An Assessment of Hydro-ecological Changes at Two Closed-drainage
Basins in the Peace-Athabasca Delta, Alberta, Canada

By
Ramila N. Sinnatamby

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ABSTRACT

Diatom analyses were carried out on sediment cores collected from two low-lying, closed-drainage basins (PAD 9 - 58º46.46'N, 111º19.48'W; PAD 12 - 58º57.29', 111º19.74') in the Peace sector of the Peace-Athabasca Delta (PAD), Alberta, Canada, to provide >1000 year long records of hydro-ecological change. Results from diatom analyses were compared with macrofossil and stable isotope records from the same cores and assessed within the framework of an Athabasca River headwater climate record inferred from isotope dendroclimate data. Results from PAD 9 and PAD 12 sediment cores indicated closed-drainage conditions during the Medieval Warm Period (MWP) and the post-Little Ice Age and high water conditions during the Little Ice Age (LIA). High water levels at PAD 9 and PAD 12 reflected high water conditions on Lake Athabasca and the Rivière des Rochers or possibly the Peace River during the LIA (~AD 1600-1900). High water conditions were also observed at low-lying sites in the central and southern regions of the PAD (PAD 31 and PAD 37), and corresponded with evidence of high streamflows on the North Saskatchewan River. In contrast, desiccation evident at PAD 5, a site largely isolated from river influence, reflected atmospherically dry conditions during the LIA. Consistent with changes observed at PAD 5, sediment records at PAD 15, an oxbow lake off the Revillion Coupé, demonstrated low flood frequency during the early to mid-1700s. Increased water levels evident at low-lying sites located in proximity to the central open-drainage network of lakes and rivers were likely due to higher flows on the Athabasca River and potentially on the Peace River. High flows on rivers of the PAD may be attributed to snowmelt-dominated runoff during the LIA relative to the rainfall-dominated runoff during MWP (prior to ~AD 1600) and the post-LIA period (~AD 1900 to present).

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INTRODUCTION

The Peace-Athabasca Delta (PAD), the world's largest freshwater delta, is contained within Wood Buffalo National Park and has been designated as a Ramsar wetland of international importance and a UNESCO (United National Educational, Scientific and Cultural Organisation) World Heritage site for its ecological and cultural significance. The PAD contains a large number of small, perched basins that provide favourable habitat for a large variety of plant and animal species (PADPG, 1973). The ecology of these basins is closely linked to the hydrology of the system. In particular, periodic widespread flooding of the delta has been identified as vital to supplying nutrients and raising water levels in perched basins and regulating wetland and terrestrial plant communities (Prowse and Lalonde, 1996).

Concerns regarding drying of the PAD began with construction of the WAC Bennett hydroelectric dam at the headwaters of the Peace River and the initial filling of Williston Lake reservoir in 1968. Construction of the dam and reservoir infilling coincided with a low-flow period (1968-1971), low levels on Lake Athabasca and no significant flooding in the PAD (Townsend, 1975). A second more extensive dry period occurred between two major ice-jam flood events in 1974 and 1996 (Prowse and Conly, 1998).

Since the construction of the WAC Bennett dam, several studies have been carried out to assess the impacts of Peace River regulation (PADPG, 1973; PADIC, 1987; PADTS, 1996; Gummer *et al.,* 2000). The Peace Athabasca Delta Project Group was formed in 1971 to investigate the downstream effects of the WAC Bennett dam and concluded that water levels on the delta required management in order to mitigate the effects of river regulation on the Peace River (PADPG, 1973). Consequently, fixed-height weirs were constructed during the 1970s and were found to nearly restore summer water levels of open-drainage basins but did

not affect water levels of elevated areas of the delta adjacent to the central open-drainage network (PADIC, 1987). Following those initial studies, the Northern River Basins Study (NRBS) and the Peace Athabasca Delta Technical Study (PADTS) were initiated in the 1990s to explain reasons for continued drying in the delta and to design methods to restore flooding (Prowse and Conly, 2002). Results from the PADTS suggested that increases in freeze-up ice levels due to enhanced winter flows from the reservoir and decreased spring snowmelt runoff from downstream tributaries were responsible for decreased frequency and severity of ice-jam floods.

Most studies have focused on evaluating and modelling flow regimes of the Peace River and its major distributary channels (PADPG, 1973; PADTS, 1996; Prowse and Lalonde, 1996; Leconte *et al.,* 2001; Peters and Prowse, 2001; Beltaos, 2003). However, following a period of record high river flows on the Peace and Athabasca rivers during the ice-free season of 1990, Prowse and Lalonde (1996) identified periodic ice-jam flooding as a critical factor in recharging the PAD because ice-jams provide the only mechanism that can induce widespread flooding of perched basins and elevated regions. Consequently, ice-jam floods are thought to be a dominant factor in maintaining hydro-ecological conditions of perched basins, which lie outside the range of floods generated during the ice-free season. Although it is commonly believed that reduced flows resulting from river regulation were responsible for the decline in ice-jams, a study by Prowse and Conly (1998) showed that the decline in flood events may be due to climatic variation that has increased temperatures during the ice-cover season and reduced snowpack depths. Currently, reduced spring ice-jam flooding due to Peace River regulation, and climate change represent two competing mechanisms to explain recently observed drying trends in the PAD. However, monthly instrumental flow records began in

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~1959, only nine years prior to the dam (Prowse and Lalonde, 1996) and are too short to assess the relative importance of these factors on patterns of ice-jam flooding.

In the absence of direct long-term hydrological measurements in the PAD, an extensive multiproxy paleolimnological study was initiated in 2000 by Hall *et al*. (2004), which included spatial surveys of water and surface sediments from lakes, wetlands and rivers in the PAD. Analyses of chemistry, nutrients, biota and stable isotopes were used to characterize modern hydrological and ecological conditions in order to provide a framework for paleolimnological interpretation of past hydro-ecological conditions. Sediment cores from 11 basins were analysed to assess changes in hydro-ecological conditions of the PAD during the past 100 to 300 years.

ISOTOPE DENDROCLIMATE RECORD – A FRAMEWORK FOR PAST CLIMATE VARIABILITY

As part of the study by Hall *et al.* (2004), an ~1100 year isotope dendroclimate record was developed for the eastern Canadian Rockies in order to provide an independent assessment of climate history at the Athabasca River headwater region to which lake-specific records can be compared (Edwards *et al.*, 2004b). In general, the climate of the past millennium has been characterized by three main climatic regimes, the Medieval Warm Period (MWP), the Little Ice Age (LIA) and the post-LIA period (Figure 1). While the literature indicates large variability in the geographical and temporal expanse of these periods, a general understanding of climate during these times can be gained based on hemispherical knowledge and constrained based on regional evidence. In the Northern Hemisphere extratropics (30° to 90° N), the MWP, generally characterized by warmer temperatures, may have begun as early as AD 900 (Esper *et al.,* 2002). Classical understanding of the 'High Medieval' places the warmest temperatures between AD 1100 and 1200 (Bradley *et al.,* 2003). The LIA climate phase was an

approximately 330 year period, which spanned the late 1500s to ~1900, often defined by average summer temperatures below the AD 1960-1990 summer temperature mean (Matthews and Briffa, 2005). While hemispheric temperature inferences are generally agreed upon, precipitation patterns of the MWP and LIA are highly debated (Bradley *et al.,* 2003; Matthews and Briffa, 2005; Salzer and Kipfmueller, 2005). Due to variable precipitation records during the last millennium, as well as region-specific temperature data, development of an isotope dendroclimate record pertaining to the Peace-Athabasca Delta was required to understand the hydro-ecology of the PAD during the past millennium.

The isotope dendroclimate record, developed from $\delta^{13}C$ and $\delta^{18}O$ analyses on cellulose in decadally resolved tree-rings from the eastern Canadian Rockies provided a method to quantitatively infer past temperature and relative humidity for the Athabasca River headwaters, a region climatologically and hydrologically upstream from the PAD (Edwards *et al.*, 2004b). The reconstructed temperature and relative humidity records indicated relatively warm mean annual and moist summer conditions between ~AD 950 and 1550 (MWP) and in particular highlighted the 'high-Medieval' between ~1100 and 1250 (Figure 1). The MWP was followed by a shift toward cold and dry conditions between ~AD 1550 and the late 1800s (LIA). From ~1900 to the present, the reconstructed climate history indicated a return to relatively wet summer and warm annual conditions, similar to that of the late MWP. The headwater climate history was developed from isotope dendroclimatic data that primarily records mean annual temperatures and daytime summer relative humidity, whereas lake sediment records are also influenced by non-summer conditions such as snowpack, ice-cover season conditions, river floods and local precipitation. Comparison of the inferred headwater climate with paleolimnological records of hydrological and ecological changes provides the potential to

dissect hydrologic and climatic influences contributing to hydro-ecological conditions throughout the delta.

The study by Hall *et al.* (2004) assessed modern hydrological and limnological conditions of 63 lakes or ponds (Figure 2) throughout the PAD that were situated along a broad hydrological gradient, from constant river connection to isolated, irregularly flooded sites. An isotope-mass balance model was used to estimate the water balance of lakes and rivers at the end of the 2000 thaw season, expressed as an evaporation to inflow ratio (E/I) at each site (Wolfe *et al.,* 2006a). The isotope mass balance model provided a means to quantitatively classify lakes along the hydrological gradient into 3 categories: open-, restricted-, or closed-drainage basins. Open-drainage basins were identified as those with E/I ratios similar to major rivers, reflecting basin water balances that were dominated by inflow relative to evaporation. In contrast, closed-drainage basins contained the highest E/I ratios (≥ 1) due to water balances that were strongly influenced by evaporation. Restricted-drainage basin E/I ratios were intermediate between open- and closed-drainage basins.

Notable limnological differences were observed between the isotope-inferred hydrological lake categories. Open-drainage basins were found to be as turbid as major rivers, whereas restricted- and closed-drainage basins typically contained clear water, high alkalinity and high concentrations of K, Mg, DOC, dissolved nitrogen (dN), total nitrogen (TN), dissolved phosphorus (dP) and chlorophyll relative to rivers and open-drainage basins. A fourth category called shallow precipitation-influenced basins was revealed based on the integration of isotope and limnological data (Wolfe *et al.,* 2006a). This category consists of very shallow sites (<50cm) that were previously categorised as restricted- or open-drainage based on surface

waters depleted in ^{18}O similar to river water, however, limnological data indicated chemistry similar to that of closed-drainage basins. In fact, these shallow sites (<50 cm) are isolated, resembling the closed-drainage basin category but contain E/I ratios similar to open-drainage basins because the water balance of this category was dominated by recent summer precipitation, which has δ^{18}O values similar to river water and low subsequent evaporative losses. Due to the morphology of these basins (e.g. relatively large and shallow) and closed-drainage hydrology, this category of sites is susceptible to desiccation during the thaw season (Wolfe *et al.,* 2006a).

BIOLOGICAL INDICATORS

Limnological differences along the hydrologic gradient of river influence resulted in differences in community composition and abundance of aquatic biota (Karst-Riddoch *et al.,* In Preparation). Typically, diatom assemblages (a group of Eukaryotic algae) from the PAD were dominated by periphytic species, but some planktonic diatoms were present. Analyses of diatom assemblages in surface sediment samples collected from 55 of the sites in the spatial survey indicated that community composition of diatoms in open-drainage basins was significantly different from assemblages of restricted- and closed-drainage basins, but community composition did not differ significantly between restricted- and closed-drainage basins. The diatom community compositions of restricted- and closed-drainage basins were typically dominated by epiphytic taxa, which occupy habitats provided by aquatic macrophyte communities and proliferate under high light conditions due to high water clarity. In contrast, sedimentary diatom assemblages of open-drainage basins were dominated by small benthic *Fragilaria* taxa, which are known to be tolerant of low light environments provided by the turbid conditions of open-water systems (Lotter and Bigler, 2000). In open-drainage basins,

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percent abundances of *Fragilaria* taxa would be further inflated by low abundances of epiphytic taxa due to suppression of macrophyte growth in turbid-water environments. Planktonic diatoms were also associated with open-drainage conditions, as they are often common in lotic environments and may have originated from rivers (Karst-Riddoch *et al.,* In Preparation). Characterization of present-day diatom assemblages in relation to known hydrological and limnological conditions allows assessment of hydrological changes from sedimentary diatom assemblages in cores from sites throughout the PAD.

Macrofossil remains from open- or restricted-drainage basins with relatively low E/I ratios were either rare or absent due to low light conditions associated with high minerogenic turbidity due to greater river influence (Karst-Riddoch *et al.,* In Preparation). Based on surface sediment samples from spatial survey sites in the PAD, closed- and restricted-drainage basins with relatively high E/I ratios were characterized by submergent aquatic plants (e.g., *Chara, Potamogeton, Ceratophyllum*) and restricted-drainage basins with moderate E/I ratios were characterized by other aquatic plant taxa (e.g., *Drepanocladus*, *Selaginella*, *Myriophyllum*, *Elodea,* filamentous green algae). Macrofossils and pollen from emergent and submergent aquatic plants (e.g., *Typha latifolia, Myriophyllum, Potamogeton, Nuphar* and *Chara*) were more abundant in basins with maximum depths greater than 50 cm, whereas shallower basins (e.g., shallow precipitation-influenced basins) were dominated by higher abundances of terrestrial shoreline vegetation (e.g., Poaceae, Carex, *Scirpus, Rummex*) (Karst-Riddoch *et al.,* In Preparation)

PALEOLIMNOLOGICAL ANALYSES

Paleolimnological analyses of sediment cores from five basins in the Peace sector (sites PAD 5, 9, 12, 15, 37) and PAD 31 in the Athabasca sector demonstrated variability in

hydrological and ecological conditions during the past ~100 to 300 years (Figure 3). In particular, each site demonstrated periods of increased flooding or open-drainage conditions as well as a drying trend since ~1920 with the exception of PAD 31, which was more influenced by a natural geomorphic change in the delta that occurred in 1982 (Hall *et al.*, 2004). However, the longer paleolimnological records provided by sites PAD 5, 15, 31 and 37 demonstrated different hydro-ecological conditions during the LIA that are challenging to reconcile.

Site PAD 5 (58°50.82'N, 111°28.84'W, 209.9 m asl) is currently a closed-drainage basin and represents one of the most elevated and least flood-susceptible basin of the study sites in the PAD. The hydro-ecological record of PAD 5 demonstrated closed-drainage conditions and periodic desiccation or near-desiccation during the early to mid 1700s, indicating an episode of exceptionally dry conditions (Figure 3) (Wolfe *et al.,* 2005). This period coincided with a period of low flood frequency and magnitude during the early to mid-1700s at site PAD 15 based on magnetic susceptibility measurements in a sediment core. PAD 15 is an oxbow lake located in the northwest region of the Peace sector (58°56.72'N, 111°29.32'W) that is susceptible to river flooding because it is separated from the Revillion Coupé (a tributary connected to the Peace River) by a low sill and consequently can provide a flood frequency record for the Peace River. Sites PAD 5 and PAD 15 demonstrated conditions consistent with the headwater dendroclimatic record that depicted cold and dry conditions during the LIA (Edwards *et al.*, 2004b; Wolfe *et al.,* 2005; Wolfe *et al.,* 2006b).

In contrast to records from PAD 5, PAD 15 and the dendroclimate data, the sediment record from PAD 37 (58°39.73'N, 111°27.37'W; 209.1 m asl), a closed-drainage basin separated by a narrow sill from Mamawi Lake, a large open-drainage basin in the central, low-lying region of the delta, demonstrated frequent connection with Mamawi Lake which

suggested higher water levels and/or wetter conditions between ~AD 1660 and 1800 (Figure 3) (Hall *et al.*, 2004). Consistent with PAD 37, site PAD 31 (58°29.84'N, 111°31.15'W, 206 m asl), a small, shallow restricted-drainage basin located 150 m west of Mamawi Creek just south of Mamawi Lake in the Athabasca sector, demonstrated open-drainage conditions during the 1700s (Hall *et al.*, 2004).

Differences among sites during the LIA suggest that basins within a relatively small area can reflect different signals in response to the same climatic and hydrological conditions. Sites located throughout the PAD likely reflect varying influences of climate and river hydrology due to site-specific location and elevation. In general, the extended records available indicated dry conditions in the northwest region (sites PAD 5 and 15) of the PAD and wet conditions in the central and southern regions (sites PAD 31 and 37). However, longer hydro-ecological records from more sites in different settings may provide the opportunity to refine interpretations of the role of regional climate, basin location and river hydrology during the LIA.

Sites PAD 9 and PAD 12 are low-lying, closed-drainage basins located in the northeast region of the PAD adjacent to the open-drainage network and may provide a record of changes in the hydrology of rivers and open-drainage lakes. PAD 9 and PAD 12 share similar local climatic conditions, however each site may demonstrate different responses to river hydrology. PAD 9 lies ~10 km northwest of Lake Athabasca and is separated by a frequently flooded, low-lying sedge meadow. Consequently, PAD 9 may reflect changes in water level on Lake Athabasca and flooding in the southern portion of the Peace sector. PAD 12 is located at the confluence of the Peace River and the Rivière des Rochers (the outlet of Lake Athabasca), and may record changes in the hydrology of either river. The locations of PAD 9 and PAD 12

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coupled with the hydro-ecological variability evident from the short core results suggested that these sites may provide longer records that would contribute to the understanding of the conditions in the PAD during the LIA.

Due to the differences between hydro-ecological records from sites PAD 5, 15, 37 and 31 within the context of the headwater dendroclimate history during the LIA, the PAD 9 and PAD 12 records were selected to be extended by conducting multiproxy analyses (e.g., diatom, macrofossil, $\delta^{13}C$, $\delta^{15}N$, cellulose-inferred lake water $\delta^{18}O$) on previously extracted sediment cores in order to better understand the relative roles of regional climate, local climate and hydrological conditions on different basins in the PAD.

The ~150 year record from PAD 9 developed by Hall *et al.* (2004) (Figure 4) showed that the site was submerged under a shallow embayment that extended off the west end of Lake Athabasca between the late 1800s and the early 1900s. Between ~AD 1910 and 1925, PAD 9 was inferred to be part of a flow-through, open-drainage lake, similar to the hydrology of presently open-drainage lakes (e.g., Mamawi Lake, Lake Richardson). Since ~1925, PAD 9 has existed as an isolated, closed-drainage basin. These hydrological changes are independently recorded on historical maps and air photographs (Mollard *et al.*, 2002) and discussed in relation to paleolimnological results by Hall *et al.* (2004).

Paleolimnological analyses on sediment collected in gravity short cores from PAD 12 provided a ~110 year record of hydro-ecological change, which indicated that the wettest conditions, likely restricted-drainage conditions, occurred at the base of the core between ~AD 1890 and 1930 (Figure 5), consistent with results at PAD 9. Since ~1930, a trend toward drier conditions and a shift toward closed-drainage hydrology was demonstrated (Hall *et al.*, 2004).

The short core records available from sites PAD 9 and PAD 12 depicted a unidirectional change from high water levels at the base of each record (e.g., PAD 9 embayment period, PAD 12 restricted-drainage period) to lower water levels and closed-drainage conditions at both sites. The unidirectional trend may be attributed to several mechanisms including isostatic rebound, sediment infilling caused by sediment deposition which may have separated PAD 9 from Lake Athabasca, and climatic changes that have resulted in lower water levels in the PAD. Longer records from PAD 9 and PAD 12 may help identify or eliminate some of the possible mechanisms.

RESEARCH OBJECTIVES

The objective of this research is to extend the analysis of diatom assemblages in sediment cores from sites PAD 9 and PAD 12 to ~1000 years BP in order to better understand the roles of regional climate, local climate and hydrologic processes on low-lying river-sensitive regions in the Peace sector, within the framework of known regional climate conditions (e.g., MWP, LIA). Hydro-ecological changes reconstructed from diatom assemblages were based on relationships described by Karst-Riddoch *et al.*, (In Preparation) and compared with macrofossil data provided by T. Asada and stable isotope data provided by Y. Yi (Ph.D. thesis in progress, Department of Earth Science, University of Waterloo). This research will address ecological and hydrological changes over a >1000 year period in the context of an independently derived climate record and in relation to other sites in the Peace-Athabasca Delta.
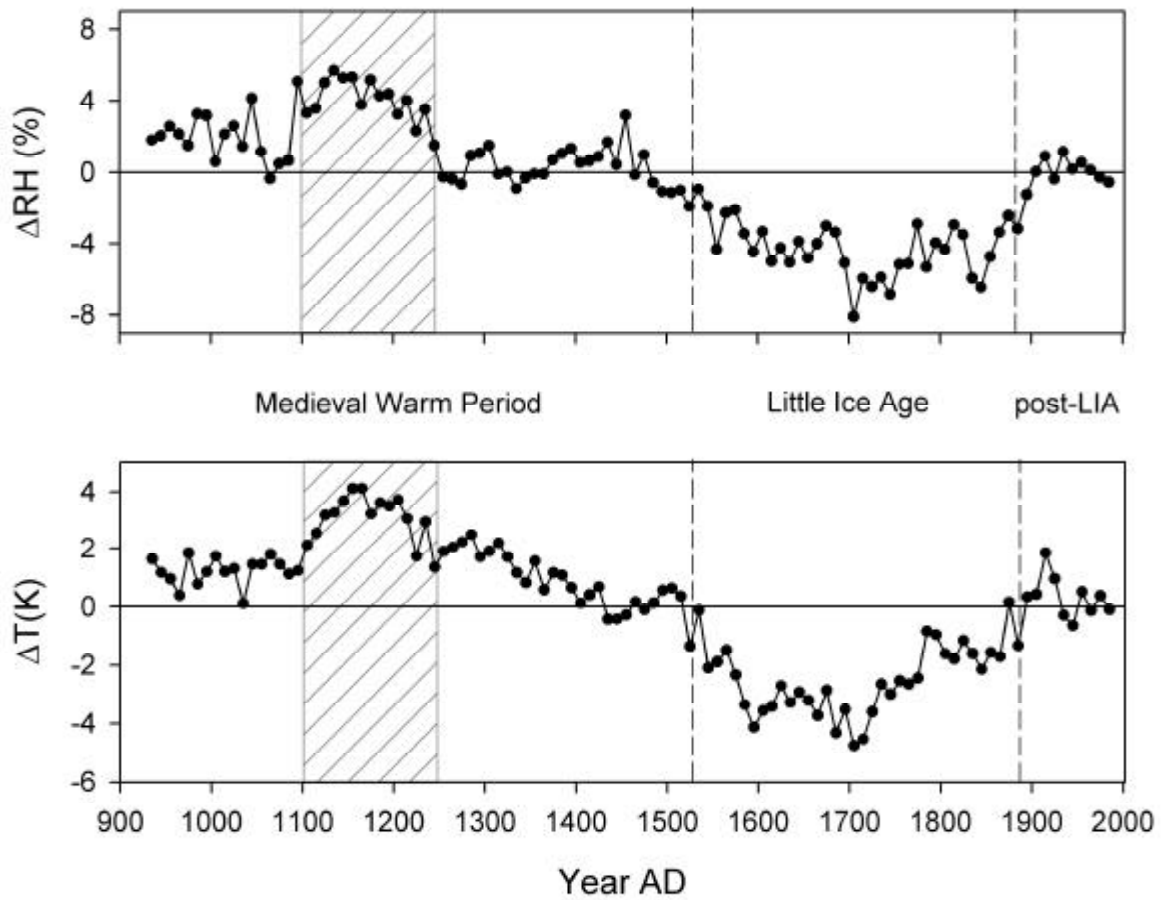
Figure 1. Diagram showing inferred variations of summer atmospheric moisture (ΔRH) and mean annual air temperature (ΔT) over the past 1000+ years in the eastern Canadian Rocky Mountains relative to the 1950-1990 mean indicated by the black horizontal line. The ΔRH and ΔT records are based on composite decadal δ^{18}O and δ^{13}C dendrochronologies. The grey, hatched box represents the 'High Medieval' and the vertical dashed lines represent the MWP-LIA boundary and the LIA-post-LIA boundary. Modified from Edwards *et al*. (2004b).
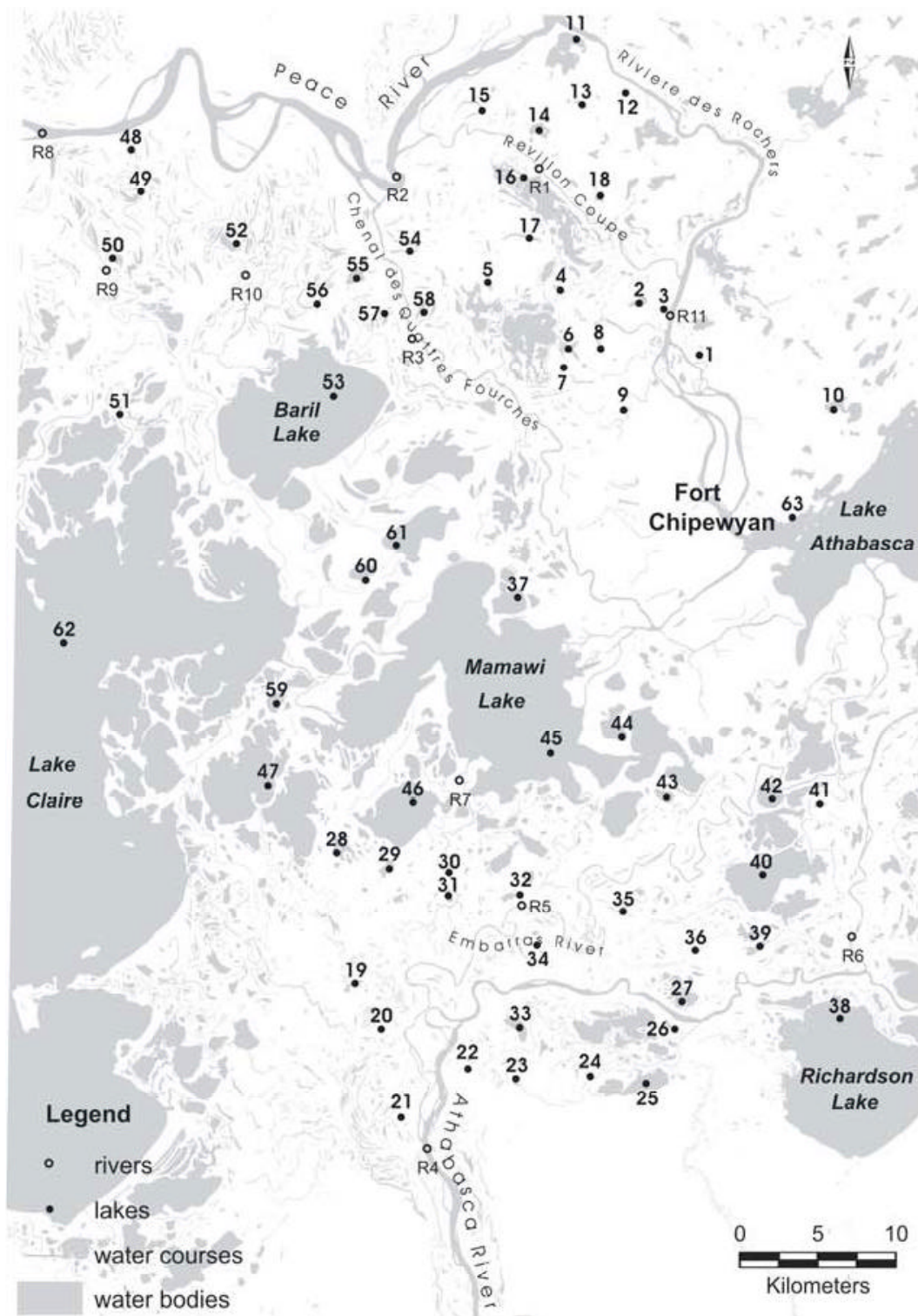
Figure 2. The Peace-Athabasca Delta showing the lakes and rivers sampled by Hall *et al.* (2004) in October 2000.
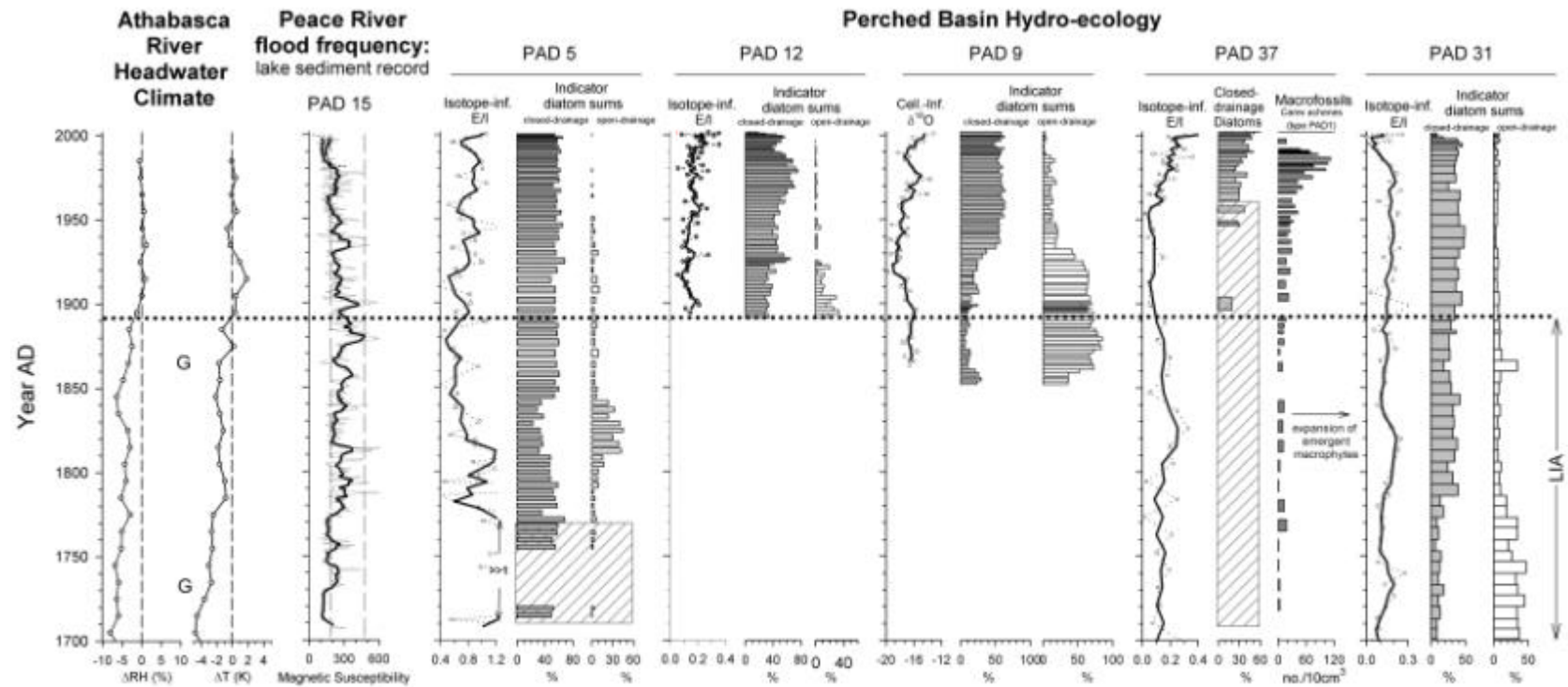
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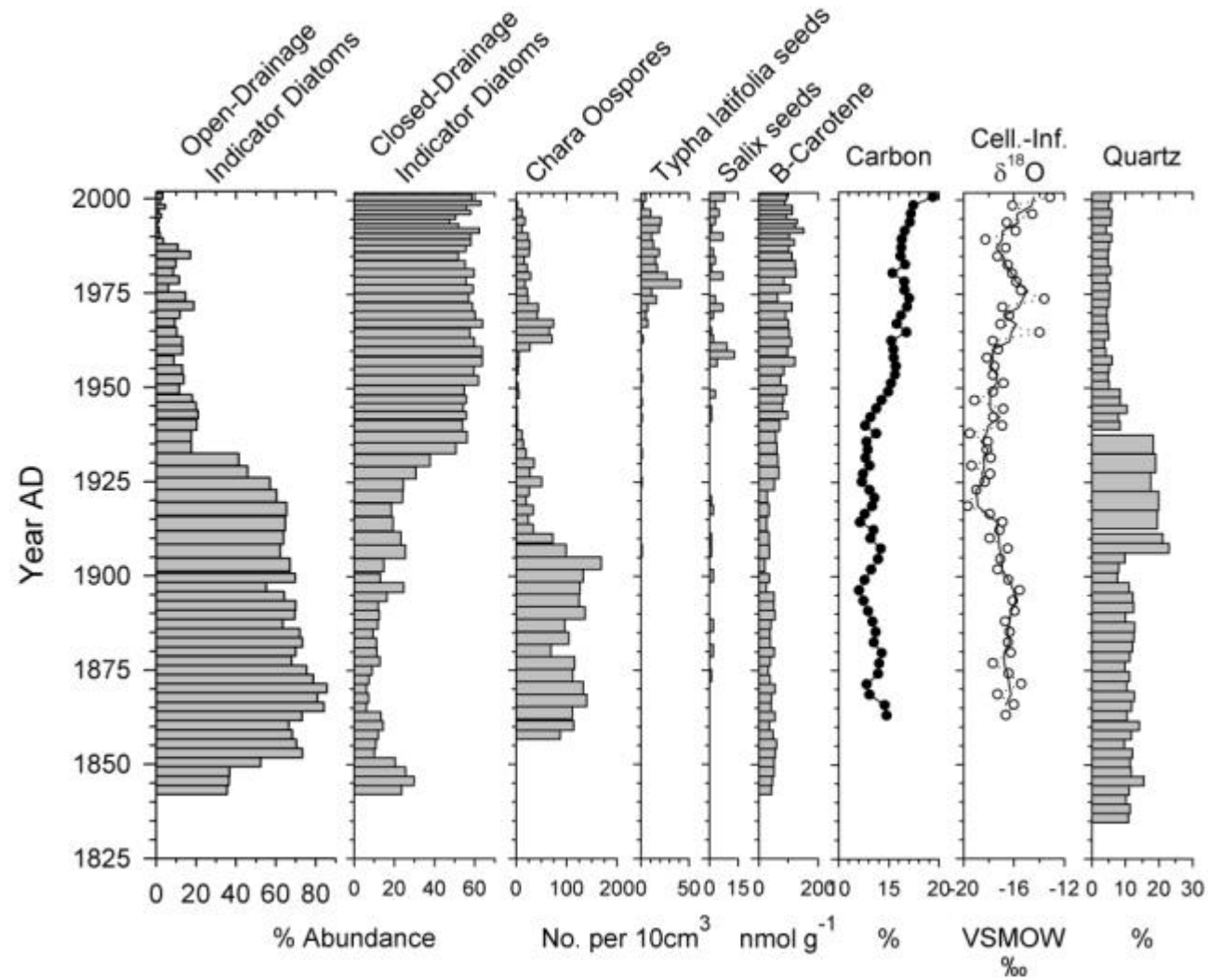
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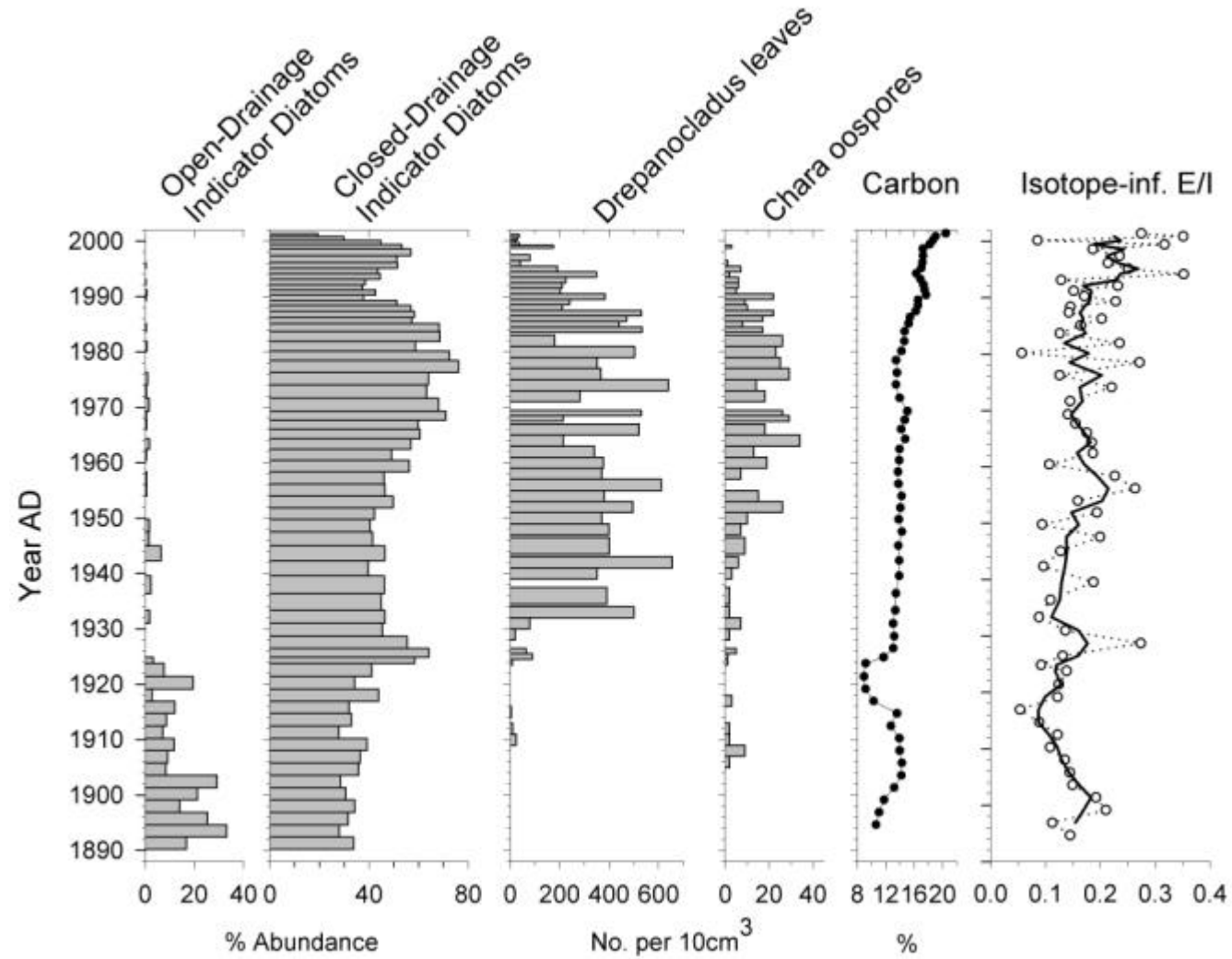
Figure 5. Summary profiles of paleolimnological indicators in short sediment cores from site PAD 12 in the Peace-Athabasca Delta. Modified from Hall *et al*. (2004).

METHODOLOGY

STUDY AREA AND SITE SECTION

The Peace-Athabasca Delta, is located at the confluence of the Peace, Athabasca and Birch Rivers, and is centred at approximately 59°N, 112°W. The 3900 km^2 delta is dominated by 4 large shallow lakes (Claire, Mamawi, Baril and Richardson) and numerous small basins of varying river-influence (e.g., open-, restricted-, closed-drainage), active and inactive channels, and vast wetland areas (Prowse and Conly, 1998; Prowse and Conly, 2002; Hall *et al.*, 2004) (Figure 2). Large areas within the PAD are dominated by sedge (*Carex atherodes*) and reed grasses (*Calamagrostis* spp.), slightly elevated areas support populations of willows (*Salix* spp.), and regions of increased elevation are able to support spruce (*Picea* spp.), poplar (*Populus* spp.), white spruce (*Picea glauca*), jackpine (*Pinus banksiana*) and white birch (*Betula papyrifera*) (Prowse and Conly, 2002). The shallow, closed-drainage basins support an abundance of emergent and submergent aquatic and semi-aquatic vegetation and are favourable habitats for muskrat, an animal of economic significance to the local people (Townsend, 1975). The PAD is also home to moose, bison, fish, waterfowl, and other migratory bird species (Townsend, 1975).

Sites PAD 9 and PAD 12 are located in the Peace sector of the Peace-Athabasca Delta. PAD 9 is a small, shallow, closed-drainage, open-water wetland located approximately 10 km northwest of Lake Athabasca, separated by a ~70 km^2 sedge meadow (Figure 2, Table 1). Surrounding vegetation consists primarily of willow shrubs, except for a small, forested bedrock outcrop along the south shore. PAD 9 was selected for the study because of a double fringe of dead willow shrubs indicating fluctuating water levels during recent decades, and because of its proximity to Lake Athabasca (Hall *et al.*, 2004).

PAD 12 is a small, round, shallow, closed-drainage, open-water wetland situated ~750 m southwest of Rivière des Rochers near the confluence with the Peace River in the northeast region of the Peace sector (Figure 2, Table 1). This site was selected to provide a history of hydrological and ecological change at the northeastern region of the PAD and because past water level fluctuations were apparent from high-water marks on exposed shoreline bedrock (Hall *et al.*, 2004). Due to its location, PAD 12 was thought to be susceptible to flooding via the Rivière des Rochers, or from direct overflow from the Peace River. Atypical of closed-drainage basins, PAD 12 is characterized by turbid, brown water, with relatively sparse submergent macrophyte growth and dominated by free-floating microalgae (Hall *et al.*, 2004).

FIELD AND LABORATORY METHODS

Long sediment cores were taken from central locations of PAD 9 (core LC3) and PAD 12 (core LC1) using a 10 cm diameter Russian peat corer in June 2001. PAD 9 core LC3 was collected ~200 m east of the coring location of the gravity short cores analysed by Hall *et al.* (2004). The long cores were sectioned into 0.5 cm intervals in the laboratory. Diatom samples were prepared following standard techniques (Hall and Smol, 1996). Briefly, wet sediment was placed in glass test tubes and treated with 10% HCl to remove carbonates. Samples were left to settle over 24 hours and the supernatant of each sample was removed. The remaining pellet was rinsed 4 times with distilled deionised water allowing a 24 hour settlement period and removal of the supernatant each time. Samples were then treated with ~10 mL of a solution of concentrated H_2SO_4 and HNO_3 and were placed in a water bath at 80-90°C for ~3 to 4 hours, stirring frequently. Samples were rinsed with distilled, deionised water approximately 9 times, until neutral pH. The well-mixed diatom slurries were placed onto 18 cm diameter coverslips at 4 different concentrations and allowed to dry completely. The coverslips were mounted onto

microscope slides using Naphrax. Samples and slides are stored at the University of Waterloo Environmental Change Research Laboratory.

Diatom taxonomic identification was based on publications by Krammer and Lange-Bertalot (1986-1991) and taxa were identified to the finest taxonomic resolution possible (typically to species or finer). Some diatom valves with problematic taxonomy were placed under the name *Fragilaria construens* var. *venter* cf. *pinnata* because they appeared as intermediate forms between *F. pinnata* and *F. construens* var. *venter*. An initial aim of 350 diatom valves per slide was set for each count, however, due to low diatom abundance relative to fine mineral content, a minimum of 150 valves were counted for approximately half the samples. In particular, low diatom counts were produced for the samples from the deeper half of PAD 9 core LC3 and more variably throughout PAD 12 core LC1. Stability curves were used to determine that the 350 and 150 minima were likely to estimate percent abundance of the diatom taxa reliably. However, a few counts of exceptionally poor quality were below the 150 valve minimum. Every sample between 10.0 and 29.0 cm and at least every second sample between 29.0 and 80.5 cm were counted for core LC3 from PAD 9. Diatom counts from PAD 12 core LC1 were completed on every second sample between 22.5 and 56.0 cm, every fourth sample between 56.0 and 68.0 cm and at least every eighth sample from 68.0 and 94.0 cm.

Diatom profiles were divided into zones using optimal partitioning in the computer program ZONE version 1.2. Zones were evaluated for significance using the broken stick method in the computer program BSTICK version 1.0 (Bennett, 1996).

Patterns of change in sedimentary diatom assemblages from PAD 9 and PAD 12 cores and their relationship to hydrological and limnological conditions were evaluated using canonical correspondence analysis (CCA) within the context of relationships between modern diatom

assemblages and environmental conditions determined from the spatial survey of 55 sites in the PAD by Karst-Riddoch *et al.* (In Preparation). PAD 9 LC3 and PAD 12 LC1 samples were plotted as supplementary data by depth and coded by zone.

The chronology of Russian cores PAD 9 LC3 and PAD 12 LC1 was based on a combination of CRS modelling of ^{210}Pb activity (Oldfield and Appleby, 1984) of gravity cores PAD 9 KB4 and PAD 12 KB3 respectively, with accelerator mass spectrometry (AMS) radiocarbon dates provided by plant macrofossils found in each long core.

^{210}Pb analysis was carried out at the Environmental Radiochemistry Laboratory, Freshwater Institute, Department of Fisheries and Oceans, Winnipeg, Manitoba, using alpha spectrometry. ^{210}Pb, a natural radioactive isotope of lead, provides a means of dating sediment from approximately 0 to 150 years BP (Appleby, 2001). One to three grams of sediment were analysed for ^{210}Pb by leaching in 6N HCl in the presence of a ^{209}Po tracer, autoplating Po onto a silver disc (Flynn, 1968), and counting the disc on an alpha spectrometer to determine ^{210}Pb using its ^{209}Po successor (Hall *et al.*, 2004). Resulting dates were modelled using the constant rate of supply model (CRS), which assumes constant rate of ^{210}Pb supply to the sediment while allowing for changing sedimentation rates (Appleby and Oldfield, 1978).

AMS radiocarbon dating of plant macrofossils was carried out at Beta Analytic Inc. in Miami Florida. In preparation for submission, samples were washed in distilled water and dried in an oven at 75°C. Samples were submitted in glass vials, wrapped in foil and plastic. Radiocarbon dates were calibrated to calendar years before present by the probability distribution method using the Intcal98 calibration curve (Stuiver *et al.,* 1998). Radiocarbon

dating provides a means of dating sediment as old as ~40,000 years BP, but is less reliable for young material (e.g., <300 years BP) (Svante and Wohlfarth, 2001).

Table 1. Summary of Russian core information for site PAD 9 and PAD 12 taken in June 2001.

Core	PAD 9 LC3	PAD 12 LC1
Date of Core Collection	June 2001	June 2001
Latitude (N) and Longitude (W)	58º46.46', 111º19.48'	58º57.29', 111º19.74'
Altitude (m asl)	208.8	209.8
Water Depth (cm)	~80	~90
Area (ha.)	~12	~5
Core Length (cm)	101.0	117.0
Number of Diatom Samples Analysed	95	49

PAD 9 RESULTS

ALIGNMENT OF GRAVITY AND RUSSIAN CORES

Russian core LC3 was aligned with gravity core KB4 based on the diatom profiles in order to construct an age-depth profile for core LC3. Patterns of diatom change corresponded well in the overlapping segments of the two cores without adjusting core depths for LC3 relative to KB4 and, therefore, no adjustments were made (Figure 6). The alignment was based primarily on the *Fragilaria pinnata* peak located at approximately 18 cm in both cores. Most of the dominant taxa showed sufficient alignment, for example, percent abundances of *Fragilaria pinnata* increased between 16 and 33 cm in both cores and the percent abundance of *Cocconeis placentula* var. *placentula* declined correspondingly. However, some discrepancies existed between the two cores. For example, percent abundance of *Fragilaria construens* var. *venter* peaked at 28 cm depth in core KB4 and between 17 and 20 cm depth in core LC3. More examples of dissimilarity between cores KB4 and LC3 were observed in some subdominant species. Ongoing studies are investigating two possible reasons for the discrepancy between cores: variability in sedimentation rates between cores and variability in diatom assemblage due to differences in hydro-limnological conditions across the ~200 m distance that separated the coring locations for cores KB4 and LC3 (Lau, Undergrad thesis in progress, Department of Biology, University of Waterloo).

CORE CHRONOLOGY

Since the initial study by Hall *et al.* (2004), AMS radiocarbon dates from plant macrofossils have raised doubts about the adequacy of the linear model used by Hall *et al.* (2004) for estimating core chronology from ^{210}Pb analysis. The ^{14}C dates from core LC3

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provided estimated ages of AD 540 and 220 at 74.5 and 78.75 cm depth, respectively (Table 2, Figure 7C), which suggested that the linear model likely provided inaccurate dates below ~17.75 cm (Figure 7A, B). Conversely, the constant rate of supply (CRS) model (Oldfield and Appleby, 1984) provided estimated dates which were more consistent with the AMS radiocarbon dates. The linear model assumes a constant sedimentation rate, whereas the CRS model assumes a constant flux of ^{210}Pb to the sediment and changing sedimentation rates (Oldfield and Appleby, 1984). The underlying assumptions of the linear model are unlikely to apply to PAD 9 and consequently the age-depth model has been revised based on the CRS model which was used to estimate sediment core chronologies for all other sites in the PAD that used ^{210}Pb analysis (Edwards *et al.*, 2004b). Extrapolation of dates below the level of unsupported ^{210}Pb activity was previously based on a linear regression of the linear model (Figure 7B), but was revised based on a linear interpolation between the base of the CRS model and the AMS radiocarbon dates from core LC3 (Figure 7C). The revised chronology for core KB4 shifted the core basal age from AD 1843 to 1579 (Figure 8).

The age-depth profile for core LC3 was established by linear interpolation between the CRS modelled age at 21.25 cm depth (KB4) and an AMS radiocarbon date provided by plant macrofossils at 74.5 cm depth (AD 540) of core LC3 (Figure 7C). Extrapolation of dates below the oldest radiocarbon date was based on linear regression of the linear interpolation between 74.5 and 78.75 cm depth. Despite varying sedimentation rates inherent in the multi-century timescale presented, the linear interpolation approach used represented the best estimate of chronology based on available information. Two other AMS radiocarbon dates were obtained near the base of core KB1 at 26.5 and 27 cm depth (AD 1500 and 1300 respectively), but were based on aquatic plant samples that are susceptible to contamination by "old carbon" (Table 2).

Accordingly, those dates were not used to develop the PAD 9 core LC3 age-depth profile (Edwards *et al.*, 2004b). The approach outlined above provided a basal age for core LC3 of ~AD 100 and a top age of ~1967, producing an approximately 1900 year record within core LC3.

REVISED SHORT CORE SUMMARY PROFILE

The revised chronology of PAD 9 core KB4 indicated a basal age of ~AD 1579, providing a ~422 year record within the 33 cm core. From the base of the core to ~AD 1900, the summary profiles (Figure 8) provided evidence supporting inundation of PAD 9 by a shallow embayment extending off the west end of Lake Athabasca. Evidence included relatively abundant open-drainage indicator diatoms and *Chara* oospores, relatively low abundances of closed-drainage indicator diatoms and macrofossils from emergent or shoreline plants, and cellulose-inferred lake water $\delta^{18}O$ values similar to present-day values of water in Lake Athabasca (-16.3 to -14.8‰). The paleolimnological data were consistent with conditions depicted in historical maps from 1827, 1884 and 1897, which illustrated higher water levels on Lake Athabasca and possible inundation of site PAD 9 under an embayment of Lake Athabasca (Figure 9).

Between ~AD 1900 and 1930, the summary proxy profiles indicated open-drainage conditions. In particular, the most depleted cellulose-inferred lake water $\delta^{18}O$ values and a quartz peak suggested strong river influence and a corresponding high energy environment. A historical map from 1917 depicts PAD 9 as part of a flow-through lake connected to Lake Athabasca by a river, which suggested receding water levels on Lake Athabasca relative to the embayment period (Figure 9).

From ~AD 1930 to 2001, the paleolimnological profiles indicated a shift to closed-drainage conditions. Specifically, an increase in abundances of closed-drainage indicator diatoms, a corresponding decline in open-drainage indicator diatoms, an increase in emergent and shoreline plant macrofossil remains and a trend toward more enriched cellulose-inferred lake water $\delta^{18}O$ values suggested a decline in river influence. Historical maps from 1927 and 1955 showed increasing isolation of PAD 9 from Lake Athabasca and a decline in river influence (Figure 9).

PAD 9 LC3 DIATOM PROFILES

Fossil diatoms were abundant and provided counts of at least 350 valves for samples between ~AD 1390 and 1967. From ~AD 130 and 1390, samples were of poor quality with low diatom abundance and dilution by high mineral content. A total of 132 diatom taxa were identified in core LC3, and 23 taxa had maximum abundances of >5% and occurred in at least 3 samples. The most common taxa were epiphytic taxa indicative of closed-drainage conditions (e.g., *Cocconeis placentula* var. *placentula*, *Achnanthes lanceolata* ssp. *frequentissima*, and *Nitzchia amphibia*) as determined by a spatial survey of surface sediment assemblages in 55 lakes in the PAD (Karst-Riddoch *et al.,* In Preparation), other mainly epiphytic forms that were not significantly associated with a hydrologic lake category (e.g., *Amphora libyca*, *Epithemia turgida* and *Gomphonema clavatum*), and small, benthic *Fragilaria pinnata* and *F. construens* var. *venter* indicative of open-drainage conditions.

Zonation analysis identified four statistically significant periods of distinct diatom assemblages and corresponding hydro-ecological conditions during the ~1900 year long sediment record of LC3 (Figure 10): ~AD 100-1600 (Zone 1), ~AD 1600-1860 (Zone 2), ~AD 1860-1930 (Zone 3), ~AD 1930-1967 (Zone 4).

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Canonical correspondence analysis of surface sediment samples from 55 sites in the PAD, which was used to provide a context for sedimentary diatom assemblages, identified 4 hydrological and 13 limnological significant variables ($p < 0.05$) as explanatory variables (Figure 11A) (Karst-Riddoch *et al.,* In Preparation). The minimum set of environmental variables that best described the variation in the diatom species data set were identified as $\delta^{18}O$, LEL offset, dP, Cl, K, Z_{max}. Sites and samples that demonstrate high $\delta^{18}O$ values and high nutrients and ions (dP, K, Cl) reflect enrichment and increased concentrations associated with evaporation characteristic of closed-drainage basins, whereas low $\delta^{18}O$ values and high nutrient and ion concentrations were characteristic of open-drainage basins. The LEL offset, the distance from the local evaporation line (LEL) in δ^2H-$\delta^{18}O$ space estimates the differences in the contribution of input sources of water (Wolfe *et al.,* 2006a). Specifically, offsets above the LEL denoted by positive values indicate a greater contribution from summer precipitation, whereas offsets below the LEL denoted by negative values indicate greater contributions from snowmelt (Wolfe *et al.,* 2006a). Accordingly, sites and samples that demonstrate higher LEL offset values and low maximum depths reflected conditions typical of shallow precipitation-influenced basins. Eigenvalues of the first two CCA axes ($\lambda_1 = 0.162$, $\lambda_2 = 0.129$) were significant ($p < 0.05$) and explained 11.1% of the variation in the diatom data (Karst-Riddoch *et al.,* In Preparation).

Zone 1

Between ~AD 100 and 1600, diatom assemblages were dominated by epiphytic taxa, in particular, *Amphora libyca* and *Cocconeis placentula* var. *placentula*. The percent abundance of centric diatoms was relatively low throughout the core and ranged from ~0 to 6% between ~AD 100 and 1100. Between ~AD 1100 and 1350, centric diatoms almost disappeared from

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the record. Percent abundances of *Fragilaria* taxa were low during this period, although modest abundances (~5-10%) were observed between ~AD 900 and 1250. When plotted passively in a CCA ordination of surface sediment diatom assemblages from surveyed PAD sites, zone 1 samples grouped together with the lowest sample scores along axes 1 and 2 compared to assemblages from subsequent zones. Zone 1 diatom assemblages were associated with limnological conditions characterized by high lake water δ^{18}O, dP, and ionic content relative to zones 2 and 3, similar to closed-drainage basins in the modern setting of the PAD (Figure 11).

Zone 2

At ~AD 1600, percent abundances of epiphytes *Amphora libyca* and *Cocconeis placentula* var. *placentula* declined by approximately 20%. *Fragilaria pinnata* increased from ~15 to 30% abundance and became the dominant species by the end of this period and *Nitzschia amphibia* increased from <10 to >20% of the diatom sum. In contrast to the short core diatom record (KB4), *Fragilaria construens* var. *venter* percent abundance remained low throughout much of this period. Sample scores for zone 2 diatom assemblages were positioned at higher values along CCA axes 1 and 2 relative to zone 1 indicating a shift to assemblages associated with depleted lake water δ^{18}O values and low concentrations of nutrients and ions (dP, K) typical of open-drainage basins in the modern setting of the PAD (Figure 11).

Zone 3

Between ~AD 1860 and 1930, the closed-drainage indicator diatoms and other epiphytic taxa declined to <5% abundance. *Fragilaria pinnata* and *F. construens* var. *venter* percent abundances increased to ~40 and ~50% of the diatom community, respectively. Zone 3 diatom

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sample scores plotted to the upper right quadrant of the CCA biplot outside the range of the lakes in the modern calibration set (Figure 11). These diatom assemblages were associated with low concentrations of nutrients and ions (dP, K) and depleted $\delta^{18}O$ values of surface water, similar to open-drainage sites of the modern calibration set.

Zone 4

At ~AD 1930, *Fragilaria pinnata* and *F. construens* var. *venter* populations declined to <5%. Concurrently, percent abundances of closed-drainage indicator diatoms and other epiphytic taxa increased, in particular *Cocconeis placentula* var. *placentula, Nitzchia amphibia* and *Amphora libyca.* Zone 4 sample scores grouped toward the center of the CCA biplot and overlapped with sample scores from zone 1. These diatom assemblages are characteristic of modern ponds with high lake water $\delta^{18}O$ values and high concentrations of nutrients and ions (dP, K) that typify closed-drainage basins.

MULTIPROXY SUMMARY OF PALEOENVIRONMENTAL CHANGES AT PAD 9

The summary profiles (Figure 12) show summed percent abundances of closed- and open-drainage indicator diatoms based on statistical association with hydrologic categories (Karst-Riddoch *et al.,* In Preparation) and emphasize the 4 zones outlined above. The summarized diatom data provides a means to compare the main trends apparent in the diatom profiles to other paleoenvironmental indicators, including plant macrofossils, cellulose-inferred lake water $\delta^{18}O$, $\delta^{13}C_{org}$ values, which can reflect changes in basin productivity, and isotope dendroclimate data from the Athabasca River headwaters. In general, low $\delta^{18}O$ values can indicate that inputs dominate the water balance of the basin and high $\delta^{18}O$ values can indicate greater influence of evaporation (Wolfe *et al.,* 2006a). However, changes in lake water $\delta^{18}O$

values can also reflect climatic shifts associated with shifts in the $\delta^{18}O$ of precipitation (Edwards *et al.*, 2004a).

Diatom Zone 1 (~AD 100-1600)

Closed-drainage indicator diatoms and the epiphyte *Amphora libyca* dominated diatom assemblage (~20-40% each) throughout zone 1 while occurrences of open-drainage indicator diatoms were negligible. Near the base of the core, between ~AD 200 and 800, concentrations of *Chara* oospores declined and abundances of *Amphora libyca, Carex, Typha* and *Chenopodium* increased. Concurrently, the cellulose-inferred $\delta^{18}O$ values indicated a trend toward more depleted values. $\delta^{13}C$ values declined at ~AD 550, consistent with low concentrations of *Chara* oospores, which were dominant among the macrofossils during this zone.

Between ~AD 800 and 1100, an increased abundance of *Chara* oospores was accompanied by decreased *Amphora libyca* percent abundances and an increase in the percent abundance of open-drainage indicators, including a small peak between ~AD 900 and 1000. From the base of the Athabasca River headwater climate record at ~AD 930 to 1100, positive relative humidity and temperature values were reconstructed, indicating relatively warm, wet conditions. The $\delta^{18}O$ record indicated generally more depleted values with increased variability during this period. $\delta^{13}C$ values increased from AD 800 to a peak at ~AD 1000 corresponding with *Chara* oospore concentrations.

Between ~AD 1100 and 1500, the isotope dendroclimate record indicated warm, wet conditions, which highlighted the 'High Medieval' between 1100 and 1250, and a transition to a more cool, dry climate at ~AD 1500. Between ~AD 1100 and 1150, the $\delta^{18}O$ record demonstrated a 4‰ enrichment and a more gradual enrichment trend until ~AD 1300,

consistent with low or no abundances of centric diatoms and dominance of closed-drainage indicator diatoms and the epiphyte *Amphora libyca* and a decline in *Chara* oospores. Between ~AD 1100 and 1600, occurrences of open-drainage indicator diatoms were more consistent. The δ^{13}C record demonstrated higher values until ~AD 1550, corresponding with relatively high percent abundances of closed-drainage indicator diatoms and the epiphyte *Amphora libyca*, but without coincident increased abundances of macrofossils from aquatic macrophytes or shoreline vegetation. At ~AD 1550 δ^{13}C values declined.

Diatom Zone 2 (~AD 1600-1860)

The Athabasca River headwater dendroclimate record was characterized by cool, dry conditions relative to zone 1. Open-drainage indicator diatoms increased from <5 to >35% abundance, and closed-drainage indicator diatoms declined to ~20% at ~AD 1600 but returned to ~40% abundance similar to values seen before AD 1600. Consequently, open- and closed-drainage indicator diatoms represented nearly equal percent abundances while *Amphora libyca* demonstrated a 30% decline in relative abundance. Core LC3 findings were inconsistent with core KB4 where open-drainage indicator diatoms reached nearly 90% abundance and closed-drainage indicator diatoms declined to ~10%. *Chara* oospores (type 2) declined, disappeared from the record and were also not observed in macrofossil counts from the short core. However, the other *Chara* macrofossils maintained moderate concentrations in core LC3. δ^{18}O values varied by ~3‰ between consecutive data points during this period, but displayed an overall trend toward higher values. δ^{13}C values were relatively depleted during this period, but demonstrated a trend toward higher values toward the top of zone 2.

Diatom Zone 3 (~AD 1860-1930)

The headwater climate record showed a trend toward wetter, warmer conditions during this period. Closed-drainage indicator diatoms declined from ~40 to <5% abundance, open-drainage indicator diatoms increased from ~40 to ~90% abundance and *Amphora libyca* demonstrated further declines in abundance. *Chara* oospores increased toward the end of this period, shortly after the open-drainage indicator diatom peak. Concentrations of *Typha, Carex, Chenopodium* and *Salix* macrofossils were either low in abundance or nonexistent. The $\delta^{18}O$ record demonstrated a trend towards lower values with a change of approximately 3‰ over the 70 year period. The $\delta^{13}C$ values were highest during this interval, but demonstrated a depletion following the trend seen in the $\delta^{18}O$ record.

Diatom Zone 4 (~AD 1930-1967)

During this period, the headwater dendroclimate record indicated temperature and relative humidity values similar to those seen at ~AD 1400. Open-drainage indicator diatom populations declined to <5% abundance and closed-drainage indicators increased to >50% abundance. Percent abundances of *Amphora libyca* increased to ~15%, similar to abundances seen in zone 3. Concentrations of *Typha, Carex* and *Salix* macrofossils increased consistent with a trend toward higher $\delta^{18}O$ values.

Table 2. AMS radiocarbon ages from PAD 9 cores KB1 and LC3 sediment records. Conventional radiocarbon ages are corrected for isotopic fractionation and are reported with a 1 σ error.

Core and Depth (cm)	Laboratory Number	Conventional radiocarbon age (yr BP)	Intercept of ^{14}C age with calibration curve (cal.yr. AD)	Calibrated age range AD (2 sigma)	Material dated
KB1 26.5	Beta-169365	360 ± 40	1500	1440-1640	*Potamogeton* seeds
KB1 27.0	Beta-169366	670 ± 40	1300	1270-1400	*Carex* seeds & wood
LC3 74.5	Beta-193586	1540 ± 40	540	420-620	*Sparganium, Carex, Scirpus & Rumex* seeds
LC3 79.0	Beta-193585	1830 ± 40	220	90-260	*Carex & Scirpus* seeds
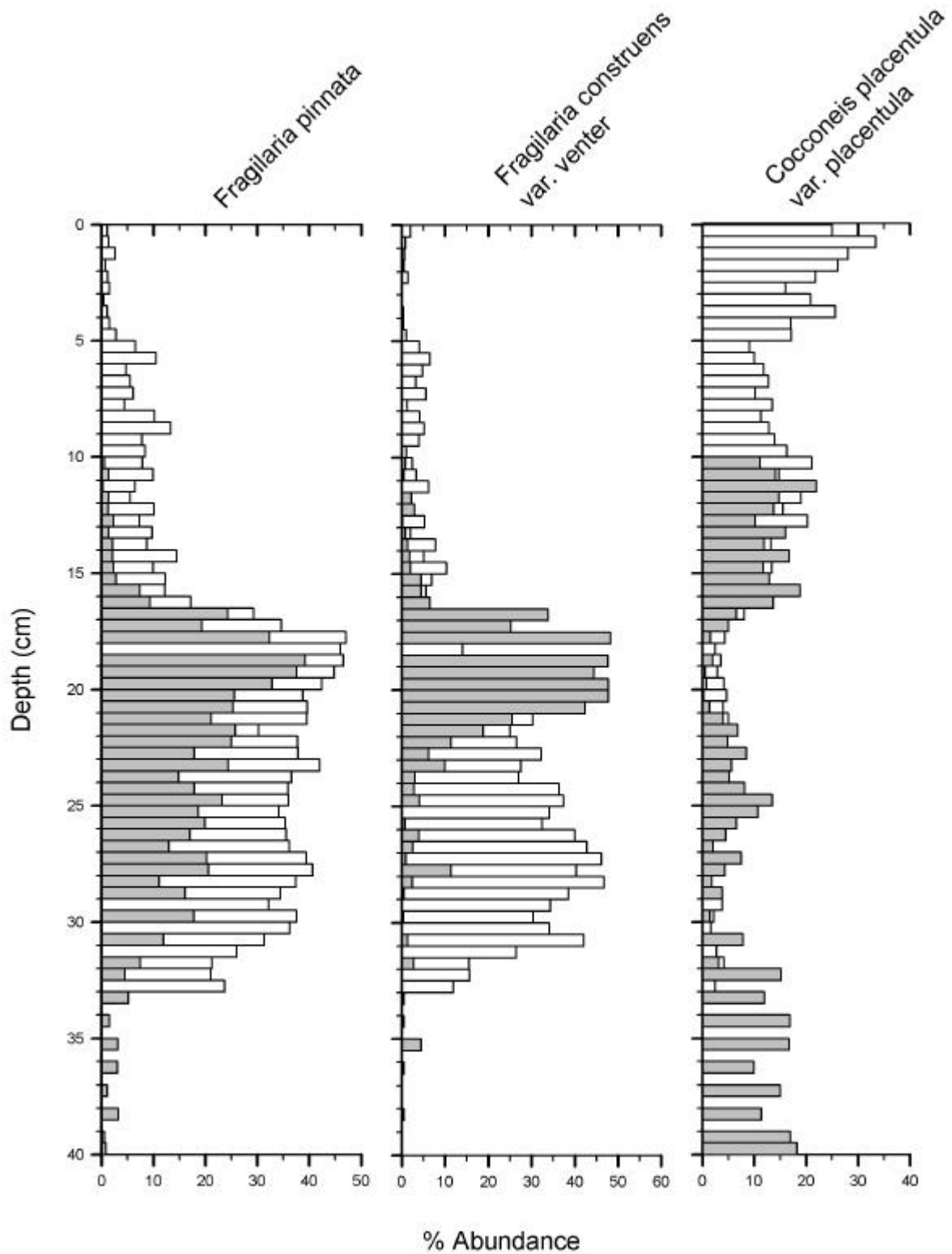
Figure 6. Profiles of percent abundance of dominant diatom taxa plotted by depth to align cores KB4 (□) and LC3 (■) from site PAD 9 in the Peace-Athabasca Delta.
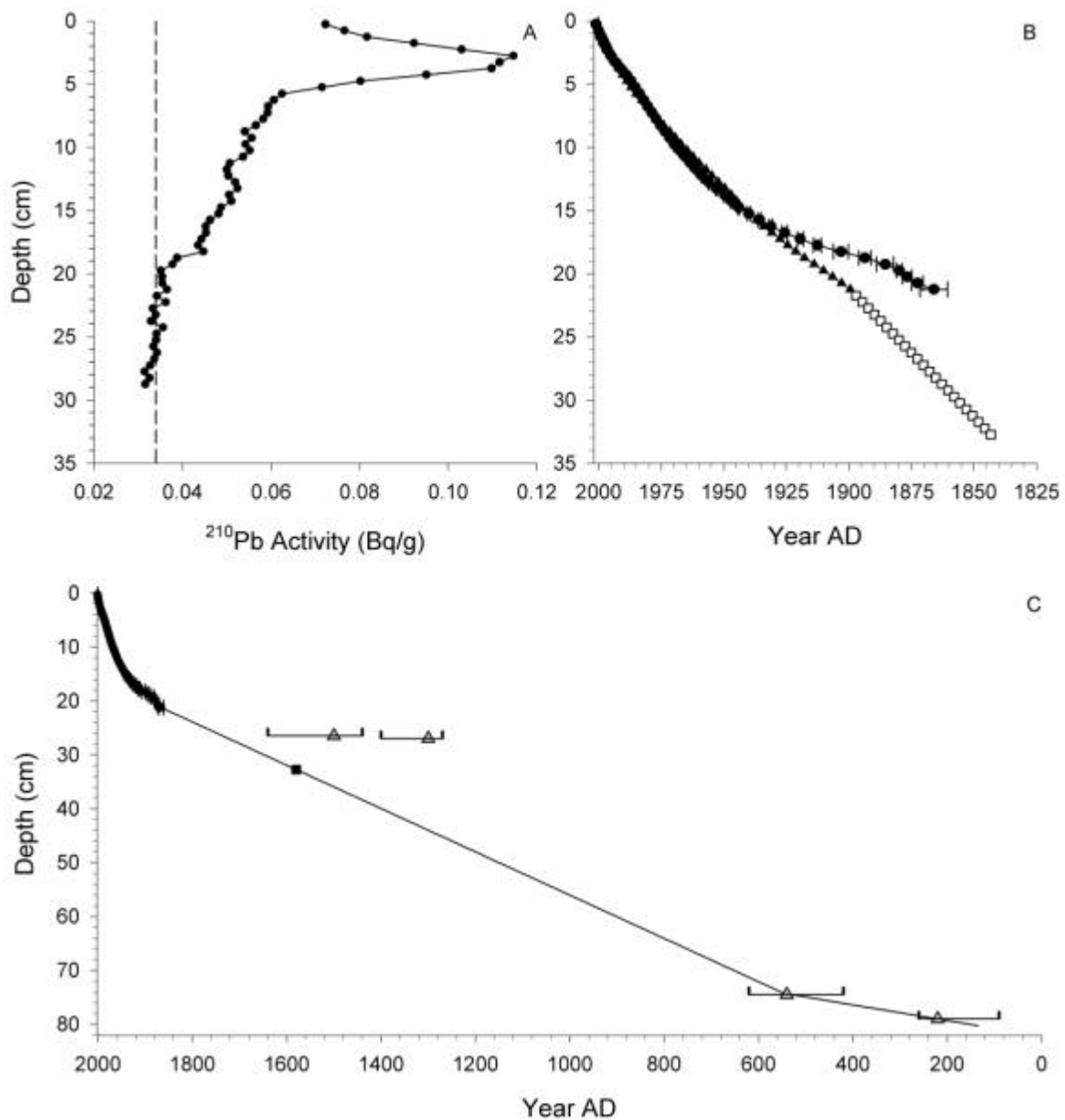
Figure 7. ^{210}Pb activity and age-depth profiles for PAD 9 sediment cores. (A) Total ^{210}Pb activity (•) versus depth of core KB4 and supported ^{210}Pb represented by the dashed line. (B) Age-depth relations as estimated using the CRS model (•) with estimated error (±2SD) and Linear model (▲) with extrapolated dates (□) to the base of core KB4 that were based on linear regression of the Linear modelled dates from 0.25 to 21.25 cm, as was developed by Hall *et al.* (2004). (C) Age-depth profile for core LC3, as used in this study, based on the CRS model (•) for core KB4 and calibrated ^{14}C dates (▲) from core LC3. The black line represents the linear interpolation between the base of the CRS model and the ^{14}C date for 74.5 cm (AD 540) as well as the linear interpolation between the ^{14}C dates for 74.5 cm and 79 cm (AD 220). (■) indicates the revised basal age of core KB4. Panels A and B are adapted from (Hall *et al.*, 2004) and C is modified from (Edwards *et al.*, 2004b).

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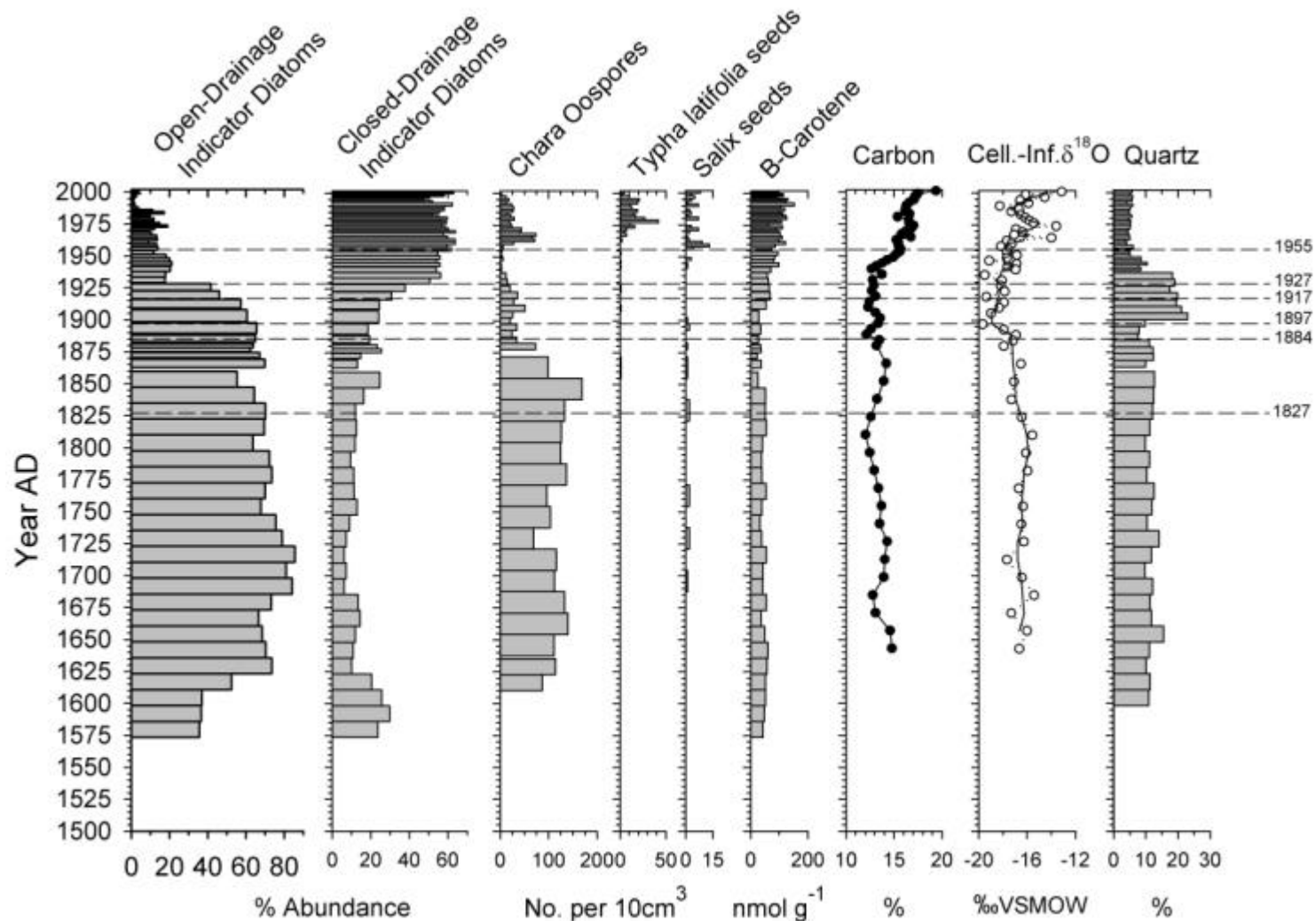
Figure 8. Summary of paleolimnological results from gravity short cores from PAD 9 from ~AD 1579 to 2001. Core chronology was revised from that prepared by Hall *et al.* (2004). Horizontal dashed lines indicate years for which historical maps are presented (see Figure 9).

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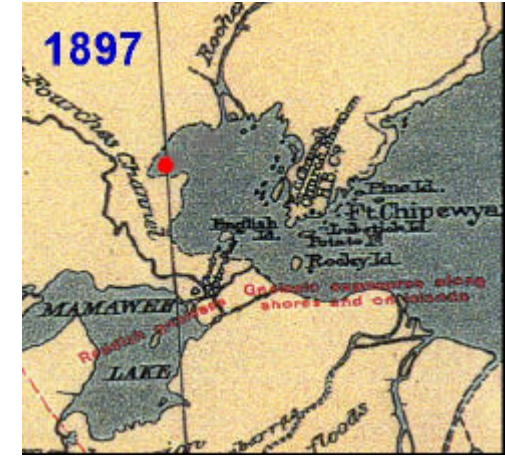
Figure 9. Historical maps for years indicated by Figure 8. The red dots represent an approximate location of PAD 9. The 1827 map is by Vandermaelen (1827). Maps from 1884 to 1955 are modified from Mollard *et al.* (2002).
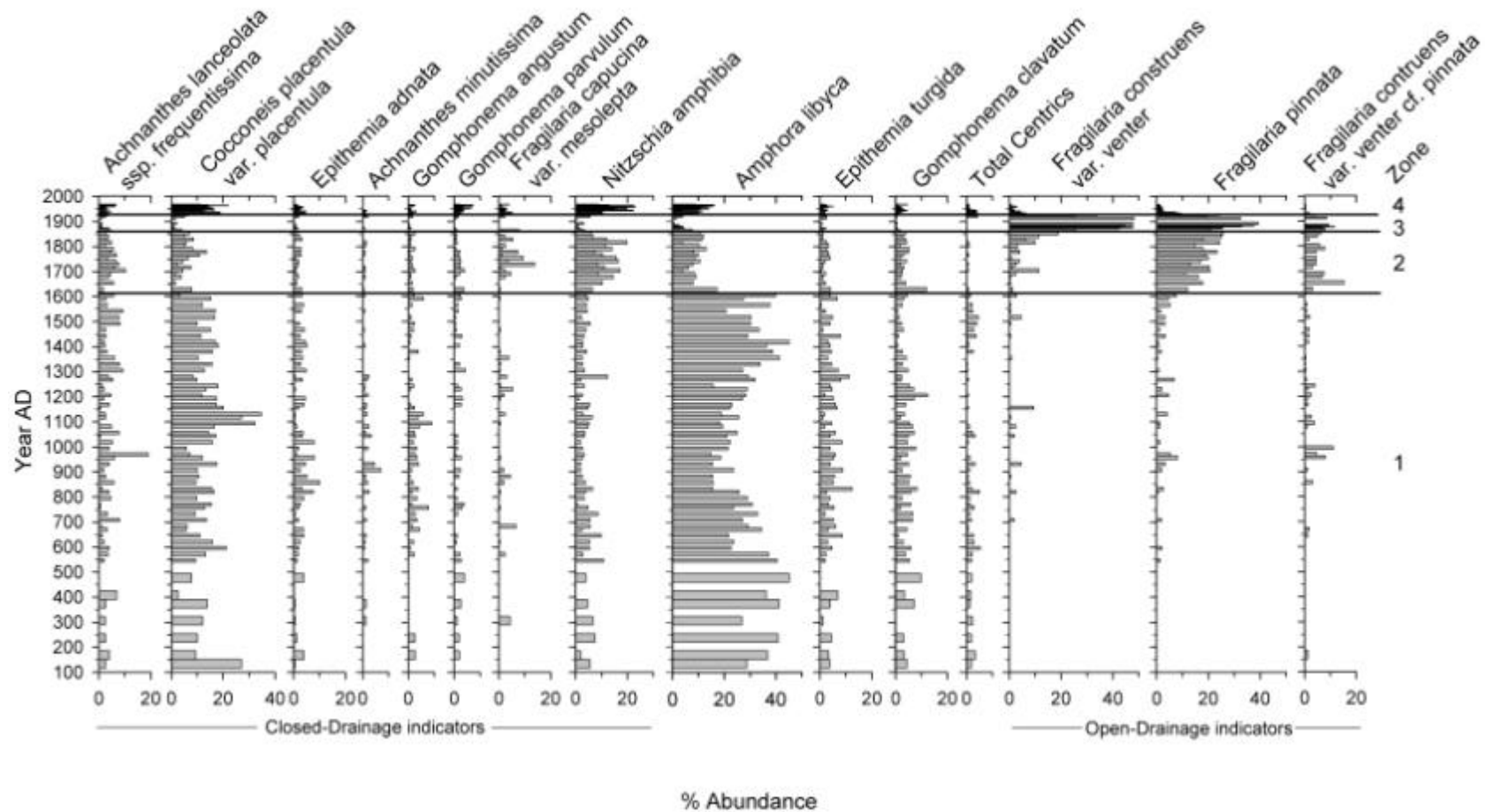
Figure 10. Stratigraphic profiles of dominant diatom taxa in core LC3 from PAD 9. Taxa that are not classified as closed- or open-drainage indicators were not significantly associated with either hydrological category.
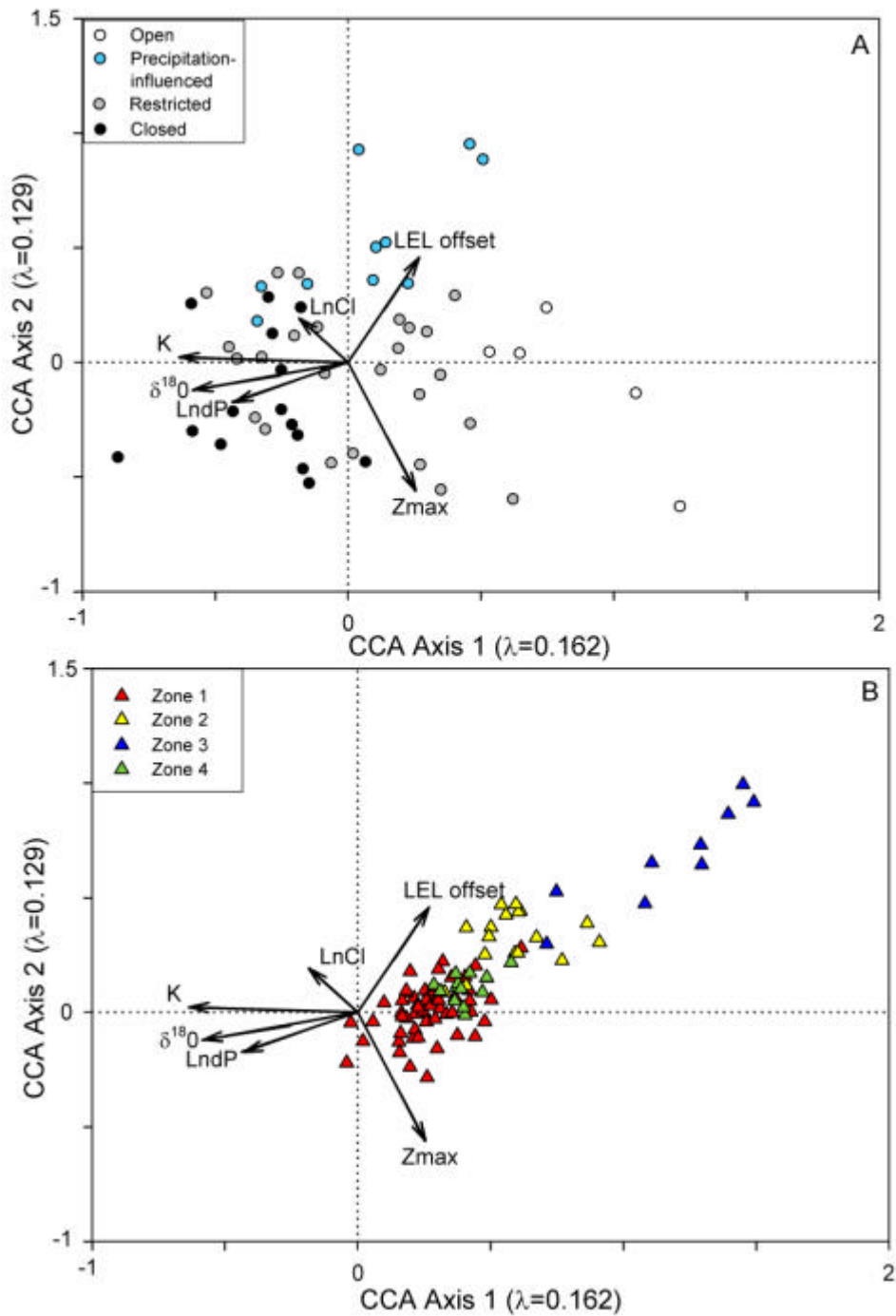
Figure 11. A. CCA ordination showing relationship between surface sediment diatom assemblages (as sample scores) from 55 lakes sampled in the PAD in October 2000 and measured hydrological and limnological variables (as biplot scores). Lakes were classified as open-, restricted- or closed-drainage and shallow precipitation-influenced. B. Sample scores for diatom assemblages in PAD 9 core LC3 were plotted as passive samples by zone within the CCA ordination space of the modern calibration set (A).
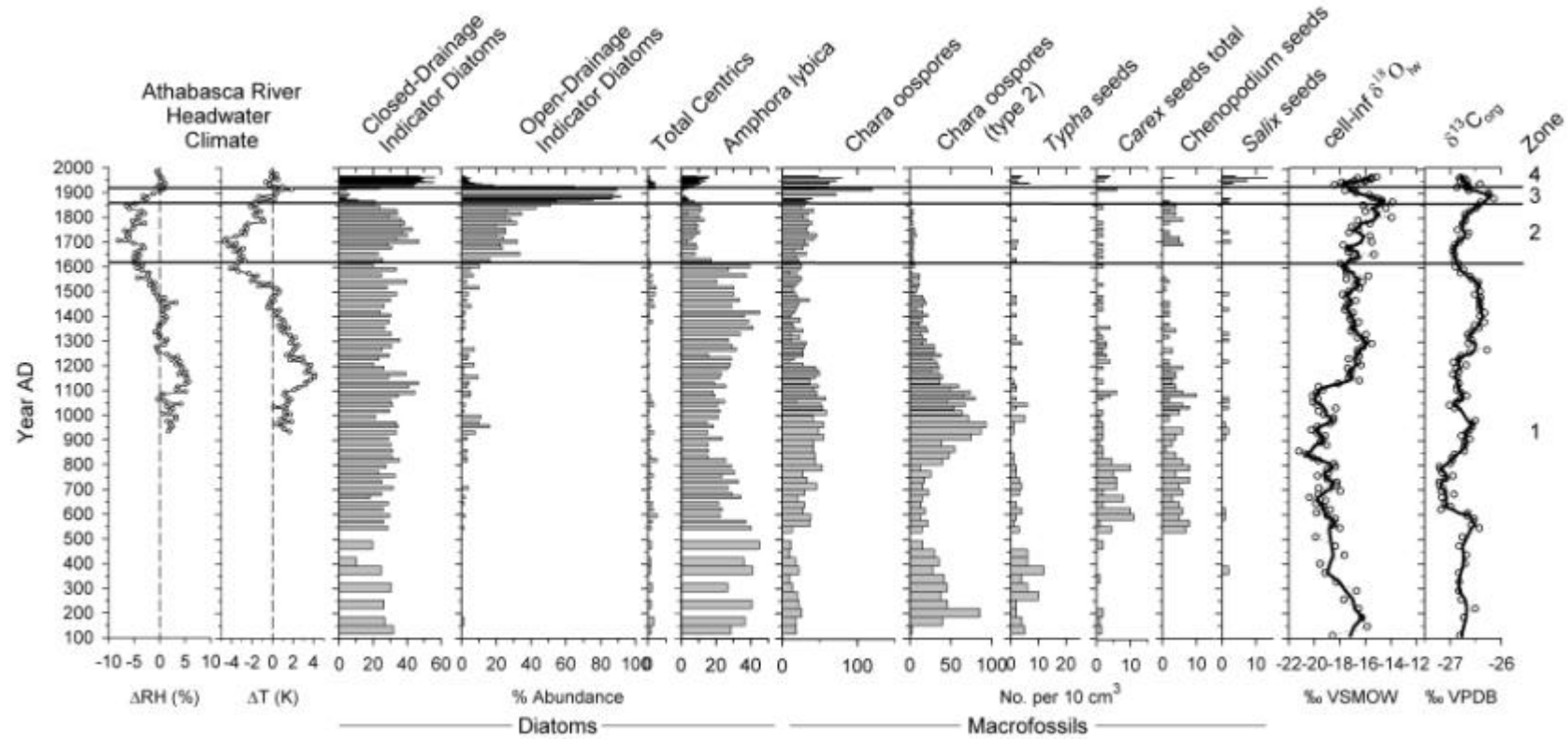
Figure 12. Summary of key proxy indicator data from diatoms, macrofossils and stable isotopes in core LC3 from PAD 9 and inferred variations of summer atmospheric moisture (ΔRH) and (ΔT) over the past ~1000 years from the Athabasca River headwater region. ΔRH and ΔT records were based on decadal $\delta^{18}O$ and $\delta^{13}C$ dendrochronologies and represent departures from the 1950-1990 mean (Edwards *et al.*, 2004b). Macrofossil, stable isotope data and Athabasca River headwater data were provided by T. Asada, Y. Yi and T.W.D. Edwards, respectively.

PAD 12 Results

Alignment of Gravity and Russian Cores

Russian core LC1 was aligned with the gravity short cores that were dated using ^{210}Pb analysis (Hall *et al.*, 2004) in order to construct an age-depth profile for core LC1 by lowering core LC1 by 6.5 cm. The alignment of the cores was based primarily on the $\delta^{13}C_{org}$ profiles from cores LC1 and KB2 (Figure 13). The downward shift of core LC1 provided sufficient alignment of the dominant diatom profiles in the interval of overlap between cores KB3 and LC1. For example, pronounced stratigraphic declines in percent abundance of *Fragilaria pinnata* from 30 to 25 cm depth and the trend toward higher percent abundances of *Achnanthes lanceolata* ssp. *frequentissima* from 25 to 23 cm depth corresponded well between cores.

Core Chronology

The chronology for PAD 12 core LC1 was based on AMS radiocarbon dates from plant macrofossil remains found in core LC1 and the ^{210}Pb-based chronology previously developed for core KB3 by Hall *et al.* (2004) (Figure 14). The PAD 12 short core chronologies were based on the ^{210}Pb activity profile of core KB3. The ^{210}Pb activity profile did not display a typical exponential decay curve, instead a large dilution of ^{210}Pb occurred between 7.25 and 10.25 cm and between ~23.25 and 24.75 cm. The CRS model was used to calculate dates to 23.25 cm and then linear regression of the CRS model was used to extrapolate dates between 23.25 cm depth and the base of the core because the CRS model could not adequately account for altered sedimentation rates due to apparent flooding. This provided a basal age of ~AD 1892 for core KB3 (30.5 cm) (Figure 14B) (Hall *et al.*, 2004). However, with the addition of a new radiocarbon date, the age-depth relationship for sediments below 23.25 cm was adjusted

by linear interpolation between 23.25 cm depth (~1924) of core KB3 and the AMS radiocarbon date of AD 420 at 119.0 cm depth from core LC1. As a result, the date of the bottom of core KB3 (30.25 cm) has been revised from ~AD 1890 to 1806 (Figure 14C).

An age-depth profile for core LC1 was established by linear interpolation between 23.25 cm of KB3 and the AMS radiocarbon date at 119.0 cm depth of core LC1 (Table 3, Figure 14C). While varying sedimentation rates are inherent in the depositional environment of PAD 12 over the multi-century timescale presented, the linear interpolation approach provided the best estimate of chronology based on the available information. The other reported AMS radiocarbon date, which was based on aquatic plant macrofossil remains at 80 cm depth of core LC1 (Table 3) appeared to be too old and consequently, was not used in the chronology development. Based on the approach outlined above, the base of the analysed portion of core LC1 (93.75 cm) dated to ~AD 736 and the uppermost sample analysed for diatoms (22.75 cm) dated to ~AD 1925, providing a ~1100 year record from core LC1 (Figure 14C).

PAD 12 LC1 DIATOM PROFILES

PAD 12 core LC1 contained more poor quality diatom samples with high mineral content relative to PAD 9 core LC3. Only one period of samples (~AD 1612-1847) contained relatively well-preserved diatoms at a higher abundance relative to mineral content. A total of 122 diatom taxa were identified in core LC1, and 25 taxa were present at a maximum abundance of >5% and occurred in at least 3 samples. The most common taxa were epiphytic diatoms indicative of closed-drainage conditions (e.g., *Cocconeis placentula* var. *placentula*, *Achnanthes lanceolata* ssp. *frequentissima*, *A. conspicua* and *Navicula laevissima*) as determined by spatial surveys of surface sediment diatom assemblages by Karst-Riddoch *et al.* (In Preparation), other mainly epiphytic forms that were not significantly associated with a

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hydrologic lake category (e.g., *Amphora libyca*, *Epithemia turgida* and *Gyrosigma acuminatum*), and small, benthic *Fragilaria pinnata*, indicative of open-drainage conditions. Zonation analyses of the ~1100 year diatom record from PAD 12 core LC1 identified five statistically significant zones (Figure 15): ~AD 820-1100 (Zone 1), ~AD 1100-1550 (Zone 2), ~AD 1550-1610 (Zone 3), ~AD 1610-1830 (Zone 4), ~AD 1830-1925 (Zone 5).

Zone 1

The diatom community was dominated by closed-drainage indicator taxa and other epiphytic diatoms. In particular, *Cocconeis placentula var. placentula* was the most abundant taxon and *Fragilaria* taxa and centric diatoms were not abundant. When plotted as passive samples within the CCA ordination space defined by surface sediment diatom assemblages and limnological variables from a 55 lake calibration set from the PAD (Karst-Riddoch *et al.,* In Preparation), sample scores for diatom assemblages during zone 1 plotted roughly toward the bottom left of the biplot indicating that assemblages were associated with high lake water $\delta^{18}O$ signatures and high concentrations of nutrients and ions (K, dP), typical of closed-drainage conditions (Figure 16).

Zone 2

The transition between zone 1 and zone 2 was marked by a decline in *Cocconeis placentula* var. *placentula* from ~30 to <20% abundance and an increase in *Achnanthes conspicua*, an epiphytic diatom, from <2 to >20% abundance. Occurrences of *Gyrosigma acuminatum*, *Fragilaria* taxa and centric diatoms increased slightly during this zone. Sample scores for zone 2 based on diatom assemblage grouped toward the right of the biplot, associated with low lake

water $\delta^{18}O$ values and low concentrations of nutrients and ions (K, dP) relative to zone 1 (Figure 16).

Zone 3

Between ~AD 1550 and 1610, the diatom community was characterized by increased abundances of *Gyrosigma acuminatum* from <10 to almost 40% and a decline in *Achnanthes conspicua* abundances to <5%. Zone 3 sample scores plotted toward the right, associated with depleted lake water $\delta^{18}O$ values and low concentrations of nutrients and ions (K, dP) relative to zones 1 and 2 (Figure 16).

Zone 4

Fragilaria pinnata increased to ~40% abundance at the base of the zone and reached the highest abundance of the entire sediment record during this zone. In general, the percent abundance of closed-drainage indicator diatoms and other epiphytic diatoms declined. In particular, *Amphora libyca*, *Epithemia adnata*, *E. turgida* and *Gyrosigma acuminatum* abundances declined appreciably. Zone 4 sample scores grouped toward the upper right quadrant of the biplot, were characterized by high LEL offset values, lower concentrations of nutrients and ions (K, dP) and low lake water $\delta^{18}O$ values and overlapped with modern restricted-drainage sites (Figure 16).

Zone 5

Between ~AD 1830 and 1925, percent abundances of open-drainage indicator *Fragilaria pinnata* declined and abundances of several closed-drainage indicator diatoms (e.g., *Cocconeis placentula* var. *placentula*, *Achnanthes lanceolata* ssp. *frequentissima*, *Navicula laevissima*) increased. Zone 5 sample scores showed greater variability in the CCA ordination space

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relative to the other zones and overlapped with samples from zones 1, 2 and 3. The diatom assemblages from zone 5 were associated with variable in lake water $\delta^{18}O$ values and concentrations of nutrients and ions (K, dP) but demonstrated closed-drainage characteristics relative to assemblages from zone 4 (Figure 16).

MULTIPROXY SUMMARY OF PALEOENVIRONMENTAL CHANGES AT PAD 12

The summary profiles of the open- and closed-drainage indicator diatoms emphasize the 5 zones outlined above. The summarised diatom data provided a means to compare the main trends in diatom community composition to other key indicators including plant macrofossils, $\delta^{13}C_{org}$ results and isotope dendroclimate data from the Athabasca River headwaters (Figure 17). The cellulose inferred lake water $\delta^{18}O$ record for PAD 12 core LC1 is not yet available.

Diatom Zone 1 (~AD 820-1100)

Between ~AD 820 and 1100, closed-drainage indicator diatoms demonstrated relatively high but variable percent abundances (30-55%) and percent abundances of open-drainage diatoms were low (0-3%). Concentrations of *Drepanocladus* and *Calitriche* remains were relatively high at the base of the core but declined during this period. Conversely, abundances of *Chara* oospores and ostracod shells increased. $\delta^{13}C_{org}$ values were stable at ~24.5‰ during this period. Between the base of the dendroclimate record at ~AD 930 and 1100, inferred climatic conditions were relatively wet and warm.

Diatom Zone 2 (~AD 1100-1550)

Between ~AD 1100 and 1550, the headwater dendroclimate record indicated a shift to wet and warm conditions relative to zone 1, which highlighted the 'High Medieval' between ~AD 1100 and 1250. Between ~AD 1100 and 1350, closed-drainage indicator diatom abundances

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(>20%), *Chara* oospore and ostracod shell concentrations and $\delta^{13}C_{org}$ values (~-27‰) decreased while abundances of *Achnanthes conspicua* and *Drepanocladus* increased. At ~AD 1450, closed-drainage indicator diatoms peaked at ~50% abundance while *Achnanthes conspicua* abundances and concentrations of *Drepanocladus* remains decreased. Between ~AD 1470 and 1550, abundances of *Drepanocladus*, *Chara*, *Nitella* and ostracod remains and $\delta^{13}C_{org}$ values increased while closed-drainage indicator diatom abundances decreased.

Diatom Zone 3 (~AD 1550-1610)

Between ~AD 1550 and 1610, the isotope dendroclimate record indicated a trend toward a cool, dry climate relative to previous conditions. While percent abundances of open- and closed-drainage indicator diatoms showed little change, *Gyrosigma acuminatum* demonstrated a distinct peak (<40%), which largely defined this zone. Concurrently, *Drepanocladus* remains and *Chara* and *Nitella* oospore concentrations declined and $\delta^{13}C_{org}$ values demonstrated a trend toward more depleted values.

Diatom Zone 4 (~AD 1610-1830)

Between ~AD 1610 and 1830, the isotope dendroclimate record indicated cooler and drier conditions relative to zone 3 conditions and encompassed much of the LIA. Open-drainage indicator diatoms increased from <10% to a peak of ~55% abundance at ~AD 1725 and *Gyrosigma acuminatum* abundances declined from nearly 40 to <5%, but closed-drainage indicator diatoms sustained ~30% abundance similar to values seen at the end of zone 2. During this period, plant macrofossils and ostracod shells were present in low abundances and $\delta^{13}C_{org}$ values became slightly higher (~-25.0‰) relative to zone 3.

Diatom Zone 5 (~AD 1830-1925)

Between ~AD 1830 and 1925, the isotope dendroclimate record indicated a trend toward wetter and warmer conditions. Closed-drainage indicator diatoms increased from ~25 to 50%, while open-drainage indicator diatoms declined from ~40 to <20% abundance. $\delta^{13}C_{org}$ values decreased by ~2‰ to ~-27.0‰. The macrofossil analysis of the sediment core ended at the sample aged at ~AD 1870 and did not show any notable change during the last period.

Table 3. AMS radiocarbon ages from PAD 12 LC1 sediment record. Conventional radiocarbon ages are corrected for isotopic fractionation and are reported with a 1 σ error.

Depth (cm)	Laboratory Number	Conventional radiocarbon age (yr BP)	Intercept of ^{14}C age with calibration curve (cal.yr. AD)	Calibrated age range AD (2 sigma)	Material dated
80.0	Beta-193584	1410 ± 40	650	580-680	*Ceratophyllum demersum* & *Potamogeton* seeds
112.5 (119.0 – adjusted)	Beta-160220	1630 ± 40	420	350-530	*Cyperaceae* seeds, wood fragments & spruce needles
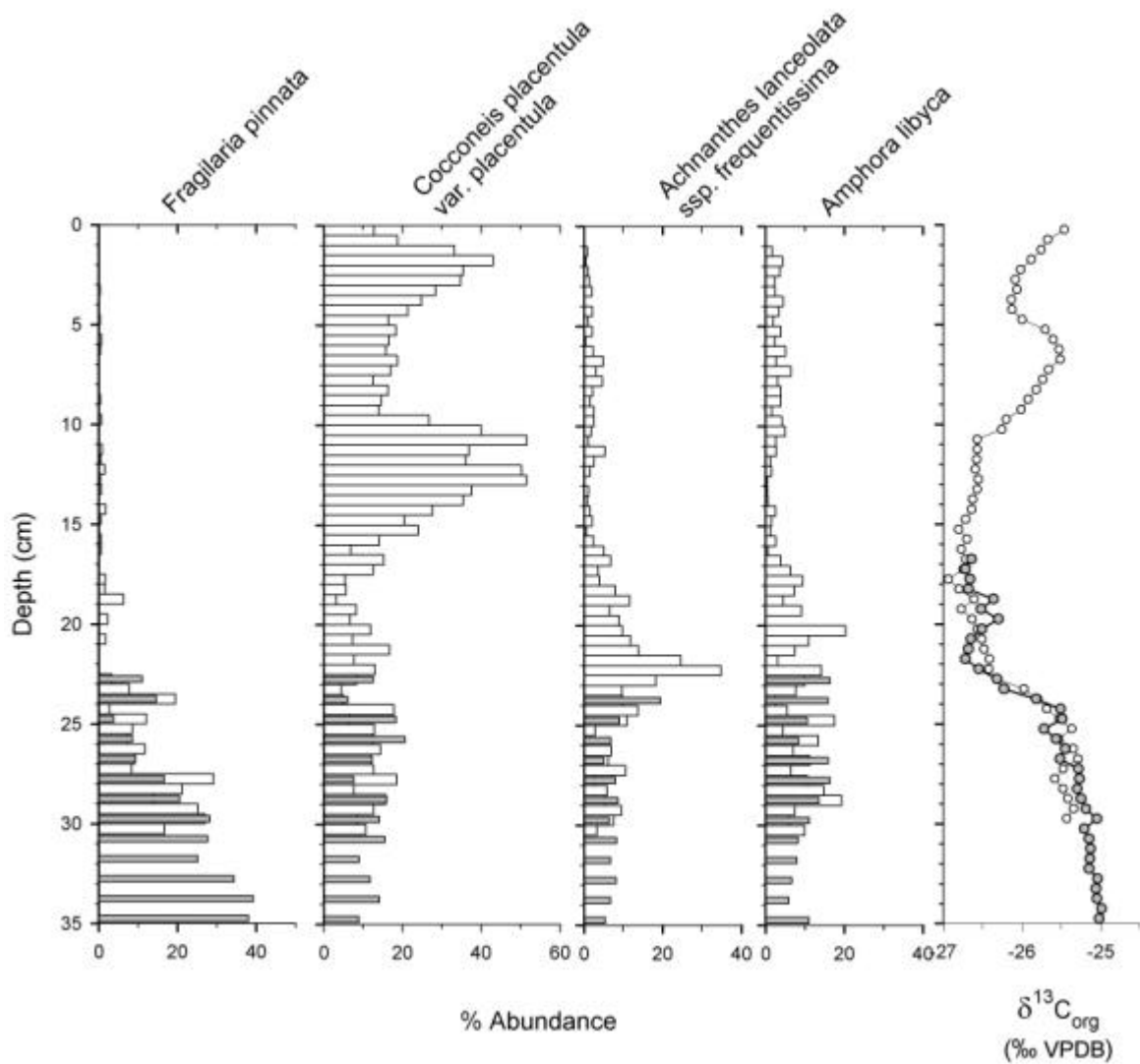
Figure 13. Percent abundance profiles of the dominant diatom taxa and $\delta^{13}C_{org}$ profile plotted by depth to align cores KB2 (o), KB3 (□) and LC1 (■,•) from PAD 12. Core depth refers to depths in cores KB2 and KB3, whereas depth in core LC1 was shifted down 6.5 cm to match stratigraphic patterns.
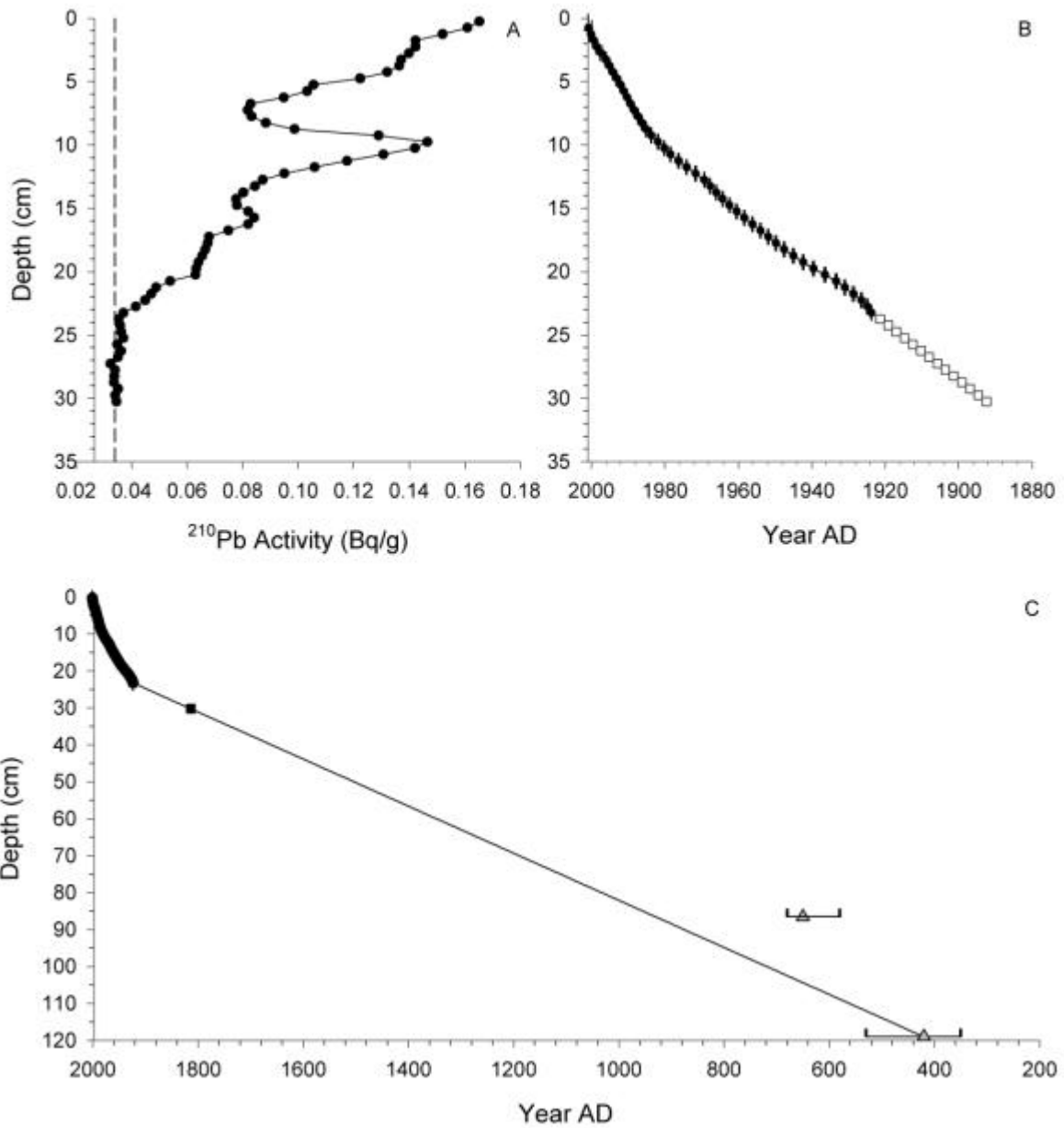
Figure 14. [210]Pb activity and age-depth profiles for PAD 12 cores. (A) Total ^{210}Pb activity (•) versus depth for core KB3 and supported ^{210}Pb represented by the dashed line. (B) Age-depth relations as estimated using the CRS model (•) with estimated error (±2SD) for KB3. Dates were extrapolated to the base of core KB3 (■) based on linear regression of the CRS modelled dates from 10.25 to 23.25 cm. (C) Age-depth profile for core LC1 based on the CRS (•) model estimated from KB3 and calibrated ^{14}C dates (▲) from core LC1. The black line represents the linear interpolation between the base of the CRS model and the ^{14}C date for 119.0 cm (adjusted depth; AD 420). (■) represents the revised basal date of core KB3 based on linear interpolation. A and B are adapted from Hall *et al.* (2004).

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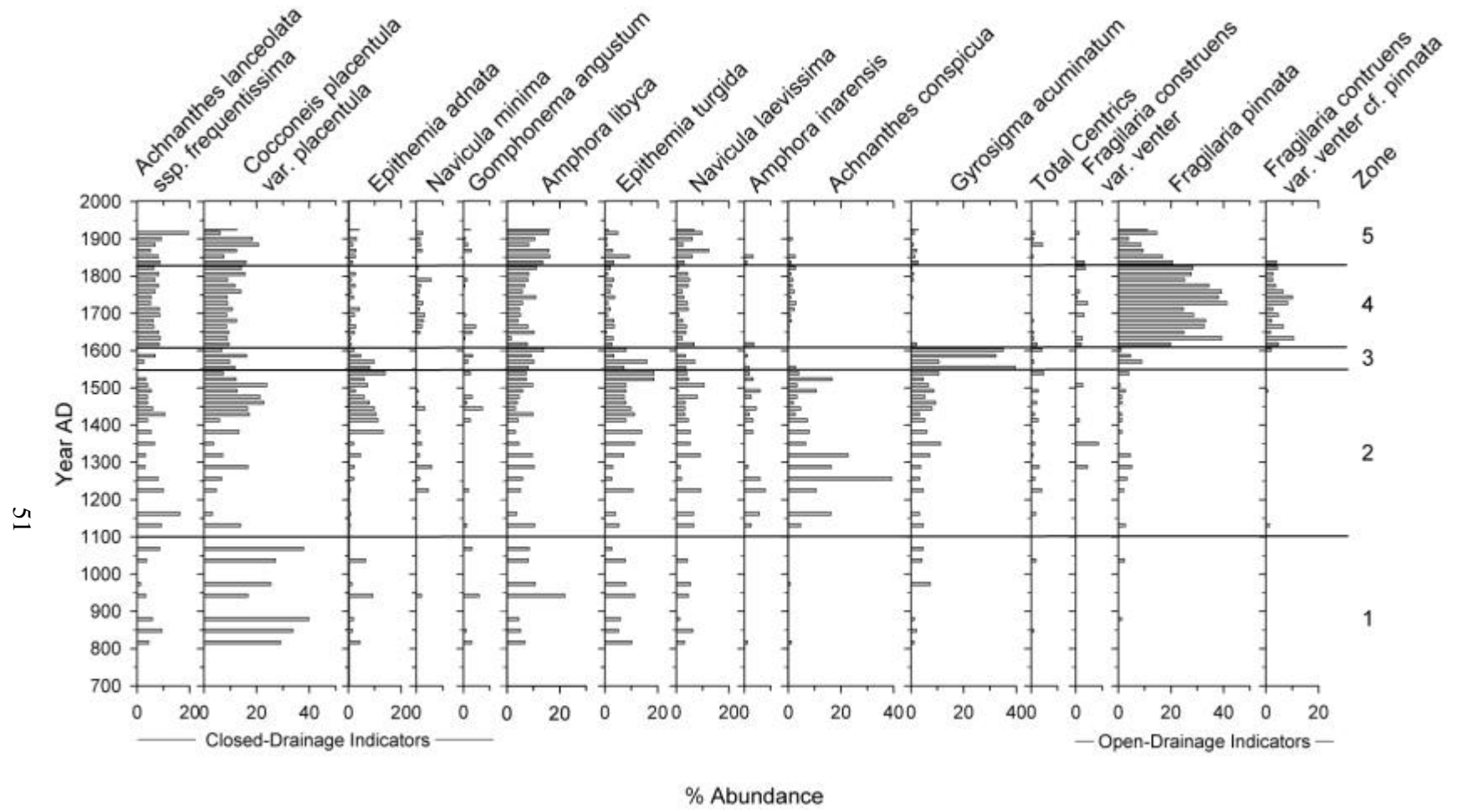
Figure 15. Diatom relative abundance profiles of dominant taxa in PAD 12 core LC1. Taxa that are not classified as closed- or open-drainage indicators were not significantly associated with either hydrological category.
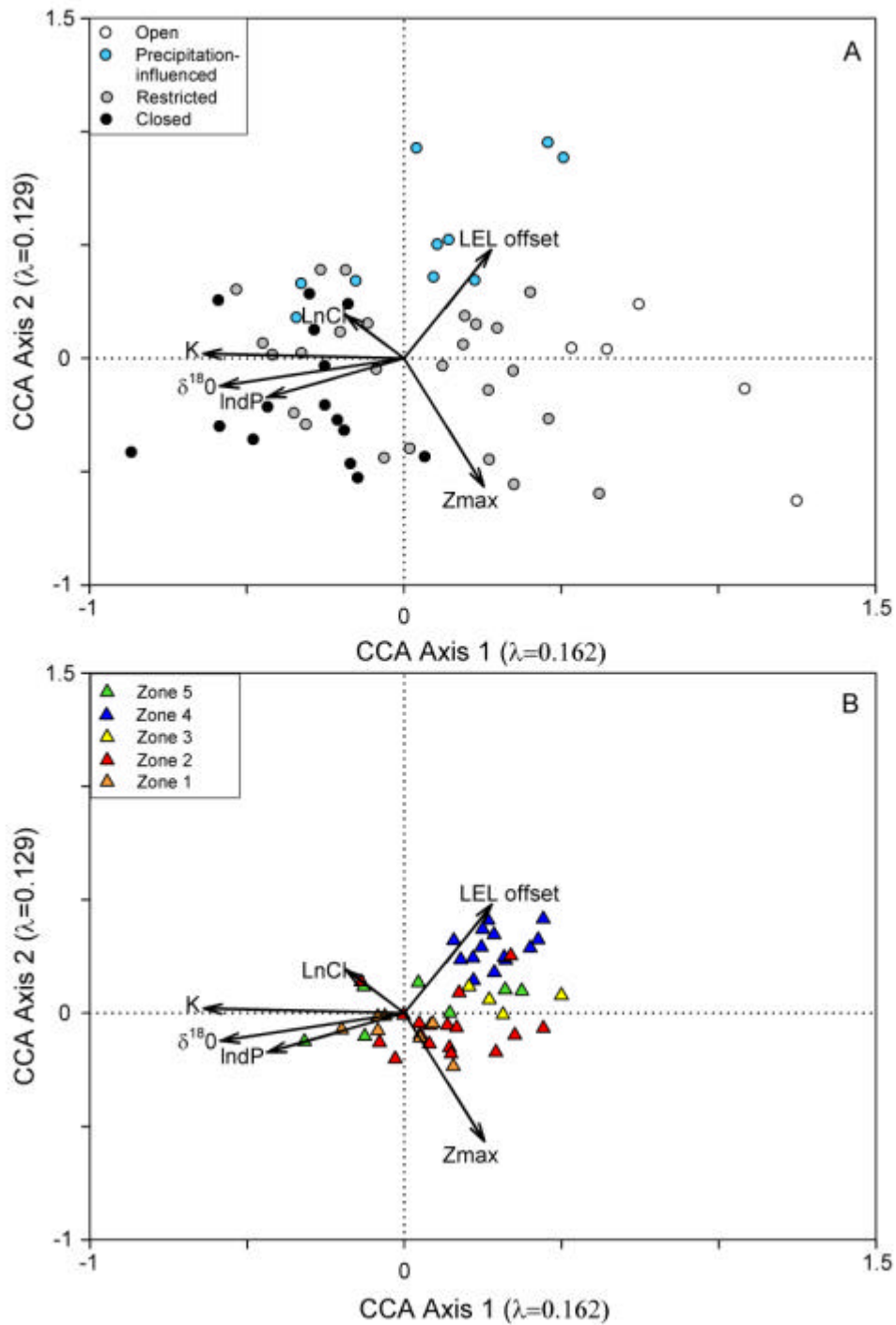
Figure 16. A. CCA ordination showing relationship between surface sediment diatom assemblages (as sample scores) from 55 lakes sampled in the PAD in October 2000 and measured hydrological and limnological variables (as biplot scores). Lakes were classified as open-, restricted- or closed-drainage and shallow precipitation-influenced. Modified from Karst-Riddoch *et al.* (In Preparation). B. Sample scores for diatom assemblages in PAD 12 core LC1 were plotted as passive samples and coded by zone within the CCA ordination space of the modern calibration set (A).
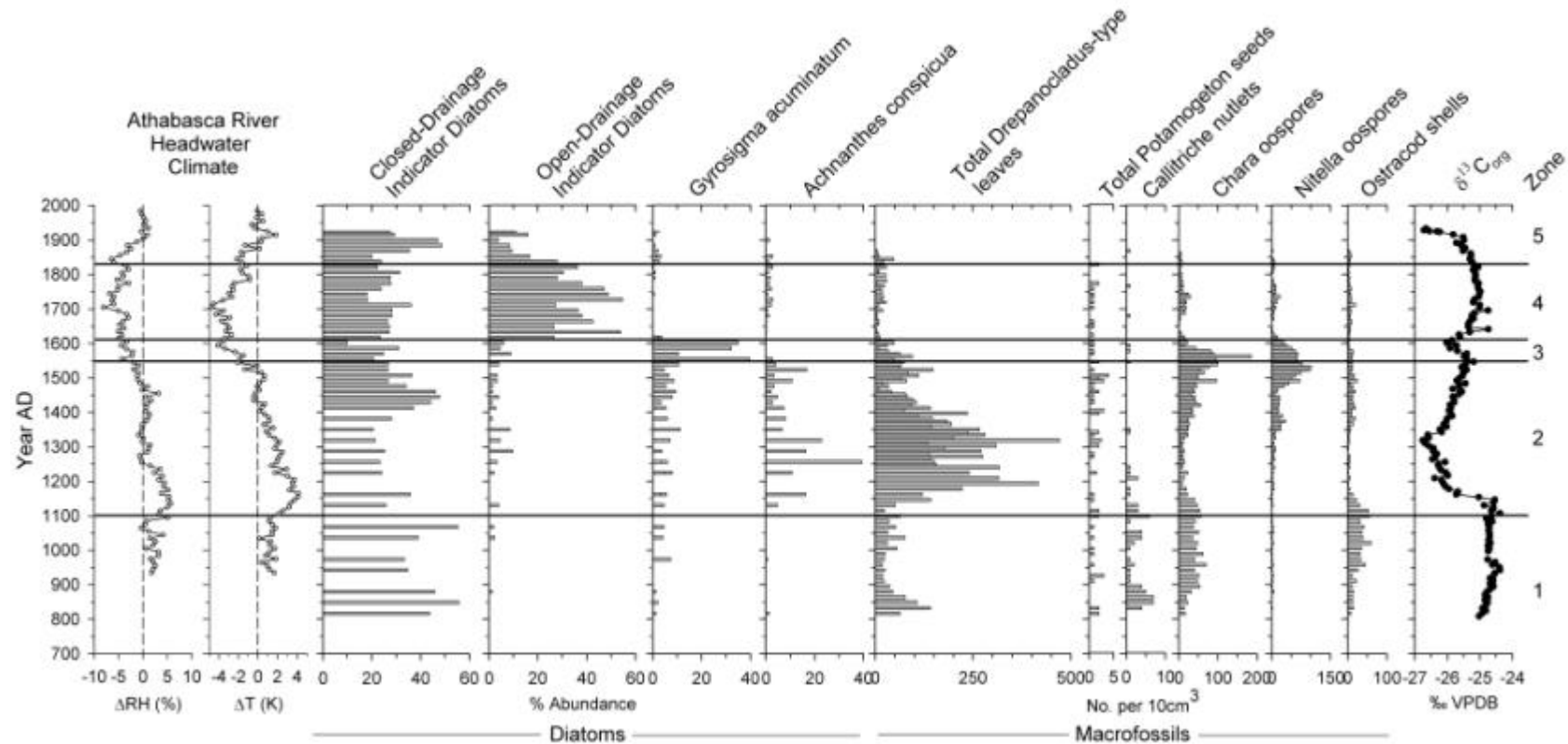
Figure 17. Summary of key proxy data from diatoms, macrofossils and $\delta^{13}C_{org}$ in core LC1 from PAD 12 and inferred variations of atmospheric moisture (ΔRH) and temperature (ΔT) over the past ~1000 years at the Athabasca River headwater region. ΔRH and ΔT records were based on decadal $\delta^{18}O$ and $\delta^{13}C$ dendrochronologies and represent departures from the 1950-1990 mean (Edwards *et al.*, 2004b). Macrofossil and stable isotope and dendroclimate data were provided by T. Asada, Y. Yi and T.W.D. Edwards, respectively.

DISCUSSION

This discussion will provide an interpretation of the hydrological and ecological changes at sites PAD 9 and PAD 12 that have occurred over the past >1000 years based on analyses of diatoms, plant macrofossils and stable isotopes. Patterns of change found at both sites will be identified and compared with hydro-ecological records from sites PAD 5, 15, 31 and 37. Possible mechanisms involved in regulating the hydro-ecological changes at sites PAD 9 and PAD 12 will be identified and discussed.

ECOLOGICAL AND HYDROLOGICAL CHANGES AT PAD 9

Site PAD 9 demonstrated considerable hydrological change over the past 1900 years. Prior to the LIA (~AD 100-1600), including the MWP, PAD 9 existed as a closed-drainage basin characterized by abundant macrophytes and corresponding diatom communities dominated by epiphytic taxa. During the LIA, paleolimnological evidence (e.g., nearly equal percent abundances of open- and closed-drainage indicator diatoms, moderate *Chara* oospore abundances, $\delta^{18}O$ values similar to present-day Lake Athabasca values) indicated that PAD 9 was likely inundated under a shallow embayment of Lake Athabasca for at least 250 years (~AD 1600-1860) due to higher water levels on Lake Athabasca as established by the short core analyses and further supported by a map from 1827 (Vandermaelen, 1827). At the end of the LIA PAD 9 gradually became isolated from Lake Athabasca. As Lake Athabasca water levels receded, a brief interval of open-drainage, flow-through conditions developed when PAD 9 was likely connected to Lake Athabasca by a river, as illustrated in a map from 1917 (Mollard *et al.*, 2002). By ~AD 1930, PAD 9 demonstrated closed-drainage conditions similar to those conditions prior to the LIA.

The findings from core LC3 are consistent with the results from the short core analyses and are further supported by historical maps with the exception of the 1884 and 1897 maps which depict PAD 9 as inundated under the embayment of Lake Athabasca instead of as a flow-through basin as indicated by the LC3 record. The discrepancy is likely caused by errors in dating and may be a result of applying the CRS modelled ^{210}Pb dates from core KB4 to core LC3. Results from Lau (Undergrad thesis in progress, Department of Biology, University of Waterloo) may justify a re-evaluation of the dating model used for core LC3, however, the information currently available limits the dating model to the one provided. The 1927 map illustrated PAD 9 as a closed-drainage basin possibly associated with relatively minor river influence whereas paleolimnological data from zone 3, which ended in ~1930, indicated stronger river influence at site PAD 9. However, the zone dates used were approximated to provide a means to more conveniently discuss changes over time. The actual zone boundary was between 1925 and 1931 and is consistent with the 1927 map indicating that the end of this zone occurred before 1927.

Within the main periods identified by zonation, additional stratigraphic changes were apparent in several proxies, which may reflect the influence of climatic shifts and suggest minor hydro-ecological changes within the record. At ~AD 1100 the δ^{18}O record demonstrated a pronounced shift to higher values, the magnitude of which was not reflected in the other proxies and may have been caused by a shift in source water (Y. Yi, personal communication). While PAD 9 likely remained a closed-drainage basin prior to the LIA (~AD 100-1600), the shifts in the δ^{18}O record may reflect changes in the relative annual inputs of snow and rain to the basin. In particular, between ~AD 350 and 800, PAD 9 may have been influenced by higher inputs of snow resulting in depleted δ^{18}O values. Between ~AD 800 and 1100,

paleolimnological evidence (e.g., a small peak in open-drainage indicator diatoms, depleted δ^{18}O values and a peak in *Chara* oospores) suggests a brief period of increased river influence at PAD 9, although minor relative to the changes observed during the MWP-LIA transition. At ~AD 1100, coincident with the onset of the 'High Medieval', a pronounced shift to more enriched values may reflect a change to rainfall-dominated inputs and high evaporation.

ECOLOGICAL AND HYDROLOGICAL CHANGES AT PAD 12

Based on available paleolimnological evidence, site PAD 12 demonstrated substantial hydro-ecological change over the past ~1200 years. Prior to the LIA (~AD 820-1550), including the MWP, PAD 12 existed as a closed-drainage basin as indicated by abundant plant macrofossil remains and diatom community assemblages dominated by epiphytic taxa. The beginning of the LIA (~AD 1550) was marked by a distinct peak in *Gyrosigma acuminatum*, and coincided with a pronounced decline in temperature and relative humidity as inferred from the dendroclimate record. *Gyrosigma acuminatum* was not well characterized within surveys of modern diatom assemblages in surface sediment in the PAD, however, the *Gyrosigma* genus is made up of motile taxa that occupy epipelic habitats and are known to have some tolerance for turbid conditions (Fore and Grafe, 2002) and may indicate increased river influence during that time period. During the LIA, PAD 12 demonstrated increased river-influence and a shift from closed- to restricted-drainage conditions characterized by increased percent abundances of open-drainage indicator diatoms while still maintaining moderate relative abundances of closed-drainage diatoms. During the period following the LIA, PAD 12 demonstrated a return to closed-drainage conditions similar to those seen prior to the LIA evident from a decline in open-drainage diatom abundances.

Pronounced changes in the plant macrofossil record indicated considerable ecological change in the basin during the closed-drainage period prior to the LIA. A change from *Chara*- to *Drepanocladus*-dominated macrophyte community was accompanied by changes in the dominant epiphytic diatom taxa and fluctuations in the $\delta^{13}C_{org}$ record. In particular, the *Drepanocladus* peak that occurred in zone 2 and corresponded with the 'High Medieval', was accompanied by low $\delta^{13}C_{org}$ values consistent with patterns observed at sites PAD 8, 31 and 23 (Hall *et al.*, 2004). High pH values (>8) measured at PAD 12 indicated that bicarbonate (HCO_3^-) makes up a large component of the DIC. In high bicarbonate lakes, submergent aquatic macrophytes (e.g., *Chara, Nitella, Potamogeton* and *Myriophyllum*) preferentially take up HCO_3^- as a carbon source (Oana and Deevey, 1960; Smith and Epstein, 1971). However, *Drepanocladus,* an aquatic moss, can take up only small amounts of bicarbonate (Bain and Proctor, 1980; Rundel *et al.,* 1980; Allen and Spence, 1981; Raven *et al.,* 1985) and instead relies mainly on dissolved CO_2 as a carbon source. Bicarbonate is enriched relative to $CO_{2(aq)}$ (Clark and Fritz, 1997) and accordingly, *Drepanocladus* tissues would be depleted in ^{13}C relative to submergent macrophytes. As a result, sedimentary organic matter derived from *Drepanocladus* remains would be ^{13}C-depleted. The shift in macrophyte community that occurred during zones 1 and 2 may be associated with carbon speciation and may reflect changes in lake water pH, in particular, *Drepanocladus* would be abundant in lower pH lake water. The relationship between *Drepadocladus* and low $\delta^{13}C$ values also likely explains the decline in $\delta^{13}C$ values at the top of core LC1, which corresponds with an increased abundance of *Drepanocladus* after ~AD 1930 in the short core macrofossil analysis (Hall *et al.*, 2004).

Comparison between the long core hydro-ecological records at sites PAD 9 and PAD 12 indicated similar conditions during the >1000 year records available. Both sites demonstrated closed-drainage conditions prior to the LIA, from the base of each record to ~AD 1600, which included the MWP. However, pronounced shifts were observed at each site (e.g., PAD 9 δ^{18}O record, PAD 12 *Drepanocladus* peak) at the onset of the 'High Medieval', which may reflect a shift in climate. Sites PAD 9 and PAD 12 demonstrated high water conditions during the LIA. Specifically, PAD 9 was submerged under an embayment of Lake Athabasca, whereas PAD 12 demonstrated increased flood frequency and was likely a restricted-drainage basin. Following the LIA, records from sites PAD 9 and PAD 12 reflected lower water levels and less frequent flooding, respectively. PAD 9 demonstrated increased open-drainage conditions indicating a river connection with Lake Athabasca due to receding water levels on Lake Athabasca followed by a return to closed-drainage conditions.

The timing of hydrological changes recorded at sites PAD 9 and PAD 12 corresponded with regional climate changes inferred from dendroclimate data. In particular, a pronounced shift in hydrologic regime was demonstrated during the transition from the MWP to the LIA and again at the LIA-post-LIA boundary. While the timing of changes was similar, the records demonstrated differences (e.g., peak open-drainage conditions at PAD 9 coinciding with closed-drainage conditions at PAD 12 immediately following the LIA) that were likely due to differences in the setting of each basin. In particular, evidence from site PAD 9 demonstrated a longer period of high water levels relative to PAD 12, which may reflect the influence of Lake Athabasca on site PAD 9.

The hydro-ecological history of sites PAD 9 and PAD 12 during the LIA suggested high water conditions in the northeast region of the PAD and can be compared to findings from sites PAD 5, 15, 31 and 37 by Hall *et al.* (2004) and with the Athabasca River headwater dendroclimate record in order to improve understanding of the roles of climatic variation and river hydrology in regulating the dynamics of the PAD ecosystem (Figure 18). Site PAD 5 is one of the most elevated deltaic pond and is contained within a bedrock basin and surrounded mainly by mature forest. Accordingly, water samples collected from PAD 5 in October 2000 contained the highest $\delta^{18}O$ value relative to other surveyed water bodies in the delta, which indicated high evaporative enrichment (Wolfe *et al.,* 2006a). Site PAD 5 is less prone to river flooding relative to most of the other surveyed sites due to its high elevation and distance from major rivers. Consequently, hydrological conditions at PAD 5 are likely strongly influenced by local climate. During the 1700s, the PAD 5 record indicated strong evaporative losses and possible periodic desiccation events consistent with the dry atmospheric conditions inferred from dendroclimate records during the LIA (Wolfe *et al.,* 2005). Site PAD 15 is an oxbow lake cut off from the Revillon Coupé near the Peace River. Magnetic susceptibility measurements on the sediment core from PAD 15 are thought to provide a record of ice-jam floods on the Peace River (Wolfe *et al.,* 2006b). Consistent with PAD 5 and dendroclimate records during the LIA, PAD 15 demonstrated low flood frequency during the early to mid-1700s.

Conversely, sites PAD 9, 12, 31 and 37 are low-lying sites located in proximity to the central open-drainage network of lakes and distributaries of the Athabasca River and appear to reflect greater influence of river hydrology relative to sites PAD 5 and PAD 15 located in the northwest region of the PAD. During the LIA, PAD 9 reflected a high water stand on Lake

Athabasca, while PAD 12 indicated increased flooding from the Rivière des Rochers or the Peace River. PAD 37 and PAD 31 likely recorded elevated water levels on Mamawi Lake that would occur by connection to Lake Athabasca. The spatial pattern of high water conditions in the PAD during the LIA suggests high flows on the Athabasca River.

Despite the low flood frequency at site PAD 15 during the early 1700s, the potential of high flows on the Peace River during that time cannot be discounted. The low flood frequency at PAD 15 may indicate a decrease in ice-jam flooding on the Peace River and may not reflect potential high flows during the thaw season. Accordingly, the discrepancy between the records from PAD 12 and PAD 15 during the LIA may reflect a difference in susceptibility to open water flood events caused by high flows on the Peace River. Conversely, the period of low flood frequency at PAD 15 is coincident with a period of glacial advance (Luckman *et al.,* 1997) and may reflect a short period of low flows on the Peace River that was undetected by the PAD 12 diatom record due to low resolution. Low magnetic susceptibility values in the PAD 15 record may also indicate a source water shift to water carrying sediment with low magnetic susceptibility signatures.

POTENTIAL MECHANISMS FOR HYDRO-ECOLOGICAL CHANGE AT RIVER-SENSITIVE SITES IN THE PEACE-ATHABASCA DELTA

Prior to the development of extended records from PAD 9 and PAD 12, hydro-ecological change since the LIA at each site could be explained by several mechanisms including isostatic uplift, sediment infilling and altered river hydrology affected by climatic changes. Revised chronologies for the short cores combined with comparison between the extended records from sites PAD 9 and PAD 12 and findings from other regions within the PAD helped to evaluate the influence of each potential mechanism on the hydro-ecology of the PAD.

The short core records available for sites PAD 9, 12, 31 and 37 demonstrated a unidirectional change to closed-drainage conditions in response to decreasing water levels. Unidirectional hydrological change seen in the records suggests both isostatic rebound and sediment infilling as possible mechanisms of change at each site. However, the longer records provided for sites PAD 9 and PAD 12 demonstrated closed-drainage conditions prior to the high water level period indicated in the short core records. The closed-drainage conditions during the MWP removed the unidirectional nature of the data available for PAD 9 and PAD 12 and indicated that isostatic rebound and sediment infilling were not driving mechanisms for hydro-ecological change at those sites. Furthermore, regional isostatic uplift studies have indicated that as eastern areas were uplifted, the western end of the lake basins were drowned (Lemmen *et al.,* 1994). Therefore, as the eastern end of Lake Athabasca rebounds, a trend toward wetter conditions in the PAD (which lies to the west of Lake Athabasca) may be expected, inconsistent with paleolimnological evidence at sites PAD 9, 12, 31 and 37.

During the LIA, a climatic period characterized by cold and atmospherically dry conditions, the low-lying PAD sites located in river proximal areas demonstrated unprecedented high water conditions, suggesting high flows on the Athabasca River, corresponding high water levels on Lake Athabasca and potentially, high flows on the Peace River. The transition from closed- to open-drainage conditions at PAD 9 and PAD 12 between the MWP and the LIA was likely due to a change in runoff regime from rainfall-dominated river discharge during the MWP to snowmelt-dominated river discharge during the LIA that elevated river volumes entering the PAD, as suggested by Case and MacDonald (2003) based on evidence from the North Saskatchewan River to the south. Streamflows on the North Saskatchewan River inferred from tree rings demonstrated lower flows during the MWP, and

higher flows during the LIA with the exception of periods of pronounced glacial advance (Luckman *et al.,* 1997), consistent with findings from the river proximal sites of the PAD. Increased temperatures associated with the MWP would likely reduce the total snowfall relative to rain and cause reduced snowpack, reduced spring snowmelt and result in net reduction of streamflow during the growing season (Nkemdirim and Purves, 1994; Yulianti and Burn, 1998; McCabe and Wolock, 1999). Conversely, snowmelt-dominated runoff associated with the LIA may have provided a more sustained source of water during the thaw season due to increased seasonal snowmelt. The shift in hydrology during the MWP-LIA transition evident at sites PAD 9 and PAD 12 is consistent with the hydrologic changes associated with changes in runoff regime.

The North Saskatchewan and Athabasca Rivers both have headwaters in the southern Canadian Rocky Mountains and would likely explain the common trends in water level change apparent at sites PAD 9 and PAD 12 and the North Saskatchewan River during the MWP and the LIA, and also sites PAD 37 and 31 during the LIA. The correspondence of the hydrology of sites PAD 9, 12, 31 and 37 with climatic regimes demonstrates the influence of regional climate on river-sensitive sites in the PAD and the impact of changing runoff regime on basin hydrology. In particular, climatic changes associated with the LIA appear to have resulted in complex and dynamic changes in the PAD. Sustained high water levels on the open-drainage network of the PAD resulted in high water conditions at river proximal sites whereas elevated climate-sensitive sites reflected atmospherically dry conditions. These findings highlight the role of the headwater regions of the PAD in the hydro-ecological conditions of the PAD and the complex, non-linear relationship between climate, flood-frequency and water levels.

FUTURE DIRECTIONS

Paleolimnological reconstruction of the hydro-ecology of sites PAD 9 and PAD 12 have highlighted several areas of research that require further investigation.

- Evidence from PAD 9 reflected a high water stand on Lake Athabasca during the LIA. However, paleolimnological evidence from sites located within Lake Athabasca (e.g., Bustard Island, other embayments of Lake Athabasca) is necessary to provide an independent, non-deltaic record of historic Lake Athabasca water level fluctuations (Johnston and Köster, in progress).

- Records from PAD 9 and PAD 12 demonstrated low water level conditions during the MWP relative to the LIA. Extended records from sites PAD 31 and 37 are required to assess hydrological conditions at those sites and provide an opportunity for regional comparison of river proximal sites in the PAD during the MWP.

- Extended records from sites PAD 15 and 54 (an adjacent oxbow lake) may provide a history of flood frequency from the Peace River during the MWP and the beginning of the LIA and reveal conditions in the northwest region of the PAD during those times. In particular, more information is required to assess whether low magnetic susceptibility signatures during the early 1700s from the PAD 15 record were due to (1) increased open water floods (below the PAD 15 sill level) but decreased ice-jam flooding, (2) low flows on the Peace River during glacial advance, or (3) a source water change to waters carrying sediment with lower magnetic susceptibility signatures (Jarvis, M.Es. in progress, Department of Geography, Wilfrid Laurier University).

- An isotope-inferred dendroclimate record from the Peace River headwaters is necessary to evaluate the influence of headwater climate on Peace River flows and PAD hydrology (Edwards and MacDonald, in progress).

- In addition to a Peace River headwater dendroclimate record, paleolimnological records from additional sites in proximity to the Peace River and removed from the influence of the Athabasca River (e.g., PAD 48 and PAD 49) are necessary to establish flows on the Peace River.

- Developing an understanding of Peace River conditions during the MWP and the LIA through paleolimnological analyses of sites PAD 15, PAD 54 and potentially PAD 48 and PAD 49, as well as the headwater dendroclimate record, may provide information necessary to assess the relative roles of the Peace River and the Athabasca River on PAD hydrology.
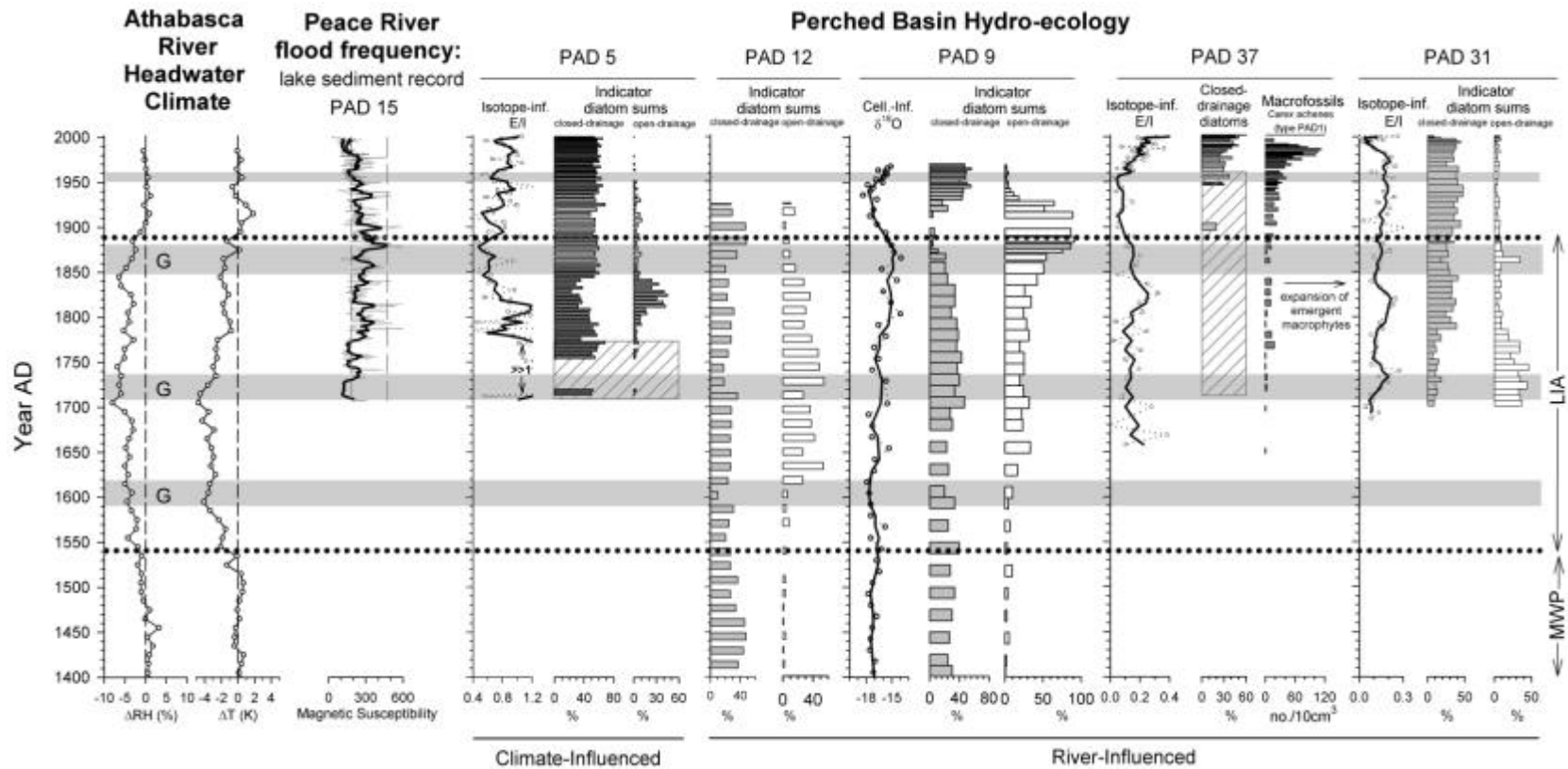
Figure 18. Summary of Athabasca River headwater dendroclimate record, and hydrological and ecological records obtained from lake sediment cores from sites PAD 15, 5, 12, 9, 37 and 31. The PAD 9 and PAD 12 records include only long core data. The horizontal dotted black lines indicate the MWP-LIA boundary and the end of the LIA. The 4 shaded grey intervals indicate periods of low flow on the North Saskatchewan River identified by Case and MacDonald (2003) and the intervals labelled 'G' correspond to known regional glacial advances in the eastern Rocky Mountains (Luckman *et al.*, 1997). The grey, hatched boxes indicate sediment intervals where diatom abundances or preservation was inadequate for quantifying relative abundances. Modified from Edwards *et al.* (2004b).

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APPENDICES

Appendix I

Diatom taxa identified as being statistically significant in association with open- or closed-drainage basins based on surface sediments from 55 sites sampled in the PAD from October 2000 (Hall *et al.*, 2004).

Closed-Drainage Indicator Diatoms

Achnanthes lanceolata ssp. *frequentissima*
A. minutissima
Cocconeis placentula (small)
C. placentula var. *placentula*
Epithemia adnata
Fragilaria capucina var. *mesolepta*
Gomphonema angustum
G. parvulum
Navicula cryptocephala
N. minima
N. pupula
N. seminulum
Nitzschia amphibia
N. palea

Open-Drainage Indicator Diatoms

Cyclostephanos cf. *tholiformis*
Fragilaria brevistriata
F. construens var. *venter*
F. pinnata

APPENDIX II

Chronology data for a.) PAD 9 and b.) PAD 12

a.) PAD 9 LC3 Chronology

Midpoint Depth (cm)	Year (AD)	Midpoint Depth (cm)	Year (AD)	Midpoint Depth (cm)	Year (AD)
10.25	1967.57	34.25	1542.30	58.25	944.65
10.75	1965.34	34.75	1529.84	58.75	932.20
11.25	1963.22	35.25	1517.39	59.25	919.75
11.75	1960.91	35.75	1504.94	59.75	907.30
12.25	1958.71	36.25	1492.49	60.25	894.85
12.75	1956.07	36.75	1480.04	60.75	882.40
13.25	1952.92	37.25	1467.59	61.25	869.95
13.75	1949.69	37.75	1455.14	61.75	857.50
14.25	1946.89	38.25	1442.69	62.25	845.04
14.75	1943.99	38.75	1430.24	62.75	832.59
15.25	1939.99	39.25	1417.79	63.25	820.14
15.75	1935.63	39.75	1405.34	63.75	807.69
16.25	1931.16	40.25	1392.88	64.25	795.24
16.75	1925.67	40.75	1380.43	64.75	782.79
17.25	1919.41	41.25	1367.98	65.25	770.34
17.75	1912.59	41.75	1355.53	65.75	757.89
18.25	1903.16	42.25	1343.08	66.25	745.44
18.75	1893.59	42.75	1330.63	66.75	732.99
19.25	1885.45	43.25	1318.18	67.25	720.54
19.75	1879.83	43.75	1305.73	67.75	708.09
20.25	1876.63	44.25	1293.28	68.25	695.63
20.75	1872.55	44.75	1280.83	68.75	683.18
21.25	1866.02	45.25	1268.38	69.25	670.73
21.75	1853.57	45.75	1255.92	69.75	658.28
22.25	1841.12	46.25	1243.47	70.25	645.83
22.75	1828.67	46.75	1231.02	70.75	633.38
23.25	1816.22	47.25	1218.57	71.25	620.93
23.75	1803.76	47.75	1206.12	71.75	608.48
24.25	1791.31	48.25	1193.67	72.25	596.03
24.75	1778.86	48.75	1181.22	72.75	583.58
25.25	1766.41	49.25	1168.77	73.25	571.13
25.75	1753.96	49.75	1156.32	73.75	558.67
26.25	1741.51	50.25	1143.87	74.25	546.22
26.75	1729.06	50.75	1131.42	74.75	511.88
27.25	1716.61	51.25	1118.96	75.25	477.54
27.75	1704.16	51.75	1106.51	75.75	443.20
28.25	1691.71	52.25	1094.06	76.25	408.86
28.75	1679.26	52.75	1081.61	76.75	374.53
29.25	1666.80	53.25	1069.16	77.25	340.19
29.75	1654.35	53.75	1056.71	77.75	305.85
30.25	1641.90	54.25	1044.26	78.25	271.51
30.75	1629.45	54.75	1031.81	78.75	237.17
31.25	1617.00	55.25	1019.36	79.25	202.83
31.75	1604.55	55.75	1006.91	79.75	168.49
32.25	1592.10	56.25	994.46	80.25	134.15
32.75	1579.65	56.75	982.00		
33.25	1567.20	57.25	969.55		
33.75	1554.75	57.75	957.10		

b.) PAD 12 LC1 Chronology

Midpoint Depth (cm)	Year (AD)	Midpoint Depth (cm)	Year (AD)	Midpoint Depth (cm)	Year (AD)	Midpoint Depth (cm)	Year (AD)
22.75	1924.86	47.25	1546.91	71.75	1162.21	96.25	777.51
23.25	1923.76	47.75	1539.06	72.25	1154.36	96.75	769.66
23.75	1915.91	48.25	1531.21	72.75	1146.51	97.25	761.81
24.25	1908.06	48.75	1523.36	73.25	1138.66	97.75	753.96
24.75	1900.21	49.25	1515.51	73.75	1130.81	98.25	746.11
25.25	1892.36	49.75	1507.66	74.25	1122.96	98.75	738.25
25.75	1884.51	50.25	1499.81	74.75	1115.11	99.25	730.40
26.25	1876.66	50.75	1491.96	75.25	1107.25	99.75	722.55
26.75	1868.81	51.25	1484.11	75.75	1099.40	100.25	714.70
27.25	1860.96	51.75	1476.25	76.25	1091.55	100.75	706.85
27.75	1853.11	52.25	1468.40	76.75	1083.70	101.25	699.00
28.25	1845.25	52.75	1460.55	77.25	1075.85	101.75	691.15
28.75	1837.40	53.25	1452.70	77.75	1068.00	102.25	683.30
29.25	1829.55	53.75	1444.85	78.25	1060.15	102.75	675.45
29.75	1821.70	54.25	1437.00	78.75	1052.30	103.25	667.60
30.25	1813.85	54.75	1429.15	79.25	1044.45	103.75	659.74
30.75	1806.00	55.25	1421.30	79.75	1036.60	104.25	651.89
31.25	1798.15	55.75	1413.45	80.25	1028.74	104.75	644.04
31.75	1790.30	56.25	1405.59	80.75	1020.89	105.25	636.19
32.25	1782.45	56.75	1397.74	81.25	1013.04	105.75	628.34
32.75	1774.59	57.25	1389.89	81.75	1005.19	106.25	620.49
33.25	1766.74	57.75	1382.04	82.25	997.34	106.75	612.64
33.75	1758.89	58.25	1374.19	82.75	989.49	107.25	604.79
34.25	1751.04	58.75	1366.34	83.25	981.64	107.75	596.94
34.75	1743.19	59.25	1358.49	83.75	973.79	108.25	589.08
35.25	1735.34	59.75	1350.64	84.25	965.94	108.75	581.23
35.75	1727.49	60.25	1342.79	84.75	958.08	109.25	573.38
36.25	1719.64	60.75	1334.94	85.25	950.23	109.75	565.53
36.75	1711.79	61.25	1327.08	85.75	942.38	110.25	557.68
37.25	1703.94	61.75	1319.23	86.25	934.53	110.75	549.83
37.75	1696.08	62.25	1311.38	86.75	926.68	111.25	541.98
38.25	1688.23	62.75	1303.53	87.25	918.83	111.75	534.13
38.75	1680.38	63.25	1295.68	87.75	910.98	112.25	526.28
39.25	1672.53	63.75	1287.83	88.25	903.13	112.75	518.42
39.75	1664.68	64.25	1279.98	88.75	895.28	113.25	510.57
40.25	1656.83	64.75	1272.13	89.25	887.42	113.75	502.72
40.75	1648.98	65.25	1264.28	89.75	879.57	114.25	494.87
41.25	1641.13	65.75	1256.42	90.25	871.72	114.75	487.02
41.75	1633.28	66.25	1248.57	90.75	863.87	115.25	479.17
42.25	1625.42	66.75	1240.72	91.25	856.02	115.75	471.32
42.75	1617.57	67.25	1232.87	91.75	848.17	116.25	463.47
43.25	1609.72	67.75	1225.02	92.25	840.32	116.75	455.62
43.75	1601.87	68.25	1217.17	92.75	832.47	117.25	447.77
44.25	1594.02	68.75	1209.32	93.25	824.62	117.75	439.91
44.75	1586.17	69.25	1201.47	93.75	816.77	118.25	432.06
45.25	1578.32	69.75	1193.62	94.25	808.91	118.75	424.21
45.75	1570.47	70.25	1185.77	94.75	801.06		
46.25	1562.62	70.75	1177.91	95.25	793.21		
46.75	1554.77	71.25	1170.06	95.75	785.36		

APPENDIX III

Percent abundance of all diatom taxa encountered in a.) PAD 9 and b.) PAD 12.

a.) PAD 9 Relative Abundances Midpoint Depth (cm)

	10.25	10.75	11.25	11.75	12.25	12.75	13.25	13.75	14.25
Achnanthes conspicua	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.52	0.00
A. hungarica	0.00	0.00	0.00	0.28	0.63	0.56	0.53	1.04	0.26
A. lanceolata var. *biporoma*	1.15	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00
A. lanceolata ssp. *frequentissima*	6.59	6.48	1.14	6.16	2.75	2.25	0.27	3.39	2.62
A. minutissima	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.26	0.26
Unidentified *Achanthes* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Amphora inariensis	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
A. libyca	9.17	12.96	13.43	11.48	9.94	8.99	6.90	11.75	7.87
A. ovalis	7.16	0.85	0.29	2.24	0.63	1.12	1.06	0.26	0.00
A. veneta	0.00	0.56	1.14	0.00	1.27	0.56	0.00	0.78	0.00
A. girdle	0.00	3.10	2.86	4.48	3.59	1.97	1.86	2.35	2.10
A. sp. cf. *delicatissimma*	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00
Anomoeoneis sphaerophora	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aulacoseira ambigua	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A. crenulata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A. lareta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified *Aulacoseira* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Caloneis bacillum	0.57	0.28	0.00	0.00	0.00	0.00	0.53	0.00	0.00
C. schumanniana var *biconstricta*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. silicula	0.57	0.00	0.86	0.00	0.00	0.00	0.00	0.26	0.00
Unidentified *Caloneis* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified Centric sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cocconeis placentula small (<15um)	8.02	5.07	7.43	7.84	5.50	4.21	8.49	7.31	3.67
C. placentula var. *euglypta*	3.15	0.00	0.00	0.00	0.00	1.12	0.00	0.52	1.05
C. placenula var. *klinoraphis*	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.26	0.00
C. placentula var. *lineata*	1.72	1.13	0.00	2.52	0.00	1.12	0.27	1.31	0.00
C. placentula var. *placentula*	5.73	7.04	12.29	7.84	5.71	6.46	6.10	4.96	10.76
C. Raphid valves (>15um)	2.01	3.10	2.29	1.40	2.54	0.84	2.39	2.61	2.89
Unidentified *Cocconeis* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclotella meneghiniana	0.57	0.00	0.29	0.00	0.00	0.00	0.00	0.52	0.00
C. sp cf. ocellata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclostephanos PAD sp. *1*	0.00	0.00	0.00	0.00	0.42	0.56	0.00	0.52	0.52
C. PAD sp. *2*	0.57	0.00	0.29	0.28	0.00	0.00	0.27	0.26	0.26
Unidentified *Cyclostephanos* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cymatopleura elliptica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. solea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cymbella aspera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. cistula	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00
C. cuspidata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. helmckei	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. cf. helmckei	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. microcephala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. minuta	0.57	0.85	2.29	0.00	0.00	0.84	0.00	0.00	2.10
C. proxima	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. silesiaca	0.00	0.56	0.00	0.00	0.42	0.84	1.59	1.04	0.52
C. subaequalis	0.00	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. subcuspidata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified *Cymbella sp.*	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00
C. sp. cf. *naviculaformis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified Diatom sp.	0.00	0.28	0.86	1.12	0.00	0.00	1.06	0.00	0.26
Epithemia adnata	1.15	1.13	2.00	0.84	3.38	3.65	2.92	0.78	2.36
E. turgida	1.72	2.54	0.57	5.04	1.90	3.09	1.59	1.04	1.05
Eunotia bilunaris	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. circumborealis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. implicata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

14.75	15.25	15.75	16.25	16.75	17.25	17.75	18.25	18.75	19.25	19.75	20.25	20.75	21.25	21.75
0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.27	0.00	0.79	0.55	0.00	0.86
0.00	0.00	0.56	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00
0.00	0.00	0.00	0.57	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	4.48	1.97	3.40	3.74	2.55	1.04	0.00	1.14	0.82	1.10	0.26	3.86	4.27	2.57
1.45	0.56	1.13	0.57	1.17	1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.48	9.24	8.17	6.52	3.50	3.40	1.57	0.00	0.57	1.92	3.59	2.90	4.41	6.13	9.14
3.19	1.68	2.54	1.13	0.00	0.85	0.26	0.00	0.57	0.00	0.55	0.00	0.28	0.53	0.29
1.16	0.00	0.85	0.85	0.93	1.13	0.00	0.00	0.57	0.00	0.28	0.00	0.55	0.27	0.29
0.00	2.52	2.25	0.57	0.70	0.57	0.00	0.00	0.00	0.55	0.55	0.53	0.00	1.60	1.43
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.96	4.76	7.89	9.07	3.50	3.68	0.52	0.00	0.28	0.27	0.28	0.26	1.10	1.33	0.57
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	0.28	0.00	1.13	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00
4.35	6.72	9.58	5.67	2.10	1.13	1.04	0.00	0.85	0.27	0.28	0.26	0.28	2.67	5.14
1.45	2.24	1.41	0.57	0.93	1.13	0.00	0.00	0.85	0.00	0.28	0.00	0.00	0.00	1.14
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
0.58	0.28	0.00	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.84	0.00	0.57	0.23	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
1.74	1.96	0.56	1.13	0.00	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.86	0.00	0.00
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.13	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	1.14
1.74	4.76	1.41	4.53	0.00	1.98	0.26	0.00	0.28	0.82	0.83	0.00	1.65	0.80	1.43
2.90	0.56	1.97	1.13	1.17	2.55	2.35	0.00	0.85	0.00	0.55	0.53	2.20	1.33	1.14
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.28	0.00	0.57
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

22.25	22.75	23.25	23.75	24.25	24.75	25.25	25.75	26.25	26.75	27.25	27.75	28.25	28.75	29.75
0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
0.00	0.00	1.99	0.28	1.28	0.00	0.28	1.05	0.50	0.56	2.20	0.57	1.11	0.00	0.48
0.00	0.00	0.00	0.56	0.00	0.00	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
3.61	3.12	4.83	2.51	5.61	4.59	6.80	3.40	6.50	7.61	6.10	10.29	4.71	3.63	5.54
0.28	0.28	1.42	1.12	0.00	0.81	0.57	0.00	0.25	0.00	0.98	0.86	0.00	1.04	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.44	10.48	3.69	8.10	13.01	5.41	7.65	7.07	8.25	7.32	5.12	3.71	8.03	8.81	7.47
1.11	0.85	1.42	0.00	0.00	0.00	3.12	0.00	0.25	0.28	0.24	1.71	1.11	0.00	2.41
0.28	1.42	1.14	1.12	1.02	0.81	0.28	0.52	0.50	0.28	0.00	0.57	0.83	0.52	0.24
2.78	0.85	0.00	2.23	0.00	2.70	3.12	1.31	2.50	0.56	0.98	0.00	0.55	0.26	0.72
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.52	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.50	1.70	3.13	3.07	0.77	5.14	3.12	1.83	1.00	1.69	0.00	2.00	1.66	0.78	2.89
0.28	0.00	0.00	0.84	0.00	0.00	0.00	0.52	0.00	0.00	0.73	0.29	0.28	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	1.40	0.00	0.00	0.85	0.52	0.00	2.54	0.00	0.00	0.55	0.00	0.96
2.78	5.95	1.99	3.35	6.63	7.84	6.23	4.45	3.00	1.41	6.83	2.57	0.83	2.33	0.48
0.00	0.85	0.57	0.00	0.77	0.54	1.98	0.79	0.50	0.28	0.73	0.00	0.28	0.78	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.28	0.00	0.84	0.00	0.27	2.27	0.79	1.25	0.00	0.00	0.00	0.55	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.63	5.54
0.00	0.00	0.00	1.96	0.00	0.00	0.00	0.52	0.00	0.56	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41	0.00	0.00	0.83	0.52	0.00
0.28	1.13	0.00	0.00	0.00	0.81	0.00	0.00	0.75	0.00	0.24	0.29	1.11	0.00	0.00
0.56	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.52	0.00	0.56	0.49	0.00	0.83	0.00	0.00
2.22	3.12	0.28	0.00	2.81	2.43	2.83	0.79	2.00	1.69	1.22	0.57	1.39	1.81	1.20
1.11	0.85	2.56	3.35	2.55	2.97	3.40	3.93	2.00	1.13	0.98	0.57	2.22	1.30	2.17
0.00	0.00	0.00	0.28	0.00	0.00	0.28	0.52	0.00	0.00	0.00	0.29	0.28	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

30.75	31.75	32.25	33.25	34.25	35.25	36.25	37.25	38.25	39.25	39.75	40.75	41.75	42.75	43.75
0.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.57	0.00	0.43	0.00	0.88
0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.90	0.00	0.00	0.86	0.56	1.68	0.00	0.00	0.57	0.00	2.60	0.68	0.88
1.63	5.53	2.69	3.15	9.16	7.71	8.17	2.51	2.71	1.99	2.27	2.99	6.06	7.82	9.25
0.54	0.79	0.00	0.00	0.79	0.29	0.00	0.56	0.00	0.85	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.34	0.44
14.36	36.36	27.35	33.24	18.32	24.00	21.69	25.42	21.95	38.46	26.35	29.91	32.90	27.55	19.38
3.52	1.98	6.73	4.30	3.93	4.29	0.00	3.63	3.79	2.85	3.40	3.42	2.16	3.40	2.64
0.54	0.40	0.90	0.29	0.26	1.14	0.28	1.12	0.54	0.57	0.00	0.00	1.73	0.00	1.76
3.52	3.56	0.00	4.87	2.88	7.43	8.45	9.22	8.40	7.12	11.33	9.83	9.09	7.14	8.81
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.54	1.19	0.45	2.29	2.09	4.57	3.38	2.79	3.52	0.57	0.85	1.71	0.00	0.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.57	0.00	0.57	0.00	0.00	0.00	0.00	0.85	0.43	0.00	0.00	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.28	0.57	0.00	0.87	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.34	0.00	10.31	5.16	8.64	8.29	8.17	4.75	9.49	5.13	8.50	7.69	2.16	8.16	2.64
0.27	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.28	0.00	0.00	0.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.45	0.00	0.52	0.29	0.85	0.00	1.90	0.85	0.28	0.00	0.00	0.00	0.00
2.44	1.98	4.93	4.58	5.24	6.86	3.94	9.50	3.79	9.40	7.65	6.41	7.36	5.10	9.25
1.63	1.19	0.90	2.29	4.19	2.00	0.00	0.84	1.90	3.13	2.83	1.71	0.87	3.06	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.86	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.00
0.54	0.40	0.00	1.72	0.00	0.57	0.28	0.00	0.27	0.00	0.00	0.00	0.00	1.36	1.76
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.56	0.00	0.57	0.00	0.00	1.30	0.00	0.00
0.81	0.00	0.00	0.00	0.00	0.00	0.28	0.56	0.00	0.00	0.28	0.00	0.00	0.00	0.00
0.54	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
2.98	3.16	0.00	3.72	2.88	0.00	2.25	4.19	2.44	4.56	5.10	2.99	3.46	2.72	4.85
4.07	3.95	6.73	0.57	2.09	4.86	3.94	1.12	7.86	3.13	3.97	4.27	3.03	4.42	7.05
0.00	0.00	0.45	0.29	0.26	0.29	0.28	0.56	0.00	0.00	0.00	0.00	0.43	0.00	0.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

44.75	45.25	46.25	46.75	47.75	48.25	49.25	49.75	50.75	51.25	52.25	52.75	53.75	54.25	55.25
0.00	1.33	2.00	0.00	1.30	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	2.63
0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.67	3.33	2.67	1.30	0.65	0.67	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.66
3.55	5.33	1.33	2.00	4.55	1.94	4.00	0.59	2.35	2.60	0.00	4.79	7.74	0.65	5.26
2.37	1.33	0.67	0.67	1.95	0.00	1.33	1.18	1.76	0.00	0.00	2.40	1.19	3.27	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.33	2.67	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
27.81	25.33	14.67	20.00	24.03	23.23	21.33	13.02	15.88	20.78	16.13	13.77	20.24	16.99	14.47
4.73	0.67	4.00	4.00	1.30	4.52	3.33	0.59	2.35	1.30	1.94	2.40	2.38	0.65	0.00
0.00	0.67	0.67	0.00	0.65	0.00	1.33	0.00	0.59	0.00	0.00	0.60	1.19	0.65	0.00
1.78	6.67	1.33	10.67	4.55	4.52	2.00	9.47	3.53	5.19	2.58	6.59	5.36	3.92	7.89
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	1.96	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.94	0.00	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.78	8.67	2.00	3.33	3.25	4.52	2.67	5.92	8.24	5.84	7.10	8.38	4.17	10.46	1.32
0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.65	0.00	0.60	0.00	0.00	0.00
4.14	2.67	16.00	7.33	5.84	9.03	14.00	9.47	22.35	20.13	20.00	7.19	7.74	5.88	9.87
2.37	2.00	0.00	2.67	1.95	3.87	0.67	5.33	4.12	1.30	4.52	1.80	2.38	3.27	4.61
0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	1.20	1.19	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	1.29	0.00	0.00	1.31	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	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	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	1.19	0.00	0.00
0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	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	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.33	0.00	1.30	0.00	0.67	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
0.59	3.33	0.00	0.67	0.00	4.52	4.00	1.78	0.59	0.65	0.65	1.20	3.57	3.27	7.89
11.24	8.00	4.00	4.67	1.95	5.16	6.00	6.51	1.76	1.30	4.52	1.80	5.95	3.92	8.55
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

56.25	57.25	57.75	58.75	59.75	60.75	61.75	62.75	63.25	64.25	65.25	65.75	66.75	67.75	68.75
0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.66	0.00	1.02
0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	1.33	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.90	19.08	6.00	3.90	1.89	2.50	5.66	1.30	3.80	4.61	0.65	0.60	3.31	7.94	1.02
1.95	0.00	0.00	4.55	6.92	1.25	1.89	0.00	2.53	0.00	0.00	1.20	0.00	1.40	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.00	0.65	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.64	11.18	18.67	9.74	20.75	12.50	10.69	15.58	18.99	28.95	23.23	18.56	23.84	17.29	16.75
0.00	2.63	2.67	1.30	2.52	2.50	2.52	4.55	0.63	0.66	0.65	1.80	0.66	0.93	1.02
0.00	2.63	4.00	0.00	1.89	0.00	2.52	1.30	1.90	4.61	0.65	3.59	4.64	0.00	0.00
7.79	4.61	0.00	6.49	3.14	3.75	6.29	0.00	6.96	0.00	7.74	5.39	9.27	10.28	13.20
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
2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.65	0.00	0.00	0.63	1.30	1.27	0.00	0.00	1.20	0.00	0.47	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.60	0.66	2.00	8.44	0.63	0.63	1.26	1.30	7.59	1.97	4.52	2.40	1.99	6.54	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	0.00	0.00	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00
3.25	5.26	9.33	6.49	8.18	9.38	4.40	12.34	6.96	7.89	8.39	9.58	5.96	3.27	5.08
0.00	1.32	0.67	2.60	1.26	0.63	3.77	1.95	1.90	0.00	2.58	1.80	1.32	3.74	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.00	1.29	0.00	1.32	1.40	0.00
0.00	0.00	0.67	0.00	0.00	0.00	0.63	0.00	1.27	1.32	0.00	1.80	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.65	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00
0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.95	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.47	0.00
1.30	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	2.03
1.95	1.32	8.00	4.55	2.52	5.00	10.06	3.25	7.59	3.95	2.58	1.80	0.66	1.87	0.00
3.90	5.92	5.33	3.90	8.81	5.63	5.03	12.34	2.53	3.95	3.23	5.39	1.99	5.14	6.09
0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.60	0.66	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

69.25	70.25	71.25	72.25	73.25	74.25	75.25	76.25	76.75	77.75	78.75	79.75	80.25
1.86	0.66	0.00	1.32	2.31	1.33	11.76	0.00	1.96	2.41	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.67	1.96	0.00	0.00	1.20	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00
3.11	1.32	1.99	3.97	3.47	2.00	0.00	6.90	2.61	2.41	2.52	4.03	2.50
0.00	1.32	1.00	0.66	0.00	2.00	0.00	0.00	1.31	1.20	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	0.00	0.00	0.66	0.00	2.00	0.00	0.00	1.31	0.00	0.00	1.34	0.63
27.95	16.45	20.90	15.89	34.10	27.33	41.18	31.03	30.07	21.08	30.19	30.87	21.25
1.86	1.97	1.49	1.32	4.62	2.00	0.00	0.00	1.96	1.20	1.89	0.67	3.75
1.86	0.00	2.49	1.99	0.00	0.00	1.96	5.17	0.00	0.00	0.63	0.00	0.63
6.83	5.92	2.99	7.28	3.47	14.00	3.92	5.17	11.76	6.02	11.32	6.04	8.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.58	0.67	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
0.62	1.97	0.00	0.66	0.58	1.33	1.96	1.72	0.65	2.41	1.89	3.36	1.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	0.00	1.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	1.89	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.86	5.92	4.48	12.58	1.73	3.33	0.00	1.72	5.23	2.41	3.14	0.67	13.13
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	0.00	0.00	0.00	0.00	1.72	0.65	0.00	0.00	0.00	0.00
2.48	4.61	6.97	2.65	9.25	4.67	7.84	1.72	4.58	7.23	5.66	6.71	7.50
1.24	1.32	4.48	5.96	2.31	1.33	0.00	0.00	5.23	2.41	1.26	2.01	8.13
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	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	1.99	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.62	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3.29	1.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	1.20	0.00	0.00	0.00
0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.48	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.60	0.00	0.67	0.00
3.73	3.95	2.49	1.99	1.73	1.33	3.92	0.00	0.65	0.60	1.26	4.03	0.63
3.11	8.55	2.99	4.64	2.31	2.00	0.00	6.90	3.92	1.20	4.40	3.36	3.75
0.00	0.66	0.50	0.00	0.58	0.00	0.00	1.72	0.00	0.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

a.) PAD 9 Relative Abundances Midpoint Depth (cm)

	10.25	10.75	11.25	11.75	12.25	12.75	13.25	13.75	14.25
Eunotia incisa	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.52	0.00
Unidentified *Eunotia* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
E. sp. cf. *diodon*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fragilaria brevistriata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. bidens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina var. *capucina*	2.87	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00
F. capucina var. *gracillis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
F. capucina var. *mesolepta*	4.01	0.56	0.00	1.40	0.21	0.00	2.65	3.13	0.00
F. capucina var. *rumpens*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina var. *vachariae*	2.01	1.69	0.00	0.56	0.85	1.40	0.27	3.66	1.57
F. construens	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
F. construens f. *binodis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. construens var. *venter*	0.86	0.56	0.00	2.24	2.96	0.28	0.80	1.31	1.84
F. contruens var. *venter* cf. *pinnata*	0.00	0.56	0.00	0.00	0.63	0.00	0.00	0.52	0.52
F. delicatissima	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. neoproducta	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. sp. cf neoproducta (girdle view)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. parasitica var. *subconstricta*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. pinnata	0.57	1.41	0.29	1.40	1.27	2.25	1.33	2.09	2.10
F. pinnata var. *intercedens*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
F. tenera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. virescens var. *exigua*	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view) 18str/10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view) 17str/10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view) 16str/10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view) 15str/10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00
Unidentified *Fragilaria* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.00
F. sp. cf. *fasciculata*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gyrosigma acuminatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gomphonema acuminatum	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.26
G. affine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. angustatum	0.00	0.56	0.00	1.12	0.00	0.00	0.00	0.00	0.00
G. angustum	0.00	2.54	0.00	1.96	0.21	0.00	0.53	1.04	1.05
G. clavatum	4.58	0.85	0.57	1.12	1.27	1.12	2.12	3.13	1.31
G. gracile	1.43	2.82	2.00	2.80	3.38	1.12	2.65	2.09	1.31
G. insigne	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.52	0.00
G. minutum	0.00	0.00	0.00	0.56	0.00	0.28	0.00	0.00	0.00
G. olivacaeum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. parvulum	2.29	7.32	4.00	3.08	3.38	7.02	6.10	3.13	2.62
G. truncatum	0.57	0.00	1.71	0.28	1.06	0.00	0.53	0.52	0.79
Unidentified *Gomphonema* sp.	0.00	0.00	0.29	0.00	0.21	0.56	0.00	0.00	0.00
G. sp. cf. *angustatum*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. clavatum/truncatum (girdle view)	0.00	0.00	0.57	0.00	1.69	0.00	0.00	0.00	2.10
G. other (girdle view)	0.00	0.00	1.71	0.56	2.11	2.81	4.77	2.87	1.05
Hantzchia amphyoxis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula capitata var. *capitata*	0.57	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.52
N. capitata var. *hungarica*	0.00	1.13	0.00	0.28	0.00	0.28	0.53	0.26	0.00
N. cryptocephala	2.87	0.00	4.00	1.68	3.59	4.21	0.53	2.35	2.10
N. cryptotenella	0.00	0.00	0.29	0.00	0.00	0.56	3.45	0.00	1.05
N. cuspidata	0.29	0.56	0.00	0.00	0.00	0.84	1.06	0.26	0.00
N. elginensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. explanata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. halophila	0.00	0.00	0.86	0.28	0.85	0.84	0.00	1.04	0.26
N. laevissima	2.58	1.41	0.29	0.84	0.00	1.40	0.27	0.52	1.84

14.75	15.25	15.75	16.25	16.75	17.25	17.75	18.25	18.75	19.25	19.75	20.25	20.75	21.25	21.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	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	0.57	0.00	3.40	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.56	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.61	1.96	5.07	1.70	0.00	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.73	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.22	0.56	0.56	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.27	0.57
1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.53	1.14
0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	2.13	0.00
2.03	4.48	4.51	6.52	33.88	25.21	48.30	0.00	47.73	44.51	47.79	47.76	42.42	25.60	18.86
0.00	0.28	0.00	1.98	6.78	3.97	8.62	0.00	0.00	9.34	6.35	11.61	7.71	7.73	6.29
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.32	2.80	7.32	9.35	24.30	19.26	32.38	0.00	39.20	37.64	32.87	25.59	25.34	21.07	25.71
0.00	0.00	0.00	0.57	0.47	0.28	0.26	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.13	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	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00
0.58	0.56	0.56	1.13	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.84	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3.08	1.69	1.42	0.47	1.70	0.00	0.00	0.00	0.55	0.28	0.53	1.10	0.00	2.57
4.35	1.68	1.69	1.13	0.23	0.57	0.00	0.00	0.57	0.00	0.00	0.53	0.55	1.60	3.14
0.87	1.40	0.00	0.28	0.47	0.85	0.00	0.00	0.00	0.55	0.00	0.00	0.00	1.07	0.57
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	1.33	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.77	3.36	2.25	2.55	1.40	1.70	0.78	0.00	0.28	0.00	0.28	0.26	0.55	1.07	0.57
0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.27	0.00
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.12	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.57
0.00	0.00	1.13	2.27	1.40	0.00	1.04	0.00	0.57	0.00	0.00	0.00	0.00	0.00	1.14
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	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
5.22	3.08	0.00	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.29
0.00	0.00	4.79	0.00	0.00	0.28	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00
0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.29
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.74	1.12	0.00	0.28	0.47	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.74	1.68	1.69	1.42	0.23	0.57	0.00	0.00	0.28	0.27	0.28	1.32	0.55	0.53	0.00

22.25	22.75	23.25	23.75	24.25	24.75	25.25	25.75	26.25	26.75	27.25	27.75	28.25	28.75	29.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.39	0.00	0.00	1.12	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	1.11	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	0.83	0.00	0.00
2.78	9.92	0.00	4.19	2.04	0.00	1.42	0.52	0.00	0.00	8.78	0.00	3.32	5.70	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.22	5.38	0.28	2.51	1.28	7.30	1.13	9.42	3.50	13.80	0.73	2.29	4.71	2.33	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.48
0.00	1.13	0.00	0.56	0.26	1.35	1.13	1.83	0.25	5.07	4.39	0.00	3.60	0.52	1.69
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.00	0.00	0.00	0.00
11.39	6.23	9.94	3.07	2.81	4.05	0.00	0.79	4.00	2.54	0.98	11.43	2.49	0.52	0.48
4.72	1.70	0.00	5.59	7.65	4.32	0.28	4.45	4.25	4.23	2.93	0.00	7.48	6.74	15.18
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	17.85	24.43	14.80	17.86	23.24	18.70	19.90	17.00	12.96	20.24	20.57	11.08	16.06	17.83
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	7.95	0.00	0.00	1.89	0.00	0.00	7.25	0.00	0.00	4.86	0.00	9.33	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.00	6.99
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45
1.67	0.57	0.00	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69
0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.52	0.00	2.82	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	1.41	0.00	0.57	0.83	0.78	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.28	0.00	0.00	0.57	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00
1.11	1.13	0.57	0.84	2.55	0.54	0.57	1.57	1.00	1.41	1.46	2.57	0.83	1.04	1.45
2.78	3.68	4.26	1.96	4.59	3.24	2.83	1.31	3.75	0.85	1.71	2.57	2.49	0.78	2.41
1.67	0.00	0.00	0.56	0.00	0.81	0.57	0.52	0.00	0.28	0.49	0.29	0.00	1.04	0.72
0.00	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.56	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	1.66	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.11	0.57	1.14	0.28	0.77	2.16	1.42	2.36	2.50	2.25	2.44	4.00	2.22	0.78	0.00
0.00	0.28	0.00	0.28	0.00	0.00	1.42	0.52	0.00	0.00	0.00	0.00	1.66	0.52	0.00
0.00	0.00	1.14	0.00	0.00	0.27	0.57	0.52	0.75	0.00	0.00	0.00	0.28	0.00	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.51	1.62	0.00	0.52	0.50	1.13	1.46	0.00	0.00	2.07	1.45
0.00	0.00	0.00	0.56	0.00	0.54	0.57	0.00	1.00	1.69	3.41	0.00	1.11	1.55	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.52	0.96
0.28	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00
0.00	0.57	0.00	1.96	0.51	0.00	0.28	0.26	0.00	0.00	0.49	0.00	2.22	1.30	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	1.83	0.00	0.00	0.49	0.57	0.55	0.26	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.13	0.00	0.00	0.00	0.49	0.00	0.55	0.26	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.85	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.83	0.85	1.14	1.12	0.51	0.54	0.00	0.52	0.25	1.13	0.98	1.43	0.83	1.81	0.96

30.75	31.75	32.25	33.25	34.25	35.25	36.25	37.25	38.25	39.25	39.75	40.75	41.75	42.75	43.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.45	0.00	0.00	0.00	0.00	0.56	0.27	0.00	0.00	0.43	3.90	0.68	0.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	0.00	1.72	1.05	1.14	1.69	0.00	0.00	0.00	0.28	0.00	3.03	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.36	2.77	0.00	0.57	0.52	4.57	0.56	0.00	0.54	0.00	0.00	0.00	0.87	0.00	0.00
2.98	0.00	0.00	0.86	0.79	2.00	0.00	1.68	1.63	1.42	0.00	0.00	0.43	0.34	0.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.92	7.51	4.48	5.16	1.57	3.14	3.10	1.12	3.25	0.57	0.85	1.71	0.43	0.00	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	2.24	0.00	3.66	0.00	2.54	0.00	0.00	0.00	1.70	0.00	0.00	1.36	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.40	0.00	0.29	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.43	0.34	0.00
0.54	0.79	0.45	0.29	0.00	0.00	0.00	0.56	1.08	0.57	0.28	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.90	2.37	5.83	1.43	0.00	1.14	2.25	1.96	1.08	0.57	0.00	3.85	0.43	0.00	0.00
7.32	1.98	3.14	1.43	0.79	0.86	2.25	1.96	0.81	0.28	0.28	2.56	3.46	1.02	3.96
0.54	0.00	0.90	0.86	1.05	0.00	1.13	0.00	2.17	1.14	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	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.79	2.37	2.69	1.43	1.57	0.57	0.56	0.84	2.98	0.00	1.98	0.00	0.00	2.04	4.41
0.00	0.00	0.90	0.00	0.52	0.00	0.28	0.28	0.54	0.00	0.00	0.00	0.43	0.00	0.00
0.27	0.79	0.00	0.00	0.26	0.29	0.00	0.28	0.54	0.00	0.28	0.00	0.00	0.34	0.44
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.61	2.37	0.00	1.15	0.00	0.57	0.00	1.12	0.54	0.00	0.57	0.00	0.87	1.70	0.88
4.34	3.16	0.00	0.57	5.24	0.00	2.82	2.23	2.17	1.14	0.57	0.00	0.00	0.68	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.08	0.00	1.79	0.00	0.26	0.29	0.28	0.00	0.54	0.00	1.13	0.85	0.43	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44
0.54	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00
0.00	0.00	0.45	0.00	0.00	0.00	0.28	0.00	0.00	0.57	0.28	0.00	0.00	0.68	0.00
0.54	0.00	0.45	0.00	0.52	0.29	0.00	0.28	0.27	0.00	0.28	0.85	0.87	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.34	0.00
1.36	1.58	0.90	2.01	1.57	1.43	2.82	1.40	1.63	1.14	1.13	2.14	1.73	1.70	2.64

44.75	45.25	46.25	46.75	47.75	48.25	49.25	49.75	50.75	51.25	52.25	52.75	53.75	54.25	55.25
1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	11.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.17	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	0.00
2.96	0.00	0.67	5.33	1.95	0.65	0.00	0.00	2.35	0.00	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.65	1.29	0.00	0.00	0.00	1.30	0.65	0.00	0.60	0.00	0.66
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.61	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.47	0.00	0.65	0.00	2.40	0.00	1.96	0.00
0.00	0.67	4.00	1.33	2.60	1.29	1.33	0.00	0.00	2.60	3.87	1.20	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	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	6.67	0.00	2.00	4.55	0.00	0.00	0.00	4.12	0.00	1.29	1.20	0.00	0.00	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	3.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.59	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	5.16	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	0.00	0.00	3.59	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.67	0.00	0.65	1.94	0.67	2.37	1.76	0.00	1.94	1.20	0.60	0.65	0.66
0.00	0.00	1.33	0.00	1.30	0.00	2.67	0.59	2.35	0.00	0.00	0.00	1.19	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	0.00	0.00	0.00	0.00	0.00	1.78	0.00	0.00	0.00	0.60	0.00	0.00	0.00
0.00	1.33	2.00	0.67	0.00	0.00	0.67	2.37	5.88	3.90	9.03	4.19	2.38	2.61	1.97
2.37	1.33	5.33	4.00	7.79	1.94	4.00	0.00	2.35	1.95	3.23	5.39	5.95	3.92	4.61
0.00	1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.33	2.67	0.00	3.23	2.67	0.00	0.00	0.00	0.00	0.00	0.00	1.31	1.32
1.18	0.67	1.33	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	1.31	1.32
0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.33	0.00	4.00	4.55	5.16	0.00	1.18	1.18	0.00	2.58	1.20	1.19	1.31	0.00
1.18	1.33	0.00	0.00	0.00	1.29	0.00	1.18	1.18	1.30	1.29	0.00	0.00	2.61	2.63
0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.65	1.29	0.67	1.78	1.18	0.00	0.00	0.00	0.60	0.00	0.66
0.00	0.67	0.00	0.67	0.65	0.65	1.33	1.18	1.76	1.95	0.00	2.40	0.60	2.61	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	1.30	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	1.18	0.00	0.00	0.00	0.00	1.31	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.67	1.18	0.00	0.00	0.00	0.00	0.60	0.00	0.00
0.00	1.33	2.00	0.00	1.30	0.00	2.67	2.37	0.00	1.95	0.00	0.60	2.38	0.00	0.66
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19	0.00	0.00
0.00	0.00	1.33	2.67	7.14	0.65	4.00	2.96	1.18	1.30	0.65	1.80	0.00	3.92	2.63

56.25	57.25	57.75	58.75	59.75	60.75	61.75	62.75	63.25	64.25	65.25	65.75	66.75	67.75	68.75
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	1.89	4.38	1.89	0.00	0.63	0.00	0.00	0.60	0.00	0.00	6.60
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	1.32	0.00	0.65	0.00	0.00	0.63	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	4.55	0.00	0.63	0.00	0.00	2.53	0.00	0.00	0.00	0.00	1.87	0.00
11.04	4.61	8.00	0.00	1.26	0.00	3.14	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	1.32	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	0.65	1.26	0.00	0.00	0.00	0.00	0.00	0.65	1.20	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	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.26	8.00	3.25	1.89	0.00	0.00	2.60	0.63	0.00	0.00	0.00	0.00	1.87	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	3.90	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.19	0.00	0.00	0.00	0.00	3.13	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	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.54
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.95	0.66	0.00	2.60	1.26	3.13	3.14	1.30	3.80	2.63	0.65	1.20	0.00	0.93	3.05
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.25	2.63	3.33	3.90	1.26	0.63	1.89	3.90	1.27	3.29	1.29	7.78	2.65	3.27	1.52
7.79	2.63	0.67	3.90	1.26	4.38	5.03	7.14	5.70	1.97	4.52	1.80	3.31	2.80	0.00
0.00	1.97	0.00	0.00	1.26	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	1.40	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.66	2.67	0.00	2.52	1.88	0.00	1.30	0.00	1.32	3.87	2.99	1.32	0.00	0.00
0.00	0.00	0.00	0.65	0.00	0.00	0.00	1.30	0.63	2.63	0.00	0.00	0.66	0.00	2.03
0.65	0.66	1.33	0.65	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.97	1.33	1.30	1.26	1.25	0.00	1.30	0.00	1.32	1.29	0.00	3.97	3.74	1.02
1.30	1.32	0.00	0.00	6.29	0.00	2.52	0.00	2.53	3.95	0.00	1.20	5.30	0.93	1.02
0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.63	0.00	1.29	1.20	0.00	0.00	0.51
0.00	0.00	0.00	0.65	0.00	0.00	0.63	0.65	0.00	0.00	1.29	0.00	0.00	0.00	0.00
1.30	2.63	0.67	0.00	2.52	2.50	0.63	1.30	1.27	0.66	0.65	0.00	0.00	0.93	0.00
0.00	0.00	0.00	0.00	1.26	0.00	0.00	1.30	0.63	0.00	0.00	0.00	0.00	0.00	1.02
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	0.00	1.26	0.65	0.63	0.00	0.65	0.60	0.66	0.00	1.02
0.00	0.00	0.00	1.30	1.26	0.63	0.00	2.60	0.00	0.00	1.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	0.67	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	3.29	3.33	1.30	3.77	3.13	4.40	3.25	1.27	1.32	3.87	2.40	3.31	3.27	1.02

69.25	70.25	71.25	72.25	73.25	74.25	75.25	76.25	76.75	77.75	78.75	79.75	80.25
0.62	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.50	0.00	2.31	0.00	0.00	0.00	0.00	4.22	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
1.24	0.00	1.00	0.66	0.00	0.00	0.00	5.17	0.00	0.00	5.66	2.01	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.86	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.66	1.16	0.67	3.92	0.00	0.00	0.60	0.63	0.00	1.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.99	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	1.32	2.99	0.66	0.00	0.00	0.00	0.00	0.00	0.60	1.26	0.00	0.63
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.35	0.00	1.99	0.66	2.31	0.00	0.00	0.00	0.00	0.00	2.52	2.68	0.00
4.35	0.66	1.00	5.96	3.47	4.00	5.88	3.45	7.19	0.00	1.89	2.68	4.38
0.00	0.00	0.00	1.32	0.00	0.67	0.00	0.00	1.31	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
0.00	1.32	1.00	0.00	2.31	2.67	3.92	0.00	2.61	1.20	1.89	2.01	0.00
0.00	1.97	0.50	0.00	1.73	0.00	0.00	3.45	0.00	0.00	0.00	2.68	0.00
0.00	0.66	0.50	0.66	0.58	0.67	0.00	0.00	0.00	1.81	0.63	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	1.32	2.99	0.00	0.58	1.33	3.92	0.00	0.00	2.41	1.26	1.34	0.00
2.48	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
0.62	0.00	0.00	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.24	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
0.00	0.00	1.49	0.00	1.73	0.00	0.00	0.00	0.00	1.20	0.00	2.01	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	3.36	0.00
0.00	0.00	0.00	0.00	1.73	0.00	0.00	1.72	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2.63	0.00	0.00	0.00	0.00	0.00	5.17	0.00	2.41	1.26	1.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.07	2.63	0.50	1.99	1.73	0.67	0.00	5.17	1.31	4.82	1.26	3.36	3.13

a.) PAD 9 Relative Abundances Midpoint Depth (cm)

	10.25	10.75	11.25	11.75	12.25	12.75	13.25	13.75	14.25
Navicula libonensis	3.15	6.76	4.57	3.36	5.07	4.21	5.04	3.66	4.72
N. minima	5.73	1.69	1.14	0.56	0.21	0.00	0.53	0.78	2.89
N. menisculus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. oblonga	0.57	0.28	0.00	0.28	0.00	0.56	0.00	0.00	0.00
N. placentula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. pseudanglica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. pupula	0.00	0.85	0.00	1.12	0.42	0.28	0.00	0.52	0.26
N. pupula var. *nyassensis*	0.00	0.00	0.00	0.00	0.00	1.97	0.00	0.52	0.00
N. radiosa	2.29	0.56	0.00	0.00	0.42	0.00	0.00	0.00	0.00
N. scutelloides	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00
N. seminulum	1.43	0.56	1.14	0.00	0.85	1.97	0.00	0.00	5.25
N. subminiscula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. subminuscula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. trivialis	0.00	0.00	0.29	0.56	0.21	0.00	1.33	1.57	0.52
Unidentified *Navicula* sp.	0.29	0.28	0.00	0.56	0.00	0.28	0.53	0.00	0.79
N. sp. cf. *bottanica*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula. sp. cf. *diluvianna*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *plausibilis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *pseudanglica*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *subplacentula*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *viridula* var. *lineata*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula/Caloneis sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula/Cymbella sp.	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
Navicula/Gomphonema sp.	0.00	0.28	0.00	0.00	0.00	0.56	0.00	0.26	0.00
Navicula/Pinnularia sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Neidium ampliatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
N. iridis	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00
Nitzschia amphibia	8.88	12.96	22.57	17.09	23.04	17.70	19.89	13.05	15.22
N. angustata	0.00	0.00	1.14	0.00	0.00	0.00	0.00	0.00	0.52
N. fonticola	0.00	0.00	0.00	0.84	0.00	0.84	0.00	0.78	0.26
N. frustulum	0.00	1.13	0.00	0.84	0.00	0.00	2.39	0.00	0.79
N. liebetruthii	0.00	1.13	1.14	1.12	2.33	2.25	2.92	3.39	0.52
N. palea	0.57	0.00	0.57	0.00	0.00	0.00	0.00	0.00	1.31
N. paleacea	1.15	1.97	0.29	0.56	2.11	1.97	0.00	2.09	1.57
N. perminuta	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00
N. radicula	0.00	1.41	0.57	0.28	0.85	1.12	0.00	0.26	2.10
Unidentified *Nitzschia* sp.	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinnularia brevicostata	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
P. gibba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
P. interupta	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
Pinnularia stomatophora	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
P. viridis	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.26
Rhoicosphenia abbreviata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
Rhopalodia gibba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stauroneis anceps	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00
S. lauenburgiana f. *angulata*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S. phoenicenteron	0.00	0.00	0.29	0.00	0.21	0.00	0.80	0.00	0.00
Unidentified *Stauroneis* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stephanodiscus hantzschii	0.00	0.00	0.29	0.00	0.00	0.28	0.00	0.00	0.79
S. medius	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
S. minutulus	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
Surirella bifrons	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Synedra ulna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tabellaria flocculosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

14.75	15.25	15.75	16.25	16.75	17.25	17.75	18.25	18.75	19.25	19.75	20.25	20.75	21.25	21.75
3.77	3.64	3.38	4.25	3.04	1.42	0.00	0.00	0.00	0.27	0.00	0.79	1.65	1.07	2.00
3.19	2.24	1.13	1.42	0.00	0.85	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.27	1.14
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	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.87	0.00	0.28	0.85	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.16	0.56	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.57	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22.32	10.08	10.42	9.92	4.67	5.67	0.52	0.00	3.13	1.10	0.55	0.53	1.65	3.20	6.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2.52	0.00	1.98	0.00	1.70	0.00	0.00	0.00	0.00	0.00	0.26	0.00	1.60	0.57
0.87	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.29
0.00	0.28	1.41	0.85	0.00	0.28	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.53	0.00
1.45	0.00	0.28	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	0.56	1.13	1.42	0.23	0.57	0.00	0.00	0.00	0.55	0.00	0.26	0.28	0.80	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.58	1.12	0.28	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.56	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.53	0.86
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.45	0.28	0.85	1.13	0.23	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.85	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

22.25	22.75	23.25	23.75	24.25	24.75	25.25	25.75	26.25	26.75	27.25	27.75	28.25	28.75	29.75
1.67	2.27	3.41	4.19	3.06	2.97	2.83	2.09	3.00	1.97	3.66	0.86	2.49	2.59	5.54
0.28	0.28	0.57	1.96	0.00	0.27	1.42	2.62	0.00	1.41	1.46	4.29	0.55	0.26	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.27	0.57	0.00	0.25	0.00	0.00	0.00	0.00	0.78	0.48
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.81	0.57	0.52	0.25	0.56	0.00	0.00	0.55	0.52	0.24
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.00	0.00	0.00	1.53	0.00	0.85	0.52	0.50	0.28	0.73	0.29	0.00	0.26	0.48
0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.28	0.26	0.00
0.56	0.00	0.00	0.00	0.51	0.00	0.57	0.00	0.00	0.28	0.00	0.00	0.83	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.26	0.00	0.00	0.00	0.00	1.39	0.52	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.67	11.90	19.89	11.45	14.03	7.30	10.48	15.71	16.50	8.45	11.22	17.14	8.86	14.51	10.36
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.00	0.00	2.79	0.00	0.00	0.00	0.00	0.00	1.69	0.00	0.00	1.39	0.00	0.00
0.28	0.00	0.00	0.56	0.00	0.00	0.85	0.00	0.00	1.41	0.24	0.29	0.83	1.04	0.48
2.22	1.70	0.00	1.68	0.00	0.00	0.85	0.26	0.00	1.13	1.46	0.00	1.39	0.00	0.48
0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.50	0.00	0.00	0.29	0.00	0.00	0.24
0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.28	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.85	1.70	0.56	2.55	1.08	0.57	0.00	1.75	1.41	0.49	0.29	1.94	1.30	0.72
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.57	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

30.75	31.75	32.25	33.25	34.25	35.25	36.25	37.25	38.25	39.25	39.75	40.75	41.75	42.75	43.75
0.81	0.40	1.35	0.86	2.09	2.29	2.25	2.51	2.44	3.70	4.53	2.14	0.87	4.08	3.52
0.00	0.00	0.45	0.86	2.88	0.00	0.85	0.84	0.27	0.00	0.00	0.43	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.85	0.43	1.70	0.00
0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.45	0.00	0.26	0.86	0.28	0.28	0.27	0.00	1.13	0.00	0.00	1.36	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.29	3.93	0.00	1.69	0.28	0.00	0.00	0.00	0.00	0.87	0.00	0.00
0.00	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.40	0.00	0.00	0.79	1.43	0.00	0.56	1.08	0.28	0.57	0.00	0.43	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.43	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.57	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.29	0.00	0.57	0.00	0.84	0.00	0.57	0.00	1.28	0.00	0.68	0.88
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.50	3.95	4.93	4.30	4.45	2.29	5.63	3.91	3.25	2.56	2.83	4.27	2.60	2.72	3.52
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.45	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	0.28	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.68	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	3.70	0.00	0.00	0.00	0.00	3.52
0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.40	0.00	0.00	0.00	0.86	0.56	0.28	0.00	0.00	0.57	0.00	0.43	0.68	0.44
0.27	0.00	0.45	0.57	0.00	0.57	2.54	0.00	1.36	1.99	3.97	3.85	0.43	1.36	0.00
0.54	0.79	0.00	0.00	0.52	0.00	0.56	0.00	0.27	0.00	0.28	0.43	0.43	0.68	0.00
0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.68	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.27	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.28	0.00	0.43	0.43	0.68	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.40	0.00	0.00	0.00	0.00	0.56	0.00	0.27	0.00	0.00	0.85	0.00	0.00	0.44
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

44.75	45.25	46.25	46.75	47.75	48.25	49.25	49.75	50.75	51.25	52.25	52.75	53.75	54.25	55.25
5.92	0.67	4.00	4.67	1.30	2.58	1.33	3.55	2.35	5.19	1.94	4.79	4.76	4.58	3.95
1.78	0.00	0.00	0.00	0.00	0.65	0.00	2.37	0.00	0.00	1.94	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.67	0.65	0.00	0.00	0.00	0.00	0.65	1.94	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.66
0.00	0.67	2.00	0.67	0.00	0.65	3.33	0.00	0.00	0.00	0.00	0.60	0.00	0.65	0.00
0.00	0.00	0.00	1.33	1.30	0.00	0.00	0.00	1.76	1.30	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.60	0.00	0.65	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	1.20	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	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.67	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.65	0.65	0.00	0.60	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.59	0.00	0.00	0.00	0.65	0.65	0.67	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
12.43	2.00	3.33	0.00	2.60	1.29	5.33	4.73	2.94	6.49	5.16	4.79	3.57	3.27	1.97
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.18	0.00	0.00	1.33	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00	1.31	1.32
1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	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	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	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	0.66
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	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	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.33	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
1.18	2.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32
0.59	1.33	0.00	0.67	0.00	0.00	2.00	1.18	0.00	0.00	0.00	0.00	0.00	1.31	4.61
0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19	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	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19	0.00	0.66
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	0.00	0.00	0.00	0.00	0.00

56.25	57.25	57.75	58.75	59.75	60.75	61.75	62.75	63.25	64.25	65.25	65.75	66.75	67.75	68.75
6.49	0.66	1.33	3.90	2.52	3.13	6.29	3.90	1.90	3.95	8.39	4.79	4.64	4.67	8.12
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	1.29	0.00	0.00	0.00	3.05
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.00	0.00	0.60	0.00	0.00	0.00
0.65	0.00	0.00	0.00	0.63	0.63	0.00	1.30	0.00	0.00	0.00	0.60	0.00	0.00	1.02
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.65	0.66	0.00	0.00	0.00	1.88	0.63	0.00	0.00	1.32	0.00	1.20	0.66	1.87	0.00
0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	1.94	0.00	0.00	0.00	2.03
0.00	0.00	0.00	0.65	0.00	0.63	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.65	0.00	0.67	0.00	0.00	1.88	0.63	0.00	0.63	1.32	1.29	0.60	0.66	0.00	1.52
0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.93	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.65	0.00	0.00	1.30	0.00	1.25	1.89	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.93	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.00	1.33	0.65	0.00	2.50	0.00	0.00	0.63	0.66	1.94	1.20	1.32	1.87	1.52
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.60	3.29	2.67	1.95	1.89	2.50	3.77	6.49	3.80	3.29	0.65	4.79	8.61	5.61	5.58
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.47	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	0.00	1.20	0.00	0.00	0.51
0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51
0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	0.00	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30	0.66	0.67	0.00	1.26	0.63	0.00	0.00	0.63	0.00	0.00	0.00	0.66	0.00	0.51
0.65	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	2.63	0.65	0.00	1.32	0.47	0.00
1.95	0.00	0.00	0.00	1.89	0.63	0.00	0.00	0.00	0.00	0.00	0.00	2.65	0.93	0.00
0.00	3.95	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	1.29	1.20	0.66	0.00	4.57
0.00	0.00	0.67	0.00	0.63	0.63	0.00	0.00	0.00	0.66	0.00	1.20	0.00	0.00	0.00
0.65	0.66	0.00	1.30	0.00	0.63	0.00	0.00	0.00	0.66	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	1.95	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51
0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

69.25	70.25	71.25	72.25	73.25	74.25	75.25	76.25	76.75	77.75	78.75	79.75	80.25
1.86	5.26	8.46	4.64	1.73	1.33	0.00	1.72	2.61	3.61	3.14	0.67	3.75
0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	2.41	0.00	0.00	0.00
1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.63
0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.00	1.99	0.00	0.67	0.00	0.00	3.27	0.00	1.89	1.34	2.50
0.00	1.32	1.99	0.00	0.00	0.00	0.00	0.00	0.00	2.41	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	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	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00
1.24	1.97	0.50	0.00	0.00	0.67	0.00	0.00	0.00	0.60	0.00	1.34	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.16	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	3.92	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.48	0.66	0.50	0.00	0.00	0.00	0.00	3.45	0.00	3.01	0.00	0.00	1.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.48	9.87	5.47	5.30	2.89	10.67	3.92	0.00	4.58	6.63	7.55	2.01	5.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.62	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.66	1.16	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	1.33	0.00	0.00	0.00	2.41	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.66	0.50	0.66	0.00	0.00	0.00	1.72	0.00	2.41	0.63	0.67	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.67	0.00
0.00	1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00
0.00	0.00	1.99	0.66	0.58	0.00	0.00	3.45	1.31	0.00	0.00	0.00	0.63
0.00	1.32	0.50	1.32	0.00	0.67	0.00	0.00	0.00	0.00	0.00	1.34	0.63
1.24	0.66	0.00	0.00	0.00	0.00	0.00	1.72	0.00	0.00	0.63	1.34	0.63
0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.32	1.16	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.62	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

b) PAD 12 relative abundances Midpoint Depth (cm)

	16.25	17.25	18.25	19.25	20.25	21.25	22.25	23.25	24.25
Achnanthes conspicua	0.00	0.00	1.52	0.00	0.00	2.67	0.99	2.79	0.99
A. hungarica	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00
A. lanceolata var. *biporoma*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00
A. lanceolata ssp. *frequentissima*	0.00	19.51	9.09	6.84	5.07	8.00	8.61	6.37	8.25
A. minutissima	2.78	0.00	0.00	0.00	1.45	0.00	0.00	0.00	1.32
Unidentified *Achnanthes.* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Anomoeoneis sphaerophora	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amphora inariensis	0.00	0.00	0.00	0.00	0.00	3.33	0.99	0.00	0.00
A. libyca	16.41	15.85	10.61	8.39	15.94	16.33	13.58	11.13	8.25
A. ovalis	1.64	0.00	0.00	1.86	0.00	2.33	1.99	0.43	0.66
A. pediculus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A. veneta	0.00	0.00	0.00	0.00	3.62	0.00	0.33	0.00	0.00
Aulacoseira ambigua	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
A. crenulata	0.00	1.22	0.76	0.85	0.00	0.00	0.00	0.00	0.00
Caloneis bacillum	2.78	0.00	0.00	1.71	0.72	0.00	1.32	3.98	2.64
C. schumania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. silicula	0.00	0.00	0.00	0.00	0.00	3.33	0.00	0.00	0.00
Unidentified *Caloneis* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cocconeis placentula var. *euglypta*	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00
C. placentula var. *lineata*	0.00	0.00	2.05	1.59	0.00	3.05	0.00	0.61	0.00
C. placentula var. *placentula*	12.50	6.10	18.41	20.63	12.32	7.62	15.96	14.13	15.51
Cyclotella bodanica var. *lemanica*	0.00	0.00	0.00	0.85	0.00	0.67	0.00	0.00	0.00
C. oscellata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. rossii	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. stelligera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclostephanos PAD sp. 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. PAD sp. 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cympatopleura elliptica	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00
Cymbella solea	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00
C. aspera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00
C. cistula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. cuspidata	0.00	0.00	1.52	0.00	0.72	0.00	0.00	0.00	0.00
C. microcephala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. minuta	0.00	0.00	0.76	1.71	0.72	0.00	0.33	0.00	0.66
C. proxima	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. silesiaca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. subaequalis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. subcuspidata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C. sp. cf. *descripta*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified *Cymbella* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified Diatom sp.	0.00	1.22	0.76	0.85	0.00	0.00	0.00	0.80	0.33
Unidentified Centrics sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Epithemia adnata	4.17	0.00	3.03	1.71	2.90	2.67	1.66	0.40	2.64
E. turgida	1.39	4.88	0.76	0.85	2.90	9.33	3.31	1.99	0.99
Eunotia bilunaris	0.00	0.00	1.52	0.00	0.00	0.00	0.00	0.00	0.00
E. diodon	0.00	0.00	0.76	1.71	0.00	0.00	0.00	0.00	0.00
E. flexosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. formica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. incisa	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00
Unidentified *Eunotia* sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

25.25	26.25	27.25	28.25	29.25	30.25	31.25	32.25	33.25	34.25	35.25	36.25	37.25	38.25
1.69	1.41	2.26	0.85	2.85	2.27	0.79	1.23	0.28	0.28	0.28	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.49	0.00	1.70	0.28	0.00	0.00	0.00
6.78	8.17	6.78	5.35	5.13	8.52	8.66	6.13	6.35	8.22	8.83	8.33	0.00	6.90
0.00	1.69	1.41	0.00	0.00	0.00	0.79	0.00	0.28	0.00	1.42	1.04	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	3.65	0.00	1.15
8.00	6.74	5.93	10.98	5.98	4.83	5.24	4.17	8.02	10.32	1.71	7.81	13.93	9.20
1.04	0.31	2.26	0.29	0.85	0.28	0.28	0.74	1.09	0.45	0.57	1.56	1.07	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.28	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.69	1.13	1.13	3.38	2.28	7.67	5.51	1.96	0.00	0.00	0.00	0.00	1.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.28	0.00	1.04	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.37	1.91	1.33	0.00
0.56	0.94	0.00	1.27	2.65	0.35	0.00	0.41	0.00	0.50	0.00	0.00	0.00	0.00
9.04	11.74	14.12	8.87	9.03	10.73	8.66	12.33	8.56	9.42	8.89	9.55	6.67	16.09
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	2.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	1.04	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.28	0.00	0.00	0.52	0.00	0.00	0.00	0.57	0.52	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.13	2.54	1.13	1.97	0.28	4.26	2.36	0.74	2.76	2.27	0.85	1.04	2.00	4.60
3.39	2.54	1.98	3.66	1.14	1.99	1.05	3.43	3.59	0.57	3.13	2.60	8.00	3.45
0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	3.45
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	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00

39.25	40.25	41.25	42.25	43.25	44.25	45.25	46.25	47.25	48.25	49.25	51.25	53.25	55.25
0.00	2.70	4.00	16.67	3.31	10.67	3.33	2.00	4.64	2.63	7.28	8.00	6.62	22.73
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99	0.00
2.65	0.00	0.00	3.33	3.97	5.33	4.00	4.00	5.96	10.53	3.97	5.33	6.62	3.25
1.77	0.00	0.00	0.00	0.00	1.33	0.67	1.33	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.80	2.00	3.33	0.00	6.00	2.67	0.00	4.64	1.97	3.31	3.33	0.00	0.00
10.35	8.11	7.33	7.33	9.82	6.00	4.67	4.00	3.31	9.87	4.33	3.33	4.64	9.74
1.15	0.00	0.00	0.00	2.10	0.00	1.33	0.00	0.00	0.00	3.61	3.33	0.00	0.00
0.00	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00	1.32	3.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.88	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.32	0.00	0.00	0.00
2.65	0.90	1.33	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	1.32	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.30	1.47	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	5.20	0.00	0.00	4.05	0.00	0.00	1.15	0.00	0.00	0.93	0.00
9.73	11.71	7.33	12.13	23.84	12.53	21.26	22.67	16.56	17.27	5.96	13.33	3.71	7.14
0.00	0.00	3.33	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.65
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	1.32	0.00	0.00	0.00
0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	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	0.00	0.00	0.00	0.67	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
0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.67	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	1.33	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	0.66	0.00
0.88	0.00	0.00	0.00	0.00	0.00	0.67	1.33	1.32	1.32	0.66	0.67	0.66	1.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.73	8.11	14.00	6.00	7.28	2.67	6.00	8.00	9.93	10.53	11.26	13.33	1.99	4.55
15.93	7.21	18.67	18.67	7.95	8.00	7.33	8.00	9.93	11.18	7.95	14.00	11.26	7.14
0.00	0.00	0.00	0.00	0.66	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.65
0.00	0.90	1.33	1.33	1.32	1.33	0.00	0.67	0.00	1.32	1.32	0.67	1.99	1.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

57.25	59.25	61.25	65.25	67.05	71.25	73.25	77.25	79.25	83.25	85.25	87.25
16.30	39.33	10.67	16.26	4.64	0.00	0.00	0.67	0.00	0.00	0.00	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	1.33	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.96	8.00	10.00	16.26	9.27	8.55	3.55	1.33	3.33	5.88	9.38	4.43
0.74	0.00	0.00	13.82	5.96	1.32	0.00	3.33	0.00	1.96	2.08	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	6.00	8.00	5.69	2.65	0.00	0.00	0.00	0.00	0.00	0.00	1.27
10.37	6.00	5.25	3.79	10.51	8.55	8.11	10.81	22.00	4.58	5.21	6.84
0.00	0.00	0.75	1.90	0.75	0.00	1.35	3.86	0.00	1.96	0.00	0.76
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.22	1.33	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00
2.96	0.00	0.00	0.00	0.00	1.97	0.00	0.67	0.00	1.96	0.52	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00
3.33	0.00	0.00	0.00	0.00	1.72	2.47	0.00	0.00	0.00	2.11	0.00
16.67	6.67	4.67	3.25	13.91	37.76	27.12	25.33	16.67	39.87	33.81	29.11
0.00	0.00	2.67	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	3.25	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00
0.74	0.00	0.00	1.63	2.65	0.00	0.00	0.67	0.67	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00
1.48	0.00	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00
0.00	0.00	0.67	0.00	0.66	0.66	0.00	1.33	0.00	1.96	0.00	0.00
0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.22	2.00	0.67	0.81	0.66	0.00	6.51	1.33	9.33	1.96	1.56	4.43
2.96	2.67	10.67	4.07	5.30	2.63	7.69	8.00	11.33	5.88	5.21	10.13
0.00	0.00	0.00	1.63	1.32	0.00	0.00	0.00	0.00	1.96	0.00	0.00
0.74	1.33	0.00	1.63	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

b) PAD 12 relative abundances   Midpoint Depth (cm)

	16.25	17.25	18.25	19.25	20.25	21.25	22.25	23.25
Fragilaria brevistriata	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina var. *capucina*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.59
F. capucina var. *gracilis*	8.33	0.00	6.06	1.71	0.00	0.00	0.00	0.00
F. capucina var. *mesolepta*	0.00	0.00	10.61	0.00	0.00	1.33	0.00	0.00
F. capucina var. *vachariae*	0.00	0.00	0.00	0.00	2.90	0.00	0.00	0.00
F. capucina (girdle view) 16str/10	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00
F. capucina (girdle view) 15str/10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. capucina (girdle view)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. construens	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. construens f. *binodis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. construens var. *venter*	0.00	1.22	0.00	0.00	0.00	0.00	3.31	3.59
F. contruens var. *venter* cf. *pinnata*	0.00	0.00	0.00	0.00	0.00	0.00	3.97	4.38
F. delicatissima	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. leptostauron var. *leptostauron*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. neoproducta	0.00	0.00	3.03	1.71	0.00	0.00	0.00	0.00
F. nitchiodes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. parasitica var. *subconstricta*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. pinnata	11.11	14.63	3.79	8.55	9.42	16.67	20.53	28.29
F. famelica (girdle view)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. sp. cf. *construens* var. *binodis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F. sp. cf. *fasciculata*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified *Fragilaria* sp.	0.00	4.88	0.00	0.00	0.00	0.00	0.00	0.00
Gyrosigma acuminatum	2.78	1.22	0.00	0.85	2.17	1.33	2.65	0.40
Gomphonema acuminatum	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.80
G. angustatum	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
G. angustum	2.78	0.00	0.76	1.71	2.90	0.00	0.33	0.00
G. gracile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. insigne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. minutum	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.80
G. oliveceum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. parvulum	0.00	1.22	0.00	0.00	0.00	0.00	0.66	0.00
Unidentified *Gomphonema* sp.	0.00	0.00	0.76	0.85	0.00	0.00	0.33	0.00
G. sp.cf. *exiguum*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. sp.cf. *subtile*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G. other sp. (girdle view)	0.00	2.44	1.52	0.00	0.00	0.00	0.66	0.00
G. clavatum	0.00	0.00	3.03	0.85	4.35	2.00	0.66	1.59
G. truncatum	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00
Hantzchia amphyoxis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula capitata var. *capitata*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
N. capitata var. *hungarica*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. cryptocephala	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. cryptotenella	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. cuspidata	1.39	3.66	0.00	1.71	0.00	0.00	0.00	0.00
N. elginensis	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.20
N. exigua	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
N. halophila	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. laevissima	6.94	9.76	6.06	2.56	12.32	6.00	2.98	0.80
N. libonensis	4.17	1.22	0.00	0.85	1.45	2.67	2.32	0.80
N. meniscus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. menisculus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

24.25	25.25	26.25	27.25	28.25	29.25	30.25	31.25	32.25	33.25	34.25	35.25	36.25	37.25
0.00	0.28	0.00	0.00	0.00	0.57	0.00	0.00	2.45	3.04	0.00	1.42	0.00	3.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	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
4.95	1.98	0.56	1.41	0.00	0.57	6.82	0.26	1.23	0.00	0.00	0.57	0.00	1.00
0.00	0.00	2.54	0.00	1.13	0.00	2.56	4.72	8.82	1.10	1.13	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.32	1.13	0.00	0.00	0.85	0.00	0.00	2.10	0.00	0.00	0.00	1.14	3.13	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00
0.00	0.00	0.00	1.41	0.56	4.56	0.00	3.15	0.25	0.28	0.00	2.56	2.08	0.00
2.64	2.54	3.66	6.50	10.14	8.26	2.56	4.72	2.21	6.63	1.70	10.54	4.69	2.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00
0.00	1.69	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27.72	25.14	34.37	39.27	38.03	41.31	24.72	28.61	33.09	32.60	24.93	39.32	19.79	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.68	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.28	0.00	0.00	0.00	0.00
0.66	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.55	0.00	0.00	2.00
0.99	0.85	0.00	0.00	0.56	0.00	0.00	0.26	0.00	0.00	0.00	0.00	2.08	35.00
0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	1.56	0.00
0.00	0.56	0.00	0.56	0.56	0.00	0.00	0.00	0.98	0.55	1.13	0.00	1.04	0.00
0.00	1.41	0.56	0.00	0.28	0.28	0.00	0.79	0.00	4.70	3.40	0.57	0.00	0.00
0.66	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.98	0.56	0.00	0.00	0.00	0.00	0.28	1.84	0.25	0.00	0.00	0.00	1.04	2.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.69	0.56	0.00	0.28	0.00	0.85	0.79	0.00	0.55	0.57	1.42	0.52	0.00
0.66	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.32	0.00	0.56	0.56	0.00	0.00	0.00	0.52	0.00	1.66	4.53	0.00	1.04	0.00
1.32	1.69	1.13	0.85	0.85	1.14	0.85	1.31	0.00	0.00	2.55	0.95	0.00	3.00
0.00	0.00	0.28	0.85	0.56	0.28	0.00	0.00	0.25	0.00	0.57	1.90	1.04	0.00
0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.28	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.28	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00
0.00	0.56	0.00	0.00	0.00	0.00	0.57	0.26	0.25	0.00	0.00	0.00	0.00	0.00
0.33	0.28	0.56	0.00	0.56	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
0.33	0.00	0.28	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.28	0.00	0.52	0.00
0.33	0.00	0.56	0.00	1.13	0.57	0.00	0.00	0.49	0.55	0.00	0.00	0.52	1.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.29	5.08	4.51	2.26	2.82	4.27	4.55	1.05	2.45	3.87	3.68	2.28	6.77	0.00
2.64	1.41	1.13	2.82	0.85	0.28	3.13	1.57	0.98	1.93	2.27	0.57	2.60	1.00
0.33	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.25	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

38.25	39.25	40.25	41.25	42.25	43.25	44.25	45.25	46.25	47.25	48.25	49.25	51.25	53.25
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.97	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.66	0.00	5.30	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	3.97
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.64	8.00	3.97
0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	2.65	0.00	0.00	0.00	0.00	0.00	1.32	0.00	8.61
0.00	0.00	0.00	0.00	0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.60	8.85	0.00	4.00	0.00	0.66	2.67	1.33	1.33	0.00	1.32	1.32	1.33	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32.18	10.62	39.64	10.67	4.67	6.62	8.67	5.33	9.33	7.95	3.29	5.30	6.00	11.26
0.00	0.00	1.80	0.00	0.00	0.00	1.33	0.00	1.33	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.45	1.77	0.00	2.67	0.00	0.00	0.00	3.33	1.33	7.28	0.00	2.65	0.00	0.00
0.00	3.54	0.00	0.00	0.00	0.00	1.33	0.00	1.33	1.99	0.00	0.00	0.00	0.00
0.00	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.90	0.00	0.90	0.00	0.67	0.00	4.00	0.00	1.33	0.00	0.00	1.32	0.00	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	1.33	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	1.33	0.66	0.00	1.33	0.67	0.00	0.00	0.66	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	2.65	1.32	0.00	0.00	1.32
0.00	1.77	0.00	2.67	2.67	0.00	0.00	1.33	5.33	1.32	0.00	0.00	0.00	3.31
0.00	0.00	0.00	0.00	0.67	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
1.15	0.00	0.00	0.67	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.33	1.32
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.15	2.65	0.00	1.33	0.00	1.32	0.00	0.00	0.00	0.66	0.00	0.66	0.00	0.00
0.00	0.00	1.80	1.33	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.45	7.08	3.60	4.00	4.67	10.60	0.67	8.00	3.33	3.31	3.29	4.64	5.33	5.30
1.15	1.77	4.50	2.67	0.67	2.65	0.67	1.33	0.67	0.00	3.29	0.66	0.00	3.31
0.00	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	1.32	2.67	0.00

55.25	57.25	59.25	61.25	65.25	67.05	71.25	73.25	77.25	79.25	83.25	85.25	87.25
0.00	0.00	0.00	0.00	0.00	0.00	1.97	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.67	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
2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.55	5.19	3.33	2.00	0.00	2.65	0.00	2.37	0.00	0.00	1.31	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00
7.14	3.70	3.33	4.67	3.25	4.64	4.61	4.14	7.33	0.00	1.31	2.08	1.27
0.00	0.00	0.00	0.00	0.81	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.00	0.00	1.32	3.29	0.00	0.00	6.00	0.00	1.04	3.16
0.00	0.00	0.00	0.00	0.00	2.65	0.00	0.59	0.00	1.33	0.65	0.00	1.27
0.65	0.00	1.33	0.00	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00
0.00	0.00	2.00	1.33	0.00	0.00	1.32	2.37	0.00	0.00	4.58	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00
0.00	0.00	1.33	0.67	0.00	0.00	1.32	2.37	0.00	0.67	1.96	2.60	1.90
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00
0.00	0.00	0.00	6.67	0.00	0.00	2.63	0.00	0.00	0.00	1.31	3.13	2.53
1.30	0.74	1.33	0.00	0.00	0.00	1.32	1.18	0.00	0.67	0.00	0.00	1.27
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	1.33	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.26	0.00	1.33	0.00	0.00	1.04	1.27
0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.81	1.99	0.66	0.00	0.67	0.00	0.00	0.00	0.00
0.00	1.48	0.00	1.33	0.00	2.65	0.00	0.59	1.33	0.67	0.00	1.04	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.09	1.48	2.00	9.33	6.50	6.62	0.00	4.14	5.33	4.67	1.31	6.25	3.16
0.65	0.00	0.67	2.00	0.81	0.66	3.29	4.14	2.00	0.67	4.58	2.08	7.59
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.65	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00

b) PAD 12 relative abundances Midpoint Depth (cm)

	16.25	17.25	18.25	19.25	20.25	21.25	22.25	23.25	24.25
Navicula minima	0.00	2.44	1.52	1.71	2.17	0.00	0.00	0.80	0.00
N. oblonga	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.33
N. placentula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. pseudokotschyi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. pupula	2.78	1.22	0.76	4.27	2.17	0.00	0.33	0.40	1.32
N. pupula var. *nyassensis*	0.00	0.00	0.00	0.85	0.00	1.33	0.33	1.20	0.33
N. radiosa	0.00	1.22	0.00	0.00	0.00	0.00	0.66	0.00	0.00
N. rhynocephala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. seminulum	0.00	0.00	1.52	0.00	1.45	0.00	0.00	0.00	0.00
N. subminuscula	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00
N. trivialis	2.78	0.00	1.52	0.00	0.72	0.00	0.33	0.80	0.66
Unidentified *Navicula* sp.	1.39	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *accomoda*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *bryophila*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *clemantis*	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *elginensis*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp. cf. *pusio*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp cf. *radiosa*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp cf. *tuscula*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. sp cf. *vulpina*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00
Navicula/Achnanthes sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula/Amphora sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula/Cymbella sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Navicula/Gomphonema sp.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Neidium ampliatum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
Nitzschia amphibia	0.00	0.00	3.03	7.69	7.25	1.33	0.33	1.20	0.00
Navicula angustata	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. fonticola	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. frustulum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. gracilis	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.00	0.00
N. liebetruthii	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00
N. palea	1.39	0.00	0.00	3.42	0.00	0.00	0.00	0.00	0.00
N. paleacea	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N. radicula	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00
Unidentified *Nitzschia* sp.	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Orthoseira oeseanna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinnularia divergens	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00
P. gibba	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.80	0.00
P. interupta	1.39	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00
P. legumen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P. nodosa	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00
P. stomatophora	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P. viridis	1.39	3.66	0.00	2.56	0.00	1.33	0.99	0.80	0.33
Rhoicosphenia abbreviata	0.00	0.00	0.76	0.00	0.00	0.00	0.99	0.00	0.00
Rhopolodia gibba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
Stauroneis anceps	0.00	0.00	0.76	0.00	0.00	0.00	0.66	0.00	0.00
S. lauenburgiana f. *angulata*	0.00	2.44	0.00	0.00	1.45	0.00	1.32	1.59	1.65
S. phoenicenteron	0.00	0.00	0.00	4.27	0.72	0.67	0.99	2.39	0.00
Stephanodiscus hantzschii	0.00	0.00	0.00	2.56	0.00	0.00	0.00	0.00	0.00
S. medius	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S. minutulus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

25.25	26.25	27.25	28.25	29.25	30.25	31.25	32.25	33.25	34.25	35.25	36.25	37.25	38.25
5.65	1.69	1.13	0.85	2.56	1.14	3.15	2.70	2.21	1.42	0.28	0.00	0.00	0.00
0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.85	1.69	0.00	0.28	0.00	0.57	0.52	1.96	0.28	0.00	0.00	1.04	0.00	0.00
1.13	0.85	0.00	0.00	0.00	0.00	0.26	0.00	0.00	1.13	0.00	0.00	0.00	0.00
0.00	0.56	0.28	0.00	0.00	1.70	0.79	1.72	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.28	1.70	0.79	0.49	0.00	0.28	1.14	1.04	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.56	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.28	0.00	0.52	0.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00
0.28	0.00	0.56	0.00	0.28	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
1.13	1.13	1.98	1.13	1.71	1.70	2.89	2.94	1.10	2.55	4.56	1.04	2.00	0.00
0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.85	0.00	0.28	0.00	0.57	0.00	0.00	0.00	0.55	0.28	0.00	1.04	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.28	0.00	0.52	0.00	0.28	1.42	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.57	0.00	0.00	0.00	0.00	1.56	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.56	0.00	0.56	0.00	0.28	0.26	0.00	0.55	0.00	0.57	0.00	1.00	0.00
0.85	0.00	0.00	0.00	0.28	0.00	0.00	0.74	0.55	1.98	0.00	0.00	0.00	0.00
0.28	0.56	0.56	0.00	0.00	0.57	0.79	0.49	0.00	0.00	0.00	0.00	1.00	0.00
1.13	0.00	0.00	0.00	0.00	0.57	0.79	0.00	0.00	0.00	0.00	0.00	3.00	0.00
0.56	1.97	0.00	0.00	0.00	0.00	0.00	0.25	0.28	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	1.00	0.00
0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.28	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	1.56	2.00	0.00

39.25	40.25	41.25	42.25	43.25	44.25	45.25	46.25	47.25	48.25	49.25	51.25	53.25	55.25
0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.67	3.31	0.00	0.00	1.33	1.99	1.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.65
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.66	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	3.33	0.67	1.32	1.33	0.00	0.67	2.65	1.32	0.00	0.00	1.32	3.25
0.00	0.00	0.67	0.00	0.00	0.00	2.00	1.33	1.32	1.32	0.00	0.00	0.00	0.00
0.00	0.00	0.67	2.00	0.00	1.33	2.67	1.33	0.00	1.32	0.00	0.00	0.00	1.30
0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	4.61	0.00	0.00	1.99	0.00
0.00	0.00	0.00	0.00	0.00	1.33	1.33	1.33	1.32	1.32	1.99	0.00	0.66	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
0.00	1.80	0.00	1.33	0.00	0.00	0.67	0.00	1.32	0.00	0.00	0.00	0.00	0.00
0.88	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	1.95
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.66	0.65
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.66	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.88	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
1.77	0.00	0.00	0.00	1.32	2.67	0.67	1.33	1.32	3.95	6.62	0.67	2.65	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
0.00	0.00	0.00	0.67	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.67	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	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.90	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.80	0.67	0.67	0.00	0.00	0.00	0.67	0.00	0.66	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.33	0.00	1.99	1.33	0.00	0.67	0.00	1.32	0.00	1.33	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	2.00	0.00	0.00	0.00	0.00	1.99	1.33	1.99	0.65
0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.66	1.32	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

57.25	59.25	61.25	65.25	67.05	71.25	73.25	77.25	79.25	83.25	85.25	87.25
5.93	1.33	4.67	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.99	0.00	0.00	0.00	0.00	1.31	0.52	0.00
0.00	0.00	0.67	0.00	0.00	0.00	0.00	2.00	0.00	2.61	0.00	2.53
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	2.00	0.00	0.00	0.00	0.66	1.78	0.00	0.00	0.00	0.00	0.63
0.00	0.00	0.00	0.00	0.00	0.00	2.37	0.00	0.67	0.00	0.00	1.27
0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	2.53
1.48	0.00	0.00	0.00	0.00	0.00	0.00	1.33	0.00	0.65	2.08	0.00
0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.67	0.00	0.00	0.00	2.37	3.33	0.67	0.00	1.04	0.63
0.00	0.00	0.67	0.00	0.00	1.32	1.78	0.00	1.33	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.81	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.74	2.00	0.67	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.52	1.27
0.00	1.33	2.00	1.63	0.00	1.32	0.00	4.00	0.00	1.31	3.65	0.00
0.00	0.00	0.00	0.00	0.00	0.00	1.18	1.33	0.00	1.31	2.08	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	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	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	1.04	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	1.33	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.48	0.00	1.33	0.00	0.00	0.00	0.00	1.33	0.00	1.31	0.00	0.00
0.00	0.00	0.00	0.81	1.32	0.00	1.78	0.00	1.33	0.00	1.56	0.63
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.33	0.00	1.32	0.00	0.59	0.67	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.65	0.52	1.27
1.48	0.00	0.00	0.81	0.66	0.00	0.00	1.33	4.00	0.65	1.04	0.00
2.96	1.33	0.00	0.00	1.99	0.00	0.00	2.00	0.00	0.65	1.56	0.00
0.00	0.67	0.67	1.63	3.97	1.32	1.18	0.00	0.67	2.61	0.00	0.00
0.00	0.00	0.00	0.81	0.00	0.66	0.59	0.67	1.33	0.00	0.52	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00