.08	6.75	7.54	6.83	5.37	3.93	2.82	2.09	1.79	1.76	1.91	2.07
1883.61	48	48.5	0.00	0.00	0.00	0.00	0.00	0.16	0.26	0.43	0.77	1.50	3.10	5.60	7.47	7.90	6.91	5.28	3.74	2.61	1.91	1.72	1.84	2.13
1881.97	48.5	49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.58	1.52	3.45	5.37	6.58	6.57	5.62	4.37	3.27	2.49	2.23	2.35	2.69
1880.40	49	49.5	0.00	0.14	0.23	0.35	0.53	0.79	1.16	1.63	2.19	2.80	3.38	3.62	3.17	2.50	1.84	1.28	0.88	0.61	0.44	0.39	0.42	0.50
1879.00	49.5	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.64	1.69	3.82	5.82	6.94	6.69	5.49	4.08	2.91	2.11	1.82	1.86	2.09
1877.80	50	50.5	0.12	0.23	0.37	0.57	0.87	1.30	1.89	2.64	3.49	4.32	4.96	4.93	4.01	2.97	2.09	1.45	1.02	0.74	0.58	0.52	0.56	0.67
1876.62	50.5	51	0.00	0.17	0.27	0.41	0.63	0.95	1.39	1.95	2.61	3.29	3.89	4.02	3.48	2.79	2.13	1.56	1.10	0.77	0.55	0.46	0.48	0.57
1875.41	51	51.5	0.00	0.18	0.29	0.44	0.68	1.02	1.49	2.10	2.81	3.54	4.17	4.22	3.52	2.69	1.97	1.39	0.95	0.64	0.44	0.34	0.35	0.41
1874.26	51.5	52	0.00	0.14	0.23	0.35	0.54	0.82	1.20	1.68	2.25	2.86	3.43	3.66	3.26	2.67	2.04	1.45	0.98	0.66	0.46	0.38	0.41	0.50
1873.09	52	52.5	0.00	0.14	0.23	0.35	0.54	0.81	1.18	1.66	2.22	2.83	3.41	3.66	3.33	2.82	2.26	1.69	1.20	0.83	0.59	0.48	0.50	0.60
1871.74	52.5	53	0.00	0.15	0.23	0.36	0.55	0.82	1.21	1.70	2.28	2.90	3.49	3.73	3.34	2.79	2.20	1.62	1.13	0.77	0.54	0.45	0.46	0.56
1870.39	53	53.5	0.00	0.14	0.23	0.35	0.54	0.82	1.20	1.69	2.27	2.89	3.47	3.72	3.20	2.51	1.81	1.24	0.82	0.54	0.38	0.33	0.35	0.44
1869.00	53.5	54	0.00	0.13	0.21	0.33	0.50	0.75	1.09	1.53	2.06	2.63	3.19	3.47	3.15	2.64	2.06	1.50	1.04	0.70	0.49	0.42	0.44	0.54
1867.52	54	54.5	0.00	0.14	0.23	0.35	0.53	0.79	1.15	1.60	2.14	2.72	3.24	3.42	3.02	2.46	1.89	1.38	0.96	0.66	0.47	0.40	0.42	0.52
1866.06	54.5	55	0.00	0.14	0.24	0.36	0.56	0.84	1.23	1.75	2.36	3.03	3.67	3.96	3.50	2.78	2.04	1.40	0.94	0.63	0.44	0.38	0.40	0.48
1864.58	55	55.5	0.00	0.00	0.00	0.00	0.00	0.14	0.21	0.32	0.50	0.79	1.31	2.03	2.75	3.00	2.71	2.11	1.48	1.00	0.72	0.64	0.69	0.79
1863.18	55.5	56	0.00	0.00	0.00	0.11	0.17	0.26	0.40	0.62	0.94	1.44	2.23	3.07	3.54	3.27	2.58	1.81	1.19	0.78	0.57	0.52	0.58	0.66
1861.74	56	56.5	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.22	0.37	0.64	1.18	1.94	2.69	3.03	2.74	2.10	1.45	0.96	0.68	0.59	0.62	0.70
1860.18	56.5	57	0.00	0.00	0.00	0.00	0.00	0.13	0.20	0.31	0.49	0.80	1.36	2.10	2.81	3.03	2.69	2.05	1.42	0.96	0.69	0.62	0.67	0.76
1858.66	57	57.5	0.00	0.00	0.00	0.00	0.00	0.12	0.19	0.31	0.53	0.96	1.75	2.65	3.29	3.32	2.73	1.95	1.29	0.83	0.59	0.53	0.56	0.63
1857.09	57.5	58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.24	0.44	0.89	1.56	2.27	2.70	2.58	2.08	1.51	1.04	0.75	0.68	0.73	0.83
1855.51	58	58.5	0.00	0.00	0.00	0.14	0.22	0.34	0.51	0.76	1.11	1.62	2.35	3.07	3.37	3.04	2.40	1.72	1.18	0.82	0.64	0.61	0.68	0.77

1854.08	58.5	59	0.00	0.00	0.00	0.00	0.00	0.10	0.17	0.28	0.47	0.83	1.49	2.25	2.83	2.94	2.51	1.87	1.29	0.88	0.68	0.65	0.72	0.82
1852.75	59	59.5	0.00	0.00	0.00	0.00	0.10	0.16	0.26	0.41	0.67	1.15	1.97	2.84	3.46	3.45	2.85	2.09	1.45	1.00	0.80	0.76	0.84	0.93
1851.61	59.5	60	0.11	0.22	0.35	0.55	0.84	1.28	1.86	2.60	3.44	4.24	4.83	4.76	3.77	2.71	1.85	1.23	0.83	0.57	0.43	0.38	0.42	0.51
1850.64	60	60.5	0.00	0.17	0.28	0.44	0.69	1.04	1.52	2.13	2.81	3.50	4.09	4.28	3.64	2.82	2.02	1.35	0.87	0.57	0.40	0.35	0.38	0.48
1849.52	60.5	61	0.00	0.16	0.25	0.38	0.58	0.87	1.27	1.78	2.37	2.98	3.51	3.64	3.14	2.54	1.95	1.42	0.98	0.66	0.46	0.38	0.40	0.50
1848.13	61	61.5	0.00	0.12	0.20	0.32	0.50	0.78	1.17	1.70	2.36	3.18	4.09	4.54	3.98	2.97	1.98	1.25	0.78	0.51	0.37	0.34	0.37	0.43
1846.87	61.5	62	0.00	0.13	0.22	0.34	0.52	0.78	1.15	1.62	2.18	2.79	3.38	3.71	3.29	2.66	1.98	1.36	0.88	0.57	0.39	0.33	0.36	0.46
1845.86	62	62.5	0.00	0.19	0.30	0.46	0.71	1.06	1.55	2.18	2.91	3.66	4.29	4.36	3.56	2.65	1.87	1.29	0.88	0.60	0.44	0.37	0.40	0.49
1844.79	62.5	63	0.00	0.17	0.27	0.42	0.64	0.95	1.38	1.93	2.55	3.18	3.70	3.73	3.05	2.31	1.69	1.20	0.84	0.58	0.42	0.35	0.38	0.47
1843.71	63	63.5	0.00	0.15	0.24	0.38	0.57	0.86	1.25	1.74	2.30	2.87	3.36	3.42	2.92	2.34	1.79	1.30	0.89	0.59	0.40	0.32	0.33	0.41
1842.59	63.5	64	0.00	0.14	0.23	0.36	0.54	0.82	1.20	1.69	2.27	2.87	3.42	3.58	3.00	2.22	1.50	0.95	0.58	0.36	0.24	0.20	0.22	0.29
1841.49	64	64.5	0.00	0.16	0.26	0.40	0.60	0.90	1.30	1.81	2.39	2.99	3.48	3.51	2.96	2.33	1.77	1.29	0.90	0.61	0.43	0.34	0.36	0.44
1840.48	64.5	65	0.11	0.20	0.33	0.50	0.77	1.15	1.69	2.37	3.18	4.02	4.73	4.82	3.88	2.76	1.80	1.14	0.72	0.47	0.34	0.30	0.33	0.42
1839.51	65	65.5	0.00	0.16	0.25	0.38	0.58	0.88	1.27	1.78	2.37	2.98	3.52	3.63	3.12	2.51	1.92	1.40	0.96	0.64	0.44	0.35	0.36	0.44
1838.53	65.5	66	0.11	0.20	0.32	0.49	0.74	1.10	1.59	2.22	2.95	3.70	4.33	4.41	3.50	2.47	1.61	1.02	0.65	0.43	0.30	0.27	0.30	0.39
1837.44	66	66.5	0.00	0.18	0.29	0.46	0.70	1.06	1.54	2.15	2.85	3.55	4.10	4.09	3.32	2.47	1.75	1.18	0.76	0.49	0.33	0.27	0.28	0.36
1836.10	66.5	67	0.11	0.21	0.33	0.51	0.77	1.15	1.66	2.29	3.01	3.69	4.20	4.09	3.11	2.06	1.24	0.72	0.43	0.27	0.18	0.17	0.20	0.28
1834.72	67	67.5	0.11	0.20	0.32	0.49	0.74	1.10	1.59	2.20	2.91	3.63	4.21	4.24	3.40	2.45	1.65	1.10	0.74	0.52	0.38	0.35	0.40	0.52
1833.06	67.5	68	0.10	0.20	0.32	0.49	0.75	1.12	1.64	2.30	3.05	3.79	4.38	4.35	3.40	2.40	1.60	1.05	0.68	0.45	0.31	0.27	0.29	0.37
1831.09	68	68.5	0.00	0.00	0.12	0.20	0.30	0.47	0.71	1.04	1.49	2.09	2.90	3.60	3.64	3.04	2.20	1.43	0.88	0.54	0.37	0.33	0.36	0.43
1829.50	68.5	69	0.00	0.00	0.13	0.20	0.30	0.45	0.66	0.95	1.32	1.77	2.32	2.83	2.87	2.58	2.08	1.51	1.01	0.66	0.45	0.38	0.41	0.50
1828.31	69	69.5	0.00	0.14	0.23	0.35	0.54	0.81	1.18	1.66	2.23	2.83	3.37	3.56	3.02	2.30	1.62	1.09	0.70	0.46	0.31	0.26	0.28	0.36
1827.14	69.5	70	0.00	0.14	0.24	0.37	0.57	0.86	1.25	1.76	2.37	3.02	3.70	4.11	3.78	3.12	2.35	1.64	1.10	0.74	0.53	0.46	0.50	0.60
1825.96	70	70.5	0.00	0.14	0.22	0.34	0.51	0.77	1.13	1.60	2.15	2.77	3.39	3.75	3.52	3.05	2.44	1.80	1.25	0.85	0.59	0.50	0.52	0.62
1824.66	70.5	71	0.00	0.17	0.28	0.44	0.68	1.03	1.52	2.13	2.84	3.55	4.15	4.20	3.36	2.37	1.55	0.97	0.61	0.40	0.29	0.26	0.29	0.35
1822.81	71	71.5	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.29	0.52	0.99	1.93	3.02	3.78	3.83	3.14	2.22	1.44	0.92	0.63	0.54	0.55	0.60
1820.63	71.5	72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.19	0.38	0.84	1.62	2.50	3.07	3.00	2.43	1.74	1.17	0.80	0.67	0.68	0.76
1818.57	72	72.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.31	0.69	1.38	2.14	2.64	2.58	2.07	1.46	0.96	0.64	0.53	0.54	0.62
1816.69	72.5	73	0.00	0.00	0.00	0.00	0.00	0.13	0.20	0.34	0.59	1.07	1.95	2.87	3.43	3.31	2.58	1.75	1.10	0.68	0.48	0.43	0.47	0.54
1814.84	73	73.5	0.00	0.14	0.22	0.34	0.52	0.79	1.17	1.65	2.23	2.86	3.47	3.82	3.41	2.76	2.05	1.41	0.91	0.59	0.40	0.33	0.36	0.45

1813.04	73.5	74	0.00	0.17	0.28	0.44	0.68	1.03	1.52	2.12	2.81	3.51	4.12	4.26	3.54	2.62	1.79	1.15	0.73	0.48	0.34	0.30	0.32	0.40
1811.07	74	74.5	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.29	0.52	0.95	1.78	2.71	3.36	3.38	2.77	1.97	1.30	0.85	0.61	0.54	0.58	0.65
1809.17	74.5	75	0.00	0.11	0.19	0.30	0.46	0.70	1.03	1.49	2.06	2.77	3.62	4.21	3.96	3.23	2.37	1.64	1.12	0.79	0.61	0.58	0.64	0.75
1807.11	75	75.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.31	0.75	1.54	2.31	2.73	2.61	2.11	1.53	1.08	0.78	0.69	0.75	0.88
1804.74	75.5	76	0.00	0.00	0.00	0.00	0.00	0.15	0.24	0.39	0.68	1.22	2.18	3.14	3.73	3.63	2.86	1.99	1.30	0.85	0.64	0.61	0.67	0.75
1802.43	76	76.5	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.32	0.57	1.08	2.07	3.15	3.83	3.73	2.93	1.99	1.24	0.76	0.52	0.44	0.46	0.51
1799.96	76.5	77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.32	0.67	1.46	2.47	3.18	3.25	2.71	1.90	1.22	0.77	0.52	0.46	0.49	0.57
1797.89	77	77.5	0.00	0.00	0.00	0.00	0.00	0.11	0.18	0.30	0.54	1.02	1.91	2.85	3.47	3.48	2.86	2.03	1.35	0.88	0.66	0.62	0.69	0.77
1796.21	77.5	78	0.00	0.00	0.00	0.00	0.00	0.16	0.27	0.47	0.84	1.55	2.75	3.70	4.04	3.66	2.73	1.83	1.17	0.76	0.57	0.54	0.60	0.66
1794.41	78	78.5	0.00	0.00	0.00	0.11	0.17	0.27	0.42	0.65	1.02	1.62	2.57	3.45	3.82	3.31	2.41	1.56	0.95	0.59	0.43	0.40	0.45	0.52
1792.60	78.5	79	0.00	0.00	0.12	0.19	0.30	0.48	0.74	1.12	1.67	2.49	3.51	4.13	3.96	3.04	2.06	1.30	0.81	0.53	0.41	0.39	0.44	0.50
1790.95	79	79.5	0.00	0.00	0.11	0.17	0.27	0.43	0.67	1.02	1.56	2.38	3.43	4.14	4.12	3.28	2.29	1.48	0.94	0.62	0.48	0.45	0.50	0.56
1789.30	79.5	80	0.00	0.10	0.17	0.27	0.42	0.64	0.95	1.37	1.91	2.57	3.35	3.90	3.67	2.94	2.09	1.38	0.88	0.58	0.42	0.39	0.43	0.51
1787.62	80	80.5	0.00	0.00	0.12	0.19	0.30	0.46	0.71	1.07	1.60	2.37	3.38	4.06	3.98	3.14	2.18	1.41	0.89	0.59	0.45	0.42	0.47	0.54
1786.02	80.5	81	0.00	0.16	0.27	0.43	0.66	1.00	1.47	2.07	2.76	3.47	4.08	4.17	3.35	2.38	1.57	1.00	0.64	0.43	0.32	0.29	0.32	0.39
1784.46	81	81.5	0.00	0.00	0.15	0.23	0.36	0.54	0.81	1.18	1.67	2.30	3.10	3.74	3.66	3.01	2.19	1.45	0.93	0.60	0.44	0.40	0.44	0.52
1783.02	81.5	82	0.11	0.21	0.34	0.53	0.82	1.24	1.81	2.53	3.34	4.13	4.74	4.72	3.84	2.84	1.98	1.34	0.91	0.63	0.47	0.42	0.45	0.55
1781.70	82	82.5	0.00	0.14	0.24	0.37	0.57	0.86	1.26	1.78	2.38	3.03	3.72	4.12	3.73	3.00	2.19	1.47	0.96	0.64	0.45	0.40	0.45	0.55
1780.20	82.5	83	0.00	0.17	0.27	0.43	0.66	1.00	1.48	2.08	2.79	3.53	4.24	4.58	4.06	3.25	2.39	1.65	1.10	0.74	0.52	0.45	0.47	0.55
1778.60	83	83.5	0.00	0.13	0.23	0.36	0.56	0.86	1.28	1.83	2.50	3.27	4.06	4.37	3.74	2.76	1.85	1.18	0.74	0.49	0.36	0.32	0.35	0.42
1776.93	83.5	84	0.00	0.00	0.15	0.25	0.39	0.61	0.94	1.40	2.03	2.90	3.99	4.62	4.22	3.15	2.07	1.26	0.75	0.46	0.32	0.29	0.32	0.36
1775.17	84	84.5	0.00	0.14	0.23	0.36	0.55	0.83	1.21	1.72	2.33	2.98	3.62	3.90	3.36	2.57	1.81	1.20	0.78	0.52	0.37	0.33	0.36	0.43
1773.35	84.5	85	0.00	0.18	0.30	0.47	0.72	1.10	1.61	2.26	3.00	3.73	4.33	4.38	3.51	2.53	1.70	1.10	0.72	0.48	0.35	0.32	0.35	0.43
1771.47	85	85.5	0.00	0.17	0.28	0.44	0.68	1.03	1.51	2.13	2.83	3.55	4.15	4.20	3.38	2.41	1.59	1.01	0.65	0.44	0.32	0.29	0.32	0.39
1769.53	85.5	86	0.00	0.00	0.10	0.16	0.26	0.40	0.61	0.92	1.36	2.00	2.93	3.78	3.95	3.33	2.41	1.57	0.98	0.61	0.44	0.39	0.44	0.51
1767.46	86	86.5	0.00	0.00	0.00	0.00	0.12	0.20	0.31	0.51	0.83	1.40	2.37	3.34	3.85	3.49	2.60	1.71	1.04	0.63	0.43	0.38	0.42	0.48
1765.32	86.5	87	0.00	0.00	0.00	0.00	0.14	0.22	0.36	0.57	0.93	1.56	2.63	3.67	4.21	3.81	2.85	1.88	1.17	0.72	0.50	0.44	0.47	0.53

Table E-2. Continued.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																					
			1.51≤ 1.73	1.73≤ 1.98	1.98≤ 2.27	2.27≤ 2.60	2.60≤ 2.98	2.98≤ 3.41	3.41≤ 3.91	3.91≤ 4.47	4.47≤ 5.12	5.12≤ 5.87	5.87≤ 6.72	6.72≤ 7.70	7.70≤ 8.82	8.82≤ 10.10	10.10≤ 11.57	11.57≤ 13.25	13.25≤ 15.17	15.17≤ 17.38	17.38≤ 19.90	19.90≤ 22.80	22.80≤ 26.11	26.11≤ 29.91
2018.60	0	0.5	0.79	0.94	1.13	1.34	1.53	1.68	1.77	1.84	1.91	2.01	2.14	2.31	2.51	2.72	3.05	3.46	3.92	4.39	4.73	4.78	4.50	3.95
2018.33	0.5	1	0.58	0.71	0.88	1.10	1.34	1.58	1.80	2.01	2.20	2.39	2.57	2.76	2.98	3.21	3.50	3.81	4.20	4.55	4.69	4.50	4.02	3.35
2017.92	1	1.5	0.67	0.81	1.01	1.25	1.51	1.75	1.96	2.14	2.33	2.52	2.73	2.95	3.18	3.42	3.72	4.01	4.39	4.78	4.99	4.89	4.43	3.72
2017.50	1.5	2	0.72	0.86	1.04	1.26	1.48	1.67	1.83	1.96	2.10	2.25	2.43	2.64	2.87	3.11	3.44	3.80	4.23	4.66	4.93	4.88	4.46	3.78
2017.05	2	2.5	0.57	0.69	0.86	1.07	1.31	1.55	1.78	2.00	2.21	2.41	2.61	2.82	3.06	3.31	3.61	3.93	4.33	4.68	4.81	4.60	4.07	3.35
2016.56	2.5	3	0.57	0.69	0.86	1.08	1.31	1.53	1.71	1.86	1.99	2.13	2.28	2.46	2.68	2.93	3.29	3.73	4.25	4.75	5.03	4.97	4.56	3.90
2015.93	3	3.5	0.56	0.68	0.85	1.06	1.28	1.50	1.68	1.83	1.96	2.09	2.24	2.42	2.64	2.89	3.26	3.70	4.23	4.75	5.07	5.04	4.66	4.02
2015.24	3.5	4	0.53	0.64	0.81	1.02	1.27	1.54	1.81	2.07	2.31	2.53	2.73	2.92	3.11	3.32	3.52	3.73	4.02	4.27	4.34	4.14	3.70	3.13
2014.71	4	4.5	0.61	0.74	0.92	1.14	1.39	1.64	1.86	2.07	2.25	2.42	2.59	2.77	2.96	3.18	3.46	3.75	4.14	4.50	4.68	4.55	4.12	3.51
2014.22	4.5	5	0.62	0.76	0.94	1.17	1.40	1.61	1.76	1.89	2.01	2.14	2.31	2.50	2.72	2.95	3.29	3.69	4.14	4.60	4.91	4.92	4.60	4.01
2013.66	5	5.5	0.55	0.68	0.85	1.07	1.32	1.55	1.76	1.94	2.10	2.26	2.44	2.63	2.85	3.10	3.44	3.82	4.28	4.70	4.89	4.75	4.28	3.62
2013.14	5.5	6	0.63	0.77	0.95	1.17	1.40	1.59	1.72	1.82	1.90	2.00	2.14	2.33	2.54	2.78	3.13	3.59	4.10	4.62	4.97	5.03	4.74	4.19
2012.67	6.5	7	0.62	0.73	0.89	1.10	1.31	1.49	1.61	1.67	1.69	1.73	1.79	1.91	2.10	2.30	2.61	3.08	3.65	4.27	4.76	4.96	4.82	4.38
2012.08	7	7.5	0.75	0.91	1.10	1.33	1.56	1.76	1.93	2.07	2.21	2.36	2.52	2.70	2.89	3.08	3.34	3.61	3.96	4.34	4.59	4.57	4.24	3.66
2011.24	7.5	8	0.56	0.69	0.88	1.12	1.39	1.66	1.91	2.15	2.38	2.61	2.85	3.08	3.32	3.54	3.79	4.02	4.31	4.58	4.66	4.46	3.97	3.30
2010.50	8	8.5	0.62	0.75	0.93	1.15	1.41	1.66	1.91	2.14	2.36	2.56	2.74	2.92	3.11	3.31	3.54	3.76	4.07	4.34	4.41	4.20	3.72	3.10
2010.10	8.5	9	0.54	0.65	0.82	1.04	1.31	1.61	1.92	2.23	2.51	2.75	2.96	3.14	3.32	3.50	3.60	3.72	3.91	4.07	4.06	3.82	3.37	2.82
2009.73	9	9.5	0.73	0.88	1.06	1.27	1.48	1.68	1.84	1.97	2.10	2.22	2.33	2.47	2.62	2.79	3.05	3.34	3.70	4.06	4.27	4.21	3.89	3.38
2009.19	9.5	10	0.46	0.58	0.74	0.95	1.18	1.41	1.61	1.77	1.91	2.05	2.21	2.41	2.64	2.89	3.25	3.71	4.19	4.62	4.81	4.68	4.25	3.63
2008.54	10	10.5	0.61	0.75	0.93	1.15	1.37	1.57	1.73	1.85	1.96	2.10	2.27	2.47	2.70	2.94	3.29	3.70	4.15	4.57	4.82	4.77	4.39	3.78
2007.81	10.5	11	0.47	0.58	0.74	0.95	1.22	1.52	1.86	2.19	2.51	2.78	3.01	3.20	3.38	3.54	3.62	3.70	3.83	3.92	3.84	3.55	3.10	2.59
2007.08	11	11.5	0.42	0.52	0.68	0.91	1.23	1.62	2.07	2.53	2.94	3.27	3.51	3.68	3.81	3.86	3.73	3.62	3.56	3.47	3.28	2.95	2.55	2.12
2006.38	11.5	12	0.47	0.56	0.70	0.91	1.19	1.53	1.91	2.27	2.59	2.83	3.02	3.16	3.28	3.32	3.17	3.06	2.98	2.90	2.75	2.51	2.21	1.88
2005.69	12	12.5	0.66	0.80	0.99	1.22	1.47	1.72	1.95	2.16	2.36	2.53	2.69	2.85	3.02	3.21	3.44	3.68	4.00	4.31	4.43	4.28	3.85	3.27
2005.00	12.5	13	0.48	0.59	0.76	1.01	1.34	1.74	2.17	2.59	2.95	3.22	3.42	3.55	3.66	3.69	3.58	3.51	3.50	3.49	3.37	3.10	2.72	2.29
2004.34	13	13.5	0.57	0.69	0.88	1.13	1.45	1.82	2.22	2.60	2.93	3.19	3.37	3.50	3.60	3.67	3.60	3.56	3.59	3.60	3.48	3.20	2.79	2.33
2003.79	13.5	14	0.71	0.85	1.04	1.26	1.50	1.74	1.95	2.14	2.31	2.48	2.63	2.79	2.97	3.15	3.40	3.65	3.98	4.28	4.39	4.22	3.76	3.15

2003.29	14	14.5	0.56	0.68	0.86	1.11	1.40	1.73	2.08	2.42	2.73	2.98	3.18	3.35	3.51	3.65	3.69	3.75	3.89	3.99	3.93	3.65	3.20	2.67
2002.71	14.5	15	0.63	0.77	0.96	1.20	1.45	1.70	1.91	2.11	2.31	2.51	2.71	2.92	3.14	3.35	3.62	3.87	4.19	4.51	4.67	4.55	4.12	3.49
2001.85	15	15.5	0.56	0.66	0.82	1.03	1.30	1.62	1.95	2.27	2.54	2.76	2.93	3.08	3.23	3.34	3.30	3.31	3.38	3.46	3.45	3.29	3.00	2.62
2000.71	15.5	16	0.55	0.66	0.85	1.10	1.43	1.81	2.22	2.60	2.94	3.21	3.42	3.60	3.78	3.89	3.84	3.86	3.94	4.02	3.95	3.66	3.18	2.57
1999.68	16	16.5	0.53	0.65	0.83	1.07	1.38	1.74	2.13	2.51	2.86	3.13	3.34	3.51	3.64	3.74	3.71	3.71	3.77	3.81	3.70	3.40	2.96	2.46
1998.24	16.5	17	0.66	0.82	1.03	1.29	1.57	1.82	2.02	2.18	2.34	2.51	2.70	2.90	3.11	3.33	3.62	3.92	4.29	4.64	4.84	4.75	4.34	3.72
1996.61	17	17.5	0.41	0.51	0.66	0.89	1.19	1.57	1.99	2.41	2.79	3.08	3.29	3.44	3.55	3.59	3.47	3.37	3.32	3.27	3.12	2.87	2.55	2.21
1995.51	17.5	18	0.47	0.57	0.74	0.98	1.29	1.68	2.11	2.55	2.94	3.25	3.50	3.68	3.84	3.92	3.83	3.77	3.76	3.72	3.56	3.24	2.80	2.32
1994.46	18	18.5	0.57	0.69	0.86	1.11	1.42	1.78	2.16	2.51	2.80	3.01	3.16	3.27	3.36	3.39	3.29	3.24	3.26	3.29	3.22	3.02	2.69	2.29
1993.36	18.5	19	0.54	0.66	0.84	1.09	1.40	1.75	2.12	2.48	2.80	3.06	3.27	3.44	3.60	3.75	3.77	3.84	3.98	4.11	4.11	3.90	3.52	3.02
1992.18	19	19.5	0.51	0.63	0.82	1.08	1.40	1.79	2.20	2.60	2.96	3.25	3.46	3.63	3.76	3.86	3.83	3.84	3.91	3.95	3.85	3.55	3.10	2.59
1991.09	19.5	20	0.74	0.88	1.07	1.30	1.53	1.75	1.94	2.11	2.26	2.40	2.54	2.69	2.87	3.07	3.34	3.62	4.01	4.39	4.60	4.52	4.13	3.53
1990.50	20	20.5	0.45	0.55	0.71	0.93	1.22	1.57	1.95	2.34	2.70	3.00	3.24	3.43	3.60	3.73	3.72	3.73	3.80	3.83	3.72	3.42	2.98	2.48
1990.06	20.5	21	0.53	0.64	0.83	1.10	1.46	1.91	2.41	2.90	3.33	3.67	3.90	4.05	4.14	4.11	3.85	3.62	3.51	3.48	3.43	3.26	2.95	2.53
1989.28	21	21.5	0.69	0.83	1.03	1.27	1.54	1.82	2.10	2.36	2.61	2.83	3.03	3.20	3.36	3.51	3.58	3.66	3.85	4.08	4.22	4.14	3.80	3.27
1988.14	21.5	22	0.45	0.54	0.69	0.92	1.22	1.59	2.02	2.47	2.92	3.33	3.70	4.04	4.35	4.56	4.56	4.55	4.54	4.42	4.05	3.40	2.57	1.73
1986.86	22	22.5	0.44	0.54	0.71	0.94	1.26	1.66	2.10	2.54	2.92	3.22	3.44	3.60	3.72	3.77	3.64	3.54	3.50	3.46	3.32	3.07	2.72	2.34
1985.80	22.5	23	0.51	0.62	0.79	1.04	1.36	1.75	2.17	2.58	2.93	3.21	3.42	3.57	3.70	3.77	3.68	3.62	3.64	3.64	3.54	3.28	2.92	2.49
1984.57	23	23.5	0.51	0.62	0.80	1.05	1.37	1.74	2.15	2.54	2.89	3.17	3.38	3.54	3.68	3.78	3.74	3.74	3.81	3.86	3.77	3.51	3.11	2.64
1982.64	23.5	24	0.50	0.62	0.79	1.03	1.31	1.62	1.95	2.27	2.57	2.84	3.07	3.27	3.47	3.66	3.80	3.94	4.15	4.30	4.26	3.95	3.44	2.83
1980.29	24	24.5	0.62	0.75	0.93	1.17	1.47	1.80	2.15	2.50	2.83	3.11	3.34	3.52	3.68	3.78	3.73	3.69	3.75	3.87	3.92	3.78	3.42	2.89
1978.38	24.5	25	0.54	0.64	0.81	1.04	1.34	1.70	2.08	2.43	2.73	2.95	3.11	3.22	3.32	3.36	3.25	3.18	3.18	3.18	3.12	2.94	2.67	2.36
1976.27	25	25.5	0.58	0.70	0.88	1.14	1.47	1.84	2.23	2.59	2.88	3.11	3.26	3.37	3.47	3.53	3.46	3.45	3.51	3.59	3.56	3.36	3.02	2.59
1973.12	25.5	26	0.75	0.90	1.11	1.34	1.56	1.74	1.84	1.91	1.96	2.04	2.16	2.32	2.52	2.73	3.06	3.51	4.02	4.55	4.96	5.08	4.87	4.35
1970.37	26	26.5	0.90	1.07	1.27	1.47	1.65	1.77	1.84	1.88	1.92	2.00	2.10	2.24	2.40	2.56	2.83	3.19	3.58	4.00	4.31	4.40	4.20	3.74
1968.71	26.5	27	0.80	0.95	1.12	1.31	1.48	1.61	1.70	1.78	1.84	1.92	2.00	2.11	2.23	2.38	2.63	2.96	3.33	3.71	3.96	3.98	3.75	3.33
1967.10	27	27.5	0.74	0.88	1.08	1.33	1.62	1.94	2.26	2.57	2.85	3.09	3.28	3.43	3.57	3.66	3.63	3.61	3.70	3.87	3.97	3.88	3.56	3.06
1965.03	27.5	28	0.51	0.62	0.79	1.04	1.36	1.75	2.18	2.60	2.96	3.25	3.46	3.62	3.75	3.81	3.71	3.65	3.65	3.62	3.48	3.17	2.74	2.26
1961.20	28	28.5	0.82	0.97	1.16	1.38	1.59	1.77	1.92	2.04	2.18	2.32	2.49	2.69	2.90	3.14	3.45	3.76	4.18	4.64	4.96	4.97	4.59	3.90
1957.87	28.5	29	0.63	0.74	0.92	1.17	1.47	1.82	2.16	2.48	2.75	2.95	3.10	3.22	3.35	3.43	3.39	3.41	3.51	3.61	3.61	3.41	3.03	2.54

1956.26	29	29.5	0.47	0.57	0.73	0.96	1.24	1.57	1.92	2.28	2.61	2.88	3.09	3.26	3.40	3.52	3.52	3.53	3.60	3.64	3.55	3.29	2.90	2.46
1953.55	29.5	30	0.72	0.87	1.07	1.31	1.54	1.72	1.82	1.86	1.87	1.91	1.99	2.13	2.32	2.53	2.85	3.34	3.90	4.49	4.96	5.14	4.98	4.52
1950.42	30	30.5	0.80	0.94	1.13	1.35	1.58	1.80	2.00	2.19	2.36	2.53	2.68	2.83	2.97	3.12	3.26	3.40	3.65	3.95	4.17	4.20	3.96	3.49
1947.71	30.5	31	0.64	0.77	0.95	1.19	1.48	1.80	2.14	2.48	2.80	3.07	3.30	3.49	3.66	3.79	3.75	3.73	3.82	3.98	4.06	3.94	3.58	3.03
1944.60	31	31.5	0.70	0.82	1.00	1.22	1.47	1.74	2.01	2.25	2.46	2.64	2.79	2.93	3.08	3.25	3.33	3.47	3.70	3.94	4.05	3.93	3.58	3.08
1939.94	31.5	32	0.81	0.97	1.17	1.39	1.59	1.75	1.85	1.92	1.99	2.09	2.22	2.38	2.57	2.77	3.09	3.48	3.93	4.41	4.76	4.83	4.57	4.02
1936.38	32	32.5	0.73	0.87	1.05	1.28	1.54	1.81	2.09	2.35	2.60	2.83	3.03	3.20	3.37	3.52	3.58	3.64	3.81	4.04	4.19	4.13	3.79	3.24
1934.87	32.5	33	0.75	0.86	1.01	1.18	1.33	1.44	1.48	1.47	1.44	1.43	1.45	1.52	1.65	1.80	2.05	2.45	2.99	3.61	4.20	4.59	4.68	4.45
1933.41	33	33.5	0.74	0.87	1.03	1.21	1.37	1.50	1.58	1.63	1.67	1.73	1.81	1.93	2.09	2.29	2.60	3.05	3.58	4.13	4.55	4.70	4.52	4.06
1930.45	34	34.5	0.70	0.82	0.97	1.14	1.30	1.43	1.51	1.56	1.60	1.66	1.75	1.87	2.03	2.22	2.53	2.97	3.47	3.97	4.33	4.42	4.20	3.74
1928.62	34.5	35	0.75	0.85	0.98	1.12	1.23	1.31	1.34	1.34	1.34	1.36	1.42	1.51	1.64	1.79	2.02	2.38	2.82	3.22	3.50	3.53	3.30	2.87
1926.46	35	35.5	0.79	0.94	1.11	1.29	1.47	1.61	1.72	1.81	1.91	2.03	2.15	2.30	2.45	2.61	2.87	3.19	3.51	3.77	3.85	3.67	3.25	2.68
1924.50	35.5	36	0.64	0.76	0.93	1.17	1.46	1.78	2.09	2.37	2.58	2.74	2.86	2.96	3.06	3.13	3.11	3.16	3.30	3.47	3.51	3.36	3.00	2.52
1922.55	36	36.5	0.72	0.84	0.98	1.14	1.29	1.41	1.49	1.54	1.60	1.68	1.80	1.97	2.19	2.44	2.84	3.38	3.99	4.58	4.96	4.96	4.53	3.79
1920.76	36.5	37	0.63	0.75	0.94	1.21	1.55	1.94	2.33	2.68	2.92	3.06	3.11	3.11	3.08	2.97	2.73	2.52	2.38	2.25	2.10	1.91	1.69	1.47
1919.29	37	37.5	1.50	1.72	1.94	2.20	2.49	2.84	3.20	3.52	3.68	3.63	3.37	2.96	2.49	2.05	1.70	1.41	1.18	0.94	0.68	0.43	0.23	0.00
1917.65	37.5	38	0.84	1.04	1.36	1.81	2.40	3.09	3.77	4.31	4.62	4.66	4.48	4.16	3.76	3.27	2.66	2.16	1.79	1.53	1.32	1.14	0.98	0.82
1915.53	38	38.5	0.61	0.71	0.84	1.00	1.17	1.30	1.40	1.48	1.56	1.67	1.84	2.07	2.39	2.76	3.31	4.03	4.88	5.74	6.32	6.37	5.81	4.78
1913.05	38.5	39	0.67	0.77	0.91	1.11	1.37	1.66	1.96	2.23	2.47	2.65	2.80	2.94	3.10	3.19	3.14	3.13	3.18	3.23	3.19	3.00	2.67	2.24
1911.19	39	39.5	1.22	1.29	1.38	1.47	1.56	1.65	1.73	1.78	1.81	1.81	1.80	1.79	1.80	1.85	1.88	1.90	1.95	2.01	2.00	1.89	1.68	1.41
1909.90	39.5	40	1.78	1.95	2.14	2.34	2.51	2.62	2.64	2.55	2.35	2.08	1.80	1.52	1.28	1.09	0.90	0.75	0.64	0.57	0.52	0.46	0.41	0.36
1908.31	40	40.5	1.88	2.24	2.71	3.26	3.85	4.36	4.64	4.55	4.06	3.28	2.42	1.66	1.08	0.70	0.48	0.36	0.28	0.21	0.14	0.00	0.00	0.00
1906.66	40.5	41	1.84	1.99	2.13	2.23	2.26	2.23	2.14	2.02	1.88	1.74	1.61	1.50	1.41	1.35	1.34	1.37	1.46	1.59	1.72	1.79	1.76	1.62
1905.09	41	41.5	2.76	3.05	3.39	3.69	3.84	3.73	3.38	2.87	2.34	1.88	1.55	1.34	1.23	1.19	1.18	1.28	1.47	1.70	1.90	1.98	1.89	1.62
1903.31	41.5	42	0.79	0.92	1.11	1.36	1.66	1.97	2.26	2.49	2.66	2.77	2.86	2.94	3.05	3.14	3.13	3.21	3.41	3.65	3.81	3.77	3.50	3.03
1901.61	42	42.5	1.80	1.99	2.13	2.23	2.29	2.34	2.40	2.47	2.51	2.51	2.43	2.31	2.15	2.01	1.92	1.83	1.74	1.65	1.52	1.32	1.07	0.79
1900.25	42.5	43	2.37	2.50	2.62	2.69	2.70	2.63	2.49	2.28	2.02	1.74	1.47	1.24	1.05	0.91	0.78	0.69	0.64	0.64	0.66	0.69	0.72	0.74
1898.58	43	43.5	0.52	0.63	0.80	1.04	1.33	1.68	2.07	2.49	2.91	3.31	3.66	3.95	4.19	4.34	4.33	4.28	4.31	4.32	4.18	3.78	3.17	2.47
1897.09	43.5	44	1.62	1.76	1.96	2.18	2.35	2.40	2.31	2.11	1.86	1.63	1.46	1.37	1.38	1.45	1.57	1.85	2.29	2.84	3.32	3.53	3.36	2.81
1896.06	44	44.5	1.37	1.52	1.68	1.88	2.08	2.30	2.49	2.63	2.68	2.63	2.50	2.32	2.13	1.97	1.80	1.61	1.45	1.29	1.12	0.92	0.72	0.54

1894.94	44.5	45	2.68	3.15	3.70	4.24	4.64	4.71	4.33	3.53	2.52	1.57	0.85	0.42	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1893.56	45	45.5	1.37	1.51	1.68	1.88	2.09	2.29	2.47	2.57	2.58	2.49	2.34	2.15	1.97	1.82	1.65	1.47	1.34	1.22	1.09	0.94	0.78	0.63
1892.08	45.5	46	1.74	1.90	2.09	2.28	2.46	2.61	2.67	2.64	2.49	2.27	2.01	1.74	1.51	1.32	1.13	0.97	0.86	0.78	0.72	0.65	0.58	0.51
1890.54	46	46.5	2.45	2.71	2.96	3.17	3.30	3.33	3.26	3.10	2.86	2.54	2.18	1.83	1.52	1.25	1.06	0.92	0.84	0.79	0.73	0.64	0.52	0.40
1888.82	46.5	47	1.96	2.27	2.69	3.16	3.59	3.85	3.84	3.57	3.15	2.68	2.26	1.92	1.68	1.50	1.35	1.31	1.36	1.45	1.53	1.53	1.45	1.30
1887.01	47	47.5	0.65	0.79	1.02	1.35	1.79	2.33	2.89	3.40	3.78	4.00	4.07	4.03	3.91	3.67	3.27	2.91	2.60	2.30	1.97	1.61	1.25	0.92
1885.30	47.5	48	2.30	2.58	2.84	3.05	3.19	3.24	3.21	3.10	2.91	2.63	2.30	1.96	1.64	1.37	1.17	1.01	0.91	0.84	0.77	0.68	0.58	0.47
1883.61	48	48.5	2.34	2.61	2.95	3.29	3.53	3.59	3.44	3.13	2.74	2.34	1.98	1.69	1.48	1.32	1.23	1.23	1.31	1.39	1.40	1.27	1.03	0.73
1881.97	48.5	49	2.92	3.17	3.46	3.70	3.78	3.62	3.24	2.74	2.24	1.81	1.51	1.32	1.24	1.22	1.24	1.37	1.60	1.89	2.11	2.17	2.00	1.64
1880.40	49	49.5	0.59	0.72	0.93	1.23	1.63	2.13	2.68	3.22	3.67	4.00	4.21	4.31	4.35	4.24	3.88	3.56	3.36	3.24	3.11	2.90	2.59	2.21
1879.00	49.5	50	2.22	2.38	2.58	2.77	2.86	2.79	2.56	2.23	1.88	1.58	1.37	1.25	1.23	1.27	1.35	1.58	1.95	2.42	2.88	3.15	3.10	2.72
1877.80	50	50.5	0.79	0.96	1.21	1.57	2.02	2.54	3.05	3.47	3.74	3.85	3.84	3.75	3.62	3.39	3.03	2.72	2.47	2.25	2.01	1.74	1.46	1.20
1876.62	50.5	51	0.68	0.82	1.05	1.39	1.84	2.38	2.95	3.47	3.86	4.09	4.18	4.15	4.05	3.81	3.38	3.02	2.77	2.61	2.48	2.30	2.05	1.75
1875.41	51	51.5	0.50	0.62	0.83	1.15	1.63	2.26	3.02	3.82	4.55	5.13	5.48	5.61	5.52	5.13	4.47	3.80	3.21	2.69	2.19	1.70	1.24	0.85
1874.26	51.5	52	0.60	0.74	0.98	1.32	1.78	2.34	2.94	3.51	3.96	4.25	4.39	4.41	4.36	4.15	3.74	3.40	3.19	3.07	2.95	2.75	2.43	2.04
1873.09	52	52.5	0.71	0.85	1.08	1.42	1.86	2.37	2.91	3.40	3.78	4.02	4.14	4.16	4.12	3.94	3.57	3.27	3.10	3.02	2.93	2.75	2.45	2.04
1871.74	52.5	53	0.67	0.81	1.05	1.39	1.85	2.40	2.98	3.50	3.90	4.14	4.24	4.24	4.18	3.98	3.59	3.28	3.10	3.02	2.95	2.80	2.53	2.17
1870.39	53	53.5	0.53	0.66	0.87	1.19	1.63	2.19	2.82	3.44	3.97	4.34	4.56	4.64	4.63	4.46	4.02	3.64	3.39	3.22	3.05	2.80	2.45	2.05
1869.00	53.5	54	0.64	0.78	1.01	1.35	1.80	2.34	2.93	3.47	3.92	4.22	4.38	4.43	4.41	4.23	3.85	3.53	3.34	3.24	3.12	2.90	2.55	2.11
1867.52	54	54.5	0.63	0.77	1.01	1.37	1.85	2.45	3.09	3.70	4.18	4.49	4.64	4.65	4.57	4.33	3.87	3.48	3.22	3.05	2.88	2.64	2.31	1.92
1866.06	54.5	55	0.56	0.68	0.87	1.15	1.53	1.99	2.51	3.03	3.49	3.85	4.11	4.27	4.36	4.30	4.00	3.72	3.55	3.45	3.30	3.03	2.61	2.12
1864.58	55	55.5	0.90	1.07	1.30	1.56	1.82	2.02	2.14	2.22	2.29	2.39	2.54	2.75	3.01	3.28	3.66	4.08	4.58	5.05	5.33	5.28	4.88	4.18
1863.18	55.5	56	0.77	0.93	1.14	1.39	1.65	1.88	2.08	2.25	2.43	2.61	2.81	3.02	3.25	3.47	3.74	4.01	4.38	4.75	4.95	4.83	4.34	3.61
1861.74	56	56.5	0.78	0.93	1.13	1.36	1.58	1.76	1.86	1.90	1.92	1.98	2.09	2.28	2.55	2.86	3.31	3.92	4.65	5.39	5.93	6.06	5.72	4.99
1860.18	56.5	57	0.87	1.04	1.27	1.53	1.78	1.97	2.07	2.11	2.15	2.21	2.33	2.52	2.79	3.09	3.52	4.04	4.65	5.26	5.71	5.82	5.53	4.87
1858.66	57	57.5	0.72	0.87	1.07	1.30	1.52	1.69	1.80	1.86	1.91	1.98	2.09	2.26	2.47	2.72	3.09	3.61	4.22	4.86	5.35	5.52	5.30	4.73
1857.09	57.5	58	0.92	1.08	1.29	1.52	1.72	1.85	1.88	1.85	1.79	1.77	1.79	1.89	2.06	2.25	2.55	3.03	3.64	4.32	4.91	5.26	5.26	4.92
1855.51	58	58.5	0.91	1.08	1.30	1.56	1.81	2.05	2.27	2.46	2.63	2.77	2.88	2.96	3.02	3.08	3.13	3.16	3.30	3.51	3.65	3.65	3.44	3.07
1854.08	58.5	59	0.95	1.15	1.39	1.64	1.85	1.99	2.05	2.07	2.09	2.15	2.26	2.40	2.57	2.73	3.00	3.36	3.74	4.09	4.31	4.29	3.99	3.47
1852.75	59	59.5	1.05	1.24	1.45	1.65	1.82	1.92	1.97	2.01	2.07	2.14	2.23	2.32	2.41	2.50	2.67	2.88	3.11	3.37	3.54	3.56	3.37	3.02

1851.61	59.5	60	0.62	0.77	1.00	1.35	1.81	2.37	2.95	3.47	3.85	4.07	4.15	4.12	4.04	3.85	3.48	3.17	2.92	2.70	2.44	2.14	1.81	1.48
1850.64	60	60.5	0.59	0.74	0.98	1.33	1.81	2.38	2.98	3.51	3.89	4.09	4.13	4.06	3.94	3.72	3.35	3.06	2.87	2.70	2.49	2.21	1.87	1.52
1849.52	60.5	61	0.61	0.77	1.02	1.41	1.94	2.60	3.31	3.96	4.44	4.71	4.76	4.66	4.46	4.11	3.56	3.11	2.80	2.60	2.43	2.21	1.93	1.60
1848.13	61	61.5	0.51	0.62	0.79	1.02	1.31	1.65	2.02	2.39	2.74	3.03	3.28	3.49	3.69	3.85	3.89	3.95	4.07	4.15	4.05	3.71	3.18	2.58
1846.87	61.5	62	0.55	0.68	0.90	1.24	1.69	2.26	2.89	3.49	4.00	4.34	4.51	4.54	4.47	4.26	3.81	3.44	3.20	3.04	2.87	2.60	2.24	1.82
1845.86	62	62.5	0.60	0.75	1.01	1.39	1.94	2.62	3.37	4.06	4.57	4.84	4.87	4.72	4.46	4.03	3.40	2.86	2.45	2.14	1.88	1.62	1.37	1.12
1844.79	62.5	63	0.59	0.77	1.05	1.50	2.13	2.93	3.82	4.63	5.20	5.47	5.44	5.18	4.79	4.24	3.50	2.88	2.42	2.09	1.81	1.55	1.30	1.05
1843.71	63	63.5	0.53	0.67	0.93	1.35	1.96	2.77	3.70	4.61	5.34	5.77	5.87	5.70	5.34	4.77	4.01	3.35	2.86	2.51	2.19	1.86	1.50	1.14
1842.59	63.5	64	0.36	0.46	0.65	0.96	1.41	2.04	2.81	3.65	4.42	5.02	5.38	5.51	5.46	5.16	4.58	4.01	3.57	3.21	2.86	2.46	2.04	1.63
1841.49	64	64.5	0.55	0.71	0.98	1.40	2.02	2.82	3.74	4.62	5.31	5.69	5.76	5.57	5.21	4.64	3.89	3.23	2.74	2.37	2.06	1.75	1.42	1.10
1840.48	64.5	65	0.52	0.67	0.93	1.33	1.92	2.69	3.56	4.40	5.05	5.39	5.43	5.22	4.85	4.30	3.54	2.86	2.33	1.92	1.58	1.27	1.00	0.78
1839.51	65	65.5	0.55	0.70	0.95	1.35	1.92	2.66	3.49	4.29	4.91	5.27	5.35	5.23	4.96	4.50	3.84	3.28	2.87	2.58	2.33	2.05	1.73	1.39
1838.53	65.5	66	0.50	0.68	0.99	1.49	2.26	3.31	4.54	5.73	6.61	6.99	6.86	6.31	5.49	4.49	3.38	2.44	1.74	1.21	0.81	0.52	0.31	0.18
1837.44	66	66.5	0.46	0.61	0.87	1.28	1.91	2.74	3.70	4.62	5.31	5.65	5.63	5.33	4.86	4.23	3.44	2.77	2.28	1.94	1.66	1.41	1.18	0.96
1836.10	66.5	67	0.39	0.56	0.88	1.43	2.30	3.55	5.06	6.53	7.57	7.93	7.58	6.71	5.58	4.34	3.09	2.11	1.41	0.94	0.61	0.39	0.24	0.15
1834.72	67	67.5	0.68	0.91	1.30	1.90	2.76	3.84	4.98	5.94	6.47	6.49	6.05	5.32	4.49	3.59	2.65	1.92	1.39	1.03	0.76	0.56	0.42	0.31
1833.06	67.5	68	0.47	0.62	0.87	1.29	1.92	2.77	3.77	4.75	5.53	5.95	6.00	5.74	5.28	4.62	3.74	2.97	2.38	1.93	1.56	1.24	0.95	0.72
1831.09	68	68.5	0.51	0.64	0.82	1.08	1.39	1.75	2.14	2.56	3.00	3.43	3.83	4.19	4.49	4.71	4.78	4.81	4.89	4.91	4.71	4.18	3.39	2.53
1829.50	68.5	69	0.59	0.72	0.93	1.22	1.61	2.07	2.57	3.09	3.60	4.07	4.48	4.80	5.05	5.14	4.99	4.75	4.50	4.25	3.94	3.52	2.98	2.36
1828.31	69	69.5	0.44	0.56	0.76	1.08	1.55	2.18	2.93	3.72	4.43	4.96	5.28	5.40	5.37	5.11	4.54	4.00	3.58	3.25	2.90	2.50	2.05	1.61
1827.14	69.5	70	0.70	0.84	1.07	1.38	1.77	2.21	2.63	2.99	3.24	3.38	3.44	3.45	3.45	3.40	3.23	3.14	3.15	3.19	3.17	3.02	2.74	2.38
1825.96	70	70.5	0.73	0.87	1.10	1.42	1.83	2.30	2.77	3.17	3.46	3.62	3.67	3.64	3.58	3.42	3.11	2.88	2.78	2.78	2.80	2.74	2.58	2.31
1824.66	70.5	71	0.43	0.54	0.72	0.98	1.36	1.83	2.36	2.89	3.34	3.68	3.89	4.01	4.07	4.02	3.78	3.58	3.43	3.29	3.09	2.80	2.47	2.13
1822.81	71	71.5	0.66	0.76	0.91	1.08	1.24	1.36	1.44	1.47	1.50	1.55	1.65	1.80	2.02	2.28	2.67	3.26	3.97	4.76	5.40	5.70	5.54	4.97
1820.63	71.5	72	0.81	0.91	1.05	1.21	1.37	1.47	1.50	1.47	1.42	1.37	1.37	1.42	1.55	1.72	1.98	2.41	3.03	3.79	4.57	5.18	5.47	5.38
1818.57	72	72.5	0.69	0.80	0.96	1.16	1.36	1.52	1.61	1.61	1.56	1.50	1.48	1.51	1.62	1.77	2.01	2.42	3.01	3.76	4.55	5.20	5.57	5.59
1816.69	72.5	73	0.62	0.77	0.98	1.23	1.48	1.70	1.86	1.97	2.07	2.19	2.35	2.54	2.76	2.98	3.29	3.71	4.13	4.51	4.70	4.61	4.24	3.67
1814.84	73	73.5	0.53	0.66	0.87	1.19	1.63	2.19	2.81	3.43	3.96	4.34	4.55	4.62	4.59	4.40	3.97	3.60	3.36	3.20	3.02	2.73	2.33	1.88
1813.04	73.5	74	0.49	0.61	0.81	1.11	1.52	2.04	2.61	3.17	3.64	3.98	4.19	4.29	4.32	4.23	3.96	3.72	3.55	3.37	3.10	2.72	2.27	1.81
1811.07	74	74.5	0.74	0.88	1.08	1.29	1.50	1.66	1.74	1.78	1.80	1.85	1.93	2.07	2.27	2.49	2.84	3.34	3.95	4.61	5.17	5.44	5.34	4.88

1809.17	74.5	75	0.86	1.01	1.22	1.48	1.77	2.07	2.33	2.53	2.64	2.68	2.66	2.62	2.58	2.54	2.43	2.38	2.42	2.50	2.54	2.49	2.34	2.12
1807.11	75	75.5	0.97	1.08	1.24	1.41	1.55	1.63	1.61	1.52	1.39	1.28	1.20	1.18	1.22	1.30	1.43	1.69	2.08	2.57	3.07	3.46	3.63	3.54
1804.74	75.5	76	0.86	1.04	1.25	1.49	1.70	1.85	1.95	2.02	2.11	2.23	2.37	2.52	2.67	2.80	3.01	3.28	3.53	3.73	3.78	3.63	3.28	2.80
1802.43	76	76.5	0.58	0.69	0.85	1.04	1.24	1.41	1.53	1.60	1.66	1.74	1.86	2.03	2.27	2.53	2.93	3.49	4.14	4.82	5.33	5.49	5.24	4.66
1799.96	76.5	77	0.64	0.76	0.94	1.15	1.36	1.52	1.61	1.63	1.62	1.62	1.65	1.74	1.88	2.03	2.25	2.61	3.06	3.50	3.81	3.89	3.71	3.33
1797.89	77	77.5	0.87	1.04	1.26	1.49	1.70	1.85	1.93	1.97	2.03	2.12	2.25	2.41	2.58	2.74	2.98	3.31	3.62	3.86	3.92	3.76	3.37	2.84
1796.21	77.5	78	0.76	0.91	1.12	1.34	1.56	1.74	1.87	1.97	2.07	2.18	2.30	2.43	2.56	2.68	2.88	3.16	3.40	3.57	3.56	3.36	2.97	2.51
1794.41	78	78.5	0.62	0.78	1.00	1.27	1.56	1.84	2.11	2.37	2.62	2.88	3.10	3.29	3.43	3.53	3.64	3.70	3.77	3.81	3.69	3.37	2.89	2.35
1792.60	78.5	79	0.61	0.76	0.95	1.20	1.48	1.78	2.09	2.40	2.68	2.91	3.08	3.20	3.28	3.34	3.38	3.39	3.43	3.41	3.25	2.91	2.45	1.97
1790.95	79	79.5	0.67	0.81	1.00	1.22	1.48	1.73	1.99	2.24	2.48	2.69	2.85	3.00	3.11	3.23	3.36	3.46	3.59	3.67	3.58	3.28	2.82	2.30
1789.30	79.5	80	0.60	0.74	0.93	1.20	1.53	1.92	2.35	2.77	3.15	3.44	3.62	3.71	3.73	3.68	3.46	3.25	3.14	3.08	2.98	2.77	2.45	2.07
1787.62	80	80.5	0.65	0.79	0.99	1.23	1.51	1.80	2.09	2.37	2.62	2.82	2.98	3.09	3.19	3.28	3.36	3.42	3.53	3.61	3.53	3.26	2.85	2.37
1786.02	80.5	81	0.48	0.60	0.79	1.07	1.46	1.93	2.47	2.98	3.41	3.71	3.89	3.96	3.98	3.90	3.63	3.41	3.24	3.07	2.84	2.52	2.16	1.81
1784.46	81	81.5	0.62	0.75	0.95	1.21	1.52	1.88	2.25	2.62	2.96	3.23	3.43	3.57	3.66	3.70	3.60	3.51	3.52	3.57	3.56	3.39	3.07	2.64
1783.02	81.5	82	0.66	0.80	1.03	1.36	1.80	2.31	2.83	3.29	3.62	3.81	3.87	3.86	3.81	3.66	3.36	3.11	2.94	2.79	2.61	2.38	2.09	1.78
1781.70	82	82.5	0.66	0.81	1.05	1.39	1.82	2.31	2.78	3.17	3.43	3.53	3.53	3.45	3.36	3.22	2.97	2.81	2.75	2.73	2.67	2.51	2.29	2.02
1780.20	82.5	83	0.63	0.75	0.94	1.20	1.54	1.93	2.33	2.70	3.01	3.24	3.41	3.56	3.69	3.75	3.66	3.63	3.67	3.70	3.60	3.31	2.84	2.26
1778.60	83	83.5	0.50	0.61	0.78	1.02	1.34	1.72	2.14	2.55	2.93	3.24	3.48	3.67	3.82	3.91	3.85	3.81	3.83	3.81	3.64	3.29	2.82	2.32
1776.93	83.5	84	0.43	0.54	0.69	0.91	1.18	1.49	1.83	2.19	2.55	2.91	3.23	3.54	3.83	4.10	4.29	4.48	4.68	4.76	4.55	4.01	3.26	2.48
1775.17	84	84.5	0.51	0.64	0.83	1.12	1.51	1.99	2.54	3.09	3.56	3.91	4.12	4.23	4.26	4.16	3.80	3.49	3.30	3.18	3.06	2.85	2.56	2.20
1773.35	84.5	85	0.51	0.63	0.82	1.11	1.49	1.96	2.48	2.96	3.36	3.64	3.80	3.89	3.94	3.89	3.64	3.45	3.33	3.21	3.03	2.75	2.42	2.07
1771.47	85	85.5	0.47	0.58	0.76	1.02	1.38	1.82	2.31	2.79	3.21	3.53	3.75	3.90	4.00	4.01	3.83	3.69	3.60	3.51	3.32	3.03	2.65	2.25
1769.53	85.5	86	0.60	0.74	0.93	1.18	1.46	1.75	2.04	2.32	2.61	2.89	3.16	3.43	3.68	3.91	4.10	4.26	4.51	4.74	4.79	4.53	3.94	3.17
1767.46	86	86.5	0.55	0.69	0.87	1.10	1.35	1.58	1.78	1.94	2.10	2.29	2.53	2.82	3.16	3.52	4.01	4.57	5.19	5.74	5.99	5.75	5.03	4.00
1765.32	86.5	87	0.61	0.74	0.91	1.12	1.34	1.54	1.71	1.84	1.98	2.15	2.36	2.61	2.91	3.23	3.68	4.19	4.78	5.34	5.67	5.56	4.98	4.07

Table E-2. Continued.

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Proportion of grains (%) in grain size category																					
			29.91≤34.26	34.26≤39.23	39.23≤44.94	44.94≤51.47	51.47≤58.95	58.95≤67.52	67.52≤77.34	77.34≤88.58	88.58≤101.46	101.46≤116.21	116.21≤133.10	133.10≤152.45	152.45≤174.62	174.62≤200.00	200.00≤229.08	229.08≤262.38	262.38≤300.52	300.52≤344.21	344.21≤394.24	394.24≤451.56	451.56≤517.20	517.20≤592.39	592.39≤678.50	678.50≤777.141

	op)																									
2018.60	0	0.5	3.25	2.58	2.01	1.54	1.18	0.90	0.68	0.52	0.39	0.30	0.22	0.15	0.14	0.15	0.17	0.21	0.00	0.34	0.46	0.61	0.69	0.39	0.00	0.00
2018.33	0.5	1	2.67	2.07	1.59	1.23	0.95	0.73	0.57	0.45	0.36	0.29	0.20	0.18	0.20	0.22	0.23	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017.92	1	1.5	2.93	2.21	1.62	1.18	0.86	0.62	0.45	0.32	0.23	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017.50	1.5	2	3.00	2.29	1.72	1.29	0.97	0.74	0.57	0.44	0.35	0.28	0.20	0.15	0.16	0.19	0.21	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017.05	2	2.5	2.61	1.96	1.45	1.07	0.78	0.57	0.42	0.31	0.24	0.18	0.12	0.10	0.11	0.13	0.15	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016.56	2.5	3	3.17	2.51	1.96	1.52	1.18	0.90	0.68	0.51	0.39	0.31	0.22	0.15	0.14	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015.93	3	3.5	3.29	2.61	2.04	1.56	1.19	0.88	0.65	0.47	0.35	0.26	0.16	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015.24	3.5	4	2.55	2.03	1.60	1.25	0.97	0.74	0.57	0.43	0.34	0.24	0.15	0.13	0.14	0.15	0.15	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014.71	4	4.5	2.84	2.24	1.75	1.35	1.04	0.79	0.59	0.45	0.35	0.25	0.15	0.11	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014.22	4.5	5	3.32	2.67	2.10	1.65	1.30	1.01	0.78	0.60	0.46	0.35	0.24	0.15	0.14	0.13	0.13	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013.66	5	5.5	2.91	2.28	1.78	1.37	1.06	0.81	0.62	0.47	0.37	0.29	0.20	0.15	0.16	0.17	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013.14	5.5	6	3.51	2.85	2.29	1.83	1.47	1.17	0.93	0.74	0.59	0.47	0.36	0.25	0.21	0.21	0.21	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012.67	6.5	7	3.75	3.12	2.57	2.12	1.75	1.45	1.19	0.98	0.81	0.68	0.59	0.49	0.43	0.43	0.44	0.44	0.45	0.48	0.53	0.60	0.68	0.75	0.76	0.42
2012.08	7	7.5	2.99	2.36	1.84	1.43	1.13	0.89	0.70	0.56	0.45	0.36	0.25	0.20	0.21	0.23	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011.24	7.5	8	2.61	2.02	1.55	1.20	0.94	0.74	0.58	0.46	0.37	0.29	0.19	0.16	0.18	0.20	0.22	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010.50	8	8.5	2.48	1.95	1.52	1.19	0.93	0.73	0.58	0.46	0.38	0.30	0.20	0.19	0.22	0.24	0.27	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010.10	8.5	9	2.28	1.80	1.41	1.10	0.86	0.66	0.52	0.40	0.32	0.22	0.14	0.15	0.16	0.18	0.20	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009.73	9	9.5	2.81	2.30	1.87	1.53	1.26	1.02	0.84	0.69	0.58	0.51	0.38	0.32	0.35	0.38	0.41	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009.19	9.5	10	2.97	2.41	1.95	1.58	1.28	1.03	0.82	0.65	0.51	0.42	0.33	0.24	0.22	0.22	0.23	0.26	0.00	0.39	0.53	0.74	0.90	0.50	0.00	0.00
2008.54	10	10.5	3.08	2.44	1.91	1.49	1.18	0.93	0.73	0.58	0.47	0.38	0.30	0.21	0.21	0.24	0.26	0.29	0.32	0.35	0.39	0.41	0.00	0.00	0.00	0.00

2007.81	10.5	11	2.11	1.71	1.39	1.13	0.92	0.75	0.62	0.51	0.43	0.31	0.20	0.21	0.24	0.27	0.29	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007.08	11	11.5	1.74	1.41	1.16	0.95	0.79	0.66	0.55	0.48	0.41	0.27	0.22	0.27	0.32	0.38	0.41	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006.38	11.5	12	1.56	1.25	0.98	0.74	0.54	0.39	0.28	0.20	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005.69	12	12.5	2.65	2.10	1.65	1.29	1.00	0.77	0.60	0.47	0.37	0.29	0.19	0.17	0.18	0.20	0.21	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005.00	12.5	13	1.87	1.51	1.21	0.97	0.77	0.61	0.49	0.39	0.31	0.20	0.15	0.16	0.18	0.21	0.22	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004.34	13	13.5	1.89	1.51	1.22	0.98	0.79	0.65	0.53	0.44	0.38	0.27	0.21	0.24	0.29	0.35	0.40	0.45	0.48	0.49	0.00	0.00	0.00	0.00	0.00	0.00
2003.79	13.5	14	2.51	1.96	1.52	1.18	0.92	0.72	0.57	0.46	0.38	0.32	0.23	0.22	0.25	0.29	0.33	0.36	0.39	0.40	0.41	0.00	0.00	0.00	0.00	0.00
2003.29	14	14.5	2.14	1.69	1.33	1.03	0.80	0.62	0.48	0.37	0.30	0.20	0.13	0.14	0.15	0.17	0.19	0.20	0.00	0.00	0.00	0.32	0.34	0.00	0.00	0.00
2002.71	14.5	15	2.80	2.18	1.68	1.30	1.01	0.79	0.62	0.48	0.38	0.29	0.19	0.15	0.16	0.17	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001.85	15	15.5	2.21	1.82	1.46	1.16	0.92	0.72	0.57	0.45	0.35	0.21	0.15	0.17	0.19	0.22	0.24	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000.71	15.5	16	1.94	1.36	0.88	0.53	0.30	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999.68	16	16.5	1.98	1.57	1.24	0.97	0.76	0.59	0.47	0.37	0.30	0.21	0.15	0.16	0.19	0.23	0.27	0.31	0.33	0.35	0.00	0.00	0.00	0.00	0.00	0.00
1998.24	16.5	17	3.02	2.37	1.83	1.41	1.08	0.83	0.63	0.48	0.37	0.28	0.20	0.15	0.16	0.17	0.20	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996.61	17	17.5	1.89	1.62	1.40	1.21	1.04	0.90	0.78	0.68	0.58	0.38	0.28	0.31	0.34	0.35	0.34	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995.51	17.5	18	1.86	1.47	1.15	0.89	0.69	0.53	0.41	0.33	0.26	0.16	0.12	0.14	0.16	0.18	0.21	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994.46	18	18.5	1.89	1.53	1.23	0.99	0.80	0.65	0.52	0.43	0.35	0.23	0.18	0.20	0.24	0.28	0.32	0.34	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993.36	18.5	19	2.49	1.98	1.50	1.07	0.72	0.45	0.27	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992.18	19	19.5	2.09	1.66	1.32	1.04	0.82	0.65	0.51	0.41	0.33	0.23	0.16	0.16	0.17	0.18	0.17	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991.09	19.5	20	2.87	2.26	1.74	1.33	1.01	0.75	0.56	0.42	0.32	0.24	0.15	0.13	0.14	0.15	0.16	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990.50	20	20.5	2.01	1.61	1.28	1.02	0.81	0.64	0.51	0.41	0.34	0.22	0.16	0.18	0.21	0.24	0.26	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1990.06	20.5	21	2.06	1.60	1.19	0.84	0.56	0.35	0.21	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989.28	21	21.5	2.68	2.12	1.67	1.31	1.03	0.81	0.62	0.48	0.36	0.23	0.12	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988.14	21.5	22	1.02	0.52	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986.86	22	22.5	1.96	1.62	1.32	1.06	0.84	0.67	0.53	0.42	0.33	0.19	0.14	0.16	0.17	0.19	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985.80	22.5	23	2.05	1.66	1.31	1.01	0.77	0.58	0.44	0.33	0.25	0.14	0.00	0.10	0.11	0.12	0.13	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984.57	23	23.5	2.18	1.78	1.45	1.16	0.91	0.71	0.54	0.42	0.31	0.18	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982.64	23.5	24	2.25	1.76	1.37	1.07	0.84	0.66	0.52	0.41	0.34	0.25	0.16	0.16	0.17	0.18	0.19	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980.29	24	24.5	2.32	1.79	1.36	1.03	0.79	0.60	0.46	0.36	0.27	0.18	0.12	0.12	0.14	0.16	0.18	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978.38	24.5	25	2.03	1.72	1.45	1.21	1.00	0.83	0.68	0.56	0.45	0.28	0.21	0.23	0.25	0.28	0.30	0.31	0.32	0.32	0.32	0.00	0.00	0.00	0.00	0.00	0.00
1976.27	25	25.5	2.16	1.77	1.43	1.15	0.92	0.73	0.57	0.45	0.34	0.20	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973.12	25.5	26	3.66	2.98	2.37	1.87	1.48	1.15	0.90	0.70	0.55	0.44	0.35	0.25	0.22	0.22	0.22	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970.37	26	26.5	3.15	2.58	2.09	1.70	1.40	1.15	0.96	0.82	0.71	0.64	0.56	0.46	0.47	0.55	0.62	0.66	0.66	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968.71	26.5	27	2.85	2.44	2.10	1.84	1.64	1.46	1.30	1.18	1.07	1.00	0.88	0.67	0.64	0.63	0.60	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967.10	27	27.5	2.48	1.92	1.45	1.09	0.82	0.61	0.46	0.34	0.26	0.17	0.11	0.11	0.13	0.16	0.19	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965.03	27.5	28	1.80	1.41	1.10	0.85	0.67	0.53	0.42	0.34	0.27	0.18	0.14	0.16	0.19	0.23	0.26	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961.20	28	28.5	3.07	2.28	1.64	1.16	0.82	0.57	0.41	0.29	0.21	0.15	0.00	0.00	0.00	0.00	0.12	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957.87	28.5	29	2.03	1.56	1.17	0.87	0.64	0.48	0.35	0.26	0.20	0.12	0.00	0.00	0.11	0.13	0.16	0.20	0.00	0.00	0.35	0.38	0.00	0.00	0.00	0.00	0.00
1956.26	29	29.5	2.03	1.65	1.33	1.06	0.83	0.64	0.49	0.38	0.29	0.18	0.11	0.11	0.11	0.12	0.14	0.16	0.00	0.31	0.48	0.68	0.76	0.42	0.00	0.00	0.00
1953.55	29.5	30	3.87	3.22	2.63	2.14	1.75	1.42	1.14	0.93	0.76	0.64	0.56	0.47	0.42	0.45	0.47	0.48	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950.42	30	30.5	2.92	2.35	1.86	1.46	1.13	0.88	0.67	0.51	0.38	0.27	0.15	0.13	0.13	0.14	0.14	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1947.71	30.5	31	2.41	1.83	1.35	0.98	0.71	0.51	0.37	0.26	0.19	0.11	0.00	0.00	0.00	0.00	0.11	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944.60	31	31.5	2.53	2.02	1.58	1.23	0.95	0.73	0.56	0.43	0.34	0.23	0.14	0.15	0.16	0.17	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939.94	31.5	32	3.34	2.67	2.10	1.65	1.29	1.01	0.79	0.63	0.50	0.40	0.30	0.21	0.21	0.23	0.25	0.28	0.30	0.32	0.00	0.00	0.00	0.00	0.00	0.00
1936.38	32	32.5	2.60	1.99	1.49	1.11	0.83	0.62	0.46	0.34	0.25	0.16	0.00	0.00	0.11	0.13	0.15	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934.87	32.5	33	3.99	3.48	2.99	2.57	2.21	1.89	1.59	1.34	1.13	0.97	0.86	0.73	0.62	0.62	0.63	0.63	0.65	0.69	0.74	0.77	0.43	0.00	0.00	0.00
1933.41	33	33.5	3.47	2.90	2.41	2.01	1.68	1.40	1.16	0.97	0.82	0.72	0.62	0.46	0.41	0.39	0.35	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930.45	34	34.5	3.19	2.68	2.25	1.91	1.64	1.40	1.20	1.05	0.92	0.85	0.81	0.69	0.66	0.72	0.76	0.76	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928.62	34.5	35	2.37	1.92	1.56	1.29	1.10	0.94	0.82	0.76	0.74	0.78	0.92	1.12	1.36	1.73	2.12	2.39	2.51	2.46	2.24	1.25	0.69	0.39	0.00	0.00
1926.46	35	35.5	2.12	1.66	1.30	1.05	0.87	0.72	0.62	0.56	0.53	0.55	0.59	0.62	0.81	1.11	1.42	1.67	1.79	0.99	0.55	0.31	0.00	0.00	0.00	0.00
1924.50	35.5	36	2.01	1.57	1.25	1.01	0.84	0.72	0.62	0.56	0.50	0.35	0.28	0.30	0.30	0.26	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922.55	36	36.5	2.97	2.24	1.67	1.24	0.95	0.72	0.56	0.47	0.40	0.38	0.40	0.41	0.51	0.71	0.93	1.12	1.21	0.68	0.38	0.00	0.00	0.00	0.00	0.00
1920.76	36.5	37	1.26	1.08	0.94	0.83	0.75	0.69	0.64	0.62	0.57	0.38	0.37	0.50	0.65	0.76	0.78	0.67	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1919.29	37	37.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1917.65	37.5	38	0.69	0.57	0.48	0.41	0.36	0.33	0.30	0.28	0.24	0.15	0.14	0.19	0.26	0.34	0.41	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1915.53	38	38.5	3.60	2.53	1.71	1.13	0.74	0.48	0.32	0.22	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1913.05	38.5	39	1.76	1.32	0.94	0.66	0.45	0.32	0.22	0.16	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1911.19	39	39.5	1.12	0.84	0.60	0.39	0.24	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1909.90	39.5	40	0.31	0.28	0.25	0.22	0.19	0.17	0.14	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1908.31	40	40.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1906.66	40.5	41	1.40	1.15	0.92	0.73	0.58	0.45	0.36	0.28	0.23	0.19	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1905.09	41	41.5	1.24	0.84	0.50	0.27	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1903.31	41.5	42	2.47	1.89	1.38	0.98	0.67	0.46	0.30	0.20	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1901.61	42	42.5	0.53	0.33	0.20	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1900.25	42.5	43	0.75	0.75	0.74	0.72	0.68	0.63	0.57	0.51	0.46	0.36	0.20	0.17	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1898.58	43	43.5	1.83	1.32	0.96	0.71	0.54	0.42	0.33	0.26	0.20	0.13	0.00	0.00	0.11	0.12	0.14	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1897.09	43.5	44	2.06	1.34	0.79	0.44	0.24	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1896.06	44	44.5	0.41	0.30	0.23	0.18	0.14	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1894.94	44.5	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1893.56	45	45.5	0.50	0.40	0.32	0.26	0.22	0.18	0.14	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1892.08	45.5	46	0.44	0.39	0.34	0.30	0.26	0.22	0.18	0.15	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1890.54	46	46.5	0.29	0.20	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.13	0.13	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1888.82	46.5	47	1.10	0.90	0.74	0.62	0.52	0.44	0.38	0.32	0.26	0.20	0.18	0.18	0.18	0.16	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1887.01	47	47.5	0.64	0.42	0.27	0.17	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1885.30	47.5	48	0.36	0.28	0.21	0.15	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1883.61	48	48.5	0.44	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1881.97	48.5	49	1.17	0.75	0.43	0.23	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1880.40	49	49.5	1.81	1.44	1.13	0.89	0.70	0.55	0.43	0.34	0.25	0.14	0.11	0.12	0.13	0.14	0.14	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1879.00	49.5	50	2.12	1.48	0.94	0.57	0.33	0.19	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1877.80	50	50.5	0.96	0.76	0.60	0.47	0.37	0.30	0.24	0.21	0.17	0.10	0.00	0.11	0.14	0.18	0.21	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1876.62	50.5	51	1.42	1.12	0.87	0.69	0.56	0.46	0.38	0.32	0.25	0.15	0.13	0.16	0.20	0.24	0.27	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1875.41	51	51.5	0.54	0.30	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1874.26	51.5	52	1.62	1.24	0.94	0.71	0.54	0.41	0.32	0.24	0.17	0.10	0.00	0.00	0.10	0.11	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1873.09	52	52.5	1.59	1.18	0.86	0.62	0.46	0.34	0.26	0.20	0.15	0.00	0.00	0.00	0.13	0.18	0.23	0.28	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1871.74	52.5	53	1.75	1.34	0.99	0.71	0.50	0.34	0.22	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1870.39	53	53.5	1.63	1.27	0.97	0.75	0.57	0.45	0.34	0.26	0.19	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1869.00	53.5	54	1.65	1.24	0.92	0.68	0.52	0.39	0.30	0.23	0.17	0.00	0.00	0.00	0.10	0.12	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1867.52	54	54.5	1.52	1.16	0.87	0.66	0.51	0.40	0.31	0.24	0.18	0.11	0.00	0.00	0.11	0.12	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1866.06	54.5	55	1.63	1.20	0.88	0.65	0.49	0.38	0.29	0.23	0.17	0.00	0.00	0.00	0.10	0.12	0.13	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1864.58	55	55.5	3.36	2.56	1.90	1.39	1.01	0.74	0.53	0.39	0.28	0.20	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1863.18	55.5	56	2.80	2.09	1.53	1.12	0.83	0.62	0.46	0.35	0.27	0.20	0.13	0.11	0.12	0.12	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1861.74	56	56.5	4.05	3.12	2.32	1.69	1.22	0.87	0.61	0.44	0.31	0.22	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1860.18	56.5	57	3.97	3.00	2.10	1.35	0.79	0.42	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1858.66	57	57.5	3.98	3.21	2.53	1.96	1.51	1.14	0.84	0.61	0.44	0.32	0.21	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1857.09	57.5	58	4.33	3.67	3.06	2.51	2.07	1.69	1.36	1.11	0.91	0.76	0.64	0.49	0.39	0.37	0.35	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1855.51	58	58.5	2.65	2.26	1.95	1.72	1.54	1.39	1.25	1.12	0.98	0.76	0.46	0.35	0.27	0.18	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1854.08	58.5	59	2.87	2.32	1.86	1.51	1.25	1.05	0.89	0.78	0.70	0.66	0.65	0.59	0.62	0.73	0.86	0.99	1.13	1.22	0.68	0.38	0.00	0.00	0.00	0.00
1852.75	59	59.5	2.60	2.22	1.91	1.68	1.52	1.38	1.29	1.23	1.19	1.18	1.11	0.91	0.91	0.97	0.97	0.92	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1851.61	59.5	60	1.16	0.88	0.64	0.44	0.29	0.18	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1850.64	60	60.5	1.19	0.91	0.71	0.55	0.44	0.36	0.30	0.26	0.21	0.14	0.13	0.16	0.21	0.27	0.34	0.42	0.51	0.56	0.31	0.00	0.00	0.00	0.00	0.00
1849.52	60.5	61	1.27	0.97	0.74	0.58	0.47	0.39	0.33	0.29	0.24	0.15	0.16	0.21	0.26	0.29	0.27	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1848.13	61	61.5	2.00	1.51	1.13	0.84	0.63	0.47	0.35	0.27	0.21	0.14	0.00	0.00	0.11	0.13	0.15	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1846.87	61.5	62	1.40	1.05	0.79	0.60	0.48	0.39	0.33	0.28	0.23	0.15	0.15	0.21	0.29	0.40	0.51	0.54	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1845.86	62	62.5	0.89	0.70	0.55	0.44	0.37	0.31	0.27	0.23	0.20	0.12	0.12	0.17	0.25	0.33	0.40	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1844.79	62.5	63	0.83	0.63	0.49	0.38	0.32	0.27	0.24	0.22	0.19	0.13	0.15	0.22	0.31	0.38	0.40	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1843.71	63	63.5	0.81	0.55	0.37	0.25	0.18	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.20	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1842.59	63.5	64	1.27	0.98	0.78	0.63	0.52	0.43	0.35	0.29	0.22	0.13	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1841.49	64	64.5	0.81	0.57	0.40	0.28	0.20	0.15	0.11	0.00	0.00	0.00	0.00	0.00	0.10	0.15	0.20	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1840.48	64.5	65	0.60	0.46	0.37	0.29	0.24	0.20	0.16	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1839.51	65	65.5	1.07	0.79	0.58	0.43	0.32	0.25	0.19	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1838.53	65.5	66	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1837.44	66	66.5	0.77	0.62	0.52	0.44	0.39	0.36	0.32	0.29	0.24	0.15	0.13	0.15	0.17	0.18	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1836.10	66.5	67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1834.72	67	67.5	0.22	0.17	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.27	0.46	0.63	0.65	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1833.06	67.5	68	0.53	0.38	0.27	0.20	0.15	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1831.09	68	68.5	1.76	1.17	0.77	0.52	0.35	0.24	0.17	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1829.50	68.5	69	1.74	1.22	0.84	0.58	0.40	0.29	0.20	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1828.31	69	69.5	1.20	0.88	0.64	0.47	0.35	0.27	0.21	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1827.14	69.5	70	1.99	1.63	1.33	1.07	0.85	0.67	0.51	0.39	0.27	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1825.96	70	70.5	1.98	1.66	1.37	1.14	0.94	0.78	0.63	0.50	0.37	0.20	0.15	0.15	0.16	0.17	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1824.66	70.5	71	1.83	1.56	1.33	1.12	0.92	0.76	0.61	0.49	0.38	0.22	0.15	0.15	0.14	0.13	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1822.81	71	71.5	4.17	3.37	2.68	2.11	1.66	1.31	1.02	0.79	0.61	0.48	0.37	0.25	0.18	0.17	0.16	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1820.63	71.5	72	4.97	4.40	3.82	3.27	2.76	2.30	1.87	1.49	1.18	0.92	0.72	0.53	0.41	0.36	0.33	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1818.57	72	72.5	5.29	4.81	4.27	3.71	3.16	2.64	2.13	1.67	1.27	0.94	0.69	0.48	0.35	0.27	0.20	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1816.69	72.5	73	3.06	2.54	2.13	1.82	1.59	1.40	1.24	1.10	0.98	0.88	0.75	0.57	0.48	0.45	0.40	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1814.84	73	73.5	1.44	1.08	0.81	0.62	0.48	0.39	0.30	0.24	0.18	0.11	0.00	0.00	0.12	0.15	0.18	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1813.04	73.5	74	1.40	1.06	0.80	0.61	0.46	0.35	0.27	0.21	0.16	0.00	0.00	0.00	0.11	0.13	0.16	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1811.07	74	74.5	4.19	3.45	2.77	2.19	1.70	1.31	0.99	0.74	0.54	0.40	0.28	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1809.17	74.5	75	1.88	1.66	1.50	1.38	1.29	1.23	1.16	1.13	1.10	0.86	0.70	0.83	0.96	1.04	1.03	0.94	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1807.11	75	75.5	3.26	2.89	2.57	2.31	2.12	1.98	1.84	1.74	1.69	1.67	1.79	1.96	2.11	2.27	2.38	2.39	2.33	2.21	1.23	0.68	0.38	0.00	0.00	0.00	0.00
1804.74	75.5	76	2.31	1.92	1.61	1.39	1.26	1.15	1.08	1.05	1.04	1.07	1.10	0.98	0.98	1.06	1.10	1.09	0.60	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1802.43	76	76.5	3.91	3.19	2.57	2.06	1.66	1.32	1.04	0.81	0.63	0.49	0.37	0.25	0.19	0.18	0.17	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1799.96	76.5	77	2.87	2.47	2.17	1.97	1.85	1.79	1.73	1.73	1.77	1.86	2.04	2.15	2.07	2.04	1.93	1.67	0.93	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1797.89	77	77.5	2.30	1.86	1.53	1.28	1.12	1.00	0.92	0.89	0.90	0.96	1.07	1.15	1.26	1.48	1.62	1.64	0.91	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1796.21	77.5	78	2.07	1.74	1.49	1.32	1.21	1.11	1.04	0.99	0.96	0.98	1.01	0.95	0.98	1.09	1.17	1.21	1.22	1.22	0.68	0.38	0.00	0.00	0.00	0.00	0.00
1794.41	78	78.5	1.85	1.47	1.20	1.02	0.91	0.83	0.79	0.77	0.77	0.79	0.72	0.77	0.99	1.19	1.30	1.23	0.68	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1792.60	78.5	79	1.56	1.24	1.02	0.87	0.77	0.70	0.67	0.66	0.70	0.74	0.69	0.89	1.24	1.56	1.71	1.54	0.86	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1790.95	79	79.5	1.83	1.46	1.18	0.98	0.82	0.69	0.60	0.52	0.46	0.40	0.30	0.28	0.32	0.37	0.42	0.50	0.63	0.84	1.18	1.51	0.84	0.46	0.00	0.00	0.00
1789.30	79.5	80	1.71	1.40	1.19	1.03	0.93	0.85	0.79	0.74	0.68	0.52	0.42	0.52	0.67	0.82	0.90	0.88	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1787.62	80	80.5	1.94	1.59	1.32	1.13	0.97	0.84	0.74	0.66	0.60	0.53	0.40	0.42	0.50	0.58	0.66	0.72	0.76	0.79	0.79	0.44	0.00	0.00	0.00	0.00	0.00
1786.02	80.5	81	1.50	1.25	1.05	0.89	0.76	0.66	0.57	0.51	0.45	0.30	0.27	0.33	0.40	0.48	0.55	0.59	0.60	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1784.46	81	81.5	2.19	1.81	1.51	1.28	1.10	0.95	0.82	0.70	0.59	0.41	0.27	0.28	0.31	0.32	0.30	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1783.02	81.5	82	1.46	1.13	0.80	0.51	0.29	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1781.70	82	82.5	1.77	1.56	1.42	1.31	1.21	1.11	1.00	0.90	0.75	0.46	0.32	0.27	0.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1780.20	82.5	83	1.66	1.14	0.72	0.42	0.23	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1778.60	83	83.5	1.85	1.47	1.18	0.94	0.76	0.61	0.49	0.40	0.33	0.21	0.15	0.16	0.17	0.19	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1776.93	83.5	84	1.82	1.32	0.98	0.73	0.56	0.44	0.35	0.28	0.23	0.17	0.11	0.11	0.12	0.13	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1775.17	84	84.5	1.84	1.52	1.26	1.06	0.89	0.74	0.61	0.49	0.36	0.19	0.13	0.13	0.13	0.12	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1773.35	84.5	85	1.74	1.45	1.20	0.98	0.79	0.62	0.49	0.38	0.28	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1771.47	85	85.5	1.87	1.54	1.25	1.01	0.80	0.64	0.50	0.40	0.30	0.17	0.12	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1769.53	85.5	86	2.39	1.73	1.23	0.87	0.63	0.45	0.33	0.24	0.17	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1767.46	86	86.5	2.95	2.07	1.42	0.97	0.67	0.46	0.32	0.23	0.16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1765.32	86.5	87	3.07	2.20	1.53	1.06	0.73	0.51	0.36	0.26	0.18	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix F: X-Ray Fluorescence (XRF) data

Table F-1. WAB 1 Sediment Core, XRF analysis element concentrations (net counts/15 seconds).

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Al	Si	K	Ca	Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	Br	Rb	Sr	Zr	Sb	Ba	W	Th
2018.70	0	0.5	34.00	227.33	1646.00	3310.83	1835.50	121.00	160.50	1275.17	78924.33	605.50	93.17	471.83	199.50	580.00	1105.83	785.33	35.33	135.17	869.33	207.83
2018.62	0.5	1	38.60	332.00	2208.80	4897.40	2263.60	135.40	218.20	1680.80	92437.80	522.60	49.40	551.20	239.20	769.60	1503.80	727.20	56.40	182.40	924.20	83.80
2018.51	1	1.5	61.83	496.17	3141.50	5890.50	3196.67	238.83	275.33	1746.50	115751.83	562.17	77.83	748.33	167.50	1023.00	1716.67	713.17	93.17	235.33	849.67	176.33
2018.33	1.5	2	51.33	477.50	2959.17	5225.00	3040.50	159.17	244.00	1689.33	105009.00	546.83	104.50	719.50	230.67	850.00	1537.50	727.00	56.83	194.00	919.67	332.67
2018.03	2	2.5	85.29	713.29	3783.57	5702.86	3793.43	242.00	329.71	1260.86	118668.43	516.43	110.71	842.86	172.57	1053.43	1751.57	905.29	60.29	297.71	894.14	279.57
2017.73	2.5	3	72.71	616.29	3531.86	5400.14	3554.86	208.14	323.57	1301.86	110277.86	588.71	141.14	813.43	138.71	1297.14	1638.43	821.43	79.86	281.86	976.86	313.29
2017.31	3	3.5	71.29	634.14	3627.43	7022.57	3642.71	260.29	342.43	1804.14	121414.14	528.29	122.57	837.29	99.71	1239.29	1712.86	836.14	94.43	254.86	877.43	325.86
2016.95	3.5	4	78.29	699.00	4018.71	4877.14	3930.00	230.86	328.57	1134.43	124772.86	453.57	129.00	891.57	163.43	1348.71	1719.43	842.43	73.86	250.14	899.71	208.14
2016.54	4	4.5	63.67	580.67	3512.50	4584.17	3521.50	219.67	327.17	1227.83	119928.50	506.17	156.67	832.33	168.00	1197.17	1562.67	787.17	58.00	271.83	867.83	273.83
2016.24	4.5	5	77.17	599.17	3438.67	5546.33	3340.83	220.33	326.83	1565.83	117443.33	538.33	89.50	800.50	148.17	949.33	1616.33	772.67	65.33	295.00	926.00	211.67
2015.93	5	5.5	56.14	572.29	3335.71	5131.14	3389.29	195.43	310.43	1589.29	120181.86	500.14	114.43	762.00	152.00	1056.43	1557.14	785.57	60.71	261.71	893.71	346.00
2015.60	5.5	6	61.17	635.00	3554.83	6391.50	3519.67	222.00	349.83	1537.00	115037.00	497.83	129.50	811.17	73.83	937.00	1745.33	817.50	111.50	353.83	921.33	248.33
2015.26	6	6.5	62.80	560.80	3376.80	6591.60	3328.40	213.40	316.20	1736.20	112497.00	528.20	54.80	742.60	136.00	959.80	1629.60	678.80	86.20	288.20	857.80	283.20
2014.89	6.5	7	79.17	515.17	3160.67	5761.00	3159.17	215.83	323.33	1872.50	111587.67	497.17	140.17	735.50	114.83	983.00	1652.67	788.50	68.17	249.67	892.17	321.83
2014.44	7	7.5	76.17	663.83	3719.83	5366.83	3634.83	232.50	347.50	1698.17	130638.67	505.00	112.00	884.50	156.67	1341.17	1690.67	721.17	95.33	346.50	939.50	309.50
2014.17	7.5	8	91.67	923.67	4307.33	4930.83	4503.33	231.83	347.50	1196.00	119209.00	507.50	161.33	942.67	88.67	1274.33	1703.83	977.67	78.67	348.33	963.83	345.50
2013.67	8	8.5	99.83	924.33	4328.50	4736.50	4471.67	285.00	360.50	1414.83	116141.50	514.17	211.83	957.33	192.50	1605.00	1712.50	983.00	50.33	331.50	980.33	407.50
2012.96	8.5	9	61.60	894.20	4166.80	4764.00	4258.40	239.20	363.80	1247.20	112493.60	529.80	173.60	992.20	175.20	1084.20	1636.20	1065.20	53.20	328.60	998.00	249.00
2012.36	9	9.5	61.17	632.50	3461.50	4699.33	3444.50	211.67	358.50	2389.33	130858.50	448.17	101.00	786.50	152.67	983.50	1534.00	854.33	79.83	319.67	831.50	382.83
2011.95	9.5	10	65.83	678.83	3622.50	5036.33	3704.83	246.17	350.83	1372.17	111842.33	564.00	136.83	793.33	101.00	1097.17	1566.33	922.50	73.67	262.33	933.67	284.33
2011.59	10	10.5	80.67	683.50	3459.67	7456.33	3332.50	215.83	314.33	3011.67	143956.17	442.17	55.50	718.50	133.83	729.00	1796.00	827.67	120.00	296.67	870.33	266.00
2011.14	10.5	11	82.67	809.33	3976.83	8133.17	3862.50	225.00	331.17	1475.67	118425.33	485.67	110.17	796.00	133.50	911.50	1895.83	973.17	120.50	295.33	947.67	355.50
2010.74	11	11.5	58.33	996.00	4302.17	7366.33	4166.17	234.50	351.83	1109.67	111391.50	494.67	130.33	871.00	156.33	1120.50	1932.17	1108.17	109.33	308.50	998.67	277.83
2010.02	11.5	12	86.83	1122.00	4516.33	7279.00	4323.17	204.33	350.50	1703.17	121314.17	508.83	153.67	899.83	92.67	1249.17	1933.83	1192.50	89.50	386.00	1007.67	328.33
2009.26	12	12.5	96.29	1122.86	4499.57	6505.71	4438.57	222.14	339.57	1295.71	118962.14	495.71	134.86	869.00	64.71	1348.00	1782.29	1256.57	126.29	348.00	1026.57	148.00
2008.71	12.5	13	90.33	1085.00	4766.33	5678.67	4509.83	252.33	358.83	1133.33	118506.17	504.00	195.50	949.33	63.00	1285.50	1913.50	1184.17	80.00	353.83	1025.83	283.83
2007.86	13	13.5	106.17	1113.67	4745.17	5548.17	4521.00	252.33	355.33	1117.17	113790.67	481.33	173.33	905.33	55.50	1257.83	1806.33	1154.17	78.00	352.17	983.00	323.67

2007.10	13.5	14	98.14	1046.29	4773.86	4757.86	4563.00	270.86	419.14	1053.29	118486.14	425.71	177.86	1039.57	116.00	1442.00	1841.86	977.29	63.86	412.43	1026.71	327.00
2006.48	14	14.5	84.86	968.86	4780.29	4593.71	4555.14	318.86	391.14	887.29	126876.57	400.14	175.57	984.71	97.29	1296.57	1766.29	855.43	69.71	402.86	925.57	356.57
2005.78	14.5	15	91.50	964.67	4655.17	4664.00	4443.33	293.83	393.50	1299.83	120475.67	510.67	173.83	1011.50	155.33	1211.50	1773.83	936.33	59.17	369.00	977.67	330.50
2005.17	15	15.5	71.33	1037.83	4598.67	5453.00	4509.17	283.67	382.00	1435.83	121331.00	479.33	162.50	940.00	71.67	1425.83	1769.67	1017.17	82.83	373.33	957.50	337.50
2004.51	15.5	16	101.33	941.33	4532.17	5381.67	4444.50	267.50	332.17	1177.33	125061.50	449.67	137.00	901.67	77.00	1389.17	1715.17	905.00	63.50	298.00	930.50	319.83
2003.89	16	16.5	90.17	944.50	4577.00	5600.00	4513.00	343.17	363.33	1300.50	133095.17	400.33	164.00	929.00	138.17	1326.83	1749.33	812.83	85.17	364.67	890.83	255.17
2003.27	16.5	17	79.71	993.71	4581.86	6116.29	4570.00	307.14	358.71	1261.00	130400.14	487.57	155.71	912.00	72.00	1435.43	1724.43	976.57	93.43	393.71	908.00	289.43
2002.60	17	17.5	100.00	1116.60	4456.00	5328.00	4698.40	260.80	362.00	921.80	113977.80	484.00	166.00	954.00	58.40	1095.00	1748.20	1326.00	83.40	403.20	1003.20	328.40
2001.83	17.5	18	69.33	1279.50	4446.83	5548.00	4683.50	244.83	388.67	951.67	108962.50	505.17	220.83	1044.50	132.50	1318.67	1779.00	1332.67	74.83	412.17	1064.33	293.50
2000.95	18	18.5	103.33	1241.83	4421.50	4869.00	4751.33	244.17	378.67	997.50	113292.33	508.33	204.67	1039.50	100.50	1431.33	1771.83	1341.50	87.83	394.50	1039.00	377.83
2000.25	18.5	19	99.43	1143.14	4416.14	4682.14	4534.43	217.57	361.43	858.71	108050.86	495.57	156.29	1035.14	120.00	1339.57	1704.71	1101.57	57.29	374.57	997.71	408.29
1999.44	19	19.5	88.17	1042.17	4645.67	5934.67	4502.00	284.00	413.00	1198.33	131730.67	473.50	201.50	1034.83	70.83	1496.17	1875.00	958.33	61.83	421.00	977.50	410.17
1998.97	19.5	20	108.00	951.57	4467.29	4820.86	4449.00	246.43	362.00	1032.00	128732.00	437.71	194.43	985.86	102.43	1656.00	1856.57	834.29	55.00	324.14	894.71	294.71
1998.44	20	20.5	97.71	1063.57	4737.00	4350.14	4705.57	305.86	386.29	1103.57	117962.43	485.86	203.57	1075.14	57.14	1495.86	1798.29	998.00	59.57	431.86	971.57	326.71
1997.77	20.5	21	90.60	906.40	4370.80	4088.00	4368.20	282.80	363.80	986.00	121966.40	504.80	195.80	1097.60	63.80	1452.40	1733.00	777.40	60.80	325.60	823.80	231.80
1997.36	21	21.5	86.33	655.67	4134.83	2673.83	4095.00	320.33	350.67	522.00	128920.67	649.33	122.00	836.83	104.33	1695.83	1772.50	675.00	30.83	239.83	794.00	278.67
1996.89	21.5	22	78.17	707.67	4529.00	2295.00	4264.00	355.00	353.17	731.00	130434.83	613.00	112.83	910.50	91.67	1468.83	1685.67	534.33	31.33	226.83	846.17	288.50
1996.46	22	22.5	98.86	774.43	4598.29	3595.29	4368.43	354.29	388.00	1228.86	136081.00	604.71	146.57	980.29	88.43	1591.29	1815.43	609.71	30.86	308.00	809.29	296.29
1995.99	22.5	23	84.29	705.29	4126.43	4557.57	3994.71	259.71	341.86	1125.86	133687.86	575.57	70.14	799.57	94.57	1059.86	1717.29	764.43	62.86	254.71	784.14	312.29
1995.52	23	23.5	76.29	672.71	3832.14	4670.57	3877.71	254.71	320.86	1102.57	137734.29	592.43	81.71	765.57	49.57	1172.86	1515.86	678.14	54.29	211.57	833.57	237.57
1995.05	23.5	24	81.33	758.83	4122.83	5597.00	4066.33	283.83	323.17	1024.50	123844.00	618.67	88.83	872.33	114.67	1257.67	1697.33	738.83	65.00	270.50	856.17	373.00
1994.52	24	24.5	76.33	864.17	4172.33	7296.67	4016.67	241.33	349.50	944.00	121525.33	603.50	121.67	889.67	101.83	992.17	1833.50	995.50	104.00	302.83	921.33	218.33
1993.89	24.5	25	76.83	861.83	3818.33	8897.17	3849.00	180.50	298.67	1353.83	111679.17	572.83	85.83	711.67	100.67	1056.00	1963.33	1134.50	109.33	264.33	997.33	288.83
1993.30	25	25.5	73.17	949.00	3935.00	8346.83	3876.33	208.33	336.00	894.33	89888.33	610.17	140.67	738.17	138.00	1164.00	1965.33	1510.17	130.67	255.83	1097.17	384.00
1992.63	25.5	26	69.67	757.67	3664.33	11075.17	3518.17	178.00	282.50	1251.67	98522.67	585.17	99.67	758.50	92.83	855.50	1985.50	1010.50	130.67	207.33	929.33	318.00
1992.04	26	26.5	83.00	901.67	4305.33	10725.50	4092.67	233.33	327.83	1024.00	112401.00	631.00	95.50	808.50	82.83	944.00	2346.17	1011.00	129.83	290.17	942.17	217.17
1991.46	26.5	27	94.29	946.71	4313.57	6301.43	4101.86	203.14	331.86	1295.14	113085.29	563.00	105.86	794.43	91.29	1239.57	1813.14	1011.14	79.71	291.29	977.14	413.57
1990.78	27	27.5	90.86	1005.14	4448.14	6412.86	4360.29	270.57	346.29	850.57	112090.86	603.14	93.00	940.71	110.29	1363.00	1806.71	1067.14	69.57	287.00	974.43	292.14
1990.13	27.5	28	95.57	1066.14	4338.57	7043.57	4293.71	226.71	307.14	791.14	101666.86	596.71	141.29	848.14	106.86	1304.29	1782.43	1212.29	101.14	261.86	1011.43	330.57
1989.39	28	28.5	85.71	1097.00	4582.71	6519.43	4499.29	246.29	319.14	1239.00	111197.14	596.00	128.14	844.71	78.43	1279.71	1875.00	1083.86	87.29	312.71	994.71	424.86

1988.67	28.5	29	95.00	1066.17	4517.83	6502.83	4470.33	256.17	359.83	853.00	102950.83	598.00	146.50	964.33	110.00	1299.83	1773.17	1271.17	94.00	308.83	1031.67	385.50
1987.94	29	29.5	77.71	1064.86	4289.14	7943.57	4218.86	220.43	312.71	1028.29	108191.14	558.86	133.71	852.43	120.14	984.43	1849.86	1228.57	107.14	317.29	1015.29	266.86
1987.21	29.5	30	99.33	1114.50	4398.67	6758.50	4411.67	229.50	352.33	1268.83	115270.00	549.33	111.33	869.00	170.83	1074.00	1927.83	1205.50	75.00	301.83	1008.67	327.50
1986.45	30	30.5	86.83	1072.33	4322.00	8099.50	4291.17	257.50	348.83	1067.17	106283.17	592.67	133.00	878.83	94.50	1204.33	2017.33	1268.17	101.83	322.83	1050.17	349.17
1985.83	30.5	31	74.33	953.67	4240.33	6990.67	4247.17	262.17	331.50	829.17	105615.00	603.33	95.33	902.50	47.50	1159.83	1846.67	1275.50	85.50	288.00	1011.83	267.00
1985.17	31	31.5	90.00	998.50	4380.33	8009.00	4409.00	254.00	328.67	1040.83	109545.67	570.50	132.50	900.17	135.50	1279.33	1903.17	1161.50	70.50	300.50	1004.17	324.17
1984.44	31.5	32	88.33	1066.17	4594.83	6445.83	4623.50	284.83	317.67	997.17	109199.50	589.67	125.67	956.50	54.50	1084.17	1843.67	1248.00	79.50	304.50	970.17	273.50
1983.74	32	32.5	88.83	1013.67	4449.33	6866.33	4381.33	274.50	365.33	1031.83	115317.67	602.17	156.50	901.83	85.17	1281.00	1859.17	1059.00	95.33	329.00	941.33	335.50
1983.02	32.5	33	64.00	1012.50	4351.00	7267.50	4392.67	241.17	331.50	1105.83	112705.67	622.67	106.50	872.67	111.50	1390.17	1901.33	1177.17	98.83	300.00	988.17	275.67
1982.33	33	33.5	94.67	1028.17	4442.00	6867.67	4390.83	257.33	347.33	1188.17	115450.83	592.00	169.67	934.83	91.50	1218.50	1905.50	1206.00	64.33	319.83	969.50	268.17
1981.63	33.5	34	78.67	926.17	4265.83	6955.17	4130.67	259.00	355.83	1146.33	118997.67	583.50	148.00	837.50	135.50	1250.17	1775.83	1067.50	78.17	334.00	978.33	298.83
1980.96	34	34.5	90.00	985.43	4391.00	7058.43	4466.57	242.14	347.86	905.71	109549.00	549.71	127.43	885.00	73.43	1228.86	1856.71	1151.43	80.43	332.29	1022.86	296.86
1980.25	34.5	35	72.71	1024.57	4455.29	6783.86	4433.14	230.71	338.71	978.43	109844.14	560.71	130.86	958.57	91.43	1334.00	1860.29	1193.43	73.14	338.86	997.57	354.86
1979.56	35	35.5	93.43	1000.43	4417.00	6639.71	4359.71	203.43	357.14	1381.57	114961.43	560.71	139.43	877.43	118.57	1179.86	1859.86	1084.43	79.00	298.43	988.71	429.43
1978.61	35.5	36	91.00	1022.57	4556.14	6510.14	4495.29	242.71	355.43	889.00	104624.14	534.86	151.00	905.43	115.86	1338.86	1903.86	1161.86	90.00	300.57	971.29	361.14
1978.03	36	36.5	67.86	1045.43	4472.29	7405.71	4280.86	234.43	362.71	1129.71	112024.43	566.43	178.29	902.00	69.00	1197.71	1949.43	1260.00	61.29	371.14	1022.29	371.29
1977.44	36.5	37	95.71	1053.00	4283.43	7325.71	4122.57	222.57	352.14	870.29	101191.14	608.57	158.14	918.86	156.00	1383.00	1941.57	1308.86	97.00	354.29	1014.57	293.86
1976.69	37	37.5	81.00	994.71	4269.71	8293.29	4078.14	219.57	315.57	857.57	103936.57	572.43	159.71	820.14	103.71	1228.29	1986.00	1366.29	95.71	301.14	1025.86	386.86
1975.82	37.5	38	92.00	1029.29	4317.14	8387.86	4183.00	249.71	342.57	951.43	106988.00	523.00	128.43	854.57	145.71	1063.29	1986.86	1224.29	110.86	332.43	975.71	319.00
1975.18	38	38.5	82.00	1056.14	4464.57	7825.71	4273.57	229.86	328.71	1112.00	110987.29	491.86	136.29	913.57	143.43	1278.14	1875.71	1356.14	73.43	361.43	1040.86	297.00
1974.47	38.5	39	86.60	1077.60	4573.60	8261.00	4427.80	275.00	375.60	915.00	106881.60	523.20	141.60	850.60	90.20	1168.40	2008.40	1335.40	105.60	367.80	1060.00	236.60
1973.66	39	39.5	92.17	1020.67	4573.67	7598.00	4473.17	244.00	374.00	818.67	105615.50	544.33	155.17	925.83	120.83	1197.67	2034.00	1181.67	108.00	327.67	1053.00	389.67
1972.97	39.5	40	69.50	996.33	4518.33	7742.67	4458.50	236.33	342.00	933.17	110737.67	494.67	170.33	870.67	34.33	1187.00	1996.17	1117.67	100.50	350.17	1037.33	349.33
1972.33	40	40.5	80.33	971.33	4502.67	7636.83	4340.50	283.17	388.83	1166.50	120505.33	526.83	154.50	925.50	93.50	1256.17	2015.00	1157.50	118.83	334.67	1056.33	239.17
1971.68	40.5	41	76.83	974.83	4589.50	7184.83	4475.50	267.67	329.50	908.67	112995.00	509.67	108.67	895.83	123.67	1154.83	1945.50	1235.50	69.83	307.67	954.67	319.17
1970.82	41	41.5	88.17	1023.17	4384.00	8149.83	4391.17	242.83	379.17	866.00	104374.33	553.50	152.17	918.33	94.17	1241.00	1903.33	1398.50	97.83	296.50	1094.33	304.00
1970.16	41.5	42	91.67	1060.17	4554.17	7171.33	4578.50	247.00	374.83	983.83	108576.33	549.83	115.50	870.50	45.00	1257.00	1957.33	1344.00	97.17	352.50	993.83	336.67
1969.27	42	42.5	88.67	1085.50	4564.83	7698.50	4346.50	253.50	353.33	910.67	106267.33	528.33	156.67	922.50	130.17	1226.83	1997.67	1358.17	105.00	360.33	1020.83	396.50
1968.75	42.5	43	77.50	940.00	4309.00	10964.17	3951.17	247.83	327.00	1486.50	114420.67	506.67	127.00	806.00	101.67	974.67	2027.50	1058.50	132.50	358.33	956.83	261.33
1967.98	43	43.5	89.33	1074.50	4528.17	8178.83	4385.33	217.17	351.83	927.83	106527.50	555.83	168.17	903.50	127.67	1273.17	1991.67	1228.33	113.33	347.17	1040.83	388.33

1967.30	43.5	44	106.83	1020.00	4542.83	8157.33	4404.67	266.00	350.00	1043.83	108657.50	523.33	194.67	897.67	106.83	1241.33	2026.17	1155.00	112.83	358.50	1025.50	313.33
1966.52	44	44.5	90.50	966.17	4287.00	7826.33	4200.17	210.33	345.00	857.17	117931.67	477.67	149.83	808.83	117.00	1031.83	1932.00	1081.33	109.50	365.50	913.83	384.50
1965.63	44.5	45	101.43	1071.57	4618.14	7806.86	4491.86	237.86	379.29	999.14	111959.29	513.14	147.71	875.00	116.71	1128.86	2034.43	1153.43	103.71	331.43	1063.71	301.43
1964.86	45	45.5	107.83	1090.83	4507.83	9386.33	4307.50	223.33	370.17	925.67	113954.50	522.50	110.00	894.33	110.50	1175.67	2049.33	1198.17	124.17	350.83	1010.67	243.00
1964.32	45.5	46	85.20	1083.20	4465.60	8064.80	4312.00	250.60	308.00	794.80	106136.60	536.00	138.20	865.00	160.60	1188.40	2015.20	1154.20	85.60	352.80	1065.60	342.60
1963.67	46	46.5	78.57	1046.71	4641.29	7248.00	4428.86	239.14	383.29	1015.86	110496.43	504.57	145.29	901.71	144.00	1133.57	1989.29	1205.14	88.29	362.29	1036.71	386.71
1963.00	46.5	47	86.57	991.14	4532.71	5758.00	4380.86	251.71	365.86	748.86	108109.00	488.57	159.86	963.29	117.29	1292.71	1882.00	1144.71	67.57	373.29	1018.57	339.86
1962.35	47	47.5	92.17	1044.67	4752.00	6923.50	4298.50	277.00	416.33	979.83	113525.00	357.83	211.83	905.67	143.33	1393.50	1969.17	1050.00	95.33	453.00	1013.33	363.50
1961.69	47.5	48	106.86	1036.71	4831.86	5670.71	4503.43	262.43	386.29	842.29	114686.71	496.00	209.43	978.71	119.43	1485.00	1968.00	1167.00	51.43	373.29	964.71	355.57
1961.10	48	48.5	91.57	985.86	4355.00	9225.86	4184.29	237.71	336.14	1555.00	120372.86	485.86	117.57	921.86	98.71	1124.14	1881.71	1008.43	112.86	352.57	1010.57	385.43
1960.57	48.5	49	95.33	1182.17	4854.83	7952.67	4673.67	291.83	393.33	972.50	114351.83	523.67	171.33	929.17	37.83	1255.00	1963.33	1105.17	91.83	387.67	1052.67	267.83
1959.94	49	49.5	94.50	1133.83	4664.67	9040.50	4341.67	265.67	381.50	918.00	107440.17	513.83	175.83	884.00	102.67	1118.67	2066.17	1221.17	107.50	386.83	1082.33	407.67
1959.25	49.5	50	105.33	1122.67	4702.83	8488.83	4602.50	253.67	372.17	630.50	102717.50	505.50	172.50	948.33	65.67	1278.17	2125.00	1298.67	107.67	372.00	1112.67	278.00
1958.34	50	50.5	86.00	1023.17	4617.50	6924.83	4501.83	239.50	345.00	1177.33	121545.33	487.33	153.00	883.67	113.50	1237.33	1895.50	1139.17	86.83	328.17	1007.50	255.67
1957.70	50.5	51	98.00	1020.67	4737.17	6939.33	4482.50	290.33	412.33	1329.83	118992.00	537.50	178.17	930.83	65.00	1230.00	1839.67	1068.00	98.67	412.50	977.50	325.00
1956.98	51	51.5	95.00	1052.67	4742.50	6503.17	4387.17	256.83	367.17	1032.17	121811.33	495.83	115.83	890.83	77.17	1227.83	1869.67	1065.67	99.50	352.50	922.67	276.17
1956.39	51.5	52	104.33	1140.83	4773.50	6276.83	4426.50	253.17	367.00	1373.50	125461.50	471.50	161.50	919.17	66.67	1221.67	1825.17	1158.17	74.50	351.17	949.50	314.83
1955.62	52	52.5	101.29	1232.14	5254.14	5845.86	4824.29	280.00	379.00	931.14	126223.71	517.43	176.00	1013.14	61.14	1259.00	1801.43	1089.86	68.14	393.14	994.86	304.14
1954.88	52.5	53	107.33	1141.67	4753.00	6165.50	4488.67	248.67	364.00	1162.83	118641.67	490.17	157.17	875.67	91.83	1295.00	1747.33	1073.83	104.33	359.67	943.83	352.17
1954.23	53	53.5	103.57	1159.57	4969.14	5424.86	4603.00	275.00	398.86	838.29	121357.43	446.86	145.57	940.00	57.29	1317.00	1842.57	1107.14	66.29	431.71	985.29	345.00
1953.43	53.5	54	97.83	1229.17	4812.00	5984.17	4592.50	245.83	391.67	1016.83	115390.33	505.83	177.50	932.33	74.83	1381.83	1853.83	1267.17	77.50	381.67	1019.00	341.33
1952.75	54	54.5	89.83	1219.50	4852.33	5579.00	4641.33	251.83	380.00	1025.50	115834.17	494.33	187.67	969.67	99.83	1233.50	1810.67	1160.83	65.00	373.67	968.67	394.50
1951.87	54.5	55	107.17	1110.50	4700.83	5996.17	4328.00	245.00	374.17	1107.17	117926.00	493.33	195.00	901.83	120.00	1318.50	1770.67	1100.83	89.00	389.83	992.50	260.67
1951.15	55	55.5	96.67	1145.67	4678.50	7161.17	4416.50	249.33	365.33	846.17	116095.67	486.00	208.67	942.33	85.50	1249.83	1773.17	1181.17	94.33	381.67	962.67	291.50
1950.36	55.5	56	106.00	1102.80	4615.40	5519.60	4405.00	250.00	380.20	1049.60	118226.40	430.60	191.40	953.20	93.00	1239.40	1827.00	1146.80	61.60	359.00	951.60	236.40
1949.58	56	56.5	90.83	1128.83	4518.33	6533.00	4296.33	212.00	348.33	1059.50	120949.50	484.00	154.67	924.50	30.83	1301.50	1740.50	990.67	86.17	391.00	899.33	308.83
1948.83	56.5	57	74.00	984.80	4262.80	5791.20	4059.60	187.40	321.80	770.40	100933.40	534.40	118.60	925.60	26.60	1300.60	1723.80	1096.20	68.80	357.80	884.60	327.00
1948.08	57	57.5	75.20	1035.80	4180.00	7516.00	4094.40	246.60	296.00	816.00	108230.00	746.60	83.80	790.40	114.00	1105.20	1924.20	1107.00	77.20	206.40	992.00	386.60
1947.24	57.5	58	96.67	996.33	4604.67	5272.17	4516.83	230.67	318.00	597.33	102655.67	722.83	154.33	900.50	104.83	1260.50	1776.33	950.50	69.67	251.00	951.00	397.50
1946.36	58	58.5	89.67	1061.67	4934.17	4375.50	4719.50	288.83	350.50	732.33	108048.00	646.83	103.83	919.50	52.17	1450.17	1742.00	925.50	47.17	242.50	973.00	324.17

1945.58	58.5	59	81.17	981.00	4305.33	4631.00	4173.33	259.83	337.33	644.50	109187.17	557.33	132.00	881.00	73.67	1250.83	1800.50	1176.00	65.50	328.83	981.67	378.17
1944.88	59	59.5	60.00	905.00	4349.80	4443.00	3975.60	260.60	302.80	810.40	104498.20	506.60	172.60	915.60	45.00	1020.00	1739.20	1259.00	52.20	319.40	1036.20	388.40
1944.25	59.5	60	72.33	1017.17	4121.67	4504.67	3670.67	246.83	283.50	429.50	84555.50	665.33	155.00	732.00	64.83	1079.83	1851.50	1294.67	60.67	271.00	1115.33	434.83
1943.54	60	60.5	94.00	1148.83	4824.33	5721.00	4398.17	214.67	319.50	539.50	92026.00	625.67	154.50	882.00	113.17	1391.17	1844.00	1057.50	64.33	297.67	1160.83	369.83
1942.60	60.5	61	88.33	1111.33	4460.50	5996.00	4136.33	207.00	308.33	581.67	86456.17	664.50	172.67	852.67	83.67	1196.67	1792.50	1268.17	81.83	268.00	1072.33	408.83
1941.97	61	61.5	79.60	1105.20	3903.40	6758.00	3832.80	184.40	303.00	581.80	82414.60	685.80	136.40	727.60	175.00	857.00	1986.20	1171.20	75.00	302.20	1125.80	343.40
1941.41	61.5	62	69.50	1002.00	4374.00	8773.67	4116.50	239.33	346.17	696.17	101693.83	615.00	108.50	837.83	76.83	1256.17	1946.50	1002.67	119.67	275.33	1031.83	290.00
1940.73	62	62.5	76.60	810.80	3949.40	7954.40	3741.00	251.00	322.00	559.40	104288.60	678.40	88.20	749.40	65.60	1008.60	1801.20	815.20	104.40	242.20	968.00	253.80
1940.13	62.5	63	67.00	663.17	3605.33	7515.00	3427.50	203.00	248.83	674.83	96479.17	664.67	94.00	698.17	89.67	876.33	1921.67	984.00	86.33	200.33	949.17	266.00
1939.34	63	63.5	61.67	804.50	3899.17	8276.50	3535.50	232.00	311.33	662.83	97521.83	591.50	142.00	688.67	154.67	1062.67	1895.17	924.17	78.67	271.50	1033.00	346.83
1938.52	63.5	64	69.33	707.17	3936.17	6679.17	3836.83	246.50	359.33	690.50	110677.50	606.17	114.33	738.17	125.50	1018.50	1853.50	938.17	70.00	256.33	949.83	323.17
1937.71	64	64.5	72.20	860.00	4207.00	6260.80	4011.80	193.40	306.00	674.60	111063.00	623.80	136.80	803.60	70.20	1406.40	1837.60	888.00	81.80	271.60	995.00	290.00

Table F-2. WAB 2 Sediment Core, XRF analysis element concentrations (net counts/15 seconds).

Estimated Year	Depth-cm (Top)	Depth-cm (Bottom)	Al	Si	K	Ca	Ti	V	Cr	Mn	Fe	Ni	Cu	Zn	Br	Rb	Sr	Zr	Sb	Ba	W	Th
2018.60	0	0.5	71.96	764.84	3691.84	7117.92	3329.24	202.60	265.88	642.44	94411.36	682.60	108.76	746.92	173.12	963.20	1692.36	1034.96	81.36	216.72	894.68	303.84
2018.33	0.5	1	37.53	429.16	2841.68	5531.00	2762.58	167.89	230.53	561.37	80771.42	641.74	124.84	655.32	150.63	1027.00	1662.63	953.95	79.05	166.42	901.00	263.74
2017.92	1	1.5	55.76	620.04	3384.80	6004.00	3264.32	188.08	252.88	648.24	88298.68	627.80	116.36	705.72	203.68	1033.88	1695.60	979.16	73.72	179.88	931.64	290.56
2017.50	1.5	2	55.30	661.70	3528.00	5612.61	3400.35	197.22	259.13	629.04	92270.91	627.30	115.04	726.52	150.35	1036.57	1643.00	980.87	71.35	208.17	895.30	320.30
2017.05	2	2.5	52.19	552.19	3222.94	5343.31	3072.56	166.13	264.31	609.19	85264.25	583.13	157.63	751.50	95.19	1025.75	1613.31	1006.94	74.63	244.56	901.69	308.25
2016.56	2.5	3	46.50	603.08	3326.63	5913.46	3191.88	179.83	264.58	615.29	86949.04	594.92	143.92	736.17	179.79	953.33	1604.63	1024.79	80.33	218.08	963.25	345.71
2015.93	3	3.5	55.23	644.77	3558.23	5839.23	3354.09	184.36	265.55	663.64	93163.55	607.95	149.59	749.91	225.27	1004.95	1699.55	1021.55	76.95	214.18	936.32	307.32
2015.24	3.5	4	56.88	598.67	3282.25	5953.88	3123.75	186.83	260.88	647.58	86558.17	636.58	122.92	707.58	164.38	982.83	1618.50	972.79	77.00	199.63	898.29	279.96
2014.71	4	4.5	59.26	639.87	3521.13	6223.61	3368.96	194.22	251.96	662.57	96590.26	647.09	139.30	753.74	167.83	1001.74	1693.22	1004.26	77.04	224.43	932.09	276.78
2014.22	4.5	5	49.77	623.58	3431.15	6340.73	3265.38	184.12	268.58	638.12	90794.58	618.65	125.38	721.42	152.19	1030.50	1622.00	999.35	73.69	202.23	902.23	333.12
2013.66	5	5.5	61.92	603.75	3376.29	5920.08	3286.21	196.13	244.54	683.33	89796.83	593.00	108.33	704.00	160.38	999.08	1689.67	1001.29	82.13	219.42	903.71	257.54
2013.14	5.5	6	55.91	604.26	3316.48	5858.48	3131.26	173.91	256.52	589.30	87982.74	638.35	129.74	736.22	194.78	1012.57	1634.17	940.30	62.22	204.57	949.57	310.52
2012.67	6	6.5	58.00	565.88	3306.46	6098.88	3161.79	202.17	248.08	593.38	90888.04	603.42	124.54	712.42	202.04	967.58	1614.13	1002.67	68.75	185.75	933.04	250.67
2012.08	6.5	7	57.29	581.88	3273.04	6098.29	3071.83	181.38	263.92	636.50	87630.96	609.08	139.83	729.79	162.42	895.13	1633.25	900.58	73.92	216.88	928.13	313.67
2011.24	7	7.5	58.38	576.73	3341.69	5870.85	3176.62	176.12	259.35	616.65	90507.88	579.35	129.00	688.38	177.31	1024.85	1632.38	927.54	71.19	193.96	918.00	291.42

2010.50	7.5	8	53.64	597.60	3263.16	5667.08	3100.40	187.20	253.20	561.08	86781.64	590.20	150.68	677.76	152.84	932.96	1589.16	933.88	74.92	211.84	898.04	314.96
2010.10	8	8.5	67.46	611.88	3322.21	5636.63	3123.58	176.21	244.50	626.08	89903.96	580.58	112.71	720.42	178.96	960.38	1606.58	888.71	78.63	209.96	909.42	247.42
2009.73	8.5	9	48.12	604.00	3357.19	6263.69	3125.88	189.96	241.92	635.69	91660.81	591.35	133.04	697.50	177.38	965.81	1638.92	914.08	71.62	193.42	905.88	228.42
2009.19	9	9.5	57.71	603.75	3242.58	6099.83	3038.54	176.33	262.29	580.33	89556.75	555.63	141.63	684.67	163.83	947.50	1639.83	959.83	77.79	208.67	925.46	231.71
2008.54	9.5	10	54.22	566.52	3125.04	5747.91	2844.26	155.83	230.09	541.78	84369.43	614.04	136.35	655.26	185.52	865.43	1541.52	806.35	82.74	183.30	898.61	276.35
2007.81	10	10.5	52.23	588.73	3141.50	5516.23	2887.19	184.00	244.81	552.35	83713.69	557.88	156.27	660.73	188.19	918.23	1513.23	837.92	67.27	187.00	943.35	307.27
2007.08	10.5	11	52.62	573.38	3070.67	4997.14	2841.24	158.00	222.67	632.19	86495.86	564.38	136.43	637.24	212.10	808.14	1514.67	794.00	75.62	197.29	944.95	284.05
2006.38	11	11.5	54.15	603.67	3519.00	6801.41	3223.22	175.78	285.41	761.33	93829.85	529.07	146.52	761.19	170.00	1047.22	1696.48	991.15	86.00	269.67	898.93	288.56
2005.69	11.5	12	50.27	500.12	3018.08	5492.19	2815.27	165.85	243.50	615.23	86075.08	549.23	130.19	661.69	147.35	957.23	1566.62	870.35	77.27	199.23	916.08	268.46
2005.00	12	12.5	58.50	565.04	3194.19	5680.58	2962.15	176.35	248.04	567.12	87480.00	574.46	129.73	663.46	153.00	861.69	1537.77	871.46	73.65	184.00	915.85	247.38
2004.34	12.5	13	44.08	499.29	2850.92	5543.13	2638.50	143.46	226.63	558.17	81440.58	577.38	138.88	621.92	184.17	889.92	1493.17	854.17	82.33	176.92	909.96	311.79
2003.79	13	13.5	45.70	482.85	2928.96	4867.89	2762.11	163.85	253.63	627.81	86186.70	580.22	118.96	680.63	140.63	894.19	1531.59	847.48	63.41	202.30	892.11	277.81
2003.29	13.5	14	53.69	561.81	3170.96	5077.65	2921.23	160.62	238.12	592.35	82453.69	597.46	141.35	683.85	197.69	931.04	1521.19	857.54	76.62	194.54	934.69	316.08
2002.71	14	14.5	59.96	595.22	3333.93	5766.96	3167.15	186.44	261.93	650.48	87941.78	570.48	135.70	712.15	178.37	1041.04	1578.63	989.93	82.00	237.04	900.56	279.81
2001.85	14.5	15	54.88	626.46	3417.46	5918.96	3219.88	192.00	247.19	654.73	89720.85	596.88	159.92	710.04	135.69	981.62	1628.81	906.27	73.35	212.77	901.85	265.00
2000.71	15	15.5	54.00	563.52	3233.81	5253.04	2948.33	193.07	254.30	560.11	83944.07	580.19	160.56	697.78	188.78	1019.89	1567.89	871.22	75.22	208.96	904.07	310.11
1999.68	15.5	16	53.31	503.00	2976.00	5108.85	2801.92	183.88	246.04	534.73	81919.65	567.54	130.46	660.62	159.73	930.19	1531.38	906.00	73.69	192.65	920.12	261.19
1998.24	16	16.5	49.74	534.93	3075.74	5332.52	2900.37	198.63	253.81	701.30	85251.96	562.52	145.07	671.00	171.52	887.63	1546.52	877.44	68.15	202.81	899.26	270.15
1996.61	16.5	17	56.00	520.11	3135.56	5394.22	2940.07	166.89	241.11	701.59	88293.52	543.70	154.70	676.44	159.56	905.48	1603.48	901.63	73.63	212.44	913.52	271.81
1995.51	17	17.5	54.23	532.54	3120.46	5568.65	2919.42	175.12	248.81	534.77	83637.50	553.15	166.96	642.00	169.73	999.00	1522.42	874.12	95.81	202.08	894.08	289.54
1994.46	17.5	18	57.72	573.80	3191.88	5336.32	2943.60	180.16	240.80	551.64	84450.44	611.32	131.12	650.56	154.48	1027.68	1554.52	887.60	83.72	197.68	881.80	303.20
1993.36	18	18.5	50.69	544.42	3169.42	4816.88	2926.62	183.62	259.04	482.73	83766.73	589.54	143.04	681.00	153.19	998.15	1488.12	915.42	79.85	211.12	912.23	216.27
1992.18	18.5	19	51.12	476.50	3001.50	4500.46	2860.08	171.92	238.00	849.31	83120.19	570.27	133.08	707.62	177.58	923.54	1485.23	921.04	66.58	187.96	910.19	281.42
1991.09	19	19.5	55.00	541.32	3155.40	4896.48	2956.12	163.44	251.24	506.20	84944.52	588.52	149.40	697.72	198.32	1008.72	1480.16	996.12	66.48	207.44	943.24	246.20
1990.50	19.5	20	58.69	627.23	3440.65	5443.08	3148.85	172.35	397.46	577.42	87760.96	649.54	148.12	729.46	157.23	947.42	1600.08	940.46	69.85	229.19	899.73	318.31
1990.06	20	20.5	55.00	570.58	3229.15	4745.54	3068.62	173.00	245.15	539.12	86058.85	577.81	131.77	707.54	149.31	889.58	1568.08	921.00	74.54	204.92	866.00	282.92
1989.28	20.5	21	58.20	588.00	3513.76	5234.96	3292.28	185.52	280.16	645.36	91255.32	537.44	143.24	812.44	148.60	999.72	1755.92	936.60	70.00	254.84	920.32	272.08
1988.14	21	21.5	62.23	553.85	3143.58	4797.35	2969.00	162.42	240.12	501.69	82135.54	593.12	140.46	714.54	169.69	1043.00	1536.23	941.65	69.42	203.88	916.00	263.31
1986.86	21.5	22	43.17	508.26	2808.35	4778.70	2611.22	146.52	231.70	509.91	75880.22	576.74	122.00	605.17	192.30	857.13	1415.74	863.91	72.87	184.43	912.52	308.91
1985.80	22	22.5	54.62	514.04	2895.04	5364.46	2707.46	178.31	232.38	528.00	79729.31	590.62	123.27	633.62	163.15	946.77	1488.96	840.77	79.54	185.46	891.15	278.35

1984.57	22.5	23	51.58	529.04	2777.27	4898.62	2571.58	147.77	219.08	429.23	74510.35	581.19	155.73	607.88	182.19	787.73	1407.38	870.38	74.27	171.00	910.42	250.73
1982.64	23	23.5	56.19	496.07	3038.07	5457.00	2944.37	171.44	254.74	583.96	82919.11	563.19	132.15	686.11	150.41	959.15	1586.11	932.41	78.37	199.85	880.78	298.26
1980.29	23.5	24	53.48	553.76	3038.00	5113.68	2783.96	167.76	237.76	547.24	80002.96	613.52	139.80	645.44	182.08	791.48	1485.88	878.68	72.76	185.80	917.36	229.88
1978.38	24	24.5	55.89	522.89	3042.41	4820.89	2926.48	187.00	250.48	497.70	80847.22	588.33	154.52	686.52	138.04	926.07	1450.37	875.19	69.00	202.52	882.74	231.19
1976.27	24.5	25	63.00	618.46	3091.63	5484.63	2822.33	172.04	242.25	493.33	74802.00	574.83	164.92	658.79	139.67	906.67	1505.46	902.00	72.13	202.29	921.63	345.88
1973.12	25	25.5	64.40	698.08	3228.16	5214.76	3029.20	161.72	240.88	476.08	74943.88	598.64	142.28	680.56	125.08	983.88	1559.84	1092.44	75.64	209.88	947.84	301.24
1970.37	25.5	26	59.30	729.13	3481.87	6358.09	3159.57	190.57	251.43	581.30	82560.30	562.39	139.61	740.96	163.35	1016.96	1601.61	1022.43	85.52	225.74	928.35	360.00
1968.71	26	26.5	58.41	690.74	3271.59	6287.46	2942.44	158.77	238.42	535.77	80034.67	603.65	142.00	723.15	136.30	937.22	1575.27	1008.74	79.77	212.85	895.62	295.62
1967.10	26.5	27	57.96	598.31	2983.31	5043.08	2760.08	155.31	212.54	483.35	79914.15	564.65	143.23	640.19	171.62	913.19	1451.35	894.85	62.92	176.54	878.73	251.15
1965.03	27	27.5	60.04	693.96	3480.60	5486.84	3144.32	185.36	249.36	502.92	88305.04	593.92	150.00	731.20	161.16	1048.20	1534.12	910.32	64.72	206.44	872.20	302.80
1961.20	27.5	28	62.28	782.56	3630.20	6605.64	3336.40	186.28	268.24	596.60	89690.72	567.76	119.16	793.40	83.20	1029.92	1730.00	1013.28	81.16	247.52	880.84	366.72
1957.87	28	28.5	64.18	731.43	3324.61	6075.11	3051.14	163.54	274.18	563.14	81507.57	587.54	143.79	686.86	173.79	854.04	1586.18	941.46	88.54	226.29	925.36	261.21
1956.26	28.5	29	61.73	792.12	3609.96	6636.46	3332.08	182.42	263.27	617.38	87814.31	604.23	122.92	760.12	123.19	939.73	1683.38	1061.04	86.62	251.38	905.65	335.88
1953.55	29	29.5	55.32	758.88	3482.84	6536.36	3246.16	188.80	257.80	627.84	86939.20	578.00	115.64	760.96	139.04	950.04	1620.48	1052.16	79.24	241.36	927.60	265.96
1950.42	29.5	30	60.36	671.08	3149.36	5843.68	2871.64	168.28	226.76	502.24	79472.52	600.00	121.60	676.08	185.56	965.40	1480.76	951.88	81.20	188.36	928.40	282.84
1947.71	30	30.5	61.88	628.23	3089.23	5893.62	2860.38	156.92	229.88	572.65	79761.00	596.15	147.58	641.04	162.65	894.58	1497.23	867.23	81.65	195.42	906.42	334.96
1944.60	30.5	31	63.54	743.19	3465.31	6506.92	3174.54	175.04	250.15	558.27	84744.35	606.19	143.92	726.46	136.04	1052.27	1566.04	947.04	76.54	204.12	914.96	251.77
1939.94	31	31.5	57.12	697.31	3285.19	6759.65	3048.31	171.65	237.42	577.00	78994.31	576.15	151.15	717.46	143.81	910.35	1523.88	971.08	90.65	211.54	956.46	334.85
1936.38	31.5	32	66.92	755.08	3399.96	6872.20	3185.04	167.80	243.40	538.76	79988.60	611.92	137.60	712.60	129.00	943.84	1516.80	988.16	78.96	210.88	937.44	298.96
1934.87	32	32.5	57.17	788.71	3348.33	7036.83	3152.83	174.13	244.29	612.75	82041.54	610.75	148.88	691.13	118.79	882.21	1555.83	1017.96	85.58	226.83	875.75	280.92
1933.41	32.5	33	65.08	900.50	3670.21	7222.46	3386.46	189.96	256.04	655.04	84451.21	608.42	156.92	764.25	108.42	1032.29	1633.17	1087.08	87.79	251.88	931.54	338.88
1931.93	33	33.5	61.23	744.38	3131.00	5862.92	2821.58	135.35	216.27	479.19	73719.15	597.96	140.69	656.35	114.88	925.35	1484.46	983.38	74.23	198.31	928.77	276.50
1930.45	33.5	34	72.72	978.60	3708.56	6490.28	3347.60	168.64	258.76	618.72	83844.96	623.28	136.72	729.96	89.84	865.56	1671.44	1052.72	87.00	259.48	916.16	281.08
1928.62	34	34.5	74.46	997.12	3648.08	7455.92	3149.81	166.92	240.73	490.08	77878.85	588.65	137.81	648.50	161.00	820.73	1642.38	1021.96	101.58	250.27	988.00	305.81
1926.46	34.5	35	77.80	1015.80	3887.04	7965.60	3284.16	181.44	256.20	533.92	82552.12	601.04	168.08	715.28	116.08	925.32	1676.16	1003.92	104.20	250.80	993.40	302.04
1924.50	35	35.5	85.77	1052.31	3972.12	7895.38	3430.65	175.65	272.96	605.73	82359.12	558.54	152.65	722.92	92.50	1014.54	1687.38	982.46	101.38	279.15	958.54	323.19
1922.55	35.5	36	84.21	1051.54	3878.38	7996.88	3208.00	175.58	272.63	628.00	84532.92	584.38	153.75	661.08	147.38	893.79	1667.25	887.67	91.79	255.96	891.83	285.29
1920.76	36	36.5	73.71	951.47	3990.35	8233.65	3464.29	183.24	265.47	416.06	91811.76	603.94	141.82	700.06	97.88	1067.82	1899.29	934.29	79.18	226.82	895.88	329.41
1919.29	36.5	37	93.92	937.60	4494.44	5758.32	3526.88	208.80	375.68	548.32	94153.32	614.04	149.12	693.48	98.56	1159.64	1755.24	752.28	63.36	201.92	907.92	290.92
1917.65	37	37.5	94.60	1151.24	5043.16	7221.12	4261.40	254.68	297.76	572.56	101145.68	609.64	138.44	829.48	95.72	1429.92	1863.28	771.84	69.60	268.88	882.68	358.68

1915.53	37.5	38	89.22	1195.41	4570.19	8854.04	4141.59	250.19	287.00	617.81	86249.67	607.07	195.37	871.11	109.22	1192.11	1811.15	990.15	89.96	275.15	962.07	297.78
1913.05	38	38.5	85.78	1244.43	4511.65	8094.04	3888.00	221.52	274.04	627.83	91803.22	631.91	168.35	820.83	123.09	1230.00	1787.61	1022.65	90.65	280.48	1006.52	308.83
1911.19	38.5	39	95.96	1091.24	4860.80	8907.12	3868.04	205.68	280.12	549.72	95634.32	590.72	169.12	710.28	128.08	1247.00	1932.28	944.28	107.88	246.72	946.32	344.08
1909.90	39	39.5	90.56	934.08	4948.60	8429.48	3561.64	245.56	292.44	607.00	99523.24	560.72	140.36	645.84	101.72	1362.48	1943.20	771.84	104.24	238.92	882.72	275.20
1908.31	39.5	40	83.08	948.13	5140.42	10030.42	3650.96	233.50	299.63	686.38	97383.83	587.92	161.42	699.13	113.04	1357.92	1938.29	709.75	122.00	226.17	883.00	331.25
1906.66	40	40.5	84.71	877.88	4794.21	7408.25	3687.79	234.08	309.63	658.25	99858.71	593.04	142.38	714.33	107.29	1276.79	1863.71	816.21	96.71	207.33	857.21	281.08
1905.09	40.5	41	88.08	828.25	4792.17	6298.75	3672.38	250.29	297.96	595.92	102452.38	574.63	174.21	771.17	148.88	1364.63	1766.79	814.67	72.67	213.71	877.79	365.83
1903.31	41	41.5	89.32	1014.68	4362.88	6566.00	3943.76	222.92	304.48	698.84	93064.68	586.00	135.04	811.00	95.84	1093.20	1690.04	1030.96	89.24	275.20	900.84	331.60
1901.61	41.5	42	82.04	864.56	4794.00	7876.36	3650.20	237.44	298.04	901.24	104738.84	529.40	156.40	713.64	91.60	1313.68	1833.72	785.04	94.48	224.80	843.44	230.84
1900.25	42	42.5	78.42	812.75	4741.92	6064.00	3443.00	259.25	309.58	623.96	98022.96	575.17	164.79	754.71	140.33	1510.88	1862.00	705.96	78.75	229.33	855.54	295.08
1898.58	42.5	43	84.04	1059.30	4591.96	7056.48	4186.52	238.13	308.70	660.52	94456.22	618.39	182.13	869.09	126.96	1318.04	1736.35	927.09	90.09	283.91	914.04	359.39
1897.09	43	43.5	69.28	650.20	3688.12	7012.28	3004.84	197.96	272.20	664.32	99745.12	552.64	116.08	574.24	150.60	1064.08	1656.28	796.52	97.96	190.96	820.68	221.92
1896.06	43.5	44	78.77	697.77	4204.50	7621.77	3206.35	198.31	279.88	836.15	119963.35	517.19	114.00	623.38	122.12	1233.35	1892.23	743.77	91.77	209.19	788.19	236.88
1894.94	44	44.5	82.83	846.92	4858.13	7560.71	3543.46	222.21	311.63	782.71	119186.17	520.42	166.08	652.50	129.83	1299.42	1902.96	732.29	85.17	247.13	838.29	312.13
1893.56	44.5	45	90.08	908.62	4886.77	7594.77	3856.12	258.08	316.00	679.31	107316.92	565.81	162.35	745.81	103.38	1429.42	2009.92	840.31	98.27	256.81	879.58	252.46
1892.08	45	45.5	90.81	898.50	5048.12	8271.27	3613.04	246.85	294.23	631.46	106275.35	530.85	167.19	660.00	101.46	1559.85	1906.23	794.69	88.08	238.23	829.81	335.27
1890.54	45.5	46	96.64	938.04	5299.00	8277.60	3891.44	273.40	331.32	786.24	113045.92	530.28	162.92	778.28	67.32	1619.32	1964.04	757.76	98.08	265.96	857.28	277.12
1888.82	46	46.5	91.77	965.62	4879.65	7813.65	3971.27	258.65	327.50	655.38	101525.62	573.38	181.23	819.04	120.69	1439.15	1870.08	757.35	101.81	283.62	900.46	325.04
1887.01	46.5	47	86.80	989.20	4673.24	7756.88	4050.36	241.32	308.48	783.60	98848.76	573.60	157.12	831.12	116.92	1367.88	1802.36	919.44	97.96	282.40	921.56	305.08
1885.30	47	47.5	90.50	889.08	4905.96	9065.50	3649.12	255.19	308.19	569.31	101255.58	546.23	152.35	718.38	109.96	1596.38	2046.92	841.54	110.77	268.69	884.88	276.96
1883.61	47.5	48	88.69	949.27	5182.42	11042.27	3864.08	238.08	301.62	592.00	101599.58	551.23	150.00	734.19	113.65	1718.31	2089.46	855.00	118.92	271.04	899.73	299.73
1881.97	48	48.5	81.58	847.96	4648.69	7366.54	3657.42	243.12	296.88	632.23	99595.62	542.00	159.12	717.19	86.35	1349.92	1878.81	833.69	93.08	256.00	883.42	273.38
1880.40	48.5	49	83.00	965.83	4473.17	6868.83	4007.00	235.13	306.88	630.67	94029.67	613.50	174.21	864.42	141.17	1328.96	1765.54	945.75	94.92	290.17	923.79	331.42
1879.00	49	49.5	61.00	580.76	3959.82	6598.47	3221.00	180.88	272.18	693.18	100183.53	544.12	135.88	717.59	126.18	1246.88	1819.12	906.59	75.65	236.47	832.94	310.18
1877.80	49.5	50	50.33	548.52	3806.52	5677.33	3429.38	192.38	293.71	752.57	102285.86	555.19	164.62	756.43	162.38	1258.14	1710.57	891.62	62.52	208.10	869.10	284.95
1876.62	50	50.5	62.12	703.77	3653.50	5852.00	3362.85	212.73	279.08	746.12	94960.92	575.54	184.65	761.69	201.92	1050.04	1574.81	904.96	83.31	226.35	884.54	296.77
1875.41	50.5	51	58.92	697.92	3558.67	6222.79	3342.04	216.71	274.92	751.13	99609.79	603.75	133.58	774.08	203.33	1032.08	1589.79	953.88	74.38	222.25	911.25	267.46
1874.26	51	51.5	51.26	566.21	3316.16	5561.84	3228.79	186.63	274.11	819.11	104465.11	527.79	99.63	759.00	177.95	1158.05	1585.79	1013.84	65.68	225.74	865.89	277.89
1873.09	51.5	52	70.77	724.08	3694.42	5880.35	3383.88	195.65	289.69	795.81	106086.50	561.92	118.50	778.69	188.15	1131.31	1626.46	965.65	73.62	235.69	904.08	323.19
1871.74	52	52.5	70.00	762.25	3743.00	6139.04	3506.38	207.71	281.04	882.00	102423.46	580.50	135.29	795.21	181.00	1128.71	1591.75	910.29	79.63	218.50	898.58	315.96

1870.39	52.5	53	82.65	939.85	4129.92	5024.73	3805.15	242.88	303.69	647.62	104098.04	565.42	134.00	821.77	158.65	1317.38	1680.04	982.62	63.58	283.96	889.35	304.31
1869.00	53	53.5	81.58	868.69	3972.08	6108.62	3710.69	226.46	295.88	990.04	109044.00	559.27	130.58	815.88	186.35	1316.88	1678.85	940.73	75.08	248.92	887.96	355.35
1867.52	53.5	54	82.35	891.42	4281.96	5370.04	4049.00	255.62	321.35	888.54	110835.77	571.88	162.92	896.54	214.00	1294.62	1733.27	987.85	66.31	278.38	913.35	374.62
1866.06	54	54.5	74.20	952.76	4336.24	4771.60	4070.20	236.32	339.08	841.96	108389.88	560.80	168.24	923.32	180.04	1260.28	1699.16	1037.08	56.76	295.92	912.12	338.76
1864.58	54.5	55	76.08	909.96	3965.92	4793.58	3762.54	221.81	290.23	573.77	97054.65	607.31	164.77	890.38	173.08	1082.12	1634.65	1026.58	70.42	265.85	924.92	329.08
1863.18	55	55.5	58.95	712.42	3732.63	5300.42	3764.84	226.11	302.47	715.16	98852.53	542.53	157.58	870.16	159.95	1269.47	1761.53	1140.21	75.84	275.05	937.37	290.74
1861.74	55.5	56	61.22	676.28	3398.72	5349.11	3480.56	199.78	279.72	593.72	89985.83	587.22	167.00	893.94	186.83	1120.94	1763.56	1227.00	77.28	270.11	972.28	295.94
1860.18	56	56.5	64.71	855.14	3760.33	5999.00	3662.29	210.67	290.48	633.90	93601.62	612.52	163.29	876.14	226.24	1189.10	1821.38	1233.00	78.90	295.33	985.24	315.95
1858.66	56.5	57	65.00	723.96	3462.88	5753.50	3470.67	196.50	282.71	779.00	92273.96	578.38	147.04	813.25	200.00	1054.29	1749.25	1236.79	81.04	254.75	984.33	331.58
1857.09	57	57.5	47.68	689.91	3418.14	5045.14	3428.64	204.64	285.00	572.23	87742.45	578.05	172.91	820.32	224.95	1057.73	1777.50	1382.77	65.64	250.00	972.32	244.73
1855.51	57.5	58	66.15	875.38	3213.62	5685.65	2989.65	161.00	216.50	580.81	83434.08	611.65	139.73	732.46	165.04	1004.35	1658.38	1224.85	74.00	210.73	945.23	320.15
1854.08	58	58.5	69.36	861.36	3055.72	7899.20	2960.00	156.28	220.44	982.16	89530.52	591.20	150.32	724.72	197.60	859.92	1712.76	1197.44	98.60	204.00	964.16	288.04
1852.75	58.5	59	49.80	660.45	3034.85	7333.15	2931.85	171.15	254.50	842.25	98679.85	587.40	140.05	783.40	142.20	980.90	1788.85	1142.40	90.75	227.55	932.80	310.80
1851.61	59	59.5	61.17	618.39	3658.72	5345.17	3445.61	234.00	311.89	780.56	108172.61	582.39	148.28	812.06	224.11	1133.00	1747.39	976.11	57.83	239.56	905.11	313.94
1850.64	59.5	60	61.00	531.75	3577.70	4212.25	3435.15	242.90	307.20	1059.50	109436.05	568.00	114.05	845.40	251.50	1282.85	1555.50	769.20	63.90	230.55	835.20	267.70
1849.52	60	60.5	73.31	690.77	3671.19	4176.46	3439.73	204.15	274.46	782.04	99984.42	562.81	137.42	796.19	184.54	1189.38	1527.85	795.31	62.35	228.81	821.85	272.62
1848.13	60.5	61	75.04	883.70	3986.43	5468.70	3832.00	223.39	311.48	591.09	100840.26	609.74	143.70	915.30	121.22	1165.04	1697.00	930.26	71.13	277.26	940.13	308.13
1846.87	61	61.5	58.84	508.89	3422.58	5802.32	3332.05	219.47	302.16	783.05	118194.00	545.16	133.21	766.00	159.00	1151.53	1662.53	809.16	90.58	233.32	796.32	297.21
1845.86	61.5	62	64.67	568.83	3399.29	6532.08	3134.08	205.13	290.71	631.33	108567.00	575.58	135.58	786.13	201.50	1117.04	1566.21	724.21	86.04	216.42	843.42	274.04
1844.79	62	62.5	60.55	555.25	3674.00	5288.65	3426.70	223.75	301.60	805.05	115163.30	550.25	132.25	799.35	184.30	1109.55	1683.20	816.80	56.40	240.50	859.80	251.80
1843.71	62.5	63	67.48	612.04	3520.68	5660.04	3296.20	216.12	284.48	546.08	118217.88	528.44	116.92	836.16	154.84	1175.80	1535.32	722.68	65.64	233.56	820.96	302.16
1842.59	63	63.5	46.09	467.78	3195.04	3919.13	3206.91	187.78	273.35	416.35	105052.57	536.48	150.74	766.17	165.22	1051.91	1532.61	790.52	56.17	232.70	813.30	290.35
1841.49	63.5	64	61.63	553.00	3591.38	5080.50	3506.46	238.33	313.54	976.75	120967.00	524.63	120.79	844.08	173.63	1214.38	1632.13	789.75	67.42	262.79	838.38	271.25
1840.48	64	64.5	42.82	327.14	2852.36	4429.59	2953.86	209.14	280.27	690.00	124253.23	514.73	119.77	727.41	116.45	1080.68	1479.32	740.27	58.18	200.82	768.41	216.95
1839.51	64.5	65	58.44	323.33	2638.78	4227.78	2678.61	164.17	259.28	611.39	127073.50	504.11	110.61	630.94	150.39	1070.67	1430.61	688.17	57.00	179.89	756.56	223.06
1838.53	65	65.5	40.17	364.28	2986.83	4518.11	3039.56	203.89	271.89	585.83	131127.22	486.22	111.56	739.78	96.33	1111.28	1531.44	709.00	57.67	209.06	776.72	238.33
1837.44	65.5	66	48.88	502.65	3762.71	4555.71	3774.18	259.06	341.06	820.41	123198.35	518.94	135.53	854.71	174.29	1301.29	1632.47	693.06	61.29	263.82	825.65	267.00
1836.10	66	66.5	74.04	594.00	4254.35	4370.88	4340.65	298.73	365.04	867.58	130998.46	541.69	175.62	1027.54	90.15	1549.73	1845.12	770.31	50.62	301.69	856.96	293.62
1834.72	66.5	67	65.25	635.70	4189.05	5600.60	3897.15	252.55	331.35	596.20	116957.55	555.20	162.50	891.60	90.00	1422.40	1770.55	804.00	64.15	289.85	808.60	269.45
1833.06	67	67.5	81.00	846.04	4607.44	6594.12	4313.84	262.08	344.84	647.44	106458.60	577.80	175.16	961.00	106.92	1397.12	1820.16	933.24	75.52	302.96	927.08	291.32

1831.09	67.5	68	73.04	878.21	4388.04	7489.88	4121.67	235.75	325.25	752.92	106086.17	567.13	172.58	904.04	116.42	1337.58	1822.75	1052.21	87.13	304.58	911.29	299.13
1829.50	68	68.5	58.19	550.95	3350.00	6901.71	3324.19	185.29	286.81	757.24	120201.38	536.57	109.00	707.52	190.67	1101.24	1687.10	962.05	93.71	230.76	841.62	227.05
1828.31	68.5	69	60.45	540.40	3314.50	7731.85	3189.40	201.35	281.10	914.75	120505.80	544.05	130.00	737.40	131.70	1096.30	1812.45	873.85	102.20	242.70	838.80	285.10
1827.14	69	69.5	59.00	485.24	3127.05	7837.86	3055.95	199.05	279.67	988.43	127965.33	505.90	109.48	690.52	137.62	1144.24	1797.71	860.05	94.05	202.95	799.67	230.52
1825.96	69.5	70	60.80	489.87	3233.33	8478.67	3081.27	194.40	280.73	932.87	128962.60	535.73	122.27	711.20	154.60	1025.87	1904.00	829.40	92.80	229.40	781.73	340.60
1824.66	70	70.5	71.26	778.16	4098.79	6486.16	3987.68	208.95	304.89	775.42	113585.53	553.53	158.37	858.58	112.58	1261.11	1884.11	1013.95	72.47	293.11	889.63	283.42
1822.81	70.5	71	74.33	1059.10	4135.38	5503.10	3934.05	179.38	299.00	556.19	89994.29	614.52	157.95	905.52	86.00	1285.43	1854.52	1459.43	64.81	330.43	985.57	321.29
1820.63	71	71.5	69.59	1082.35	4196.29	5811.41	4079.18	169.53	280.06	544.88	96185.76	599.71	166.35	885.18	66.88	1229.12	1943.29	1617.53	54.76	316.88	1037.00	267.82
1818.57	71.5	72	79.73	1293.62	4051.69	7837.81	3728.19	180.19	318.19	612.46	94245.62	578.65	159.58	804.19	129.58	1076.54	1842.00	1405.85	88.23	333.35	998.08	346.92
1816.69	72	72.5	75.20	1035.80	4180.00	7516.00	4094.40	246.60	296.00	816.00	108230.00	746.60	83.80	790.40	114.00	1105.20	1924.20	1107.00	77.20	206.40	992.00	386.60
1814.84	72.5	73	90.20	982.60	4615.80	5317.40	4525.00	232.40	317.40	590.60	103354.00	713.00	159.20	911.60	86.60	1380.20	1783.60	954.60	67.60	248.20	953.20	382.00
1813.04	73	73.5	87.20	1047.80	4923.00	4317.40	4733.80	298.80	351.00	754.60	108792.40	656.60	122.20	910.80	56.00	1568.40	1748.40	917.00	40.80	239.60	971.20	312.20
1811.07	73.5	74	82.20	954.00	4294.20	4612.00	4154.20	240.60	349.60	642.60	110305.60	549.00	125.80	882.80	83.60	1292.80	1795.80	1174.40	62.60	320.00	988.80	394.80
1809.17	74	74.5	60.00	905.00	4349.80	4443.00	3975.60	260.60	302.80	810.40	104498.20	506.60	172.60	915.60	45.00	1020.00	1739.20	1259.00	52.20	319.40	1036.20	388.40
1807.11	74.5	75	72.33	1017.17	4121.67	4504.67	3670.67	246.83	283.50	429.50	84555.50	665.33	155.00	732.00	64.83	1079.83	1851.50	1294.67	60.67	271.00	1115.33	434.83
1804.74	75	75.5	94.00	1148.83	4824.33	5721.00	4398.17	214.67	319.50	539.50	92026.00	625.67	154.50	882.00	113.17	1391.17	1844.00	1057.50	64.33	297.67	1160.83	369.83
1802.43	75.5	76	88.33	1111.33	4460.50	5996.00	4136.33	207.00	308.33	581.67	86456.17	664.50	172.67	852.67	83.67	1196.67	1792.50	1268.17	81.83	268.00	1072.33	408.83
1799.96	76	76.5	79.60	1105.20	3903.40	6758.00	3832.80	184.40	303.00	581.80	82414.60	685.80	136.40	727.60	175.00	857.00	1986.20	1171.20	75.00	302.20	1125.80	343.40
1797.89	76.5	77	69.50	1002.00	4374.00	8773.67	4116.50	239.33	346.17	696.17	101693.83	615.00	108.50	837.83	76.83	1256.17	1946.50	1002.67	119.67	275.33	1031.83	290.00
1796.21	77	77.5	76.60	810.80	3949.40	7954.40	3741.00	251.00	322.00	559.40	104288.60	678.40	88.20	749.40	65.60	1008.60	1801.20	815.20	104.40	242.20	968.00	253.80
1794.41	77.5	78	70.20	684.40	3642.80	7607.20	3435.80	200.00	247.40	682.20	97182.60	670.40	86.20	703.20	107.60	898.00	1955.00	1026.40	93.80	210.20	960.00	296.60
1792.60	78	78.5	61.67	804.50	3899.17	8276.50	3535.50	232.00	311.33	662.83	97521.83	591.50	142.00	688.67	154.67	1062.67	1895.17	924.17	78.67	271.50	1033.00	346.83
1790.95	78.5	79	69.33	707.17	3936.17	6679.17	3836.83	246.50	359.33	690.50	110677.50	606.17	114.33	738.17	125.50	1018.50	1853.50	938.17	70.00	256.33	949.83	323.17
1789.30	79	79.5	72.20	860.00	4207.00	6260.80	4011.80	193.40	306.00	674.60	111063.00	623.80	136.80	803.60	70.20	1406.40	1837.60	888.00	81.80	271.60	995.00	290.00
1787.62	79.5	80	89.00	1010.40	4312.60	6556.00	4146.20	269.20	328.80	749.60	114203.60	595.40	111.80	848.00	150.80	1124.60	1893.20	933.40	94.00	268.80	968.00	408.40
1786.02	80	80.5	72.40	774.80	4093.00	6501.60	4005.20	210.60	321.80	577.40	107078.80	603.20	137.60	825.20	128.20	1304.60	1736.40	997.40	106.80	273.60	1051.60	333.60
1784.46	80.5	81	70.67	664.50	3877.67	7899.67	3788.33	280.17	303.50	658.83	110036.50	596.17	122.33	741.83	181.17	1288.00	1873.17	921.50	79.17	186.33	956.67	296.83
1783.02	81	81.5	69.20	604.00	3316.60	7987.00	3262.80	176.80	310.40	750.80	111372.80	573.40	93.80	669.60	156.40	1034.20	1808.20	764.40	113.00	188.60	897.80	296.80
1781.70	81.5	82	80.67	644.33	3677.00	6860.00	3667.17	245.33	352.67	656.33	110283.83	568.17	111.83	737.00	162.83	1116.33	1851.67	834.67	89.50	245.00	952.33	284.83
1780.20	82	82.5	57.83	660.50	3690.50	6918.67	3757.67	196.33	306.50	706.83	110904.17	587.83	64.17	761.00	126.17	1188.00	1840.67	1078.83	97.67	241.33	934.17	315.50

1778.60	82.5	83	82.83	902.00	4126.17	7259.50	4010.17	233.50	328.67	680.67	116152.50	538.50	72.33	850.50	127.83	1035.50	1838.33	971.67	96.67	241.17	957.17	311.67
1776.93	83	83.5	70.67	891.33	4181.00	5489.50	4186.67	263.67	367.83	643.50	120453.67	547.50	136.50	857.50	149.17	1315.50	1773.50	1054.33	49.50	311.00	977.50	385.00
1775.17	83.5	84	79.50	838.83	4277.50	6525.17	4236.33	255.50	355.00	715.33	122668.17	520.00	128.50	864.17	80.83	1310.67	1752.67	987.67	86.83	302.17	938.67	341.17
1773.35	84	84.5	93.83	1021.33	4562.67	6160.17	4408.00	263.83	369.83	742.33	119846.50	552.00	115.50	916.67	72.50	1423.17	1804.17	1019.50	76.33	318.33	996.17	324.67
1771.47	84.5	85	116.40	1086.60	4753.00	5971.20	4660.60	253.40	336.60	701.60	120076.20	514.20	136.60	922.60	67.60	1517.80	1843.80	1048.20	74.20	311.60	970.60	331.80
1769.53	85	85.5	103.67	1069.83	4818.17	4704.83	4646.50	265.33	384.17	676.00	118349.33	530.83	83.83	881.50	53.33	1512.00	1760.67	1005.17	59.17	334.00	920.00	260.50
1767.46	85.5	86	106.33	1279.33	4886.50	5982.50	4826.17	266.00	367.83	769.83	116527.17	579.67	132.00	991.67	129.00	1391.00	1807.33	1136.50	78.67	319.17	983.33	312.83
1765.32	86	86.5	106.67	1367.00	4934.83	5853.50	4778.83	282.67	385.00	686.33	110523.83	572.67	108.50	999.17	59.17	1296.50	1874.83	1217.17	56.67	347.00	1034.00	403.83