University of Alberta

Analysis of Storage and Conveyance Characteristics of the Mackenzie Delta

by

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Abstract

The Mackenzie Delta is the second largest northern delta in the world. The water from the Delta entering the Beaufort Sea has a significant impact on its dynamics. Areas in the Delta were surveyed using LiDAR (Light Detection and Ranging). The goals of this study were to characterize the floodplain storage of the surveyed parts of the Delta and determine if there are trends in these characteristics across and down the Delta. The storage area consisted of lakes and the overland floodplain areas. Cross sections were taken from the LiDAR data to estimate the conveyance and storage areas above the low water levels. The conveyance and storage trends, lake distribution, as well as lake and channel water elevations of each zone are discussed. Results from this study could be used to help develop zone-based storage relationships to be used in a hydraulic model.

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1.0 Introduction

The Mackenzie River Basin, shown in Figure 1.1, drains an area of 1.8 x 10^6 km^2, or approximately 20% of Canada's land area, to the Beaufort Sea (Fassnacht and Conly 2000; Hill et al. 2001; MacKay 1965). The major tributaries of the Mackenzie River include the Athabasca, Peace, and Liard Rivers (de Rham, Prowse, and Bonsal 2008). Located in the western part of the Northwest Territories (Figure 1.2), the Mackenzie Delta is the second largest northern delta in the world and the largest in North America (Marsh and Hey 1988; Marsh 1998; Marsh et al. 1993), with a length of approximately 200 km , width of 80 km, and a surface area of about 13,000 km^2 (Emmerton et al. 2008; Marsh et al. 1993).

The Mackenzie Delta is a very complex hydrological area containing an extensive network of well-connected anastomosed channels (Anderson and Anderson 1974; Burn 1995; Emmerton et al. 2008; Goulding, Prowse, and Beltaos 2009; Jenner and Hill 1998). The Delta also has an extensive floodplain containing thousands of lakes, ranging in size from smaller than 0.005 km^2 to larger than 0.71km^2 (Emmerton et al. 2007). The estimated number of lakes in the Delta ranges from approximately 25,000 (Mackay 1963) to just over 49,000 (Emmerton et al. 2007). As the Delta is relatively flat, with only 3 to 4 meters of variation in elevation over its length (Bigras 1990; Goulding, Prowse, and Beltaos 2009), overbank flooding is a frequent occurrence, especially during spring breakup when ice jams often obstruct the channels (Morley 2012).

As seen in Figure 1.2, the Mackenzie Delta enters the Beaufort Sea through a large number of channels spanning a distance of more than 115 km, carrying with it both heat (i.e. comparatively warmer water) and sediment. This plume of sediment laden water has a significant effect on the dynamics of the Beaufort Sea and, depending upon the flow distribution between the Delta outflow channels, can affect ice extent and some intensity (Perrie et al. 2012). As it is highly desirable to be able to quantify the distribution of flow among the outflow channels, a hydraulic model of the Mackenzie Delta is currently being developed (Nafziger et al. 2009). However, to properly model the Delta flow distributions, the storage capacity of the Mackenzie Delta floodplain must first be quantified.

Because of its large size and remote location, very little is actually known about the topography of the Mackenzie Delta. Therefore, it is not possible to input floodplain geometry directly into the Mackenzie Delta hydraulic model to quantify these important floodplain storage effects, as such data is not available. Instead, topographic data were collected at representative sites within the Delta using LiDAR (Light Detection and Ranging) instrumentation, as part of an International Polar Year project sponsored by the Government of Canada. The objectives of this project were to use this LiDAR data to do the following.

1. Characterize the floodplain storage characteristics of the Delta in these surveyed areas by quantifying the storage areas attributable to overland and lake storage in the floodplains.
2. Determine if there are any geographic trends in these storage characteristics, either across or down the Delta that could be used to develop general, zone-based, storage relationships for use in the hydraulic model.

3. Quantify any identified floodplain storage trends in terms of channel capacity, to facilitate consideration of overbank storage in the hydraulic model of the Delta.

Chapter 2 examines past studies on the Mackenzie Delta, from ice jams and flooding to characteristics of the channels and lakes within the Delta. Chapter 3 describes the LiDAR data, aerial photos, and Water Survey of Canada (WSC) data used in this study. The study methodology is explained in the Chapter 4. The results are discussed in Chapter 5, focussing on the conveyance and storage, lake distribution, and some water surface characteristics. Finally, Chapter 6 provides conclusions and recommendations for future studies.

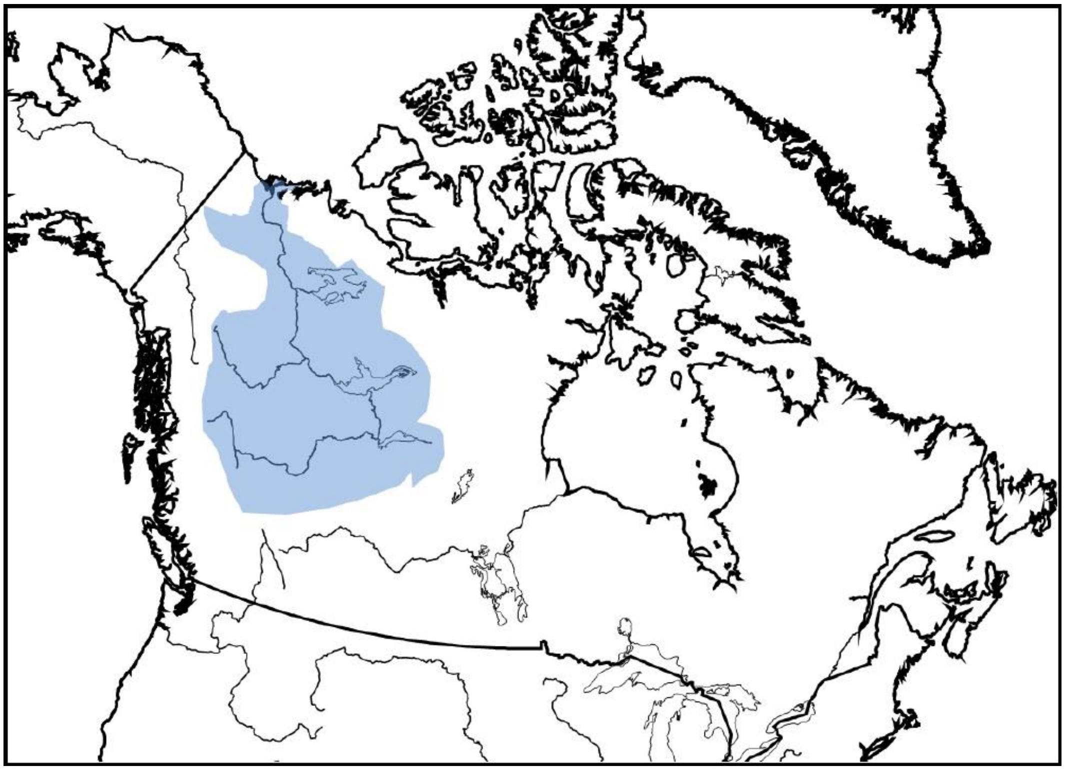


Figure 1.1 The location of the Mackenzie River Basin in Canada.

(Adapted from Morley (2012))
(Base image source: ArcMap basemaps)

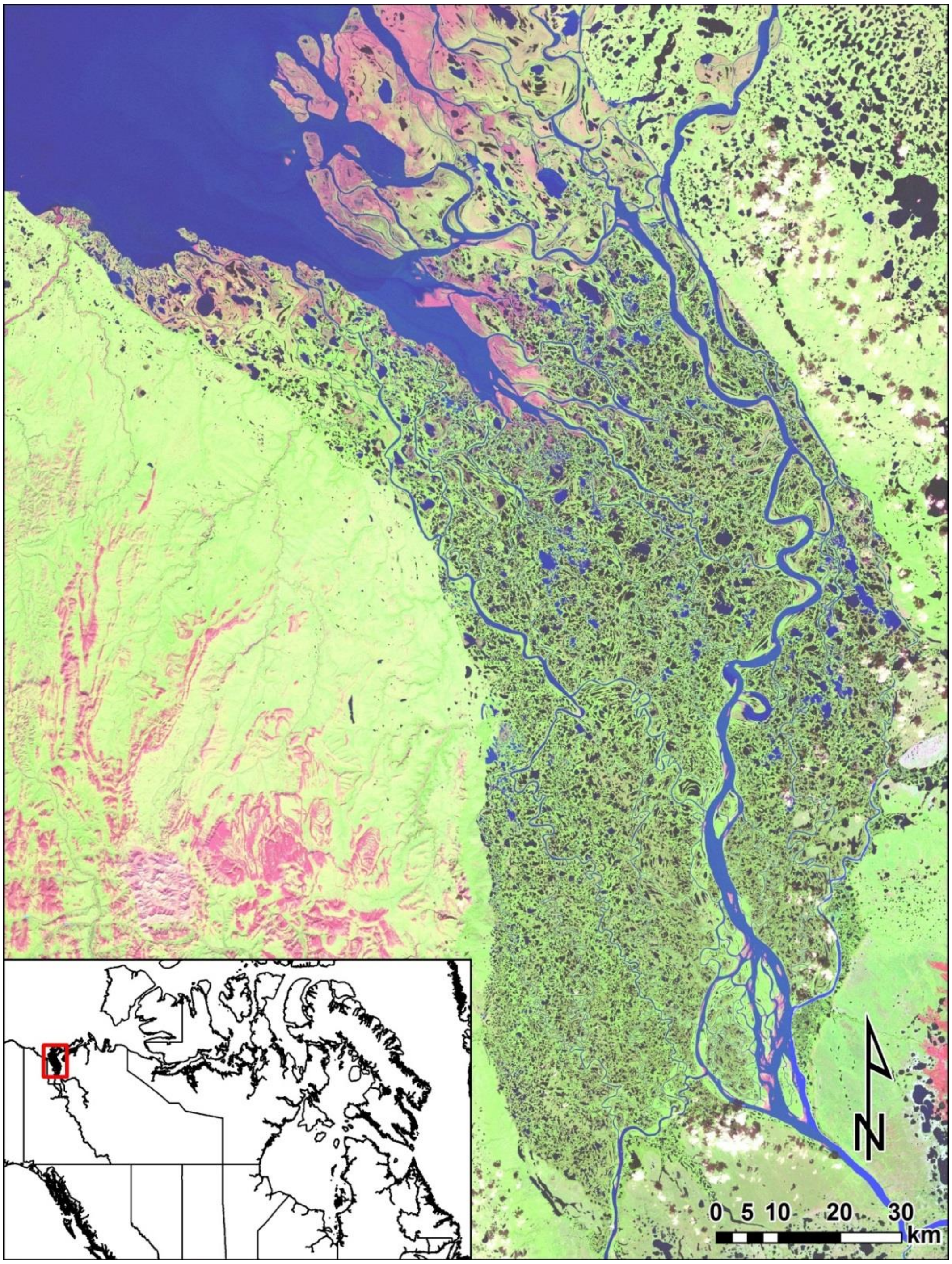


Figure 1.2 Location and map of the Mackenzie Delta in northwest Canada.

(Base image source: Industry Tourism and Investment, NWT)
(Insert image source: ArcMap basemaps)

2.0 Background Information

This chapter explains some of the characteristics of the Mackenzie Delta through an analysis of previous studies. It looks at the conveyance, flooding, and the consequent water storage in some of the areas of the Delta. This information is important as it gives background knowledge of some of the hydrological processes in the Mackenzie Delta.

The Mackenzie Delta is a vast area with significant spatial variation, which necessitates study at a large scale to capture the range of variations. However, previous studies, including two by Lesack and Marsh (2010) and Marsh and Hey (1988), have focused on small areas of the Delta. The results from such studies cannot be applied to other areas of the Delta because levee heights and the water level regime vary throughout the Delta (Marsh and Hey 1988).

2.1 Elevation and Spatial Information

Levee heights are one of many important characteristics of the Delta that vary from south to north. Therefore, the Delta can be divided into different areas, based on factors such as the levee elevations, distribution and size of lakes, channel junction properties, and the areas that are influenced by tides (Marsh et al. 1999). Levees in the upper Delta are higher due to increased riverine sediment loads in the region and increased distance and elevation from sea level (Emmerton et al. 2007).

The levee heights in the Delta decrease from south to north in a step like fashion (Goulding, Prowse, and Beltaos 2009; Mackay 1963). In the southern part of the

Delta, levees are over 9 m above the late summer water levels, while in the northern areas, the levees are less than 1.5 m above the late summer water levels (Goulding, Prowse, and Beltaos 2009). There are two rapid drops in levee height along the Delta; the locations of these are shown in Figure 2.1. The first, denoted by line 1-1' in Figure 2.1, occurs just north of Inuvik and Aklavik and involves a drop in levee height of about 5 m in less than a 16 km distance. The other notable decrease in levee height is north of Reindeer station (Goulding, Prowse, and Beltaos 2009; Mackay 1963), shown by line 2-2' in Figure 2.1, and involves a drop of about 1 m in a few kilometers. Levees are almost non-existent in areas that are less than 1.2 meters above sea level (Mackay 1963).

Flooding tends to be frequent and extensive in the northern part of the Delta where the levees are quite small (Goulding, Prowse, and Beltaos 2009). For this reason, the lakes are connected to the channels more often during floods and storm surges from the Beaufort Sea, which means water regularly flows into the lakes. This regular inflow of water into lakes results in a tendency for the northern lakes to be larger than the lakes in southern parts of the Delta (Emmerton et al. 2007; Jenner and Hill 1998; Marsh and Schmidt 1993). It was determined from previous observations that almost all of the lakes are flooded annually in the lower Delta (Marsh et al. 1999).

2.2 Flow Characteristics of the Mackenzie Delta

The Mackenzie Delta has thousands of connecting channels, which some authors have attempted to classify. Mackay (1963) defines two types of rivers, spilling rivers and incised rivers. Spilling rivers have point bars on meanders that are inundated at high water levels. Incised rivers are well defined channels with relatively steep banks that confine the water and channel at a constant and uniform width. Given these definitions, the channels in the Delta behave as both spilling and incised because they behave not only as a single channel but as several channels depending on the time of year which could be a result of the channels being so well connected (Mackay 1963). However, this connection between the channels and lakes is not uniform throughout the Delta. The southwestern part of the Delta has the fewest interconnecting channels. There is a general trend of an increase in the number of channel junctions from the upper to the lower Delta (Mackay 1963). Further, Hill et al. (2001) indicate the distributary channels in the Delta are anastomosing. This type of river has high sediment loads in the channels, which leads to aggradation, the formation of levees, and frequent overbank flooding.

As there are hundreds of channels in the Delta which vary significantly in size and flow, they have been divided into categories. Nafziger et al. (2009) examined the flows in the Mackenzie Delta at different times of the year and used discharge rates to categorize channels as primary, secondary, or tertiary, which is the convention followed here. However, not all channels fall into these three categories, as some are much smaller and may dry up over the summer; these are referred to as minor channels for this study. Figure 2.2 shows the primary and secondary channels in the Delta, which are the only types shown since there is not sufficient data regarding flow, size, depth, or cross sectional properties to accurately model tertiary or minor channels. Despite being categorized by

Nafziger et al. (2009), there is not enough flow data or cross-sectional channel information to accurately measure the conveyance of the tertiary channels. The minor channels are also too small and may dry up over the summer, making it impossible to accurately measure the conveyance in these channels.

The vast majority of the flow into the Delta comes from three main sources, the Mackenzie, Peel, and Arctic Red Rivers, which contribute about 90%, 7 to 8%, and 2% of the flow respectively (Anderson and Anderson 1974; Burn 1995; Emmerton et al. 2007, 2008; Marsh and Hey 1988). Observations made by Beltaos (2012) agree with this, and demonstrate that the Mackenzie River has the largest influence on flow in the Delta as the mean peak discharge during the spring breakup is 23,000 m^3/s, which is significantly more than the flows of 700 m^3/s and 3600 m^3/s in the Arctic Red River and the Peel River, respectively. Furthermore, the Mackenzie and Peel Rivers have mean annual discharges of 2.86×10^8 $dam^3/year$ and 2.19×10^7 $dam^3/year$ respectively (Burn 1995). Thus, the flow entering the Delta depends mainly on the Mackenzie River, with the Peel and Arctic Red Rivers having a small contribution to the flow, and the influence of other streams is negligible (Marsh and Schmidt 1993).

After entering the Delta, the flow stays mostly in the primary channels. Several of the main or primary channels in the Delta convey the majority of the flow. These channels are referred to as the Middle Channel, the East Channel, and the Peel Channel, which span the length of the Delta; the other primary channels in the Delta include the Napoiak and the Kumak Channels, which branch off the Middle Channel farther north in the Delta. The majority of the flow entering the

Delta, 80% during the peak flow period and 95% during the winter, remains in the Middle Channel (Fassnacht and Conly 2000). Farther north, approximately 25 km from the Beaufort Sea, the Middle Channel splits into the Reindeer, Middle, and Neklek channels, which convey 40%, 35%, and 25% of the flow respectively (Fassnacht and Conly 2000). Morley (2012) compared measurements of water entering the Delta to flow measurements near the middle of the Delta over a five year period. About 70 to 95% of the inflow in the Middle Channel, about 2% of the inflow in the East Channel, and 5 to 8% of the inflow in the Peel Channel was measured in the middle Delta. The discrepancy in the flows is likely due to off channel storage and flow in channels not measured (Nafziger et al. 2009). Nearly 5% more of the inflow was accounted for during the winter months than summer months which suggests that smaller channels could be blocked during the winter (Morley 2012).

Importantly, the flow into the Delta varies throughout the year, with the peak flows and highest water levels occurring during the spring, and decreasing throughout the year. In a five year study from 2006 to 2010, Morley (2012) reported peak flows in May which ranged from 26,000 to 36,000 m^3/s, and low flows observed in November and December ranged from 2,370 to 3,610 m^3/s. Figure 2.3, adapted from Hill et al. (2001) using data from WSC, shows the yearly hydrograph for the Mackenzie Delta. The open water season in the central Delta is from June to November, with the peak water levels occurring during spring breakup (Lesack et al. 1998). Morley (2012) noted that hydrographs from different gauges in the Mackenzie Delta had the same general shape, with the peak water levels occurring in late May as a result of snowmelt runoff and breakup. Further, the summer and winter flow networks are different. During spring breakup, some channels may be blocked by ice jams which can cause diversions, reversals of flow, and overtopping of levees (Mackay 1963).

Although the flow into the Delta varies throughout the year, the flow out of the Delta to the Beaufort Sea may not vary as much because of potential water storage in lakes (de Rham, Prowse, and Bonsal 2008). Figure 2.3 shows that flow in the Delta is at or very close to the base flow, which is less than 20% of the average summer discharge (Jenner and Hill 1998), from November until April or May of the following year. At which time the flow increases very quickly, flooding many lakes by early June (Marsh and Hey 1994). This increase in water level is caused by the spring breakup, which increases rapidly due to snow melt and peaks during May and June. By June, there is no longer ice in the Delta, and the discharge decreases over the open-water season (Hill et al. 2001).

The effects of climate change on flooding in the Mackenzie Delta are currently unknown, and there are conflicting predictions. On the one hand, Aziz and Burn (2006), who examined the hydrological trends and variability in the Mackenzie River Basin, noted remarks from the Intergovernmental Panel on Climate Change (IPCC 2001) that predicted probable changes in flood frequencies and increases in runoff in northern latitudes due to an increase in precipitation. On the other hand, several studies have predicted that warming in the arctic regions may reduce river ice jamming, the snowpack, and spring runoff (Lawford et al. 1995; Rouse et al. 1997). Since ice jams cause the largest floods, such predictions indicate that flooding would be less severe in the Mackenzie Delta. Furthermore, climate change could cause the spring freshet to arrive earlier due to earlier snow melt (Emmerton et al. 2007). This change in timing could also affect the channel to lake connection times for higher elevation lakes. If lakes are not connected to the channels as often or for as long, they may experience a negative water balance and dry up as there is little precipitation and runoff (Lesack et al. 1998; Marsh and Bigras 1988; Marsh and Lesack 1996; Marsh 1986). Furthermore, climate change has the potential to alter channel morphology and ground water supplies, which have an indirect influence on the ice regimes (Beltaos and Prowse 2001). This could alter the freezing of lakes, affecting whether or not a lake freezes to the bottom. Finally, changing the ice conditions in a lake would also alter potential storage in the Delta as ice dams and ice shelves may be removed (Prowse et al. 2011).

2.3 Lake Characteristics in the Mackenzie Delta

Lake characteristics vary considerably throughout the Delta. Variations in lake elevation, lake sills, and the connecting channels are important as lakes in the Delta are havens for wildlife, and therefore, water replenishment through annual spring floods is important to support aquatic life (Beltaos 2007; Bigras 1990; Prowse et al. 2011). Furthermore the lake characteristics, such as the sill elevation, can be used to divide the lakes into different categories regarding the flooding regime.

The water balance of lakes in the Mackenzie Delta varies throughout the year. The Delta is similar to other floodplains as water may only reach some lakes during high flow times, such as the spring (Forsberg et al. 1988). The hydrology of the lakes depends on the lakes' elevations in relation to the nearest distributary channel (Marsh et al. 1999). Lakes can have inflows of water from precipitation directly onto the lake surface, runoff from the area surrounding the lake, and floodwater from the main channels. Water may be lost from lakes to outflow to a channel, evaporation, or groundwater flow (Marsh 1998).

Lakes typically undergo periods when the water balance is positive, and the lake level rises, and when the balance is negative, and the lake level falls. The water balance is typically positive during the spring breakup period. The water level in higher elevation lakes is dependent on the high flood water in the spring as this is the main source of recharge for these lakes (Goulding, Prowse, and Beltaos 2009; Goulding, Prowse, and Bonsal 2009). The water balance of perched or high elevation lakes in late summer is based on precipitation and evaporation as these are the only changes in water storage because the high elevation lakes do not get flooded at this time. Perched lakes are at a higher elevation than the channels and are only connected to the channels during spring floods. Since the evaporation is typically greater than the precipitation, the lakes experience a negative water balance (Marsh and Bigras 1988).

The flooding of lakes in the Delta depends on the elevation of the lake sill. Sill elevation is defined by Marsh and Hey (1989) as the highest elevation along the connecting channel thalweg between the lake and main channel. It determines the duration, magnitude, and frequency of flooding for the lakes (Marsh and Hey 1989, 1994). Lake sills are typically found where connecting channels enter the lakes due to the high sedimentation rates (Marsh et al. 1993). However, these sill elevations are difficult to quantify because they can vary throughout the year as a result of snow filling or ice jams in a channel. Snow and ice dams are typically thicker in low sill lakes because they have deeper water in the connecting channels at freeze-up while the ice dams of higher sill lakes are thinner and often composed only of snow because the connecting channels are dry at freeze-up (Marsh and Hey 1989). The water level required to flood a lake and the duration of flooding depend on the lake sill elevation. Marsh and Hey (1994) determined that lakes with lower sills flood more frequently and for longer durations than lakes with higher sills. Sill elevation also affects lake storage, as shown by Marsh and Hey (1988), in a study near Inuvik, examining the change in depth of lakes. The mean increase in storage during the spring for lakes in the study with a sill of 1.0 m ASL is about 4.6 m of water, while lakes with a sill of 5 m ASL experience a change in depth of about 0.6 m on average.

The lakes in the Mackenzie Delta are categorized by Mackay (1963) into three different classes: no, low, and high closure. Figure 2.4, adapted from Emmerton et al. (2007), illustrates the different closure classes of lakes. No closure lakes are connected to the channels for the entire summer. These lakes represent 12% of the lakes in the Delta and about 60% of the total lake surface area (Emmerton et al. 2008), therefore these lakes tend to be larger than the other types of lakes. Low closure lakes are flooded each spring; then as the water levels recede, they become disconnected from the channels for some part of the summer. Low closure lakes represent 55% of all lakes in the Delta, and about 25% of the total lake area (Emmerton et al. 2008). Finally, high closure lakes are not flooded every spring and are not connected to channels at all throughout the summer. About 33% of the lakes in the Delta are high closure lakes, which is about 15% of the total lake area (Emmerton et al. 2008; Marsh and Hey 1989). Two benefits of this classification system are that lakes can be classified easily using air photos and that the basic properties of their flooding regime are described based on lake appearance (Marsh and Hey 1989). However, a drawback is that there can be large variations in the regimes and sill elevations within given classes (Marsh and Hey 1989).

In addition to sill elevation, climate change may affect the connection times of different closure level lakes in the Delta. Lesack and Marsh (2007) found that with climate change both no and low closure lakes tended to have a greater connection time, which essentially changed some low closure lakes to no closure lakes. However, their study also showed that higher elevation lakes experienced less flooding due to declining peak water level. In the future, this could cause higher elevation lakes, or high closure lakes, to dry up (Lesack and Marsh 2007).

Previous studies in the East Channel area near Inuvik have shown there is a significant range in lake sill elevations, which affects lake water levels. Lake sill elevations in the East Channel area near Inuvik, range from 1.5 m ASL to almost 6 m ASL, with a mean of 3.92 m ASL and a standard deviation of 0.90 m (Marsh and Hey 1988). Furthermore, it was determined that there are not very many large, low elevation lakes in the study area, but that there are many small, high elevation lakes (Marsh and Hey 1988). Only about two-thirds of the lakes are flooded annually, while the highest lakes in the area flood only every two to three years (Marsh and Hey 1988). An expansion on this study determined that no closure lakes in the area have sill elevations less than or equal to 1.5 m ASL, low closure lakes have sill elevations between 1.5 and 3.5 m ASL, and high closure lakes have sill elevations greater than 3.5 m ASL (Marsh and Hey 1989).

The characteristics of lakes, such as mean sill elevation and size, vary across the Delta. Lake sill elevations have been studied by Marsh et al. (1993) in the area between Aklavik and Inuvik. This study showed the mean sill elevations vary from 3.6 m ASL in the East Channel area, to 4.5 m ASL in the Middle Channel area, and 3.7 m ASL in the Peel Channel area. Furthermore, the average lake size in the Delta is smallest in the east part of the Delta, largest in the middle area, and lakes in the west part of the Delta are slightly smaller than the middle area (Emmerton et al. 2007).

Lake coverage in the Delta and the types of lake closure classes in each area varies from north to south. Mackay (1963) estimated that 15 to 30% of the area in both the southern and northern sections of the Delta is covered in lakes, while lakes make up 30 to 50% of the area in the central Delta. Although the estimated percentage area covered by lakes is similar in the southern and northern parts of the Delta, the number of lakes varies significantly. In the upper Delta, there is a high number of small, high closure lakes, while in the lower Delta, low closure lakes are more common (Bigras 1990; Lesack et al. 1998; Marsh and Hey 1989). A study done by Marsh (1998) found lakes in the upper Delta were perched up to 4 m higher than lakes in the lower Delta area. In the upper Delta area studied by

Marsh et al. (1999), there are very few no closure lakes, however these lakes tend to be large and make up 23% of the total lake area. Low closure lakes are intermediate in number and size when compared to the other two closure classes. However, low closure lakes comprise 51.4% of the total lake area in the upper Delta area studied (Marsh et al. 1999). Furthermore, there are lakes which are found exclusively in the southern part of the Delta, that do not have any depressions in the levee to link them to other lakes or channels (Bigras 1990; Marsh and Bigras 1988; Marsh 1986), which means that the lakes are not flooded annually and tend to have a negative annual water balance. Figure 2.5 shows the locations of Gill's Camp area, NRC Lake area, and Dishwater Lake area which were studied by Marsh and Hey (1989) and Marsh et al. (1999). The mean sill elevations increase from 2.4 m ASL in the Gill's Camp area, to 3.9 m ASL in the NRC Lake area, to 6.8 m ASL in the Dishwater Lake area (Marsh and Hey 1989; Marsh et al. 1999). The middle region of the Delta has the highest number of lakes (Emmerton et al. 2007). A possible explanation for the high number of lakes in the middle region of the Delta is the significant ice jams that occur in the Middle Channel, which flood the surrounding areas.

2.4 Water Storage Characteristics in the Mackenzie Delta

Large volumes of water can be stored in the Mackenzie Delta. The water is stored in lakes and over the floodplain areas of the Delta. This section examines the lakes and floodplain areas of the Delta.

The storage area in the Delta is comprised of lakes, wetlands, and overland areas, and is estimated to be as much as 87% of the total Delta area (Nafziger et al.

2009). Lakes are a main feature of the Mackenzie Delta, dominating the landscape in both number, as well as area (Marsh 1986). Emmerton et al. (2007) have shown that 45,000 of the 49,046 lakes, which is about 92% of the lakes, account for 99.9% of the total lake surface area in the Mackenzie Delta. This shows that the remaining 8% of the lakes in the Delta are very small as they represent 0.1% of the lake area. The depths and sizes of lakes fluctuate throughout the year, with the greatest areas and depths of lakes occurring at breakup, as water is received from flooding channels (Mackay 1963). Marsh and Hey (1989) estimated about 50% of the Delta is covered by lakes. Although this estimate varies, as it is difficult to determine due to fluctuating water levels at different times of the year. For example, Emmerton et al. (2007) estimated that at low water levels, lakes cover 25% of the Delta area. The extent of inundation varies from year to year. Two examples of years with significant flooding are 1961 and 1982 where a major ice jam in the Middle Channel caused as much as 95% of the surface to be inundated (Hill et al. 2001).

The lakes and floodplain areas of the Mackenzie Delta have the potential to store significant volumes of water. Emmerton et al. (2007) estimated the off-channel water storage capacity to be about 47% of the Mackenzie River flow during the high discharge period of the spring breakup. This suggests that the Delta has a key role in conveyance and storage of the flow from the Mackenzie, Arctic Red, and Peel rivers to the Beaufort Sea. Temporary storage in the Mackenzie Delta has been estimated to be from 26 to 31 km^3 by Emmerton et al. (2007). Of the water that is in storage, it is estimated that in an average peak flood, 11.7 km^3 of water is added to the lakes, which is equivalent to over a week of discharge of the Mackenzie River above Arctic Red River at the mean May-June discharge of 17,900 m^3/s (Emmerton et al. 2007; Marsh and Hey 1988). The estimate of water storage from Emmerton et al. (2007) is similar to an earlier estimate of about 25% of the discharge of the Mackenzie River between May 10 and June 10 from Marsh and Hey (1989). At the peak of the 2008 breakup flooding, the total volume of water stored on the terrestrial portions of the flood plain in the area studied by Marsh et al. (2009) was 32.3×10^6 m^3 (0.0323 km^3). Based on the size of the study area, which is 29.3 km^2, Marsh et al. (2009) determined the off-channel water storage, which does not include lakes or channels to be 1.3×10^6 m^3/km^2 of land area. According to the authors this is similar in magnitude to the estimate of floodplain storage given by Emmerton et al. (2007) for the entire Delta.

The volume of water that floods into lakes is significant and therefore has an important role in the water balance of the lakes. In a study by Marsh et al. (1993) of an area between Inuvik and Aklavik, the percentage of lakes that were flooded varied from 55% on May 22 to 100% on June 7, although the authors indicate this change in lake flooding is not uniform across the Delta. Furthermore, Marsh and Lesack (1996) stated that between 79 and 91% of the annual input and output total of a lake is from floodwater. Such floodwater causes the volume of the lakes to increase significantly during spring breakup, with increases in lake volumes over mid-summer volumes of 250% for high closure lakes, 290% for low closure lakes, and 330% for the connected, or no closure lakes (Bigras 1990).

Lake flooding has an impact on lake sedimentation as well. For example, Marsh et al. (1999) found that erosion occurs at substantial rates in lakes of the lower, but not upper, Mackenzie Delta. Such sedimentation changes the lake sill elevations and decreases with the distance from distributary channels. Furthermore, lake sediments decrease as the flood frequency decreases or the sill elevation increases (Marsh et al. 1999).

Permafrost also affects the storage and water balance in lakes. In perched lakes, which are lakes at a higher elevation than the surrounding channels, the water balance depends largely on flood water entering the lake. For example, Marsh (1986) indicates that permafrost limits ground water movement from NRC Lake. The NRC Lake area is shown in Figure 2.5. Since the permafrost limits the groundwater movement, it can be assumed that the losses to groundwater seepage are negligible when calculating the water balance for NRC Lake, as well as other lakes in the Delta (Marsh and Bigras 1988; Marsh 1986). Therefore, evaporation becomes an important part of the water balance of high closure lakes, as previously indicated by Marsh (1986) because it is typical for the evaporation to be greater than the precipitation over the summer months, which results in a negative water balance. Therefore, if it was not flooded in the spring by the Mackenzie River, the water level in the lake would decrease, which would most likely be the case for other perched lakes as well (Marsh 1986). Bigras (1990) indicates that although evaporation is important, it is not the dominant process responsible for the decline in lake water levels of no closure lakes over the summer, as discharge through distributary channels accounts for 96% of the annual water loss, while the remaining 4% is lost through evaporation.

The other area that is considered storage in this study is referred to as the overland area, which is any land area in the Delta. The northern location and permafrost, which can be about one meter thick even during the summer months, are influential factors in water storage in the Delta (Bigras 1990), as this means that an insignificant amount of water stored in the overland area can be lost to infiltration. According to Marsh and Hey (1988), the permafrost limits the subsurface drainage and seepage, thus making the water that goes into overland areas stay as storage in that area, rather than seeping into the ground.

2.5 Spring Breakup, Ice Jams, and Flooding

The storage in the lakes and overland areas of the Delta is often a result of ice jams, which back up flow and cause significant flooding during spring breakup. However, there are other causes of flooding in the Delta such as floods caused by storm surges. This section examines spring breakup, ice jams, and the resulting flooding.

Based on data from 1913 to 2002, spring breakup in the Mackenzie River Basin has average duration of about 8 weeks (de Rham, Prowse, and Bonsal 2008; de Rham, Prowse, Beltaos, and Lacroix 2008), while in the Mackenzie Delta the breakup period is much shorter and lasts an average of 19.4 days (Goulding, Prowse, and Beltaos 2009). The timing of breakup in the Delta is very consistent; over a twenty year period, the mean date of the peak water level was June 3, with a standard deviation of 4.1 days (Marsh and Hey 1988, 1989). This consistency is due to the large size of the Mackenzie Basin (Junk et al. 1989; Marsh and Hey 1988). The breakup process in the Delta starts with warming temperatures which causes snow to melt resulting in increased runoff (Walker 1983).

As with most north-flowing rivers, the spring breakup on the Mackenzie River usually progresses from south to north (Andres and Doyle 1984; Beltaos 2012; Goulding, Prowse, and Beltaos 2009). The spring breakup is defined as either the first movement of ice or as the date at which all ice is gone (MacKay 1965; de Rham, Prowse, Beltaos, and Lacroix 2008). Although the definition varies, the timing of breakup is not important for this study because this study focuses on water storage rather than the timing of the spring breakup. Melt water from southern portions of the Mackenzie River Basin flows to northern areas, resulting in the peak water levels of the year and significant flooding, which is often caused by ice jams in the Delta (Lesack and Marsh 2010). The Peel and Rat Rivers, which also contribute flow into the Delta, tend to break up earlier than the Mackenzie River, and cause the southwestern part of the Delta to have an earlier breakup than the rest of the Delta (Mackay 1963).

During breakup, ice in the channels melts partially and is moved downstream. Ice that moves downstream can become stuck on an intact ice cover, at sharp bends or channel constrictions, this is referred to as an ice jam. Ice jams are an essential component of many riparian and Deltaic ecosystems (Lawford et al. 1995). Some factors that can affect the type of ice jam that occurs include water level at freeze-up, flow, channel morphology, ice cover thickness and strength, and climate factors such as temperature and heat fluxes (Beltaos and Carter 2009; Beltaos 2003, 2007; Prowse and Marsh 1989). Depending on these factors, ice jams can vary between two extremes: “thermal” or “over-mature” breakup and a “mechanical” or “premature” breakup (Beltaos 2000, 2003; Lawford et al. 1995; Prowse and Marsh 1989).

Thermal breakups result from a relatively gradual melt process, mild weather, and low runoff which results in lower water levels and less flooding than a mechanical breakup (Beltaos and Prowse 2001; Prowse 1986). The gradual melt process means the ice cover decays mostly in place without going downstream, or if it does travel downstream, it is too weak to cause a significant ice jam (Beltaos and Carter 2009) and thus it will not cause major flooding as does a mechanical breakup. Knowing the difference between these two types of ice jams, and the factors that affect them is important because there can be a significant difference in the severity of flooding.

In contrast, mechanical breakups are associated with rapid runoff and meltwater from upstream and cause more severe flooding (Beltaos 2003, 2007; Prowse and Marsh 1989), because ice in the channel is broken and transported downstream before there is significant thermal deterioration, giving the ice enough strength to form an ice jam when it comes in contact with an intact ice cover or significant change in channel geometry such as a local reduction or a sharp bend (Beltaos 2000, 2007). One factor that contributes to the likelihood of mechanical ice breakup events is the channel slope. Generally, the higher the channel slope, the more rapid the river ice is flushed, which decreases the likelihood of mechanical breakup events (de Rham, Prowse, Beltaos, and Lacroix 2008). In the Mackenzie Delta, ice jams first form in the southern parts of the Delta, then as the breakup progresses these ice jams release and other ice jams are formed downstream (Morley 2012). The final stage of the breakup process is when the final ice jams are released (MacKay 1965).

Although ice jams can occur anywhere in the Delta, and vary in size and severity, two common locations are shown in Figure 2.2 - the Middle Channel at Horseshoe Bend and in the East Channel as it branches off the Middle Channel below Point Separation (Beltaos 2012). In a study of data from five years, Morley (2012) observed ice jams in the Middle Channel that stayed intact for three days and moved downstream in four of the five study years. Ice jams can stay in place for minutes or days and can be hundreds to thousands of meters long. When released, significant volumes of water and ice that were in storage are released all at once, causing flooding often with a surge and a steep wave (Beltaos and Prowse 2001; Beltaos 2007; Temimi et al. 2005). This is especially evident in the area near the Middle Channel because it is very prone to large ice jams (Marsh et al. 1999).

Ice jams back water up causing floods with much higher water levels than those from equivalent flows under open water conditions (Prowse and Lalonde 1996). One of the reasons the water levels associated with ice jams is higher than open water conditions is a result of an increase the hydraulic roughness due to a very irregular underside, which can raise water levels more than 30% above the open-water conditions (Beltaos and Prowse 2001; Gray and Prowse 1993). In an ice jam, the water is backed up behind the ice jam, causing the water level to rise and water can flow over the top of the ice at a blockage or restriction (Anderson and Anderson 1974). It is not possible to relate the water stage to the discharge during the spring breakup period because ice jams form and there are possibly inaccuracies in the flow estimates during the breakup period (Prowse 1986). In a study, Marsh and Hey (1989) indicate that over the 25 years of water level data that were available, the spring peak water level ranged from 4.298 m to 7.820 m ASL (above sea level) with a mean of 5.636 m ASL. Furthermore, Marsh and Lesack (1996) indicated that the water level from the lowest ice jam flood in the spring is still over 0.75 m higher than the highest recorded summer peak for the East Channel at Inuvik.

The main channel water regimes, levee heights, and potential ice jams vary down as well as across the Delta. For this reason, Marsh and Hey (1989) indicate the data obtained from a study near Inuvik cannot be applied directly to other areas of the Delta. There are four major characteristics of the Delta that can cause flooding in the Delta lakes. The first characteristic is the water level of the distributary channels. The second is the nature of the connecting channels that join the lake to the channel. There are two basic types of connections, the first is a single channel providing the inflow and outflow from the lake, and the second is a multiple channel or through-flow, which has two or more connecting channels with the flow predominantly into one end of the lake and out the other. The third factor is the distance between the lake and the distributary channel. Finally, the fourth factor is the elevation of the lake relative to the distributary channels (Marsh and Hey 1989).

The water level is not constant throughout the Delta, and it is difficult to determine if it is always highest in a particular area (Goulding, Prowse, and Beltaos 2009; Marsh and Schmidt 1993). For example, Goulding, Prowse, and Beltaos (2009) indicate data from some years show the water level was higher in the central Delta than the east, while it was opposite of this for other years. The western part of the Delta has an average peak water level that is lower than the central and eastern parts of the Delta in most of the years with significant floods (Goulding, Prowse, and Beltaos 2009). According to Marsh and Schmidt (1993) the water level in the Delta, especially the lower part of it, can vary due to storm surges. A study based on 2008 spring breakup data found water levels in the southern part of the Delta to be higher on the west side of the Delta than the east side. Water levels near the Middle Channel were not measureable because the benchmark at the site was destroyed during the flood event (Marsh et al. 2009). Water levels were also measured in the area between Inuvik and Aklavik during this study. The Middle Channel levels were the highest during the rising part of the hydrograph, and the Peel Channel (west side) had the lowest water levels (Marsh et al. 2009). Ice jams are one possible explanation for the uneven flooding during spring breakup. Since there is a range in the peak water level each spring, the number of lakes that are flooded changes. This is very important to the amount of storage within the Delta because after these peak water levels, the water level decreases over the summer, potentially falling lower than one meter ASL (Marsh and Hey 1989). The storage of water in wetlands and lakes reduces flood peaks and lowers the downstream flood magnitude (Frazier et al. 2003).

Ice jams are not the only cause for floods in the Mackenzie Delta; tidal activity, storm surges, and offshore winds also affect the water level for portions of the Delta. Since the maximum tidal range is about 0.37 m, about 30% of the entire Delta is affected by tides (Marsh 1998). Storm surges can be significant, reaching elevations of as much as 2 to 3 m above mean sea level (MSL) (Harper et al. 1988). A storm surge of 1.5 m can raise the water levels in the Delta as far as Tsiigehtchic, which is about 275 km upstream of the Beaufort Sea (Figure 2.2) (Marsh 1998). Coastal areas with elevations that are less than a meter above MSL can therefore experience significant flooding, which could cause water to be stored in some of the lakes in the area and affect the flow of fresh water to the Beaufort Sea. Finally, strong offshore winds can cause water levels as far as the middle Delta to be raised (Marsh and Schmidt 1993).

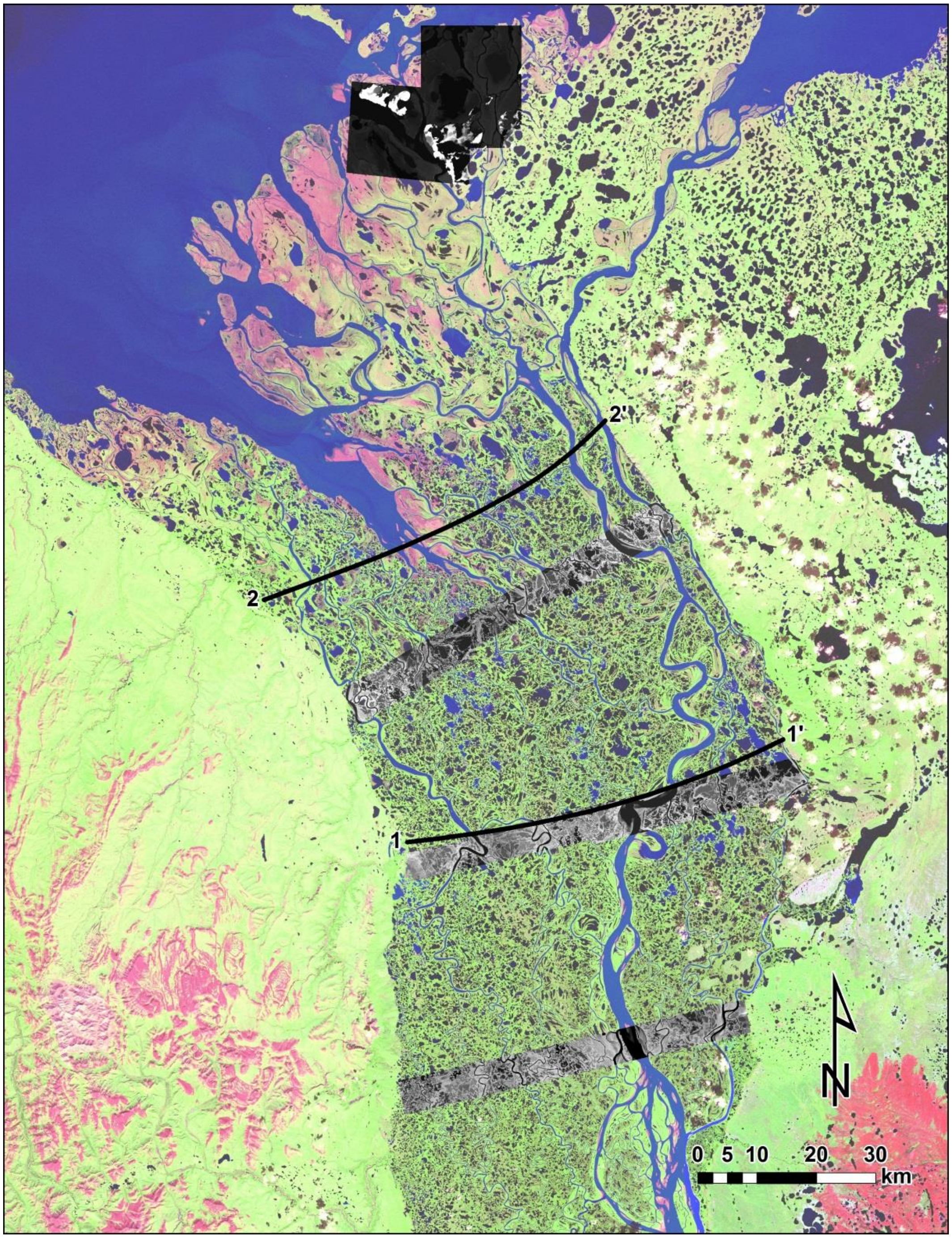


Figure 2.1 The two locations of significant decreases in channel levee elevations.

(Base image source: Industry Tourism and Investment, NWT)

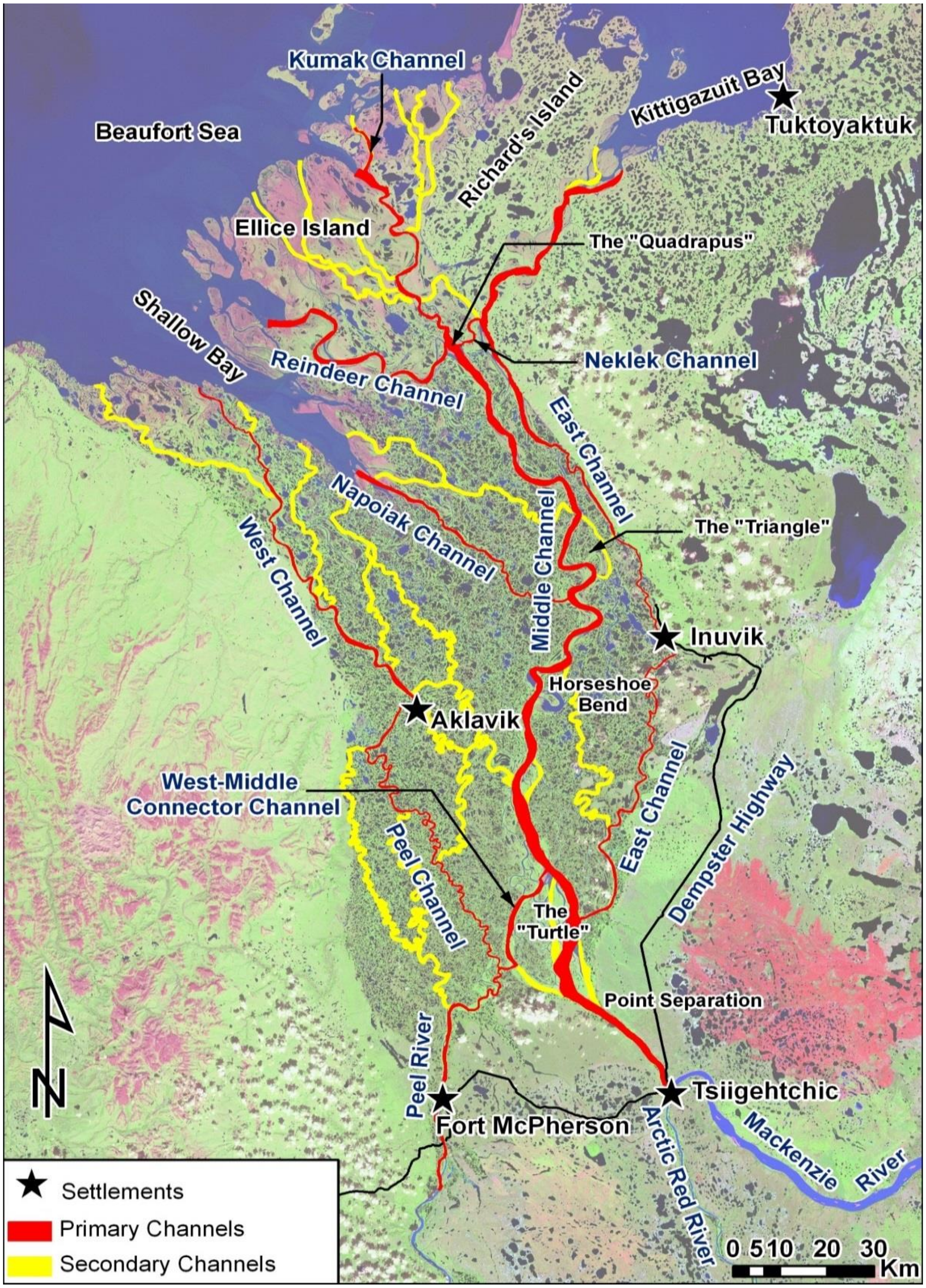


Figure 2.2 Primary and secondary channels, and town locations in the Mackenzie Delta.

(Adapted from Morley (2012))
(Base image source: Industry Tourism and Investment, NWT)

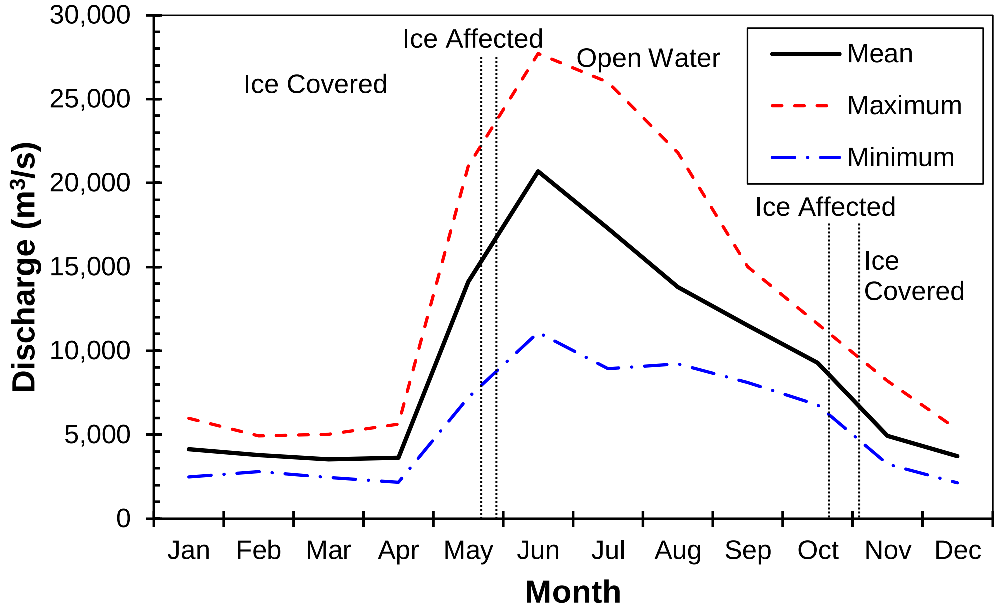


Figure 2.3 The average annual hydrograph of the Mackenzie Delta.

(Adapted from (Hill et al. 2001))

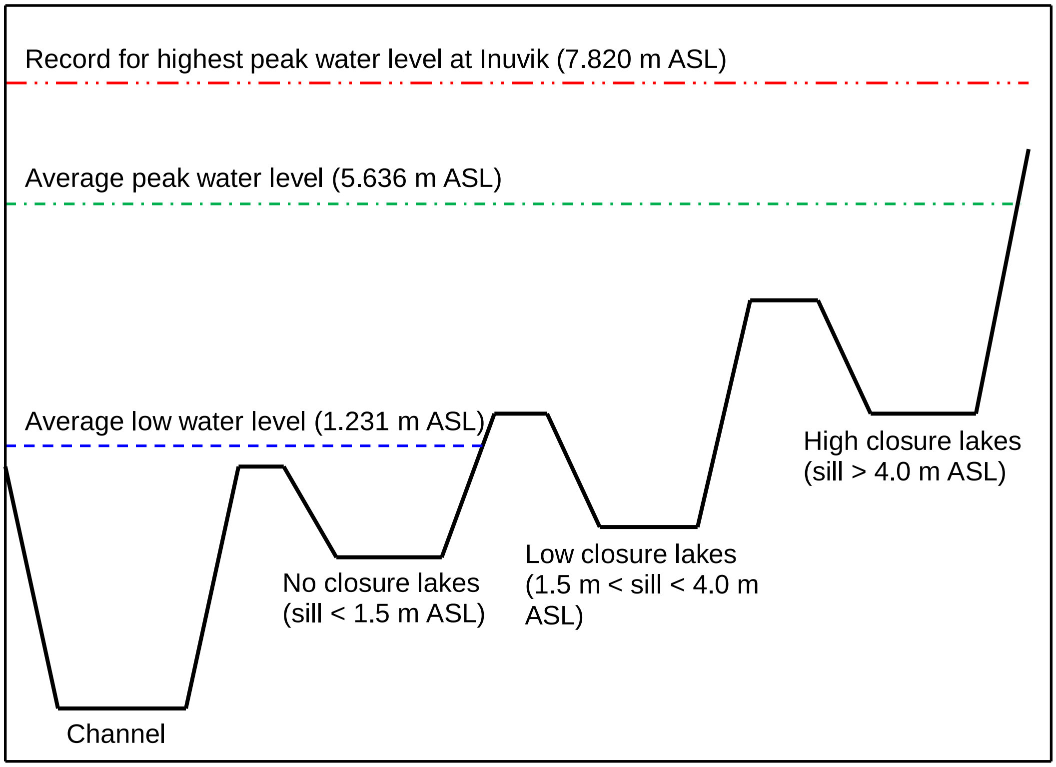


Figure 2.4 No, low, and high closure lake classes and the corresponding water levels.

(Adapted from (Emmerton et al. 2007)

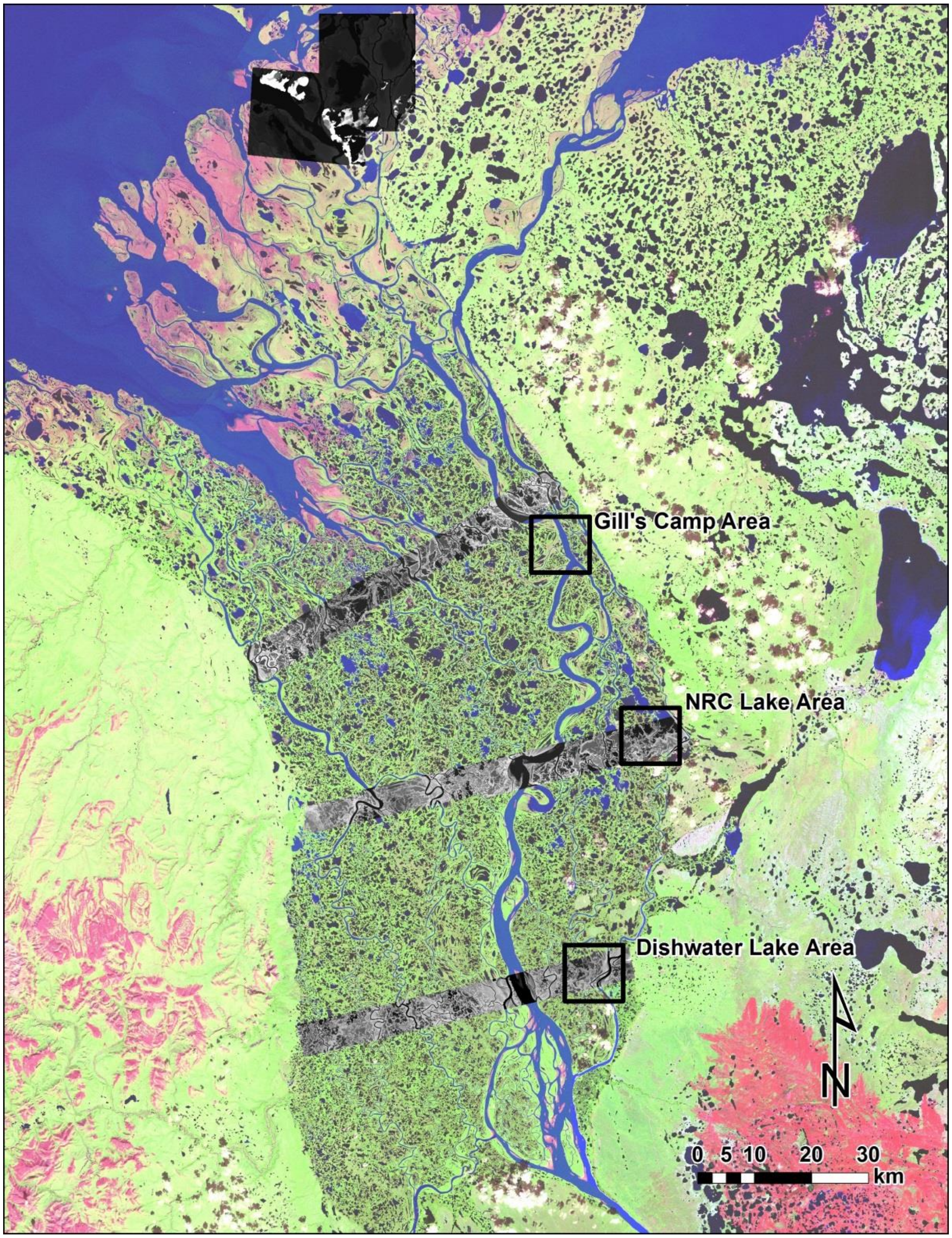


Figure 2.5 The locations of mean lake sill elevations samples taken by Marsh et al. (1999).

(Base image source: Industry Tourism and Investment, NWT)

3.0 Available Data

LiDAR (Light Detection and Ranging) data, aerial photos, and water level measurements from WSC (Water Survey of Canada) were used throughout this study. The LiDAR data were used for its high-resolution ground and water surface elevation information, which allowed for the calculation of conveyance and storage areas. Aerial photos were used along with the LiDAR data to determine the locations of the tops of banks of channels and edges of lakes. Finally, the WSC data were used to ensure the LiDAR and aerial photos had comparable water levels when the data sets were collected, and that both accurately represented the low flow characteristics in the Mackenzie Delta.

In order to model flooding and water storage in the Mackenzie Delta accurately, sufficient data, such as an accurate Digital Elevation Model (DEM) from the LiDAR data is needed. Past studies, such as those by Hopkinson et al. (2011) and Véronneau (2006), examined the accuracy and efficiency of the LiDAR data that had previously been flown in the Mackenzie Delta. The accuracy is important due to the relatively small changes in elevation within the Delta; small errors in elevation could result in large errors in the estimation of the storage or conveyance areas.

3.1 LiDAR Properties and Accuracy

The immense size of the Mackenzie Delta makes it difficult to survey using traditional survey methods; therefore, LiDAR data were collected to determine the terrain and water surface elevations (Wehr and Lohr 1999). The LiDAR data were collected using an Optech 3100 Airborne Laser Terrain Mapper (ALTM) from altitudes that ranged from 1000 to 2000 m ASL, at pulse repetition frequencies of 50 to 70 kHz and scan angles and scan rates from ±25° to ±30° and 25 to 27 Hz respectively (Marsh et al. 2009). Although a Digital Elevation Model (DEM) can be obtained from LiDAR data, and is a good method of modelling the relationship between water level and wetland inundation, it must be of a very high resolution for modelling purposes (Frazier et al. 2003). The LiDAR data used in this study had a sampling density of greater than 0.6 to 1.4 points per square meter, which allowed for the production of a DEM with a one meter by one meter grid spacing, a resolution that is acceptable for flood modelling (Hopkinson et al. 2011).

Since the Mackenzie Delta is a low elevation area, with the majority of the area at an elevation less than a few meters above sea level, the establishment of an accurate vertical datum is critical (Véronneau 2006). The benchmark used for geoid models in Canada is the Canadian Gravimetric Geoid 2005 (CGG05) datum (Véronneau 2006). CGG05 corresponds to an equipotential surface representing the global Mean Sea Level (MSL), and is used because it offers the most common and practical reference system for describing geo-referencing in the Canadian north (Véronneau 2006). Although the CGG05 datum is thought to be the most practical, it is important to consider the possibility of errors in the LiDAR data, which, according to Marsh et al. (2009) are typically less than 50 cm in the horizontal direction and less than 25 cm in the vertical direction. Since both the horizontal and vertical errors are less than the one meter spacing of the data, and given that the cross sections taken from the LiDAR transects are about 60 km long, even errors of 50 cm are likely to be insignificant at only 0.0008 % of the cross section length.

The date that the LiDAR data were collected is important because it affects the amount of information from the data that can be obtained. LiDAR data for the Mackenzie Delta were collected from August 11 to 16, 2008 as part of an International Polar Year (IPY) study on the hydrology of the Delta (Hopkinson et al. 2011). Since the LiDAR data were surveyed in late summer, the water levels in the Delta were at a very low level, approximately 1 m above the base flow levels (Hopkinson et al. 2011). This is important because LiDAR cannot penetrate water surfaces; therefore, bathymetric data for the channels and lakes were unavailable for this study. Since the LiDAR was flown in the late summer, it allows for the most complete representation of the lakes, lake sills, channels, levees, and surrounding overland area. Consequently, the areas used in this study are the available storage and conveyance areas, which represent the area above the approximate late summer low flow water level in the channels and lakes rather than the full cross sectional area of a channel or lake. For use in this study, the available areas above the low flow water levels are referred to as the storage and conveyance areas.

There are four LiDAR transects in the Delta. Figure 3.1 shows the LiDAR transects collected in the Delta in greyscale; the darker and black areas represent lower elevations, while the lighter and white colors represent higher elevations. The data includes three transects across the Delta, each approximately 6 km wide and 70 km long, as well as a fourth transect in the outer Delta of approximately 30 km by 30 km in a reverse "L" shape (Hopkinson et al. 2011). The 588 km^2 transect taken near Reindeer Station is referred to as the "Northern Transect" in this study, the 636 km^2 transect taken near Inuvik is called the "Inuvik Transect", the southernmost 576 km^2 transect is called the "Southern Transect", and the 756 km^2 transect near the Taglu area is referred to as the "Outer Delta Transect" (Marsh et al. 2009). These transect names are also shown in Figure 3.1. The Southern, Inuvik, Northern, and Outer Delta Transects are shown in more detail in Figure 3.2, Figure 3.3, Figure 3.4, Figure 3.5, respectively.

The LiDAR data had already been processed into a format that could be used in this study. Mark Russell from National Hydrology Research Center calculated the average water surface elevation in each body of water. The average elevation was assigned as the elevation value for all pixels in the corresponding water body (M. Russell, personal communication, September 2012). Figure 3.6 shows the results of this processing is the flat water surface at the average water elevation, which helps in distinguishing the channels and lakes from the overland areas. Some formatting, such as the elimination of excess data points that do not contain any elevation or location information was also required before the LiDAR data could be used.

3.2 Aerial Photos of the Mackenzie Delta

For this study, aerial photos from the Mackenzie Valley Air Photo Project from the NWT Centre for Geomatics (2007) were used to determine the locations of the tops of channel banks and the edges of lakes by overlaying the aerial photos with the LiDAR data. Although the photos are not from the same year as the LiDAR data, all of the aerial photos, except for one from September 2004, are from August 2004 (Ensom et al. 2012; NWT Centre for Geomatics 2007). Note that the single aerial photo from September 2004 is not over any of the channels or transects so it does not have any effect of the water levels, location of the top of channel banks, or edge of lakes used in this study. The time of year the data was collected is important because the water level in the Delta varies significantly throughout the year. The LiDAR and aerial photos are from the same late-summer low-flow period of the year. In the next section, data from WSC were used to compare the water levels from the two years that the LiDAR and aerial photos were obtained.

3.3 Comparison of WSC Water Elevation, LiDAR, Data, and Aerial Photos

Water elevation data from WSC were examined to determine approximate elevations and flow data for the time when the LiDAR data were collected and the aerial photos were taken. This was done to ensure that the water level in the LiDAR data was comparable to the aerial photos. This comparison justified using LiDAR data and aerial photos from different years in conjunction.

3.3.1 WSC Water Level Measurements for LiDAR Data

Water elevation data from the LiDAR were compared to the WSC gauge data in an effort to estimate the reliability of the LiDAR data. Data from six WSC gauges in the Mackenzie Delta were available; however, as Figure 3.7 shows, although the gauge locations are close to the LiDAR transects, only three overlap with the LiDAR, specifically 10MC003, 10MC008 and 10LC019. Two others (10LC002 and 10MC023) are located within reasonable proximity to the LiDAR surveys to allow for a water level comparison. The sixth WSC station (10LC015) was too far from the nearest LiDAR transect to facilitate any meaningful comparison.

Table 3.1 shows the measured water levels for the five relevant WSC gauges, for the dates on which the LiDAR data was measured. The raw water level data from these gauges are in terms of 'gauge heights', meaning they are each based on an assumed local datum, and must therefore be converted to the CGG05 datum before being compared to the LiDAR data. The constants used to convert the gauge height data to the CGG05 datum are shown for each WSC gauge in Table 3.2. The WSC water surface elevations of each gauge (converted to the CGG05 datum) for the dates the LiDAR data were flown are given in Table 3.3. Negative values indicate the water surface is below mean sea level (MSL).

Table 3.1 WSC gauge heights for dates the 2008 LiDAR was flown.

WSC Gauge	**Date and Water Elevations (m)**					
	11-Aug	**12-Aug**	**13-Aug**	**14-Aug**	**15-Aug**	**16-Aug**
10LC002	11.962	11.937	11.917	11.920	11.911	11.866
10LC019	9.696	9.640	9.560	9.563	9.542	9.590
10MC003	11.210	11.258	11.312	11.328	11.300	11.240
10MC008	11.716	11.701	11.699	11.682	11.645	11.590
10MC023	11.032	10.975	10.937	10.936	10.931	10.907

Table 3.2 Constants used to convert the WSC gauge heights to the CGG05 datum.

WSC Gauge	Datum Conversion (m)
10LC002	-10.856
10LC019	-9.637
10MC003	-10.056
10MC008	-10.346
10MC023	-10.603

Table 3.3 WSC gauge water elevations (referenced to the CGG05 datum) for days the 2008 LiDAR data was collected.

WSC Gauge	Date and Water Elevations (m)					
	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug	16-Aug
10LC002	1.106	1.081	1.061	1.064	1.055	1.010
10LC019	0.059	0.003	-0.077	-0.074	-0.095	-0.047
10MC003	1.154	1.202	1.256	1.272	1.244	1.184
10MC008	1.370	1.355	1.346	1.336	1.299	1.244
10MC023	0.429	0.372	0.334	0.333	0.328	0.304

Table 3.4 shows a comparison between the water levels obtained from the LiDAR data and the average WSC water levels for the dates the LiDAR was flown. For those cases where the WSC gauges were not actually within the surveyed LiDAR zone, water surface elevation data from the corresponding primary channel in the nearest LiDAR transect was used for this comparison. As the table shows, the LiDAR data was within 20 cm of the WSC gauge data for all five sites. Given the scale of the river, the differences in location between WSC gauges and the LiDAR data for two of the stations, the averaging of the WSC gauge data over the

dates that the LiDAR data was collected, the averaging the LiDAR water surface elevations in the data processing, and the estimated vertical accuracy of the LiDAR data (±25cm), this agreement is very good. Thus the LiDAR data is considered reliable.

Table 3.4 Comparison of the channel water levels in the LiDAR data to WSC water levels.

WSC Gauge	Channel and Transect	LiDAR Elevation (m)	Average WSC Elevation (m)	Difference (cm)
10LC002	East Channel, Inuvik Transect	1.174	1.063	11
10LC019	Kumak Channel, Outer Delta Channel	-0.195	-0.039	16
10MC003	West Channel, Inuvik Transect	1.017	1.219	20
10MC008	Middle Channel, Inuvik Transect	1.214	1.325	11
10MC023	Napoiak Channel, Northern Transect	0.413	0.350	6

3.3.2 WSC Water Level Measurements for Aerial Photos

WSC water level data were also used to ensure that the channel water levels in the August 2004 aerial photos were sufficiently comparable to those in the August 2008 LiDAR data to make the air photos a useful representation of ground conditions for interpreting the LiDAR data. Table 3.5 shows the WSC gauge data comparison for August 2004 and August 2008, where it is seen that the differences ranged from 2 to 50 cm. This was considered sufficiently comparable to the estimated vertical accuracy of the LiDAR data for the aerial photos to be deemed acceptable for use in determining the locations of channel banks and edges of lakes in combination with the LiDAR elevation data.

Table 3.5 Comparison of the water elevation from the 2004 and 2008 WSC gauge data.

WSC Gauge	**2004 Water Elevation (m)**	**2008 Water Elevation (m)**	**Difference (cm)**
10LC002	1.013	1.063	-5
10LC019	-0.019	-0.039	2
10MC003	0.727	1.219	-49
10MC008	1.135	1.325	-19
10MC023	0.319	0.350	-3

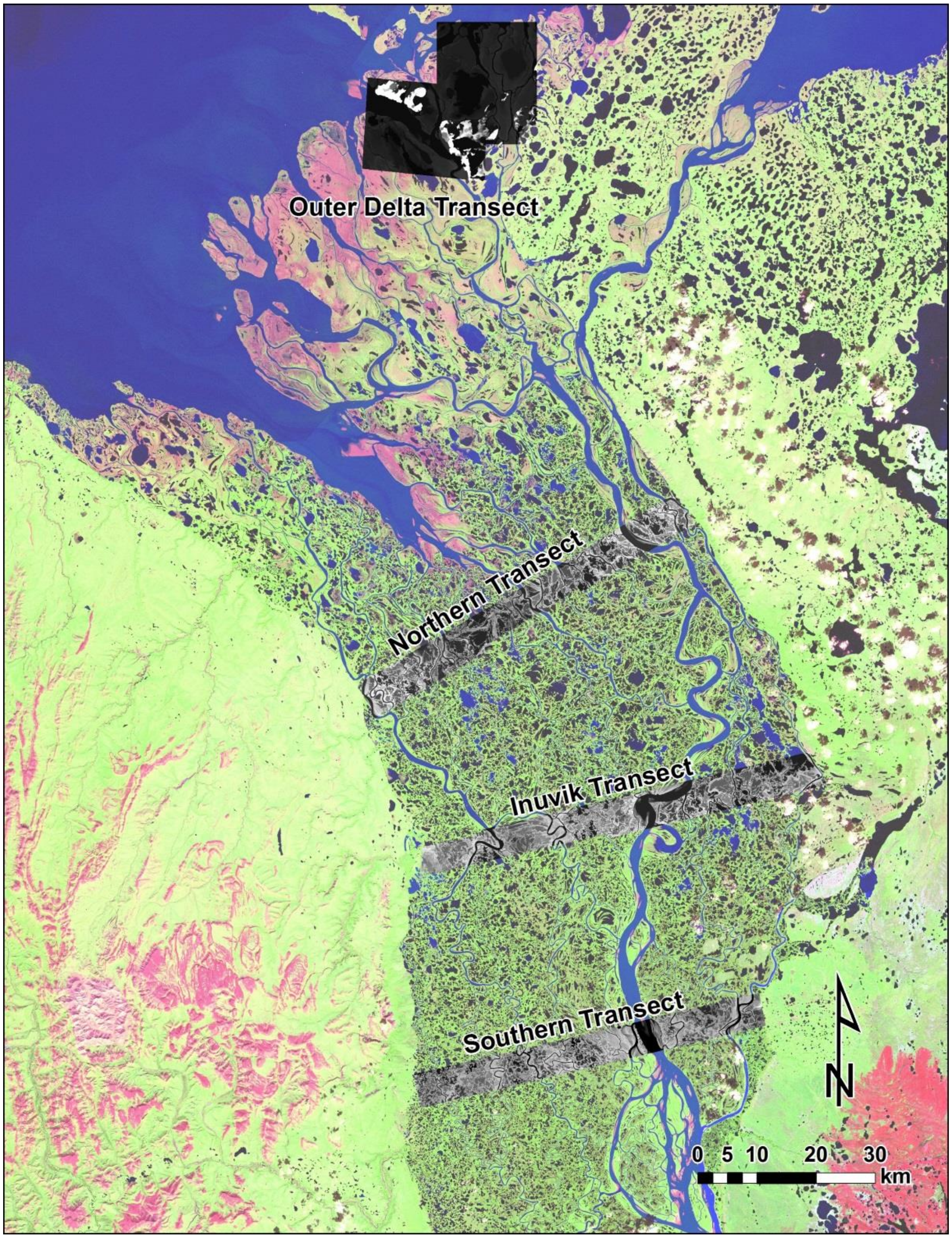


Figure 3.1 Locations of the LiDAR transects superimposed on an image of the Mackenzie Delta.

(Base image source: Industry Tourism and Investment, NWT)

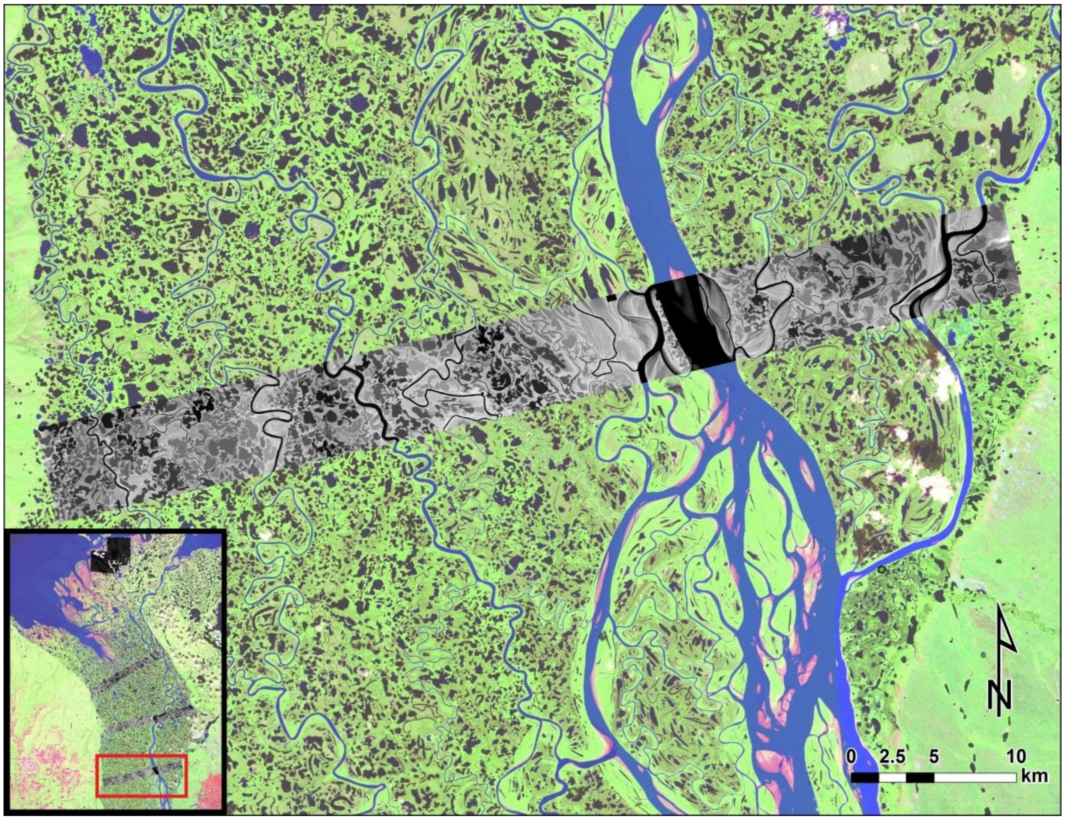


Figure 3.2 A higher resolution view of the Southern Transect LiDAR data.

(Base image source: Industry Tourism and Investment, NWT)

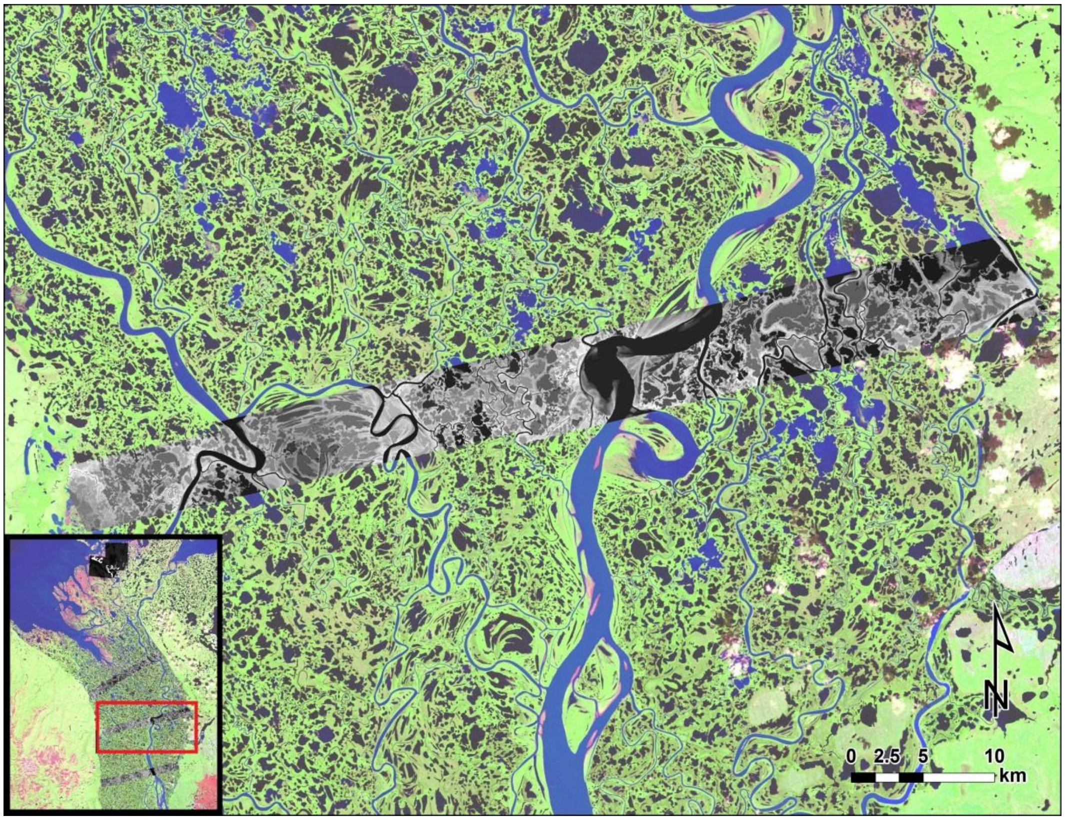


Figure 3.3 A higher resolution view of the Inuvik Transect LiDAR data.

(Base image source: Industry Tourism and Investment, NWT)

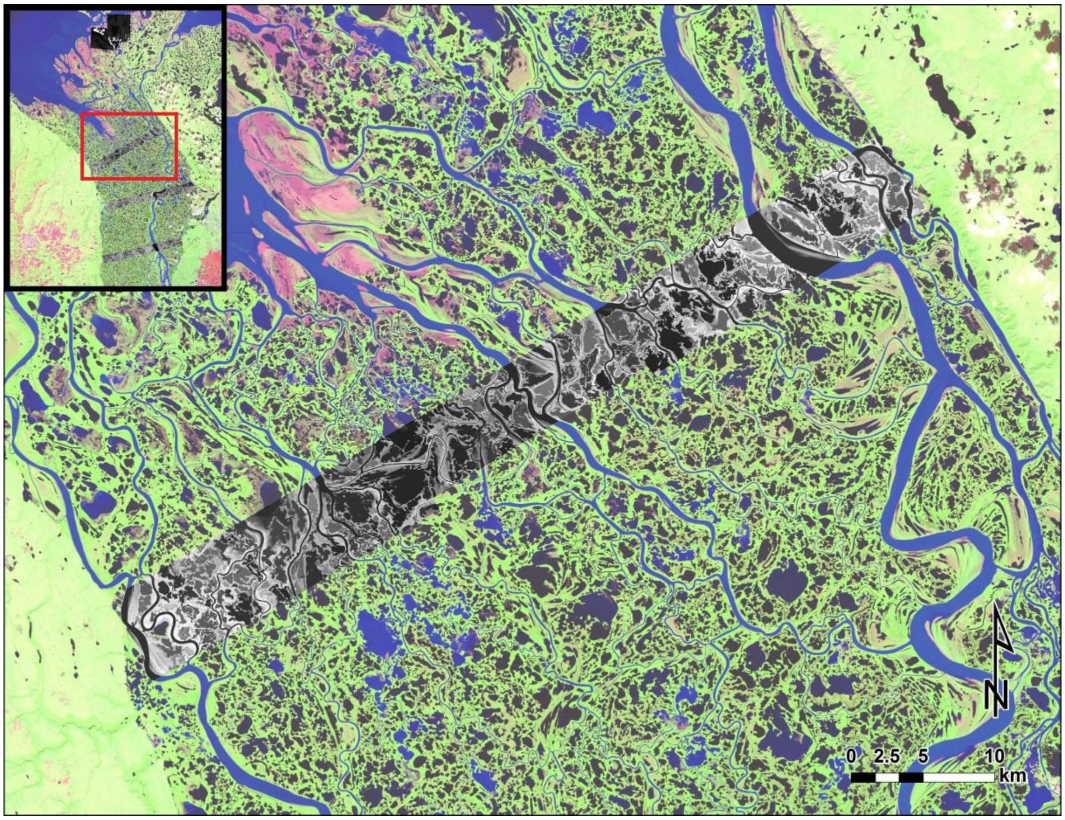


Figure 3.4 A higher resolution view of the Northern Transect LiDAR data.

(Base image source: Industry Tourism and Investment, NWT)

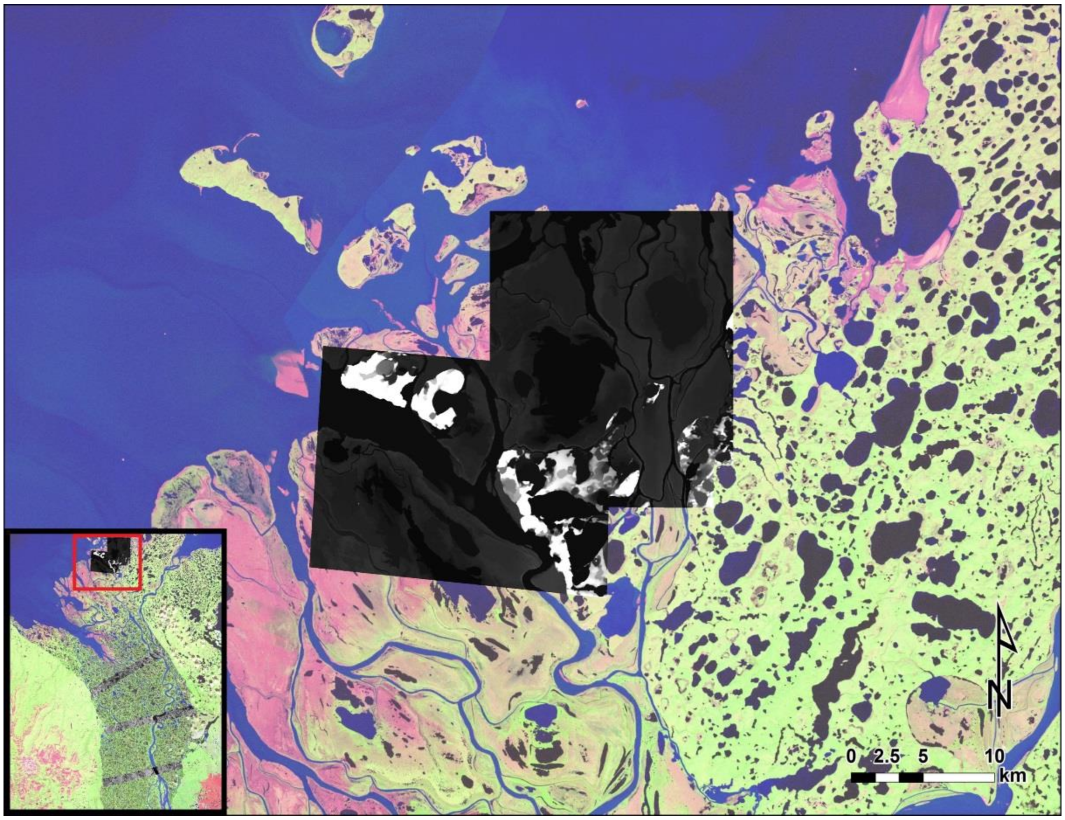


Figure 3.5 A higher resolution view of the Outer Delta Transect LiDAR data.

(Base image source: Industry Tourism and Investment, NWT)

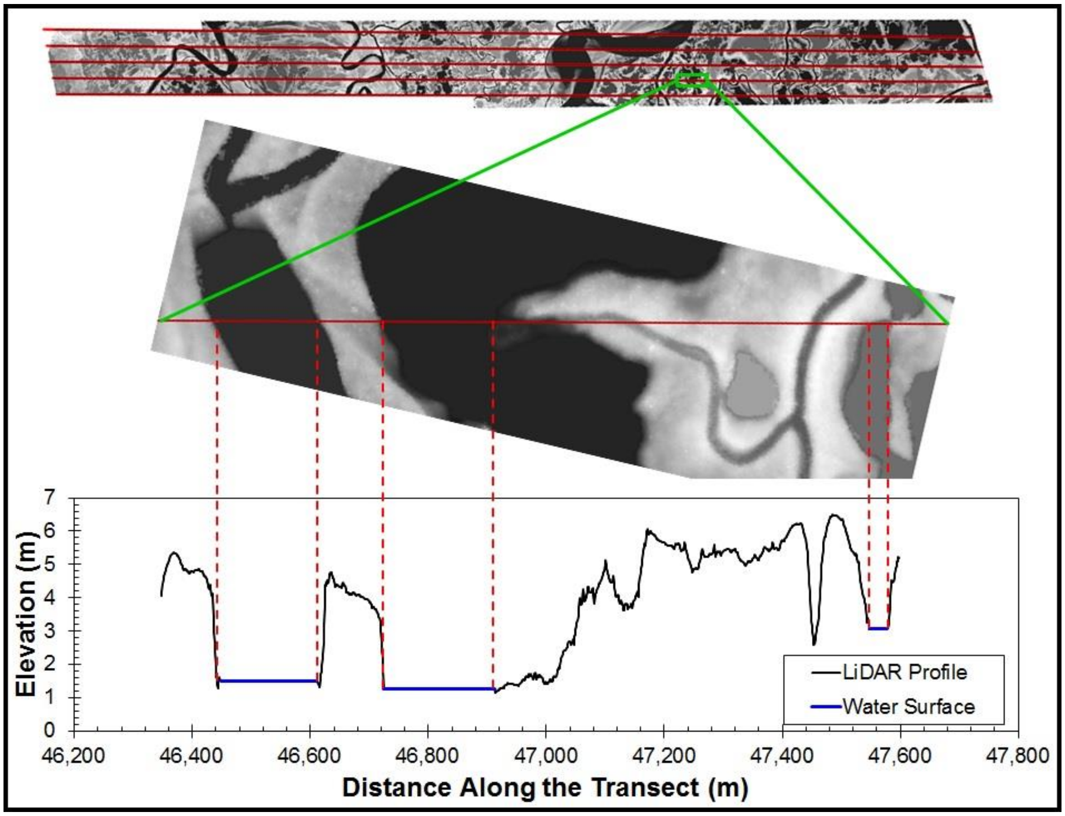


Figure 3.6 An example taken from the Inuvik Transect that shows water surfaces as average elevations in the LiDAR data.

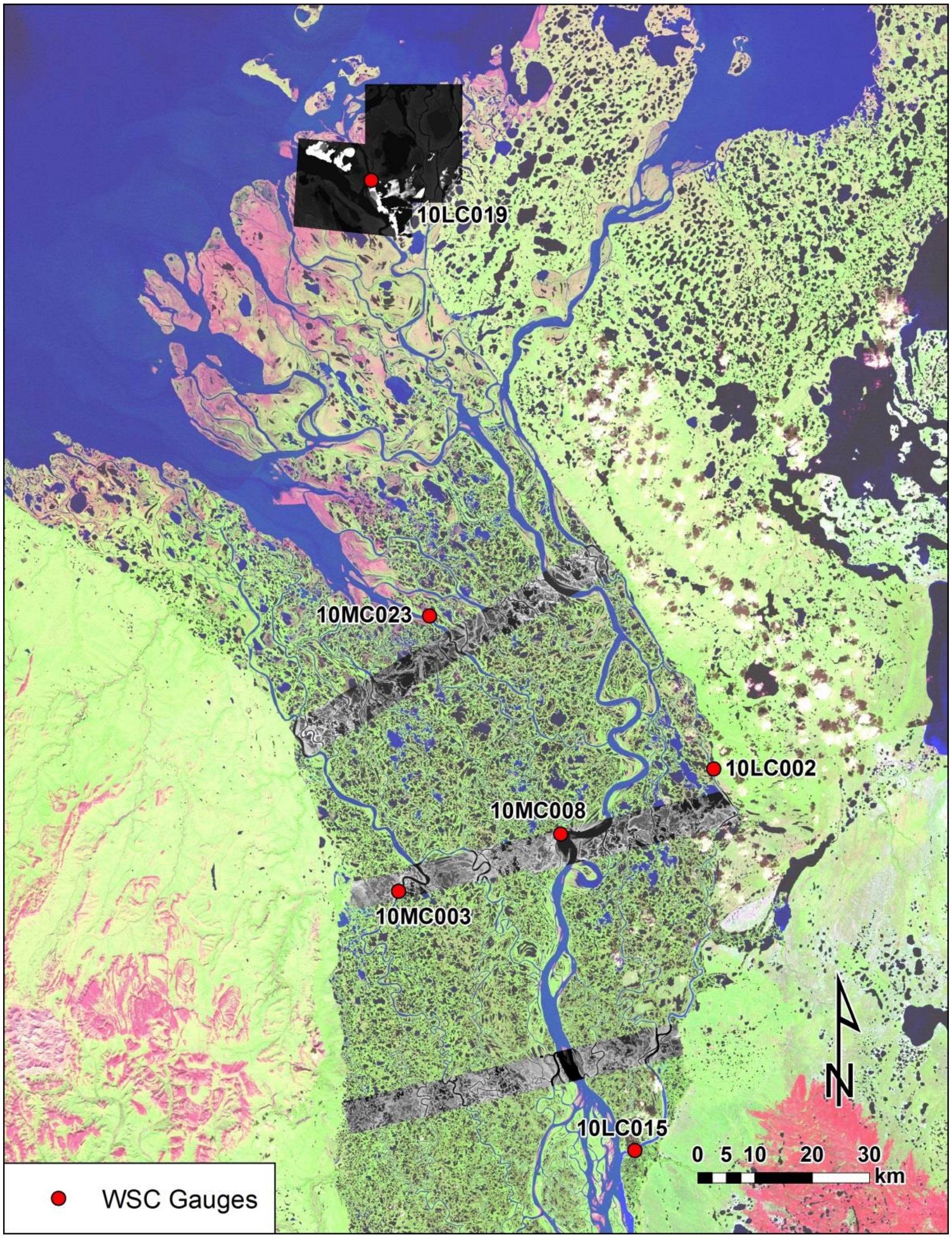


Figure 3.7 The location of the WSC gauges used to compare the water elevation to the LiDAR data.

(Base image source: Industry Tourism and Investment, NWT)

4.0 Characterizing the Delta Components

4.1 Determining Zones and Cross-sections in the LiDAR Transects

The intention of this study was to investigate and identify trends in conveyance and storage characteristics across and down the Delta. Since the Delta is such a large area, in this study, the areas that had been surveyed were divided into ten zones to aid in the investigation of the spatial variations. Figure 4.1 shows the division between the West, Middle, and East zones in each of the Southern, Inuvik, and Northern Transects and Figure 4.2 shows the Outer Delta Transect, which is the tenth zone. These divisions were intended to help examine trends in the water storage across the 60 km width of the Delta. The zones are similar to zones used in previous studies, such as Marsh et al. (1999), where the Delta was divided into the Peel Channel, Middle Channel, and East Channel zones. The primary channel in the West Zone of each transect is the Peel Channel, which influences the timing of breakup and water levels in the spring in the western portion of the Delta (Marsh and Hey 1988). In the Middle Zone the primary channel is the Middle Channel, and the Napoiak Channel is also in the Middle Zone in the Northern Transect. Finally, the East Channel is the primary channel in the East Zone and it has a significant impact on lake levels in the area (Marsh and Hey 1988, 1994).

Since a ratio between the storage and conveyance areas for each primary channel could be of use for future studies, as another part of this study the Delta was divided differently than previously described. For this part of the study, the primary channels were assumed to be the only means of conveyance in the Delta because of the lack of data for the other channels. The additional zones used for this part of the study are shown in Figures 4.3 and 4.4. Two of the zones that were defined above were further subdivided into smaller zones as they had more than one primary channel. Figure 4.3 shows the Middle Zone in the Northern Transect was divided into two zones – Middle Zone A which has the Napoiak Channel, and Middle Zone B which has the Middle Channel. Figure 4.4 shows the Outer Delta Transect was divided into two zones – Zone A which is the west part and has the Middle Channel, and Zone B which is the east part of the Outer Delta Transect, and has the Kumak Channel. The zones in the Southern and Inuvik Transects were the same as previously described.

Dividing the transects into the West, Middle, and East Zones was a difficult task as there are many lakes and connections between the primary channels. The topography of each transect was examined using contour maps to look for high points, or ridges, between the primary channels in each zone. Although the Delta is a flat area with small differences in elevation, some higher elevation areas were found. These ridges were typically near smaller channels along the channel banks, and they are most likely the levees. The high points were then used as the dividing lines between the zones in each transect. In addition to the contour map, the aerial photos from NWT Centre for Geomatics (2007) were also used to ensure that the areas thought to be levees were, in fact, levees. When the Middle Zone in the Northern Transect and the Outer Delta Transect were subdivided, the topography was examined using contour maps and aerial photos were also used in the same way as previously explained. This was particularly difficult in the Outer

Delta Transect because there are almost no levees near the channels and this area of the Delta is extremely flat. Although the Outer Delta Transect has very small changes in topography, the highest elevation points were still found and used to divide the transect into separate zones for the primary channels.

Cross-sections were taken through each of the four LiDAR transects, and then used to estimate the average conveyance and storage for each transect. Figures 4.5 to 4.8 show the cross-sections in each transect. Five cross-sections were taken in each of the Southern, Inuvik, and Northern Transects, and four cross-sections were taken in the Outer Delta Transect. The cross-sections were spread as widely and evenly as possible in each transect to represent the storage and conveyance characteristics in a complete and unbiased manner. Therefore, the five cross-section locations in the Southern, Inuvik, and Northern Transects were chosen by taking one cross-section near the south and one near the north edges of the LiDAR data and one halfway between the two edge cross-sections. The two other cross-sections are located halfway between the two edge cross-sections and the middle cross-section. There are four cross-sections in the Outer Delta Transect because it is not rectangular like the other transects, it covers a smaller area, and there are fewer channels in the Outer Delta Transect. The four cross-sections were taken perpendicular to the primary channels in the transect. In all transects the cross-sections were labelled with a letter and number. The letter was assigned to represent the transect containing the cross-section – ‘S’ for Southern Transect, ‘I’ for Inuvik Transect, ‘N’ for Northern Transect, and ‘O’ for Outer Delta Transect. The numbers were assigned based on the location within the transect, starting at one for the southernmost cross-section in each transect. Next, for each of the transects an average value of the conveyance and storage areas was calculated using all cross-sections in the transect. These average values representing each zone in each of the transects were then used to examine the trends both across and down the Delta.

The LiDAR data were limited by the fact that the East Channel is very close to the eastern edge the LiDAR data. So in some transects, information on the east overbank area was limited, or not available. In some areas the area east of the East Channel meanders out of the extent of the LiDAR coverage. Due to this limitation in the data, the East Zone was smaller than the Middle and West Zones in all transects.

4.2 Screening the Delta Elements

The LiDAR data provides only elevation information; it does not contain any information relating to land surface classification (e.g. in terms of channel, lake, or overland area). Therefore, in processing the data, aerial photos were used along with the LiDAR data to determine whether each data point was in a channel, lake or overland area. The channels were labelled as one of four categories, primary, secondary, or tertiary, as defined by Nafziger et al. (2009), or as minor channels. The fourth classification was comprised of all of the remaining channels (i.e. all those not classified as primary, secondary, or tertiary). The lakes were not categorized for this study (e.g. in terms of whether they are in the no, low, and high closure classes as described previously in Chapter 2);

however, a comparison of the lake sill elevations between the zones was conducted.

When screening the LiDAR data, it was essential to identify the location and elevation of the top of the channel banks and lake rims, as this impacted the amount of area that was considered in each category (i.e. channel, lake, or overland). Given the extremely large number of data points in each cross-section (~60,000) it was hoped that this identification could be automated in some way. Figure 4.9 illustrates the three methods tried and compared for determining the location of the top of channel banks and lake rims: the Edge of Water Method; the Extended Water Surface Method; and the Aerial Photo Method.

As noted earlier, water level data in the channels was averaged in the LiDAR data post-processing to produce flat (average) water levels in the channels and lakes. In the Edge of Water Method (shown as the red dots in Figure 4.9) the channel banks and lake rims were assumed to be located at each end of this (flattened) average water surface. The deficiency in this approach is that the average water surface often did not extend far enough left and right, as evidenced by the low areas on either side of the red dots in the example shown (which was typical). Thus the results of this method situated the banks too close together, thus underestimating the sizes of the channels and lakes and overestimating the overland areas. Because the LiDAR was flown at low water levels (to maximize the amount of exposed topography) this method also underestimated the bank and sill heights, causing low elevation areas to be erroneously included in overbank storage.

The second method investigated was called the Extended Water Surface Method. In this method, the top of bank was extended past the average water surface to determine where it would intersect the adjacent ground topography, as shown with blue triangles in Figure 4.9. However, it was found that this did not produce significantly different results from the Edge of Water Method.

Based on the poor results from the first two methods, it was determined that the tops of banks and lake sills would have to be identified based on aerial photos of the area (obtained from the NWT Centre for Geomatics (2007)) combined with direct examination of the topography data. This was referred to as the Aerial Photo Method, and an example of the results obtained by this method are shown with green squares in Figure 4.9. In the aerial photos, vegetation growth near the river bank was taken as the primary indication of top of bank location. This is because the river channels are known to form natural levees along the their margins (due to sediments dropping out of suspension during overbank flood events) and this enriched soil tend to produce more lush and substantial vegetation (e.g. large tree) along the channel banks (Mackay 1963). Furthermore, the position of the willows surrounding the Delta lakes is typically close to the edge of that lake, or the lake rim (Mackay 1963). These visual identifications were then confirmed by looking at the topographic elevation data in the LiDAR data. The manual identifications of all channels banks and lake rims was an laborious and time consuming undertaking that comprised a major portion of the time required to conduct this study. However, it was considered essential in order to obtain reasonable estimates of the overbank storage areas.

4.3 Determining Primary Channel Flow Areas

As one of the objectives of the study was to determine the proportions of overbank storage, as compared to channel conveyance capacity in the various areas of the Delta, it was necessary to estimate the flow areas in each of the Primary channels as a function of water level. This relationship was determined for each zone of each transect, by averaging the results for the cross-sections within that transect and zone.

By definition the 'channel flow area' is the channel area perpendicular to the flow direction. However, given the complexity of flow alignments among the many channels in the Delta, the cross-sections were frequently skewed to the flow direction. Figure 4.10 shows an example of this for the Peel Channel in the West Zone of the Inuvik Transect. To obtain the correct flow areas for the primary channels, the skewed flow area computed for each channel was multiplied by the ratio between the perpendicular distance across the channel and the skewed distance along the cross-section.

As the examples in Figures 4.11 and 4.12 show, the Delta channels tend to meander significantly (in terms of planform pattern) and, as a result, the cross-sections sometimes crossed a primary channel more than once. For example, as seen in Figure 4.11, cross-section I-3 in the West Zone the Inuvik Transect intersects the Peel Channel three times and cross-section I-4 intersects it twice. Including the channels areas from multiple crossings would result in an over-estimate of the channel conveyance area for that cross-section, thus the most representative crossing was taken in each case (as illustrated in Figure 4.11). The resulting channel alignment used is shown in green. Figure 4.12 illustrates a similar example for the Middle Channel. Again, the green lines illustrate the final alignment used to determine channel flow area.

In some cases, the LiDAR data did not extend fully across a Primary channel. Figure 4.13 illustrates one such example in the East Zone of the Inuvik Transect, where cross-sections I-2 and I-3 did not fully cross the East Channel. Figure 4.14, illustrates another example in the East Zone of the Northern Transect, in which cross-sections N-2 and N-3 did not fully cross the East Channel of the Northern Transect. In such cases, only those cross-sections that completely crossed the channel were used to calculate an average for the transect.

4.4 Determining the Conveyance and Storage Areas

In order to determine the storage and conveyance characteristics in each zone of the Delta, the channel, lake, and overland areas were calculated from an elevation of 0.5 m below mean sea level (MSL) to 18.55 m above MSL in 0.05 meter increments. This range was chosen because the minimum and maximum elevations in the LiDAR data range from 0.46 m below MSL to 18.54 m above MSL for all cross-sections. From this range, the subset of elevations from 0 to 14 m above MSL were selected based on an examination of water surface data from the previously described WSC gauges near the LiDAR transects from 2006 to 2009. The gauges recorded a highest water elevation of 12.681 m above MSL. The subset range thus incorporated water levels from low flow to extreme flooding scenarios. A small step size was chosen for the water surface elevation because it limited the need for interpolation between data points, and because it is smaller than the vertical error for the LiDAR data, which is less than 25 cm according to Marsh et al. (2009).

The Trapezoidal Rule is an accurate and efficient method to calculate the area of shapes with irregular sides. Figure 4.15 shows a conceptual illustration of the Trapezoidal Rule, as given by equation 3-1 below

$$\int_a^b f(x)dx \cong (b-a)\frac{\left(f(a)+f(b)\right)}{2} \qquad [3\text{-}1]$$

where:

a = the lower bound of the area being calculated

b = the upper bound of the area being calculated

For this study, the Trapezoidal Rule was used to calculate the area between each data point in the cross-sections. Figure 4.16 shows a sample of the steps between each point of the LiDAR data where the Trapezoidal Rule was used to calculate the area. The Trapezoidal Rule was applied to each area between the LiDAR (black line) and Water Surface (blue dash dot line) for each step in the LiDAR data, which are denoted by the vertical black dashed lines. These steps were spaced approximately one meter apart throughout all of the cross-sections as they were in this sample. Since the step size between data points used for the calculations was small compared to the length of the cross-section (1 m versus approximately 60 km), the Trapezoidal Rule was considered to be accurate.

The Trapezoidal Rule was applied to the LiDAR data through a Matlab code written for this study. The code took the LiDAR information, including the location and elevation data, along with the information added regarding whether a point was in a channel, lake, or overland area and calculated that cross-sectional area between a specified water level and the LiDAR profile. As noted above, the specified water level was increased in 0.05 m increments, starting from a minimum of 0.5 m below MSL to a maximum water surface elevation of 18.55 m above MSL. To ensure the Matlab code provided accurate results based on the Trapezoidal Rule, it was tested with a simple, hypothetical cross-section, where the cross-sectional area could be easily calculated by hand using basic area formulas.

One of the complications in developing the Matlab code was in determining the lake areas, since the cross-sections through the LiDAR data did not necessarily intersect the lake sill in all cases. Therefore, to compensate for the possibility of not having the lake sill elevation, as well as the range in sill elevation from spring to summer, two area methods were developed to provide a range in the lake area. An average of the two methods is examined in the results as this gives the best representation of an average flooding scenario. The difference between the areas calculated by these two methods is shown in Figure 4.17.

The first method is referred to as the Lake Sill Method and the second as the Lake Rim Method. The Lake Sill Method assumed that the water level at the average or smoothed elevation in a lake in the LiDAR data is at the same elevation as the lake sill. Therefore, when the water surface elevation in the Matlab code was at a higher elevation than the water elevation in the lakes, it was assumed that flood water entered the lakes. This method assumed that the channels and lakes in the

Delta were well connected. In contrast, the Lake Rim Method is based on the location of the edge of the lakes, as determined by using the LiDAR data in conjunction with the aerial photos. This method assumed that the channels and lakes in the Delta were not well connected so the flood water did not enter the lakes until the water elevation in the Matlab code was higher than the elevation of the lake rim. The lake rim is the edge of lake in the LiDAR data, and may be a higher elevation than the lake sill. Both of these methods were included in the Matlab code and were calculated at the same time.

A drawback of the Lake Rim Method is that the lake rims in the LiDAR cross-section may not be the location where the lake is connected to a channel. In such a case, the lake rim is most likely higher than the lake sill, and thus caused an error in the area in lakes because it was assumed that flood water would not have entered the lake. The only difference between the Lake Sill and Lake Rim methods can be seen at low water levels. The Lake Sill Method produced a greater lake area at low water levels than the Lake Rim Method, since it assumed water can enter a lake regardless of the lake rim elevation. When the water level was above the lake sill and lake rim elevations, the lake areas were the same for both methods. Figure 4.17 shows the difference between the two methods, using the West Zone of the Northern Transect as a sample for the comparison.

The lake sill elevations change throughout the year, with the spring sill elevations being 0.25 to 1.50 m higher than summer elevations because of ice and snow being frozen to the channel bed of the connecting channel between rivers and lakes (Lesack and Marsh 2010; Marsh and Hey 1988). Snow and ice depths vary each year in the Delta, so the spring sill elevation is subject to some minor variation. However, the summer sill is fixed by the Delta topography (Lesack and Marsh 2010). Therefore, the two lake area methods previously described represent the extremes in the lake sill elevations and channel to lake connectivity. Furthermore, Marsh et al. (1993) indicate the sill elevation of lakes changes over time due to sedimentation. In no and low closure lakes, high sedimentation rates, which often occur during spring breakup, increase the lake sill levels, thus gradually decreasing the frequency and magnitude of flooding in these lakes (Marsh et al. 1993). In some cases, the water levels rise to the elevation of the sill and may not flood into the associated lake, while in other cases, the water level may rise as high as the spring sill elevation, and may enter the lakes because this is greater than the summer sill elevation (Lesack and Marsh 2010). For this study, an average of the areas obtained from the Lake Rim and Lake Sill Methods was used to determine the lake storage area. An average value was used because the methods were thought to represent the extreme minimum and maximum of the lake sill elevation.

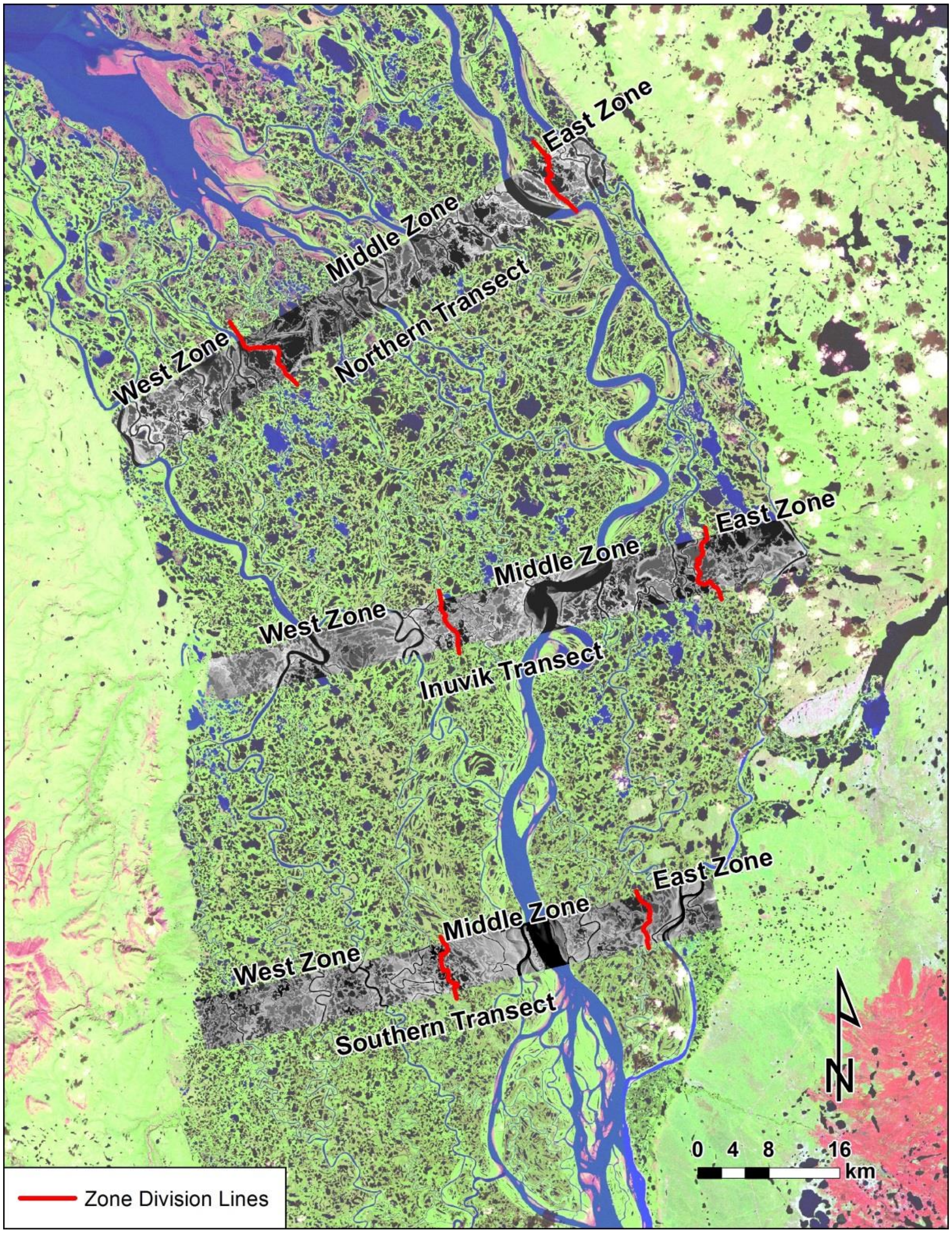


Figure 4.1 The dividing lines between the West, Middle, and East zones in the Southern, Inuvik, and Northern Transects.

(Base image source: Industry Tourism and Investment, NWT)

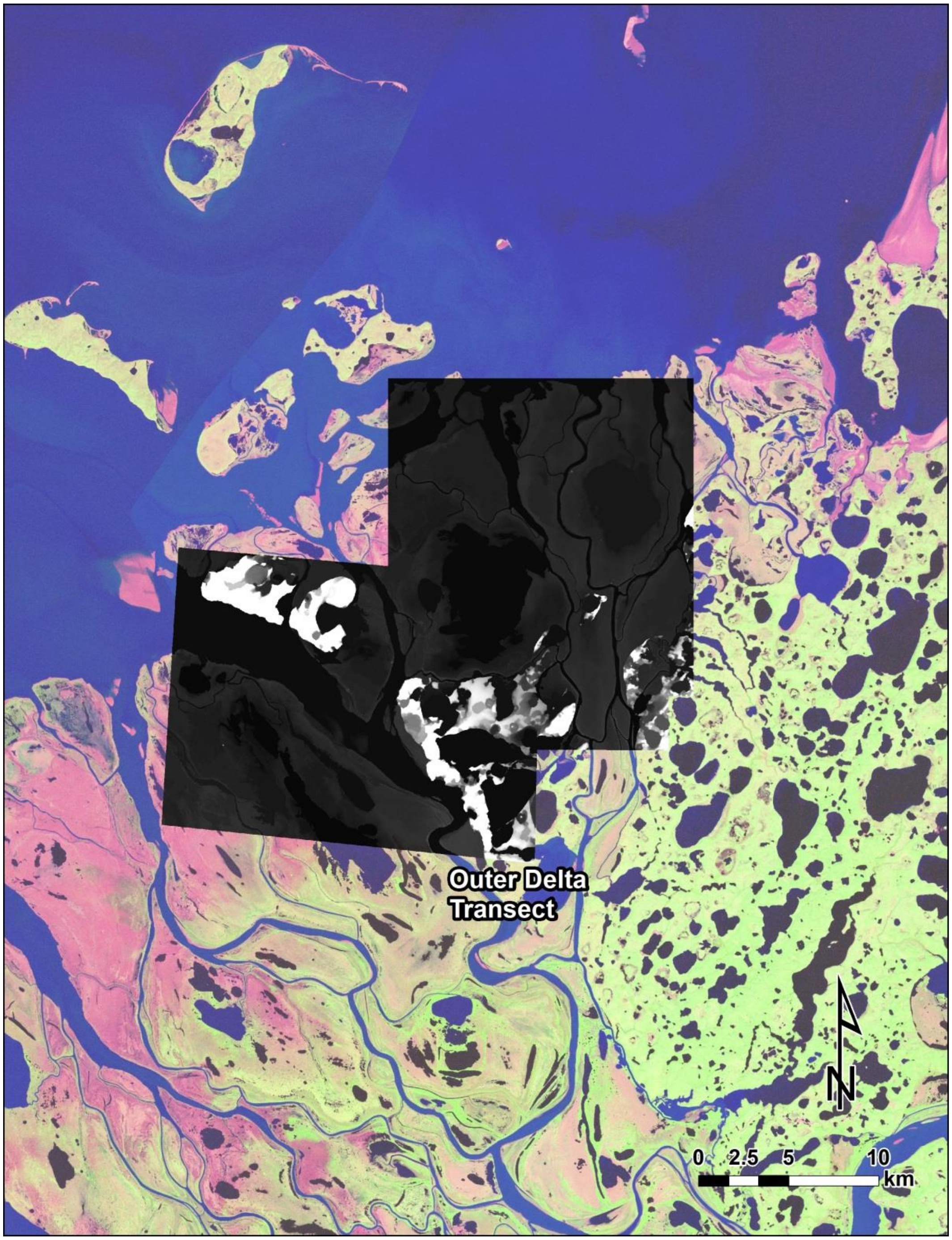


Figure 4.2 The Outer Delta Transect is the tenth zone used to analyse the hydrology trends in the Mackenzie Delta.

(Base image source: Industry Tourism and Investment, NWT)

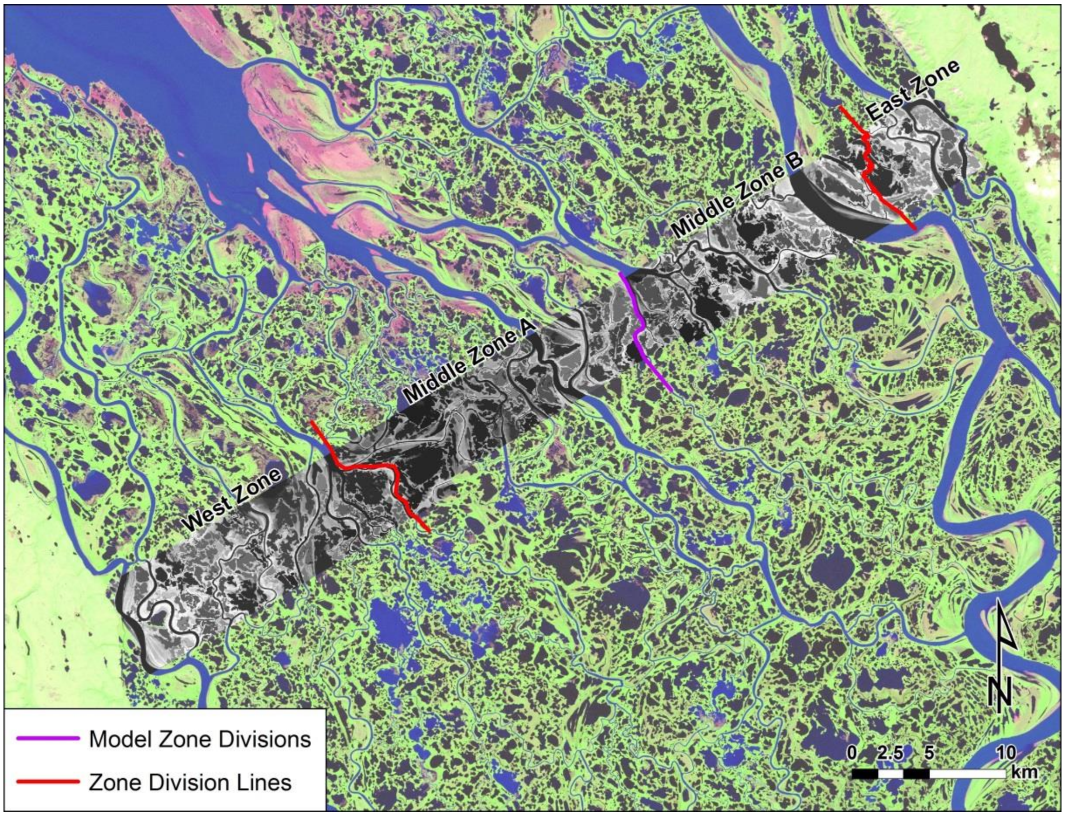


Figure 4.3 The zone divisions in the Northern Transect used in the hydraulic model.

(Base image source: Industry Tourism and Investment, NWT)

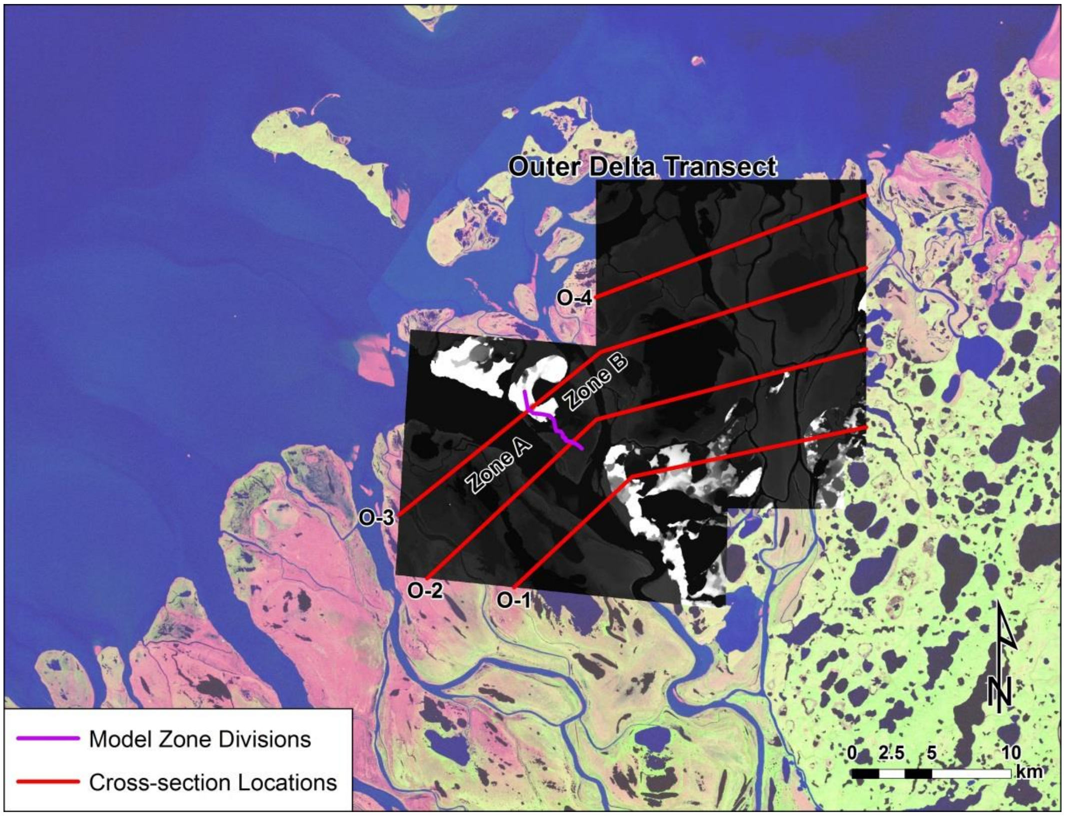


Figure 4.4 The zone divisions in the Outer Delta Transect used in the hydraulic model.

(Base image source: Industry Tourism and Investment, NWT)

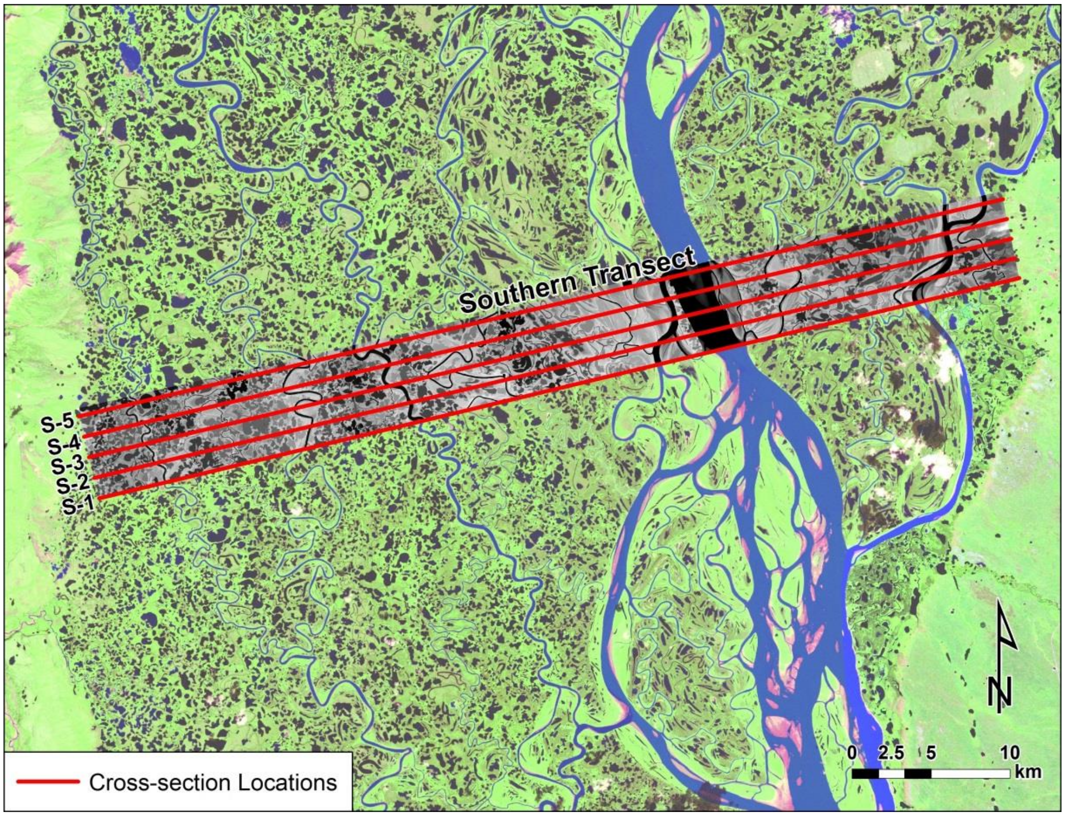


Figure 4.5 The cross-sections used to analyse the LiDAR data in the Southern Transect.

(Base image source: Industry Tourism and Investment, NWT)

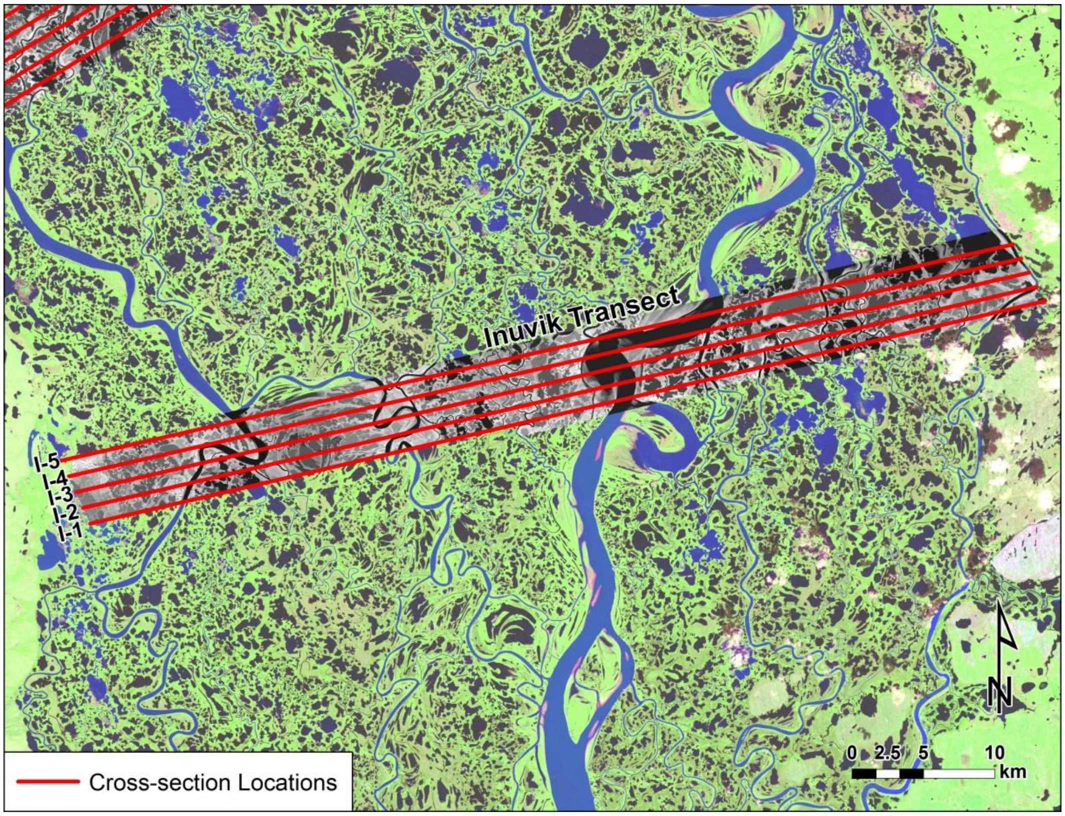


Figure 4.6 The cross-sections used to analyse the LiDAR data in the Inuvik Transect.

(Base image source: Industry Tourism and Investment, NWT)

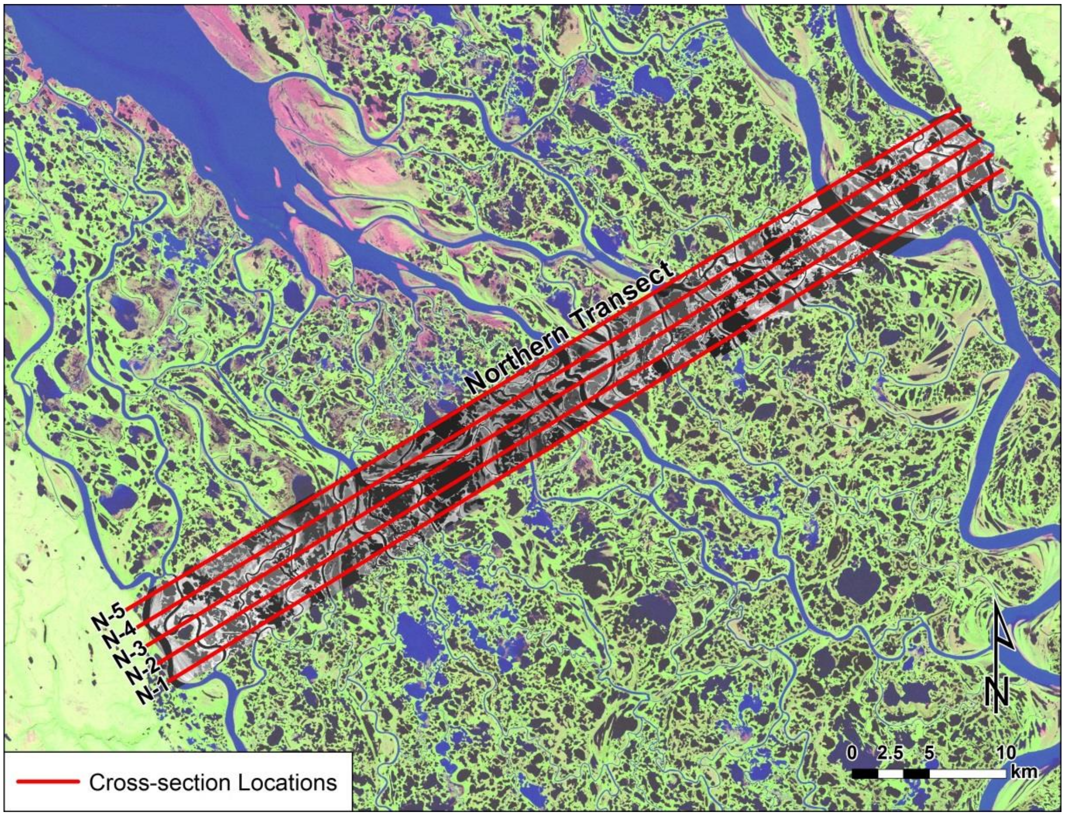


Figure 4.7 The cross-sections used to analyse the LiDAR data in the Northern Transect.

(Base image source: Industry Tourism and Investment, NWT)

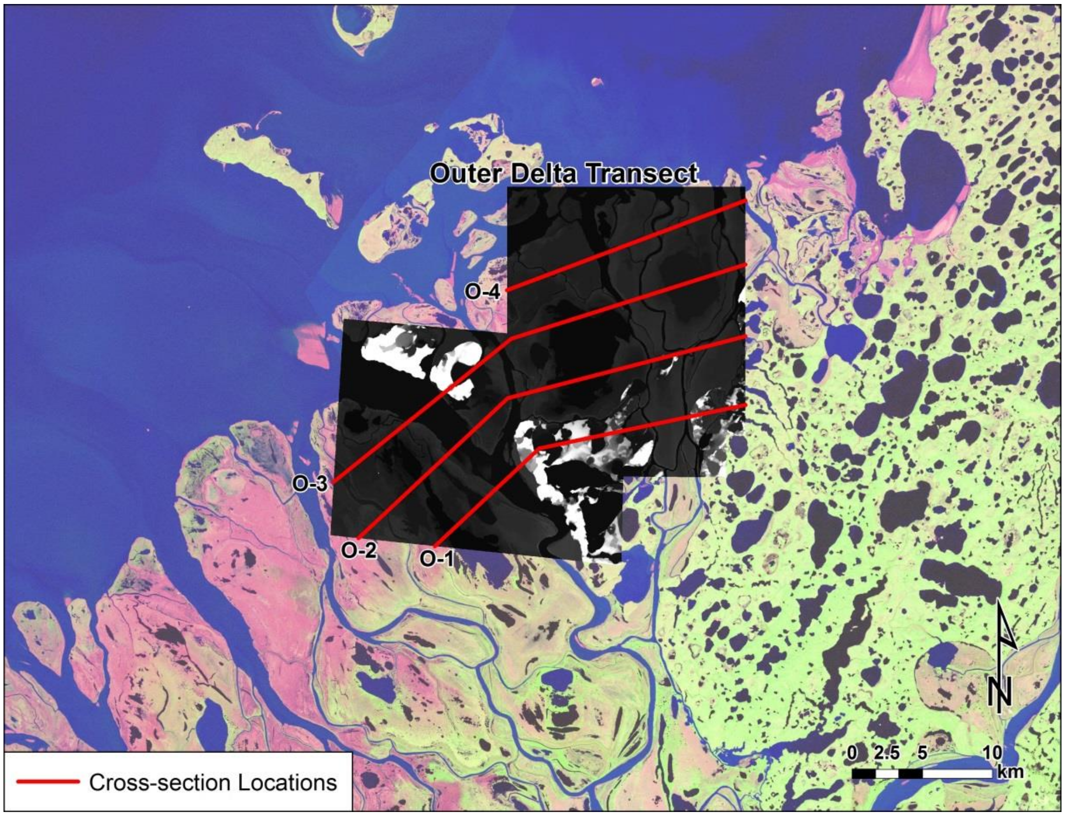


Figure 4.8 The cross-sections used to analyse the LiDAR data in the Outer Delta Transect.

(Base image source: Industry Tourism and Investment, NWT)

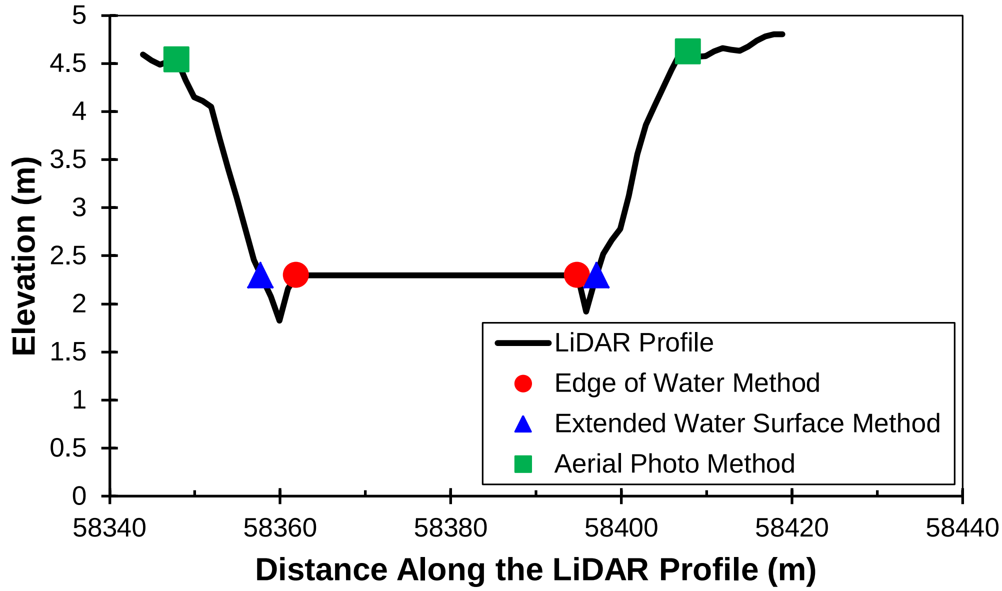


Figure 4.9 A comparison, showing the difference between the Edge of Water Method, Extended Water Surface Method, and Aerial Photo Method tested for the Top of Banks.

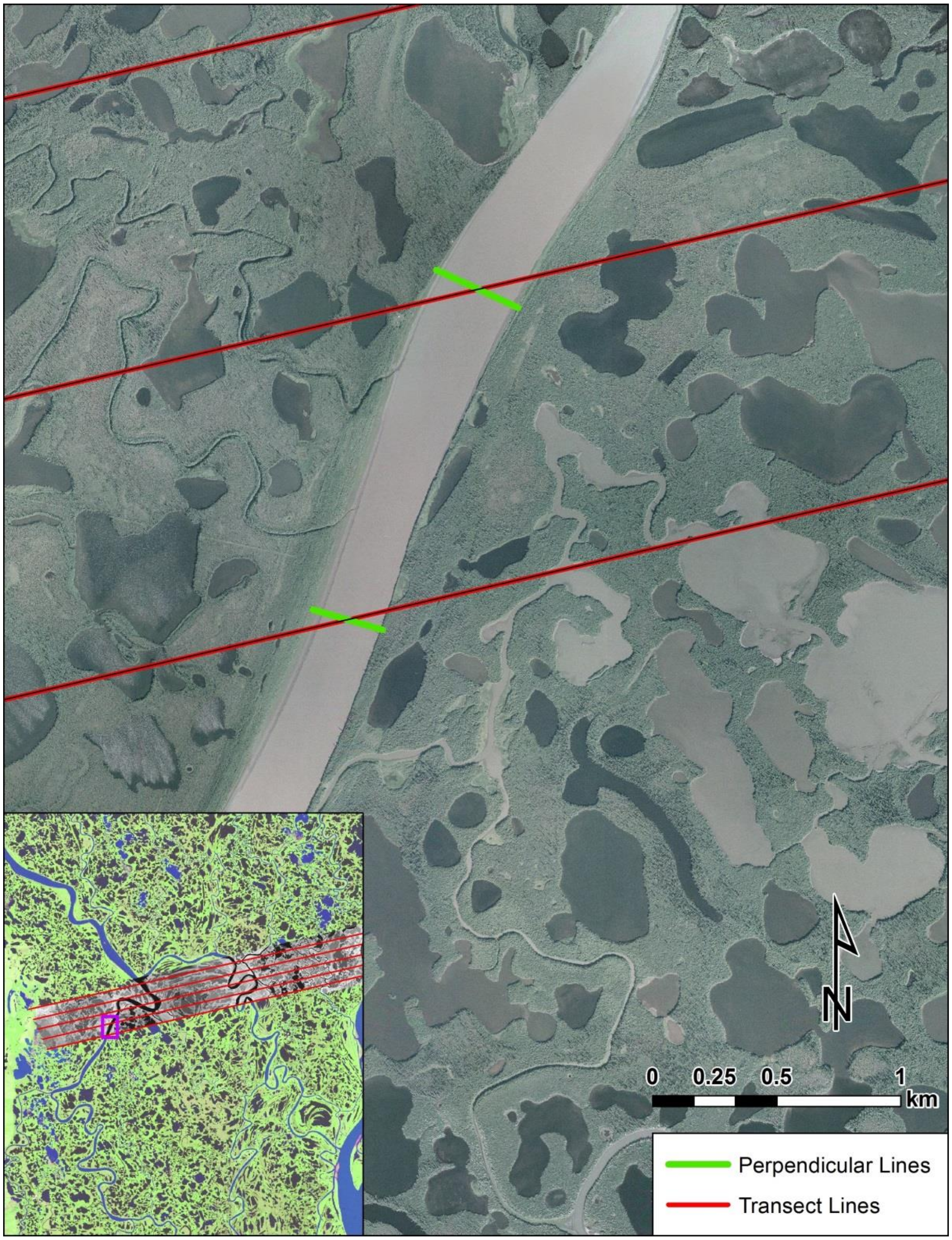


Figure 4.10 An example of the perpendicular distance across a primary channel in the West Zone of the Inuvik Transect.

(Base image source: (NWT Centre for Geomatics 2007))

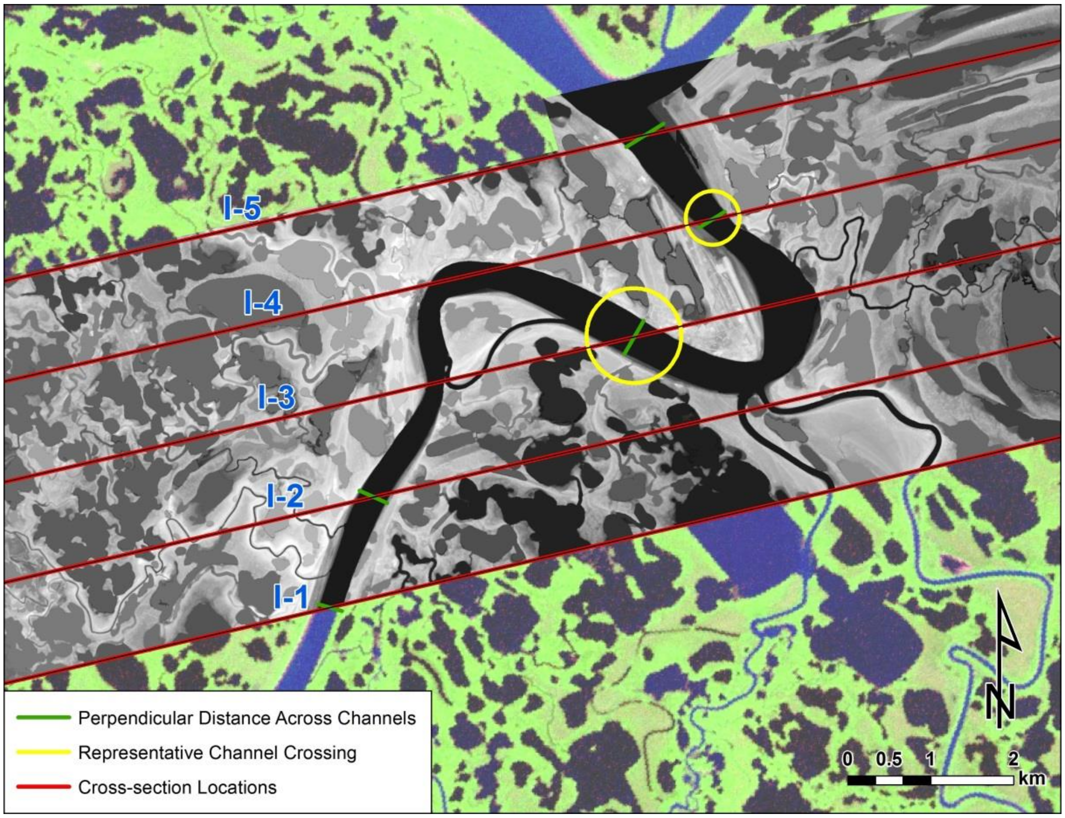


Figure 4.11 Locations with the cross-sections crossing the primary channel multiple times in the West Zone of the Inuvik Transect.

(Base image source: Industry Tourism and Investment, NWT)

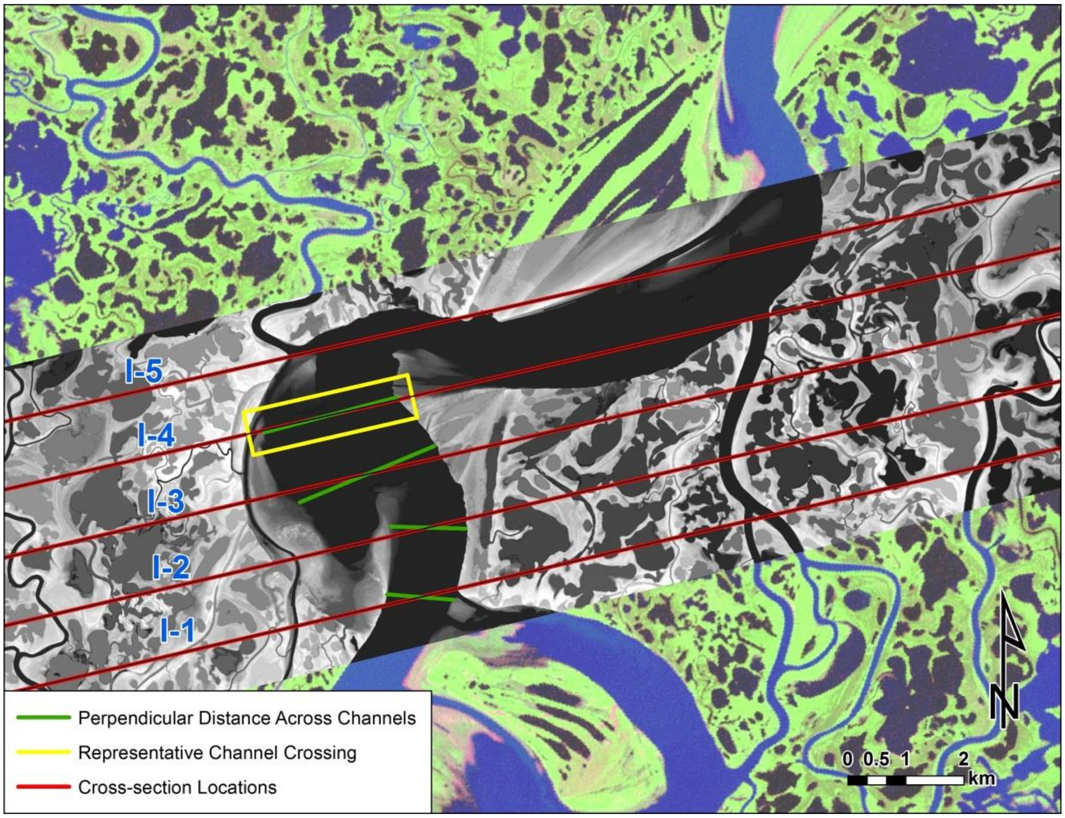


Figure 4.12 Locations with the cross-sections crossing the primary channel in the Middle Zone of the Inuvik Transect.

(Base image source: Industry Tourism and Investment, NWT)

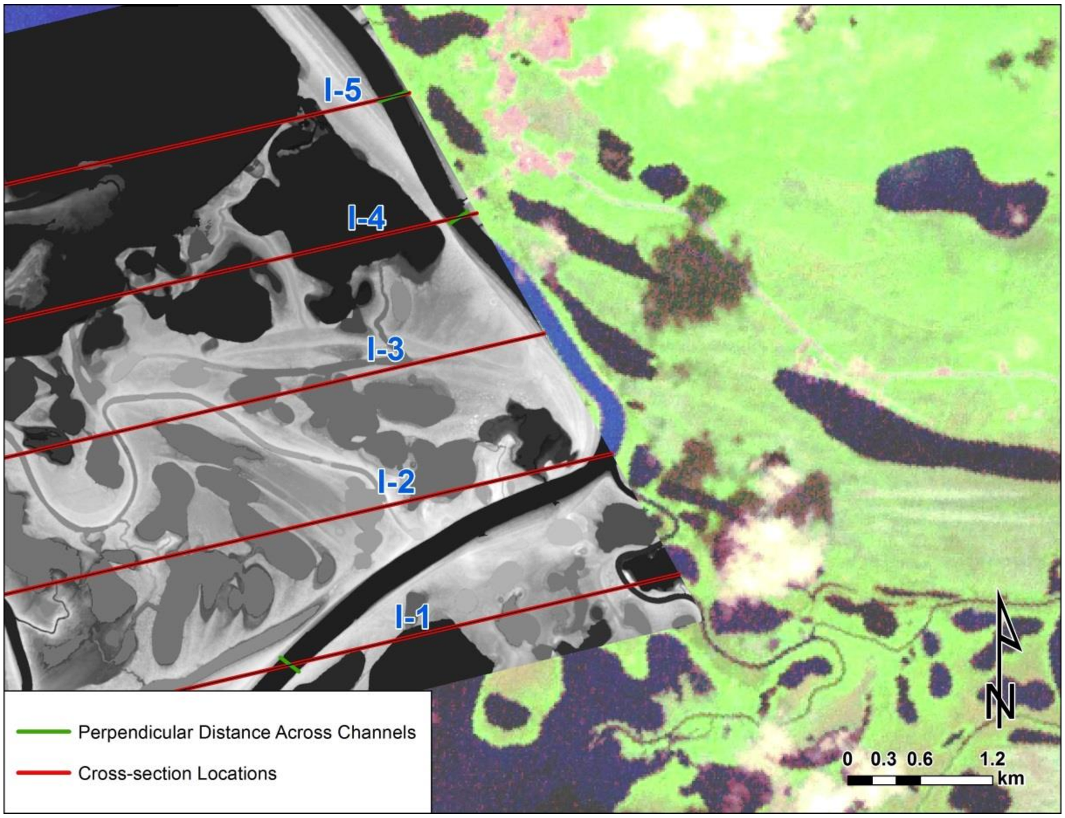


Figure 4.13 Locations with the cross-sections not fully crossing the primary channel in the East Zone of the Inuvik Transect.

(Base image source: Industry Tourism and Investment, NWT)

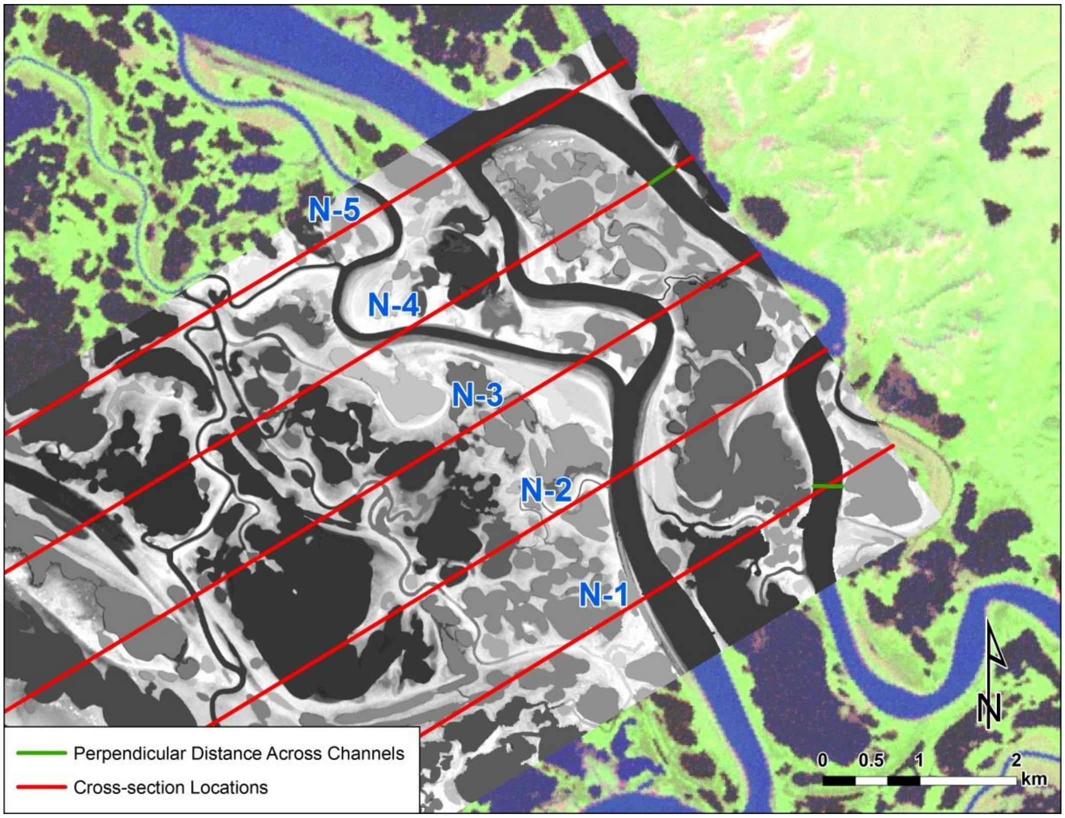


Figure 4.14 Locations with the cross-sections not fully crossing the primary channel in the East Zone of the Northern Transect.

(Base image source: Industry Tourism and Investment, NWT)

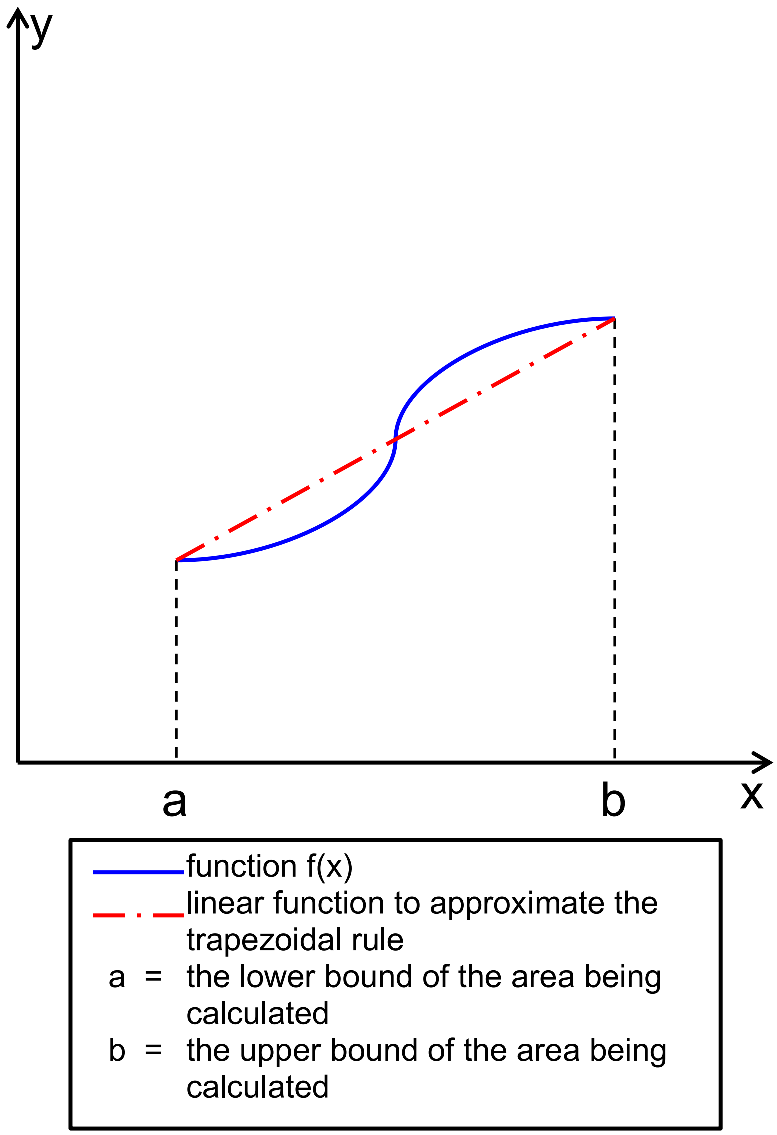


Figure 4.15 A theoretical conception of the trapezoidal rule.

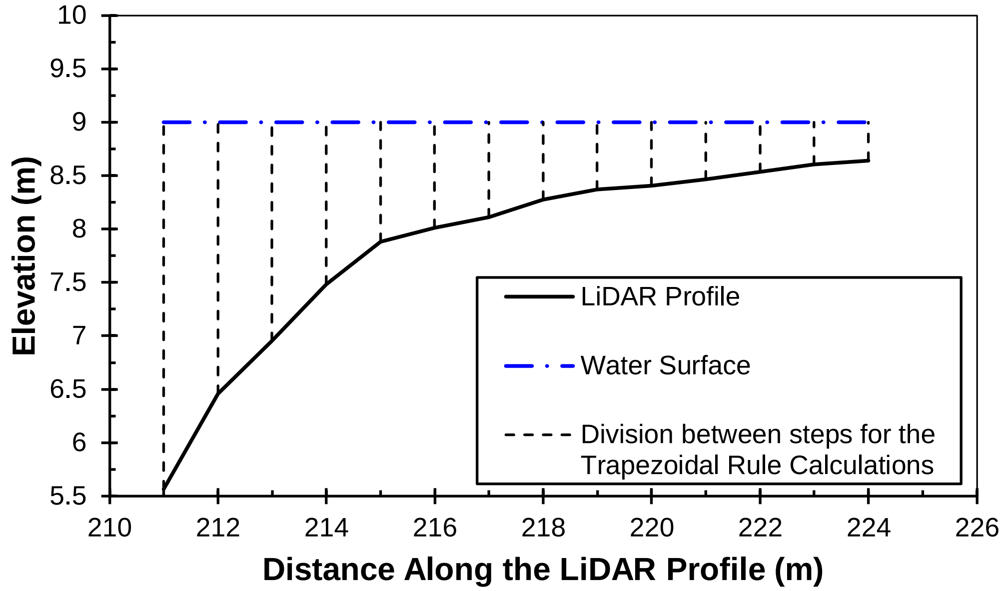
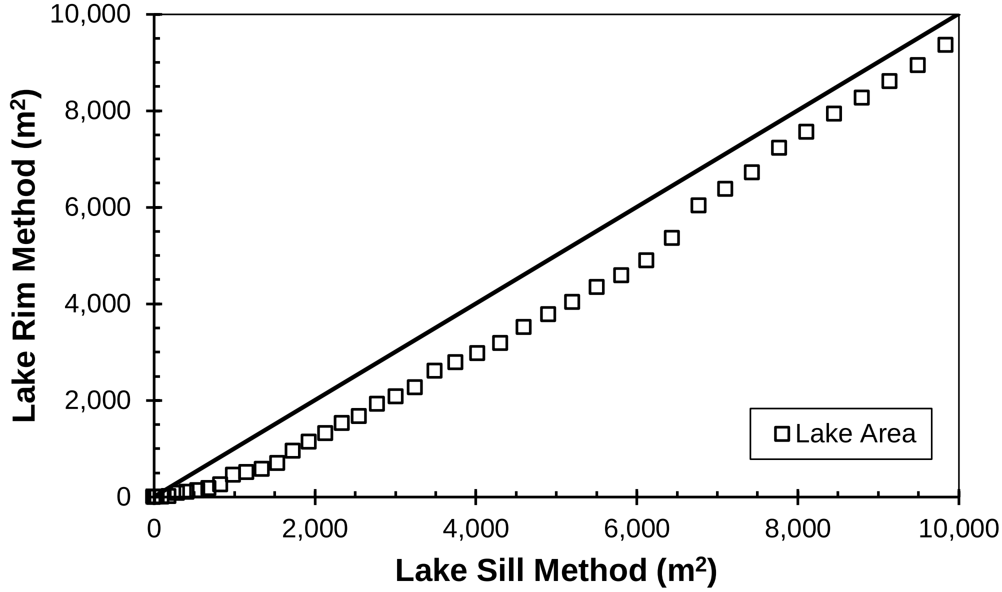


Figure 4.16 A sample of the steps used in the Trapezoidal Rule calculations from cross-section S-5.

a)



b)

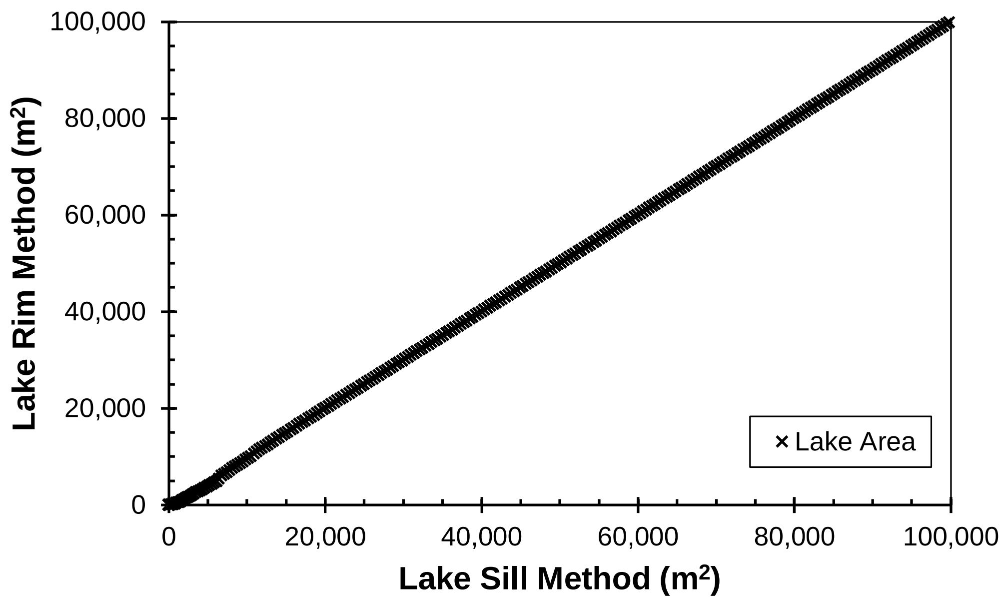


Figure 4.17 A comparison of the Lake Rim and Lake Sill area calculation methods for a) low water elevations b) all water elevations

5.0 Results

This chapter describes the results obtained for the conveyance and storage trends across and down the Delta, using the West, Middle, and East Zones of the Southern, Inuvik, and Northern Transects as well as the Outer Delta Transect. From a hydrological perspective, the conveyance area consists of the areas in the primary, secondary, tertiary, and minor channels, while the storage area included the lakes and overland areas. However, for the purposes of the hydraulic model, the conveyance area included only the primary channels, whereas the lakes, overland, secondary, tertiary, and minor channels were considered as storage. Results relevant to both the hydrological and hydraulic studies are discussed next.

5.1 Hydrology Trends

5.1.1 Conveyance Characteristics of the Mackenzie Delta

The channel conveyances for the cross-sections were averaged for each zone in each transect, and the resulting average values were used to look for trends both across and down the Delta. Five cross-sections were used in each of the Southern, Inuvik, and Northern Transects to calculate representative averages for each transect zone, and four cross-sections were used to obtain a representative average for the Outer Delta Transect. Figures 5.1 to 5.4 show the resulting conveyance areas obtained for each cross-section, as well as the average obtained for each transect zone. It is important to keep in mind that LiDAR cannot penetrate water so it does not detect the channel bathymetry; thus the conveyance areas presented here represent the incremental flow areas available in the channels above the typical low water level (i.e. above the average (flattened) water surface level in the LiDAR data). In that context, they represent the conveyance capacity for direct runoff (i.e. flows above baseflow) as opposed to total runoff capacity. As the figures illustrate, the conveyance areas in the channels increased almost linearly with water level since the channel areas above the (flattened) average water level in the LiDAR data were approximately rectangular (e.g. as was seen in Figure 4.9).

In some cases, particularly for the West Zone of the Inuvik Transect (Figure 5.2a) and the Outer Transect (Figure 5.4), there was considerable variability in the conveyance areas between the cross-sections within each transect zone. Some of this variability can be explained by the fact that not all of the cross-sections were the same length. For example, cross-section I-2 was about 800 m longer than cross-section I-4. The West, Middle and East zones also varied in size between the cross-sections because ridges were used to divide the cross-sections into zones, and the ridges were not perpendicular to the cross-sections. Another example of the cross-sections varying in size is shown in the Outer Delta Transect, where the conveyance is reflected by the size of each zone (Figure 5.4). Cross-sections O-2 and O-3 are the largest cross-sections and have two primary channels whereas cross-section O-1 has one primary channel and cross-section O-4 is the smallest and does not have a primary channel. Furthermore, the variation in the conveyance area is due to variation in channel widths between the zones as well as the number of minor channels in each zone. For example, the secondary channels may be wider in cross-sections I-1, I-2, and I-3 in the West Zone of the Inuvik Transect than in cross-sections I-4 and I-5. However, for the purposes of this study, the average conveyances were considered sufficiently representative of the transect zones to facilitate a qualitative evaluation of conveyance trends both across and down the Delta.

5.1.1.1 Variability in Channel Conveyance Area Across the Delta

Figure 5.5 shows the total conveyance areas, and the conveyance areas within each of the channel categories, for all ten zones in the Delta. Overall, the total conveyance area was highest in the Middle Zone (~60%), followed by the West Zone (~25%), and then the East Zone (~15%). Based on the size of the primary channel in each zone, this trend was expected.

Figure 5.5 also illustrates the fact that the proportion of conveyance area in each channel category varies significantly between zones. In the Middle Zone the majority of flow is carried by the primary channel (the Middle Channel), which is quite large compared to all of the other channel types. This result suggests that considering only the primary channel in a hydraulic model of the Delta is probably an acceptable approximation for the Middle Zone. However, this is not the case in the East and West Zones, where the primary channels are more comparable in size to the other channel types. As a result, in these Zones, conveyance area is actually dominated by these non-primary channels. Of particular interest is the fact that, for the West Zone, the cumulative flow area in the secondary channels is comparable to, or larger than, the flow area in the primary (Peel) channel. Therefore, adding secondary channels to the Delta hydraulic model would have the largest impact in the West Zone. The results for the East Zone further illustrate that secondary and tertiary channels represent a negligible proportion of total conveyance capacity in this zone, compared to the minor channels. This suggest that the designation of channels as secondary and tertiary, versus minor, should be revisited before adding secondary or tertiary channels to the hydraulic model of the Delta.

5.1.1.2 Variability in Channel Conveyance Area Down the Delta

As Figure 5.5 illustrates, total conveyance area tends to increase down the Delta. This trend is particularly noticeable in the West Zone, with total conveyance area approximately doubling between the Southern and Inuvik Transects. The increase in the conveyance area primarily due to the increase in conveyance area attributable to secondary channels between these two transects in this zone, again illustrating the potential importance of including secondary channels in any hydraulic model of the West Zone, at least from the Inuvik Transect downstream. The increase in total conveyance area is much smaller between the Inuvik and Northern Transect (only ~10%) in the West Zone. In contrast, for the East Zone, the rate of increase in total conveyance is negligible between the Southern and Inuvik Transects (only ~1% increase) and much more significant between the Inuvik and Northern Transects (~20% increase). In addition, the relative proportions of total conveyance area attributable to each channel type does not vary significantly down the Delta in this zone.

The downstream rate of increase in total conveyance area is most consistent for the Middle Zone, increasing on average by about 6% between each pair of transects. However, the relative proportion of the total conveyance area attributable to the four channel types varies in the downstream direction in this zone. Although essentially unimportant in the Southern Transect, secondary channels increase in relative importance in the downstream direction – most notably between the Inuvik and Northern Transects. In contrast, tertiary channels are generally of negligible in importance, except in the Inuvik Transect. The fact that the cumulative conveyance areas attributable to tertiary channels in the Inuvik Transect in this zone are larger than those for the secondary channels, yet negligible in all other transects in this zone, might indicate that some secondary channels are mistakenly classified as tertiary channels. It is recommended that the classification be checked and reconsidered if secondary channels are introduced into the Delta hydraulic model for this zone.

5.1.2 Storage Characteristics of the Mackenzie Delta

Flood water storage is an important component of the Mackenzie Delta hydrology, and represents a much larger area – in fact an order of magnitude greater area – than conveyance areas in all zones of the Delta. As a result, it is vital to consider storage effects in any hydraulic model of the Delta. Similar to the conveyance areas, the storage areas were averaged for each zone in each transect, and the resulting average values were then used to look for trends both across and down the Delta. Five cross-sections were used in each of the Southern, Inuvik, and Northern Transects to calculate representative averages for each transect zone, and four cross-sections were used to obtain a representative average for the Outer Delta Transect. Figures 5.6 to 5.9 show the resulting storage areas obtained for each cross-section, as well as the average for each transect zone.

Since LiDAR cannot penetrate water, the storage areas in the lakes represent the area above the summer low water levels.

The storage area had little variance between cross-sections in most of the zones. The two exceptions were the East Zone of the Northern Transect (Figure 5.8c) and the Outer Delta Transect (Figure 5.9). Cross-section N-5 had a smaller storage area than the other cross-sections in the East Zone of the Northern Transect because it is notably smaller due to the dividing lines between zones following ridges of high elevation (see Figure 4.3). The cross-sections in the Outer Delta Transect varied in size due to the size and shape of the transect (see Figure 4.8) but an average from the cross-section was still used to represent the transect. The minor variances in the storage areas of cross-sections in other transects are likely due to differences in the size of the zones in each cross-section because the cross sections were close in size and the storage areas were similar. Furthermore, during the analysis of the cross-sections, there were not any distinct features or differences between the cross-sections.

5.1.2.1 Variability in Storage Area Across the Delta

Figure 5.10 shows the lake, overland, and total storage areas for all ten zones in the Delta. Overall, the total storage area was represented by the lake and overland areas quite evenly, except in the Middle Zone in the Southern Transect and the Outer Delta Transect, both of which had significantly larger overland storage areas than lake areas. This result suggests that during large floods, such as those that can occur during spring breakup, both the lake and overland areas have significant roles in water storage in the Delta.

In the Southern and Inuvik Transects the storage area increased from east to west. In the Northern Transect the Middle Zone had the largest storage area, followed by the West Zone, and finally the East Zone. With this in mind, the amount of storage in each zone is not an ideal comparison because the zones were different sizes. Therefore, in order to get a meaningful comparison, the average lake, overland, and total storage areas in each zone were divided by the length of the zone giving a ratio of the storage area to the length of the zone. Figure 5.11 shows these ratios for each zone in the Delta; clearly, the storage area is very even throughout the Delta, as the ratio of storage area to zone length was very close for all zones.

5.1.2.2 Variability in Storage Area Down the Delta

Figure 5.10 shows the smallest storage area in the East Zone for all transects, the largest storage areas in the Southern and Inuvik Transects in the West Zone, and the largest storage area in the Northern Transect in the Middle Zone. Unlike the conveyance area, the storage area does not increase downstream in the Delta. Instead, the difference in the storage area between the zones is due to the varying sizes of each zone. Therefore, in order to identify trends, Figure 5.11 shows the amount of storage area compared to the size of the zone. Figure 5.11 shows that the ratio of the storage area to the length of the zone does increase going down the Delta in both the West and Middle Zones. In the East Zone the ratio is slightly higher in the Inuvik Transect than the Northern Transect. Furthermore, the increase in the ratio of storage area to the zone length is much higher between the Southern and Inuvik Transects (~40% increase) than the Inuvik to Northern

Transects (~7% increase) in the West Zones. The East Zone has a large increase between the Southern and Inuvik Transects (~50% increase), while there is a decrease in the ratio between the Inuvik and Northern Transects (about -3%). In the Middle Zone, the increase is similar between Southern and Inuvik Transects (~38%) and the Inuvik and Northern Transects (~31%), however the increase between the Northern and Outer Delta Transects is much smaller (~8%). These findings show that there is more potential storage in the lower Delta than in the upper Delta. The increase in the storage area could be due to the lower Delta area having smaller variation in the topography and the lower Delta being at a lower elevation than the upper Delta.

Figures 5.10 and 5.11 show some important characteristics of the Delta. First, they show a decrease in the elevation of the lakes and overland areas going down the Delta. For example, in the Northern Transect the storage area starts increasing at a lower water elevation (about 1 meter) than in the Southern Transect where it starts increasing at a water elevation of about 4 to 5 meters. Furthermore, Figures 5.10 and 5.11 show that the water enters the lakes before being stored in the overland areas; as shown by the lake storage area increasing and representing the majority of the storage area at lower elevations while the overland storage area remained close to zero. Finally, in some of the zones the overland and lake storage areas cross. These storage areas crossing show that although water enters the lakes first, soon after it starts to be stored in the overland area as well, which suggests there are a number of high closure lakes in that zone. This trend of the overland and lake storage areas crossing can be seen in the Southern Transect, indicating there are many high closure lakes in this part of the Delta, which agrees with previous studies from Emmerton et al. (2007) and Marsh and Hey (1989).

Figures 5.10 and 5.11 do not show an increase in the ratio of the storage area in lakes or overland moving down the Delta. As previously mentioned, the storage area is divided quite evenly between the lakes and overland areas, except in the Middle Zone of the Southern Transect and the Outer Delta Transect.

5.2 Hydraulic Model Characteristics

A hydraulic model is being developed for the Delta in a separate project; however, because there is very little channel geometry data available for the Delta, the model will only consider conveyance in the Primary channels (Figure 2.2). All other channels, as well as lakes and overland areas, will be considered as storage in the hydraulic model. To provide guidance for approximating these storage characteristics in the hydraulic model, ratios between storage and conveyance for the various zones in the Delta are needed. As previously stated, there were twelve zones used for the hydraulic model aspect of this study, two more than in the hydrological study (Figures 4.1, 4.3, and 4.4). The zones in the Southern and Inuvik Transects remained unchanged because there were three primary channels in each of these transects. The Middle Zone in the Northern Transect was divided into two zones, and the Outer Delta Transect was also divided into two zones because each of these zones initially contained two primary channels.

Figure 5.12 shows the primary channel conveyance areas in all zones for each transect. The distribution of the conveyance in the Delta was similar to the findings of previous studies, such as Burn (1995) and Marsh and Hey (1988) because the zone containing the Middle Channel had the largest conveyance area in each transect.

Figure 5.13 shows the storage area for the hydraulic model in each zone of the Delta. This figure shows that the hydraulic model storage area consists mainly of lake and overland areas. Therefore, the assumption used in the model that all Delta components other than primary channels can be considered as storage is valid.

Figure 5.14 shows the ratio of the model storage area (A_0) to the conveyance area (A). Appendix C shows tables with all of the ratios of the storage area to conveyance area for each water level. The water elevation above the top of bank on the vertical axis is the elevation in reference to the average of the left and right bank elevations for each channel, meaning each graph is referenced to a different top of bank elevation. The model storage area to conveyance area ratio shows that the storage area in each zone varies from a minimum of about 4 times greater than the conveyance area in Zone A of the Outer Delta Transect, to a maximum of about 100 times greater in the West Zone of the Southern Transect. The ratio varies significantly going down the Delta, but its large magnitude shows the storage is an important part of the Delta hydrology. Furthermore, the storage area to conveyance area ratio seems to approach a vertical asymptote in each zone except the West Zone of the Southern Transect. This shows that the conveyance area in the Peel Channel is much smaller than the storage area in the West Zone of the Southern Transect. Since the model storage area is significantly larger than the conveyance area in the Peel Channel, this suggests that other channels may have an important part in the conveyance of flow in the West Zone of the Southern Transect. Figure 5.5 further validates the fact that other channels have a significant part of the conveyance area because it shows that the secondary and primary channels have a similar conveyance area in this zone.

5.3 Lake and Channel Water Surface Characteristics

The water surface elevations in the LiDAR data were examined for variations across and down the Delta. This section looks at the range of lake sill elevations from the Lake Sill Method, which assumes the lake sill is at the same elevation as the average water surface in the LiDAR data, and number of lakes in each zone as well as the slope of some of the channels. The slope was calculated for the Peel, Middle, East, and Kalinek Channels because these were the only four channels in more than one transect.

5.3.1 Lake Distribution and Variance in Lake Sill Elevation

The cross-sections used in this study give a sample of the 49,046 lakes in the Mackenzie Delta. This section looks at the total number of lakes in each zone, the number of lakes in different ranges of sill elevation, the maximum, minimum, and average lake sill elevations as well as the difference between the maximum and minimum lake sill elevation in each zone.

Table 5.1 shows the total number of lakes in each zone, which varied greatly based on zone size. For example, the East Zone, which was the smallest of the three zones in each transect, had the smallest number of lakes in all transects. The number of lakes in each zone was determined by adding the number of lakes from each cross-section. The lakes in each zone were then broken down into smaller sill elevation ranges. In terms of trends, the number of lakes decreased from the West Zone to the East Zone in the Southern and Inuvik Transects. In the Northern Transect, the Middle Zone had the most lakes, followed by the West Zone, then the East Zone. The number of lakes in the West Zone decreased going down the Delta; the number of lakes in the Middle Zone increased going down the Delta, except for in the Outer Delta Transect, which is much smaller than the other zones. Finally, the number of lakes in the East Zone did not show a trend of increasing or decreasing down the Delta, since the Inuvik Transect contained the highest number of lakes. A ratio of the number of lakes in a zone to the zone length was calculated to get a more meaningful comparison of the number of lakes in each zone. Table 5.2 shows the ratio for each zone, which allowed for a comparison to see if any zones of the Delta had more lakes than other zones. In the Southern and Inuvik Transects the West Zone had the highest ratio of lakes per kilometer of zone length and in the Northern Transect the Middle Zone had the highest number of lakes per kilometer. The number of lakes per kilometer in the West Zone was very consistent going down the Delta. The number of lakes per kilometer increased from the Southern to Northern Transects in the Middle and East Zones. The Outer Delta Transect had the least number of lakes out of all of the zones. Based on the sample of lakes taken in the data, and the ratio of the number of lakes to the zone length, the west and northern parts of the Delta have the most lakes. Since the total storage area was represented quite evenly by lake and overland areas, the larger proportion of lakes per zone length in the west and northern parts of the Delta shows that these areas may have a higher number of smaller lakes than the other parts of the Delta.

The combination of the number of lakes and the storage area in each zone showed that the upper Delta contains a large number of small lakes. This was evident by the fact that the storage area in lakes in all zones of the Southern Transect was significantly smaller than the storage area in lakes in all zones the Inuvik Transect, despite a similar number of lakes. For example, there were more lakes in the West Zone of the Southern Transect than in the West Zone of the Inuvik Transect, but the storage area in lakes in the Southern Transect was about 35,000 m^2 smaller than the storage area in lakes in the Inuvik Transect. Furthermore, the Middle and East Zones in the Southern Transect had about two-thirds of the number of lakes of the respective zones in the Inuvik Transect, but the lake storage area in the Southern Transect was less than half that of the Inuvik Transect for these zones. The combination of the number of lakes along with the lake storage information agrees with findings from Bigras (1990), Lesack et al. (1998), and Marsh and Hey (1989), which showed a large number of small high closure lakes in the upper Delta.

Table 5.1 The number of lakes in each zone of the Delta.

Transect	Number of Lakes		
	West Zone	**Middle Zone**	**East Zone**
Outer Delta	N/A	63	N/A
Northern	181	377	59
Inuvik	260	225	79
Southern	272	152	56

Table 5.2 The number of lakes per kilometer in each zone of the Delta.

Transect	Number of Lakes per km of Zone Length		
	West Zone	**Middle Zone**	**East Zone**
Outer Delta	N/A	2.31	N/A
Northern	9.58	9.98	9.61
Inuvik	9.44	7.71	6.82
Southern	9.51	6.61	6.65

Figures 5.15 to 5.18 show the number of lakes in each zone by sill elevation range. In the Southern Transect, the West and Middle Zone lake distribution appeared similar to a normal distribution. The East Zone did not show the same distribution, which could be because of its smaller size and therefore fewer lakes. The only zone in the Inuvik Transect which showed a distribution similar to a normal distribution was the West Zone. The West and Middle Zones in the Northern Transect had more lakes at lower elevations, and therefore did not form a normal distribution. The East Zone was different than the other two zones in the Northern Transect as it did not have more lakes at lower elevations, which could be because of the smaller number of lakes in this zone. Finally, the majority of the lakes in the Outer Delta Transect were at lower elevations.

Figures 5.19 to 5.22 and Table 5.3 show the minimum, average, and maximum lake sill elevation in each zone. Note that the minimum lake sill elevation in the Outer Delta Transect was negative, which means that the lake sill in the LiDAR data was below MSL. The mean lake sill elevations varied across the Delta, which agrees with Marsh et al. (1993), who found mean lake sill elevations of approximately 3.74 m ASL in the Peel Channel zone, 4.45 m ASL in the Middle Channel zone, and 3.58 m ASL in the East Channel zone. In the Southern Transect, the minimum and average lake sill elevations were highest in the East Zone, and the maximum lake sill elevations highest in the West Zone and lowest in the East Zone. In the Inuvik Transect, the minimum and average lake sill elevations were highest in the West Zone and lowest in the East Zone. The East Zone also had the lowest maximum lake sill elevation and the West and Middle Zones had almost the same maximum lake sill elevations. Finally, in the Northern Transect the Middle Zone had the lowest minimum, average, and maximum lake sill elevation, while the East Zone had the highest minimum and average lake sill elevations.

The minimum, average, and maximum lake sill elevations above MSL decreased in all zones moving down the Delta. The maximum lake sill elevation in the Outer Delta Transect was the only exception, as it was higher than the maximum lake sill elevation in the Northern Transect. The elevation decreases from the upper Delta towards the Beaufort Sea, and therefore the decreases in the lake sill elevations were expected.

Table 5.3 Minimum, average, and maximum lake sill elevation for all zones in the Delta.

Transect	Sill Elevation (m)	West Zone	Middle Zone	East Zone
Outer Delta	Minimum	N/A	-0.357	N/A
	Average	N/A	0.592	N/A
	Maximum	N/A	5.580	N/A
Northern	Minimum	0.301	0.200	0.594
	Average	1.478	1.251	1.828
	Maximum	4.219	3.875	4.087
Inuvik	Minimum	1.067	1.001	0.987
	Average	3.224	2.977	2.241
	Maximum	6.104	6.106	5.115
Southern	Minimum	2.397	2.449	3.560
	Average	5.355	5.572	5.634
	Maximum	8.739	8.669	8.273

The lake sill elevation range, which is the difference between the maximum and minimum lake sill elevations in each zone of the Delta are shown in Table 5.4. The East Zone in each transect had the smallest difference between the maximum and minimum lake sill elevations in all transects, which indicates changes in topography were smaller in the East Zone than in the other two zones. The lake sill elevation range decreased going down the Delta in all of the zones, with the exception of the Outer Delta Transect. It should be noted that the large range in the lake sill elevation in the Outer Delta Transect was the result of one lake sill (of 63 lakes) being approximately 1.6 m higher than the next highest lake sill. If this lake sill were assumed to be an error and omitted, the lake sill elevation range in the Outer Delta Transect would be 4.313m, which is still larger than the range in the Middle Zone of the Northern Transect.

Table 5.4 The range between the maximum and minimum lake sill elevations for each zone in the Delta.

Transect	Sill Elevation Range (m) (Maximum - Minimum)		
	West Zone	Middle Zone	East Zone
Outer Delta	N/A	5.937	N/A
Northern	3.919	3.676	3.493
Inuvik	5.038	5.105	4.128
Southern	6.343	6.219	4.713

5.3.2 Channel Elevations and Slopes

The slopes of four channels were calculated to look for changes in the channel slopes going down the Delta. Channel slopes affect the potential for ice jams, since higher slopes tend to move ice downstream and make severe ice jams less likely de Rham, Prowse, Beltaos, and Lacroix (2008). Since the water surface in the LiDAR data has a single, averaged elevation throughout each transect because of data preprocessing, only one elevation point is available from most of the channels in each transect, with the exception of the East Channel, which has two different elevations because it meanders outside of the LiDAR data in the Inuvik and Northern Transects. Table 5.5 shows the water elevations for the primary channels and the only secondary channel that is in more than one transect. The Peel and East Channels are in the Southern, Inuvik, and Northern Transects, while the Middle Channel is in all transects, including the Outer Delta Transect. The Napoiak and Kumak Channels are the other primary channels examined in the study, but each of these is only in one transect, so the slope cannot be determined. Finally, the Kalinek Channel, a secondary channel that stretches from the Southern to Inuvik Transect, is the only other channel in more than one transect.

Table 5.5 The channel elevations in each transect used to calculate the channel slopes.

Transect	Primary Channel Elevations (m)					Secondary Channel Elevation (m)
	Peel Channel	Napoiak Channel	Middle Channel	East Channel*	Kumak Channel	Kalinek Channel
Outer Delta	-	-	-0.195	-	-0.195	-
Northern	0.543	0.413	0.626	0.667 0.644 0.656	-	-
Inuvik	1.017	-	1.214	1.210 1.138 1.174	-	1.214
Southern	2.751	-	2.072	2.119	-	2.119

*The three elevations for the East Channel are used as it is cut off from the LiDAR. The top elevation is the farthest north (downstream), the middle elevation is the farthest south (upstream), and the third elevation is the average.

The water surface elevations of channels in more than one LiDAR transect were used to determine the slope of the channels. The distances used to calculate the channel slope for the Peel and Middle channels were measured from the middle cross-section in each transect, along the channel to the middle cross-section in the next transect. For the East Channel, distances were measured from cross-section S-3 in the Southern Transect to cross-section I-1 in the Inuvik Transect. Within the Inuvik Transect, the distance was measured from cross-section I-1 to I-4 to calculate the channel slope. Then, the distance was measured from cross-section I-4 to N-1; then to N-4 in the Northern Transect. Finally, for the Kalinek Channel, the distance along the channel was measured from cross-section S-5 in the Southern Transect, which was the only cross-section that contained the channel, to cross-section I-3 of the Inuvik Transect. The channel slopes are given in m/m, which represent the change in elevation, or "rise", in meters for every meter along the Delta, or "run". Negative values indicate that the first point on the slope, the southern point used to measure each distance in this case, was at a higher elevation than the end, or northern point.

The slope of the Peel Channel decreased going down the Delta, as shown in Figure 5.23 and Table 5.6, from -2.28×10^{-5} m/m between the Southern and Inuvik Transects to -1.05×10^{-5} m/m between the Inuvik and Northern Transects.

Table 5.6 The elevation difference, distance between points, and slope of the Peel Channel between transects.

Channel	**First Point**	**End Point**	**Distance (m)**	**Elevation Difference (m)**	**Slope (m/m)**
Peel Channel	S-3	I-3	76105.7	1.73	-2.28×10^{-5}
Peel Channel	I-3	N-3	44957.3	0.47	-1.05×10^{-5}

The slopes of the Middle Channel, which are shown in Figure 5.23 and Table 5.7, were not constant throughout the Delta. The Middle Channel had a slope of -2.08×10^{-5} m/m between the Southern and Inuvik Transects, a much greater slope than the slope between the other transects. From the Inuvik to Northern transect, the slope of the Middle Channel is -7.41×10^{-6} m/m, which is slightly less than the slope of -8.54×10^{-6} m/m between the Northern and Outer Delta Transects.

Table 5.7 The elevation difference, distance between points, and slope of the Middle Channel between transects.

Channel	**First Point**	**End Point**	**Distance (m)**	**Elevation Difference (m)**	**Slope (m/m)**
Middle Channel	S-3	I-3	41328.1	0.86	-2.08×10^{-5}
Middle Channel	I-3	N-3	79191.4	0.59	-7.41×10^{-6}
Middle Channel	N-3	O-2	96289.5	0.82	-8.54×10^{-6}

The change in slope of the East Channel, which is shown in Figure 5.23 and Table 5.8, was more consistent than the slopes of the Peel and Middle Channels. The slope between the Southern and Inuvik Transect was -1.68×10^{-5} m/m, and between the Inuvik and Northern Transects was -1.06×10^{-5} m/m. The two water elevations of the East Channel within the Inuvik and Northern Transects were used to calculate the channel slopes within these transects, which were found to be 1.27×10^{-5} m/m and 5.40×10^{-6} m/m, respectively. Although these are positive slopes, so the channel appears to gain elevation in the downstream direction, the results are not realistic and were likely caused by slight variations in the LiDAR or errors in processing the LiDAR data.

Table 5.8 The elevation difference, distance between points, and slope of the East Channel between transects.

Channel	**First Point**	**End Point**	**Distance (m)**	**Elevation Difference (m)**	**Slope (m/m)**
East Channel	S-3	I-1	58401.4	0.98	-1.68×10^{-5}
East Channel	I-1	I-4	5654.1	-0.07	1.27×10^{-5}
East Channel	I-4	N-1	53381.6	0.57	-1.06×10^{-5}
East Channel	N-1	N-4	4313.2	-0.02	5.40×10^{-6}

The Kalinek Channel, which is a secondary channel between the Southern and Inuvik Transects, had a slope of -1.30 x 10^{-5} m/m, as shown in Figure 5.23 and Table 5.9. The slope of this channel is comparable to the Middle and East Channels, which was expected since the Kalinek Channel is between these two channels, being near the East Channel in the Southern Transect, and the Middle Channel in the Inuvik Transect.

Table 5.9 The elevation difference, distance between points, and slope of the Kalinek Channel between transects.

Channel	**First Point**	**End Point**	**Distance (m)**	**Elevation Difference (m)**	**Slope (m/m)**
Kalinek Channel	S-5	I-3	69413.1	0.91	-1.30 x 10^{-5}

The slopes identified here are similar to values from Morley (2012), who suggested an overall water surface slope of 0.00002. The Peel, Middle, and East Channels had a larger slope between the Southern and Inuvik Transects than between the Inuvik and Northern Transects. Morley (2012) also observed a change in the channel slope in the Middle and East Channels, but not in the Peel Channel. Of all primary channels, the East Channel had the smallest slope, which occurred between the Southern and Inuvik Transects. The slopes of the primary channels show that the upper Delta has a larger slope than the lower Delta, a significant result since the slope of the floodplain affects the area that will be flooded. Areas with lower slopes will be flooded to a larger extent as the change elevation is more gradual. The steeper channel slopes in the upper Delta, along with the range in lake sill elevation, are evidence that there are larger variances in topography in the upper Delta than lower Delta.

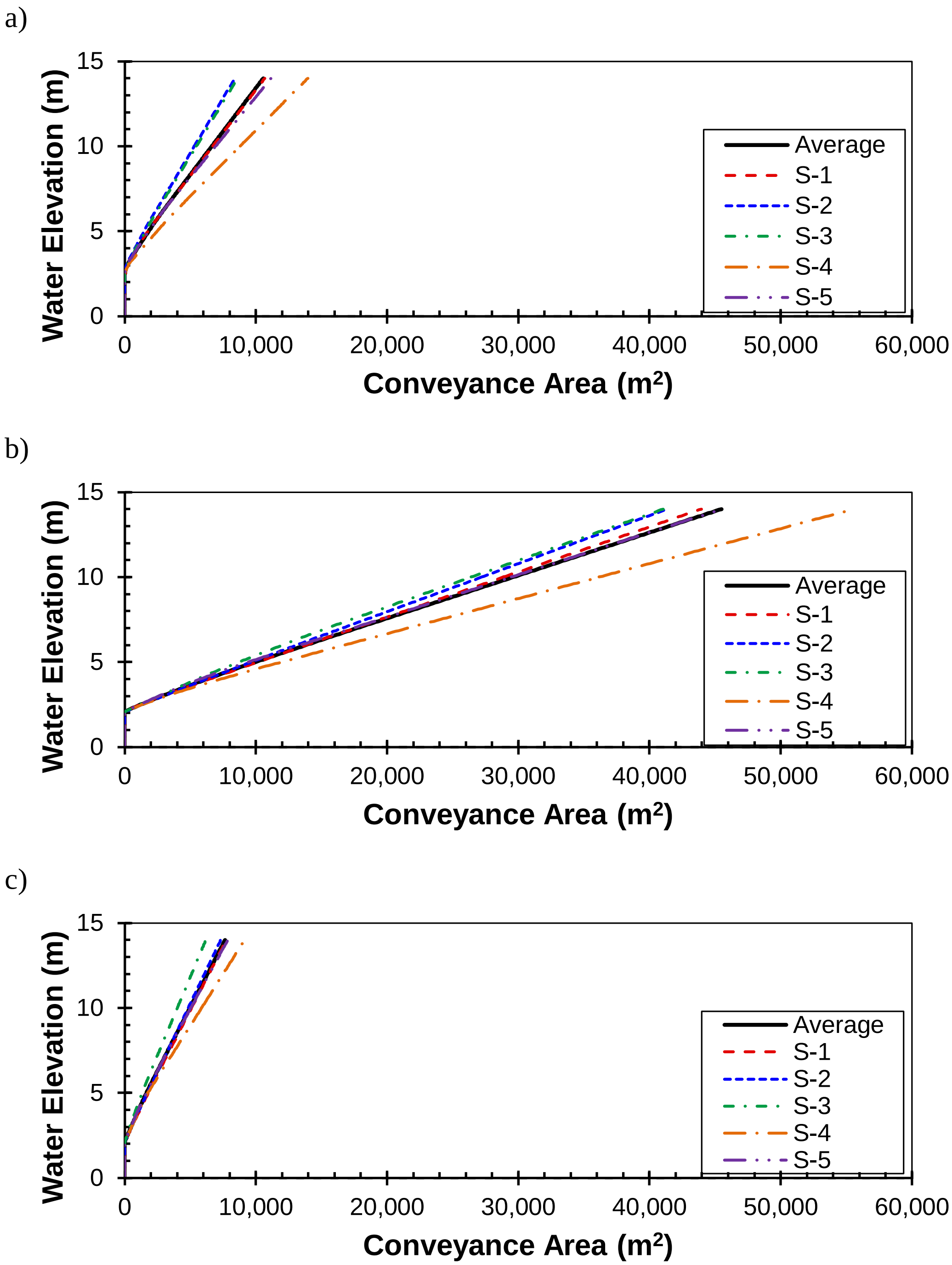
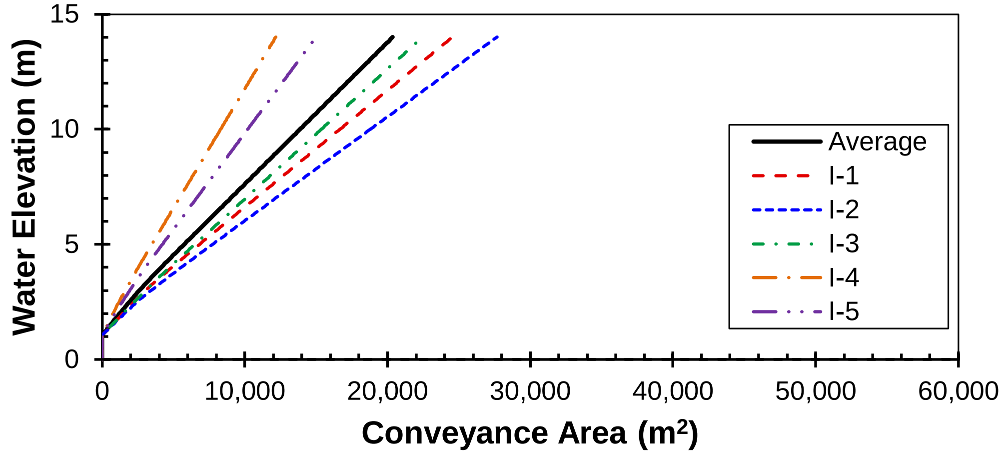
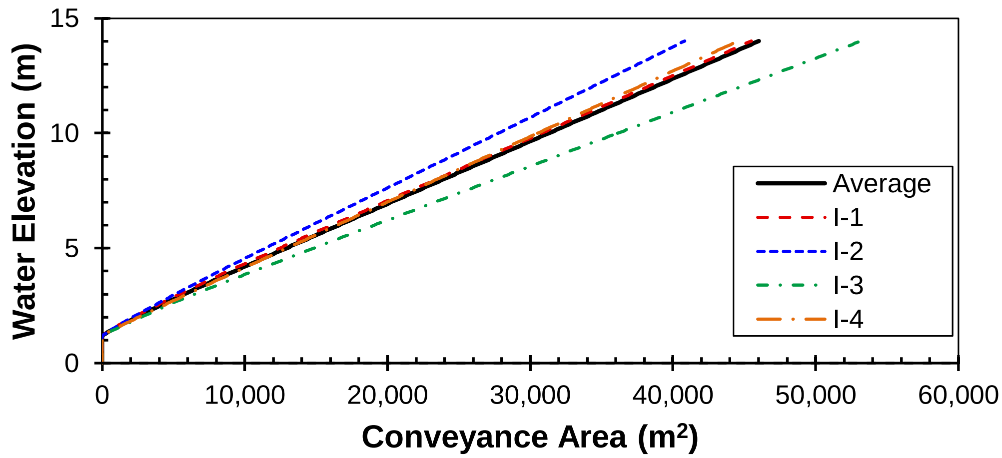


Figure 5.1 A comparison of each cross-section conveyance area to the transect average conveyance area in the Southern Transect for the a) West Zone b) Middle Zone c) East Zone.

a)



b)



c)

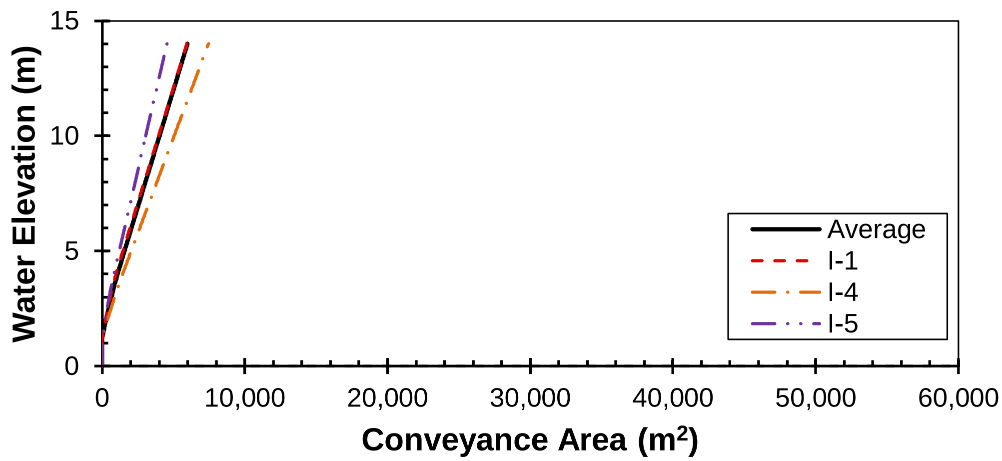


Figure 5.2 A comparison of each cross-section conveyance area to the transect average conveyance area in the Inuvik Transect for the a) West Zone b) Middle Zone c) East Zone.

a)

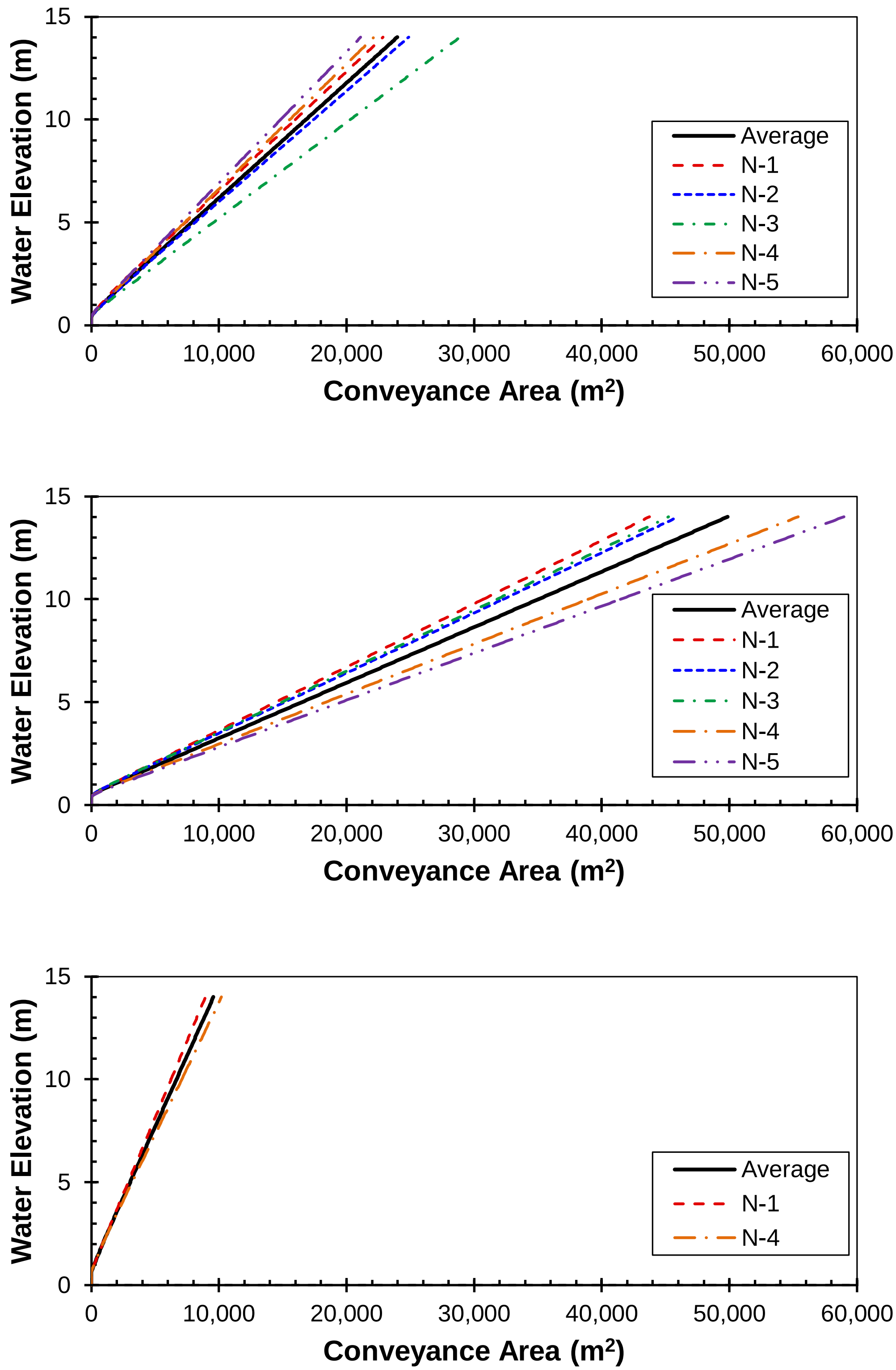


Figure 5.3 A comparison of each cross-section conveyance area to the transect average conveyance area in the Northern Transect for the a) West Zone b) Middle Zone c) East Zone.

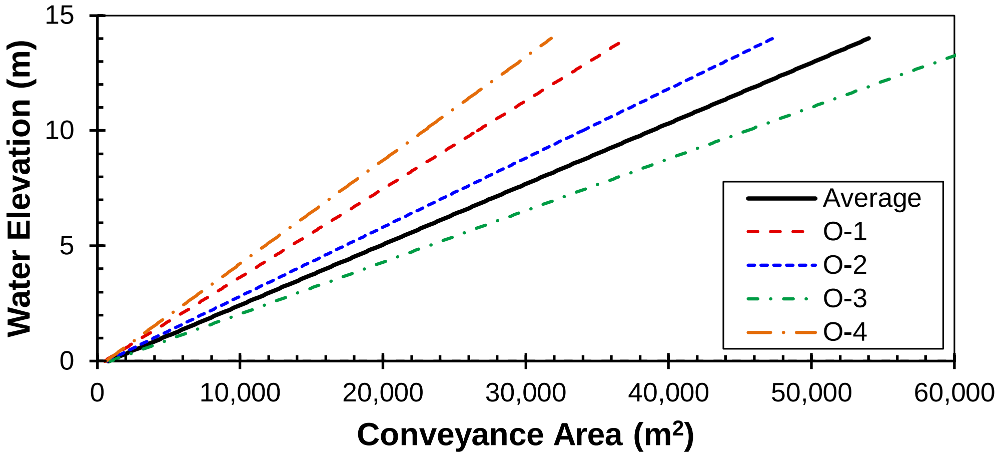


Figure 5.4 A comparison of each cross-section conveyance area to the transect average conveyance area in the Outer Delta Transect.

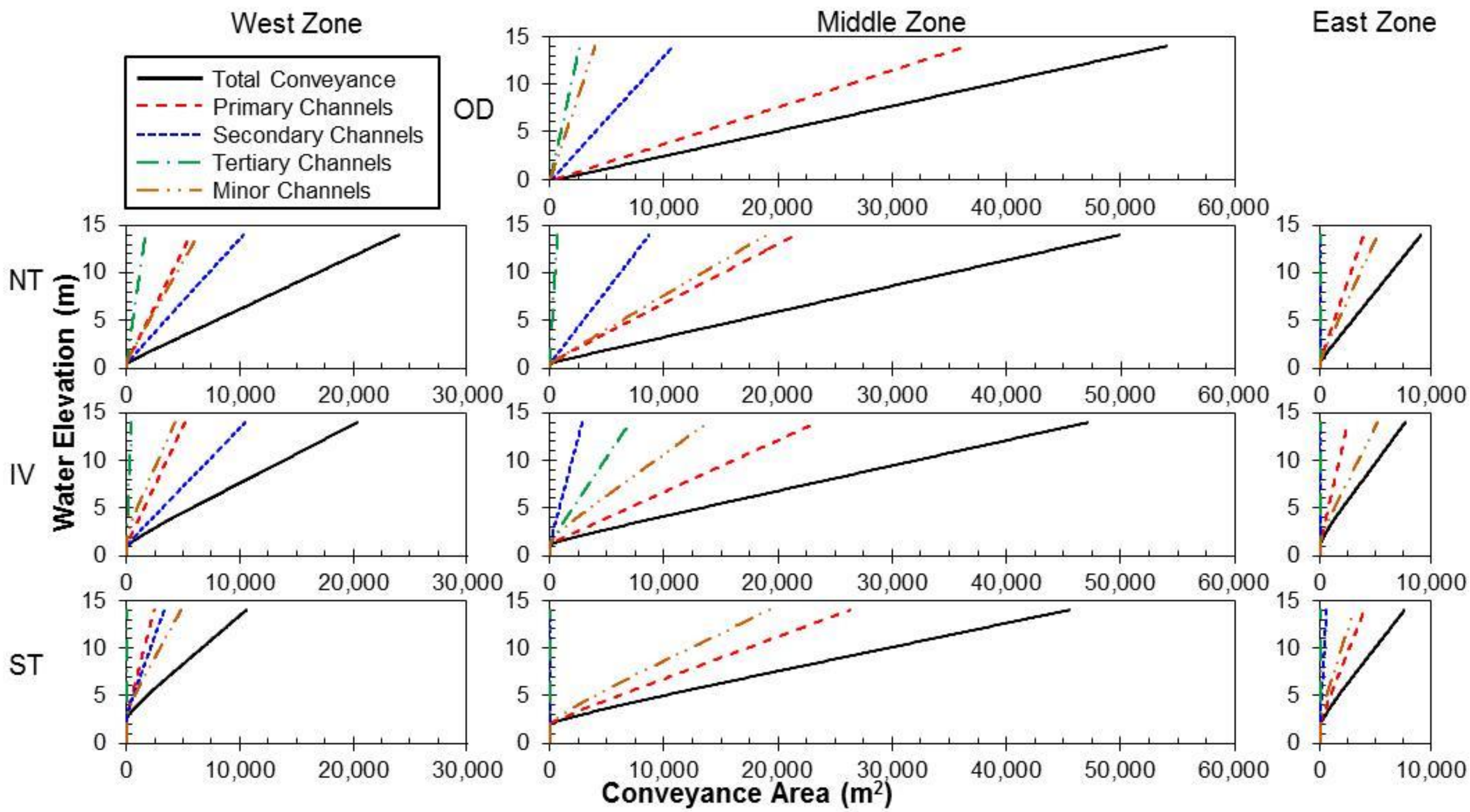


Figure 5.5 The total conveyance area, along with each component in all of the zones in the Delta.

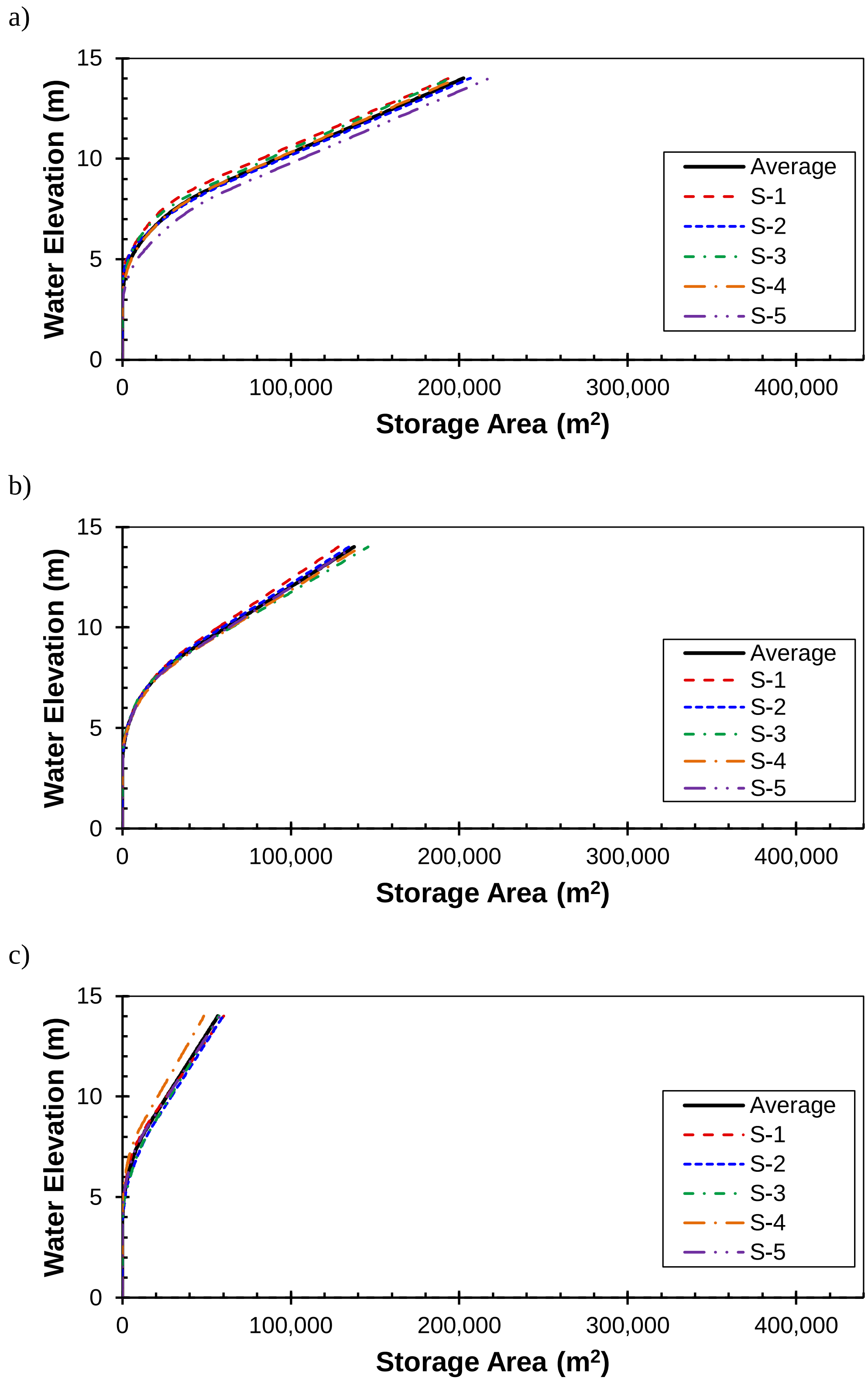
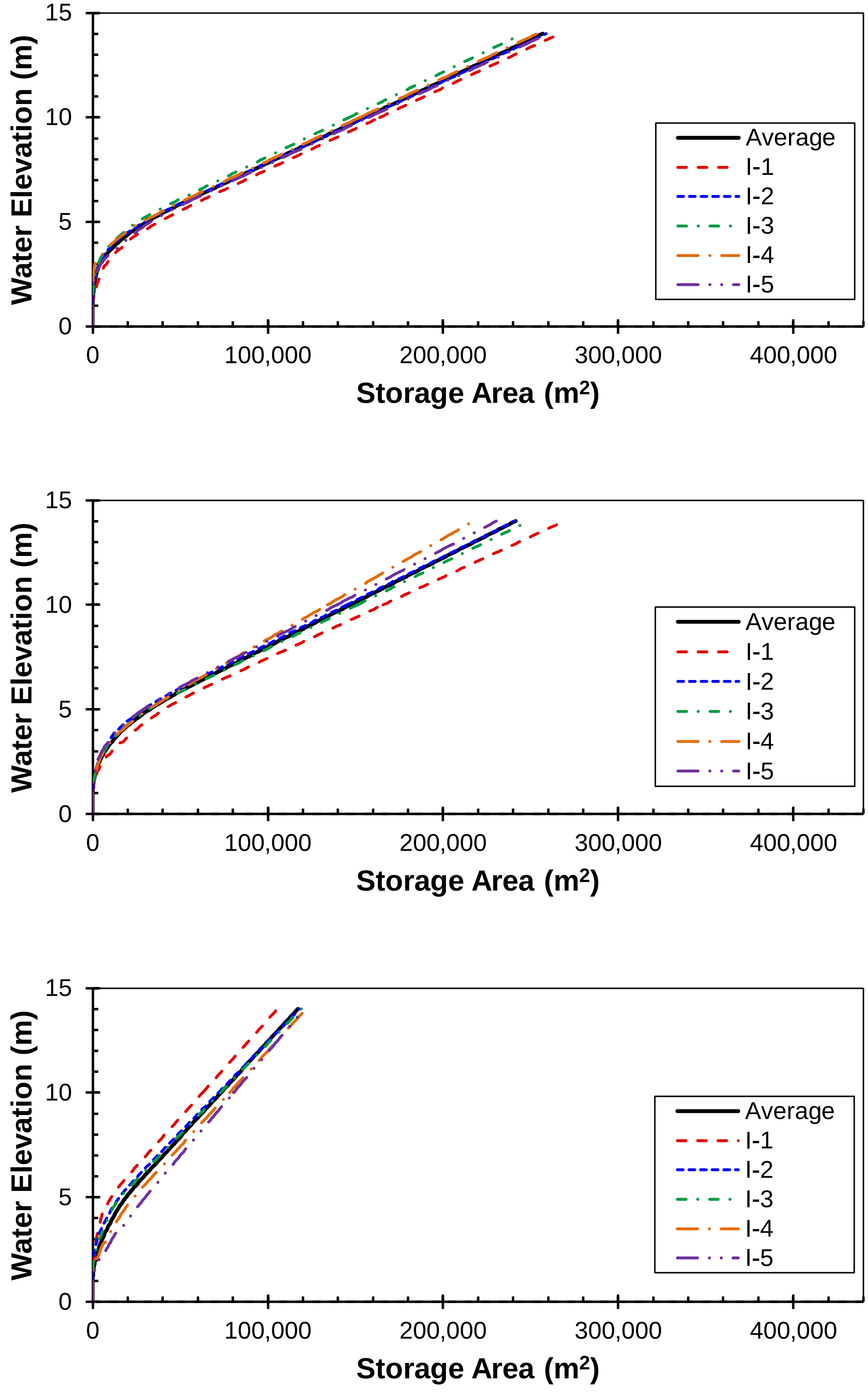


Figure 5.6 A comparison of each cross-section storage area to the transect average storage area in the Southern Transect for the a) West Zone b) Middle Zone c) East Zone.

a)



b)

c)

Figure 5.7 A comparison of each cross-section storage area to the transect average storage area in the Inuvik Transect for the a) West Zone b) Middle Zone c) East Zone.

a)

b)

c)

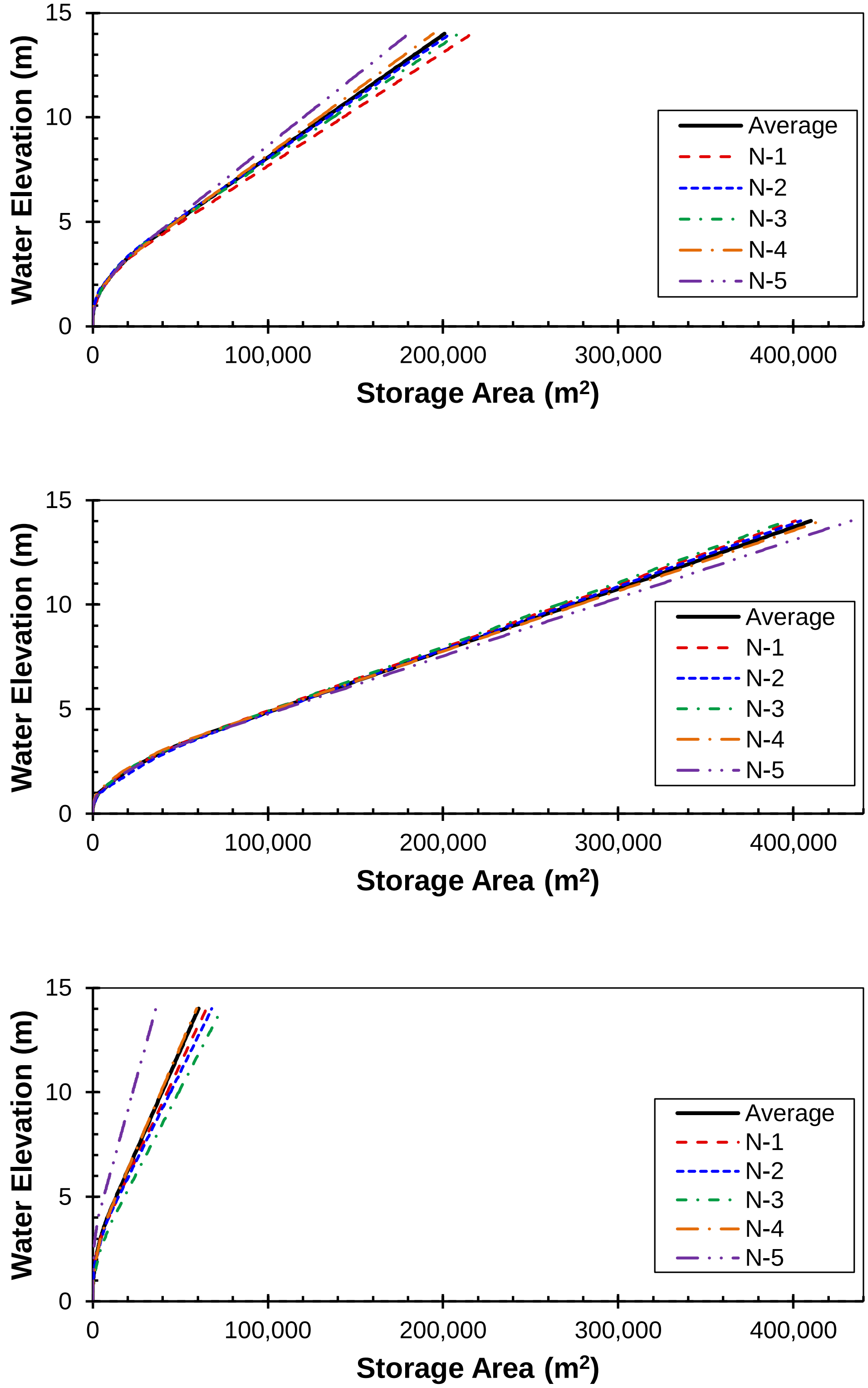


Figure 5.8 A comparison of each cross-section storage area to the transect average storage area in the Northern Transect for the a) West Zone b) Middle Zone c) East Zone.

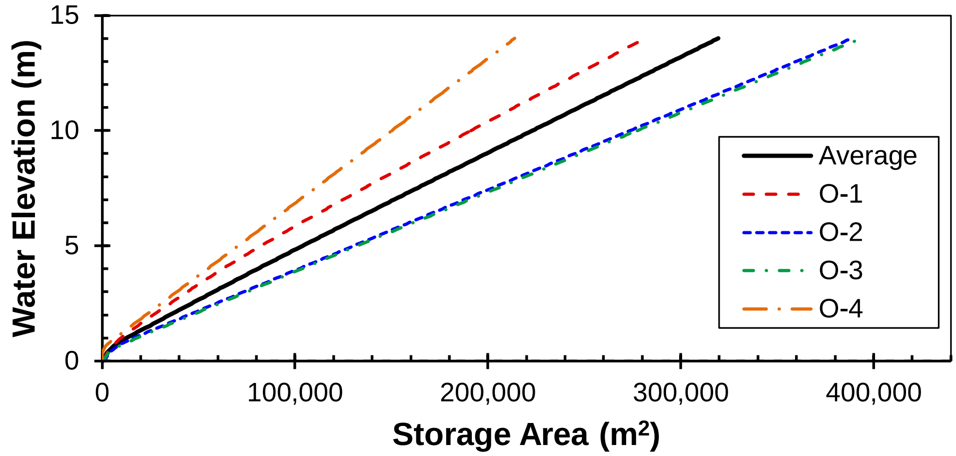


Figure 5.9 A comparison of each cross-section storage area to the transect average storage area in the Outer Delta Transect.

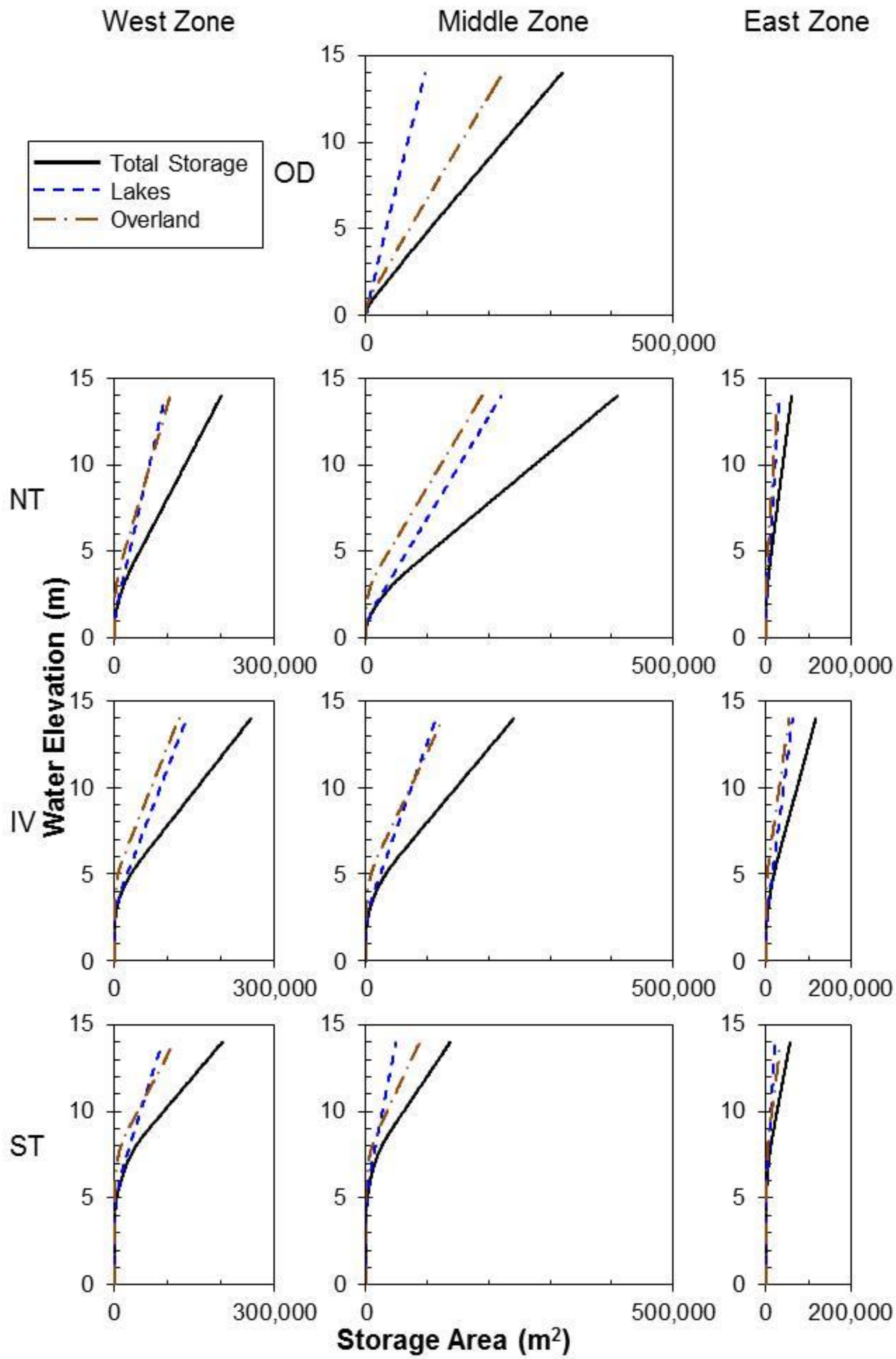


Figure 5.10 The total storage area, along with each component in all of the zones in the Delta.

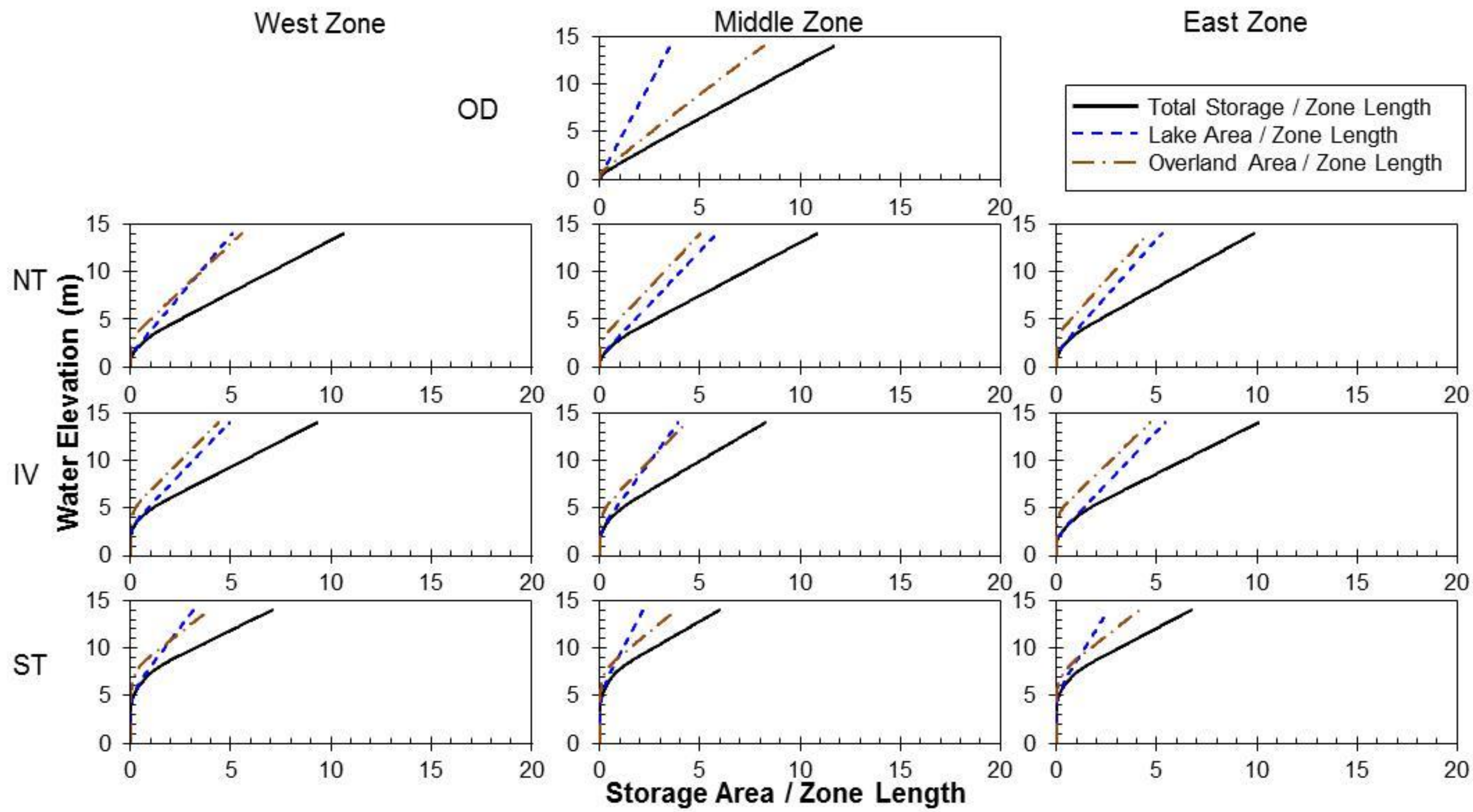


Figure 5.11 The storage area to zone length ratio for all zones in the Delta.

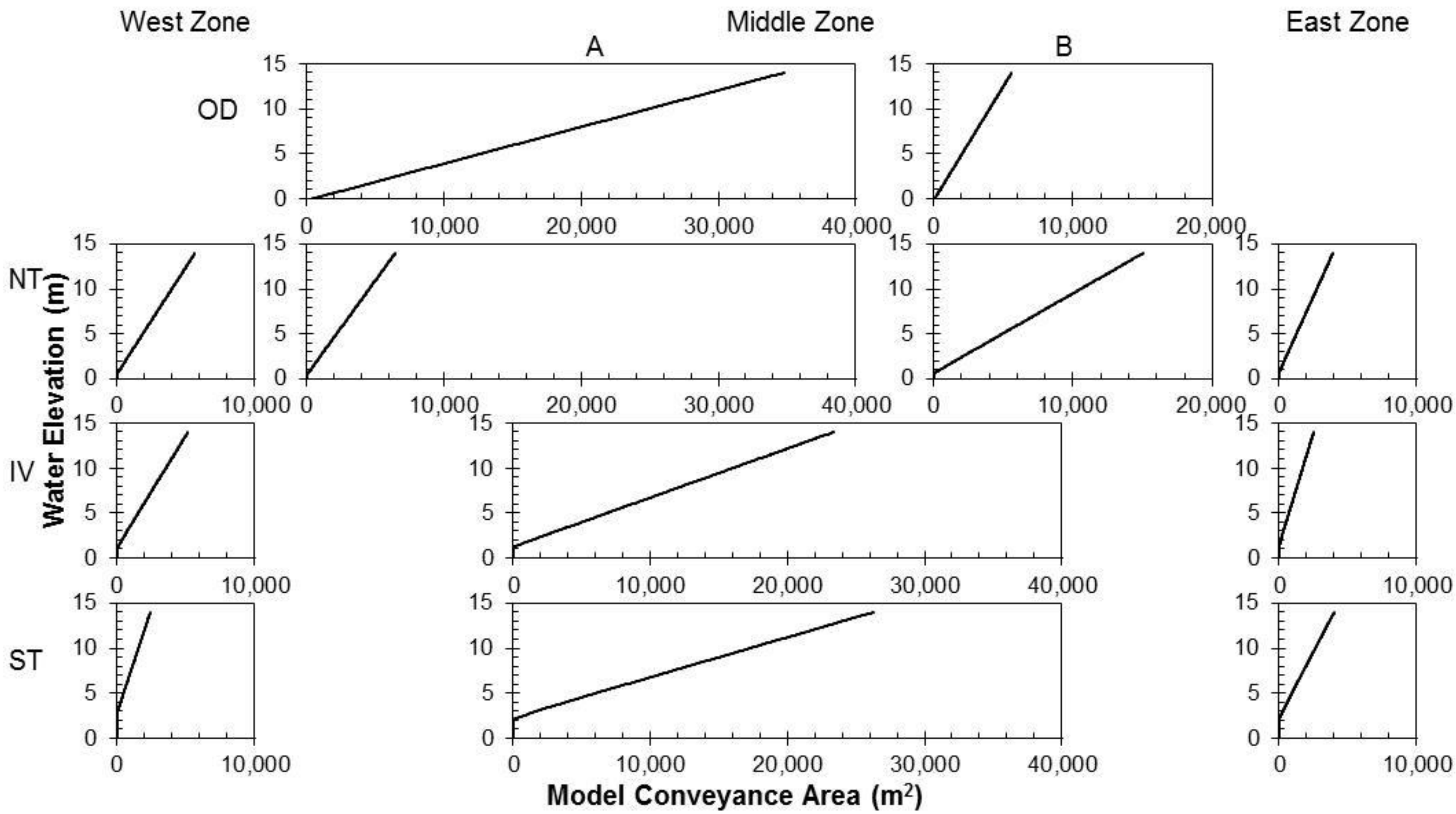


Figure 5.12 The hydraulic model conveyance area for all zones in the Delta.

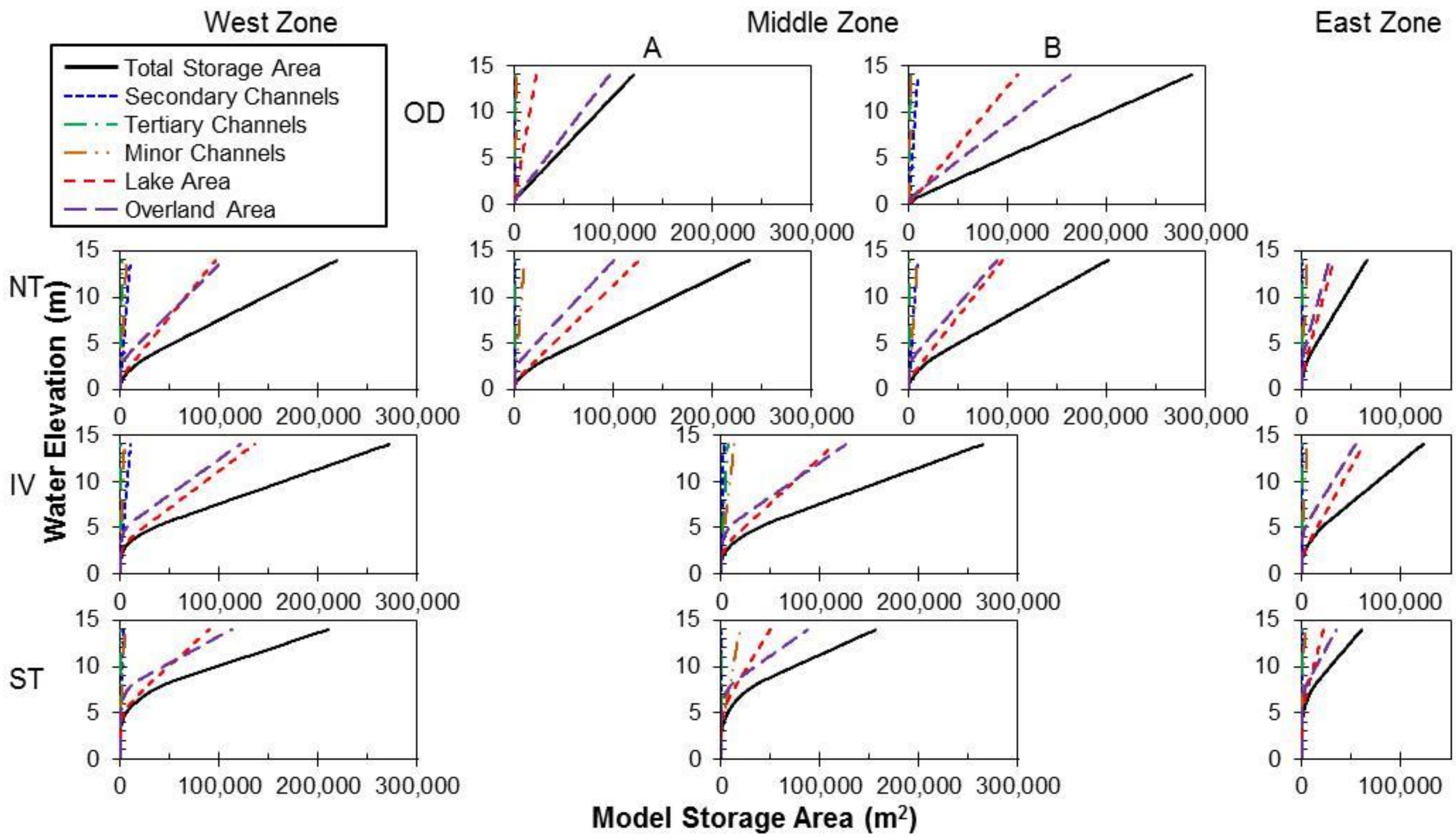


Figure 5.13 The hydraulic model storage area for all zones in the Delta.

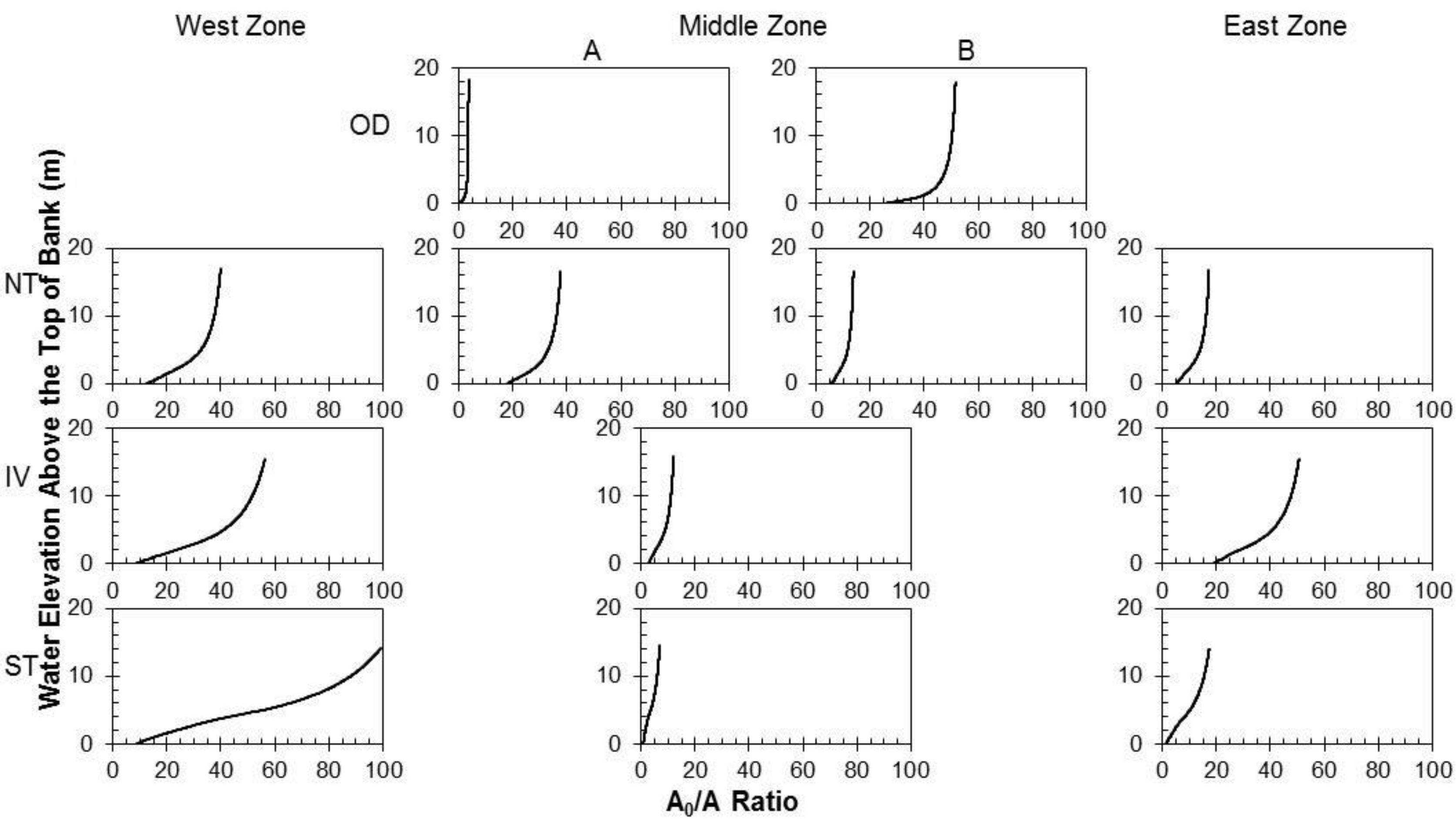
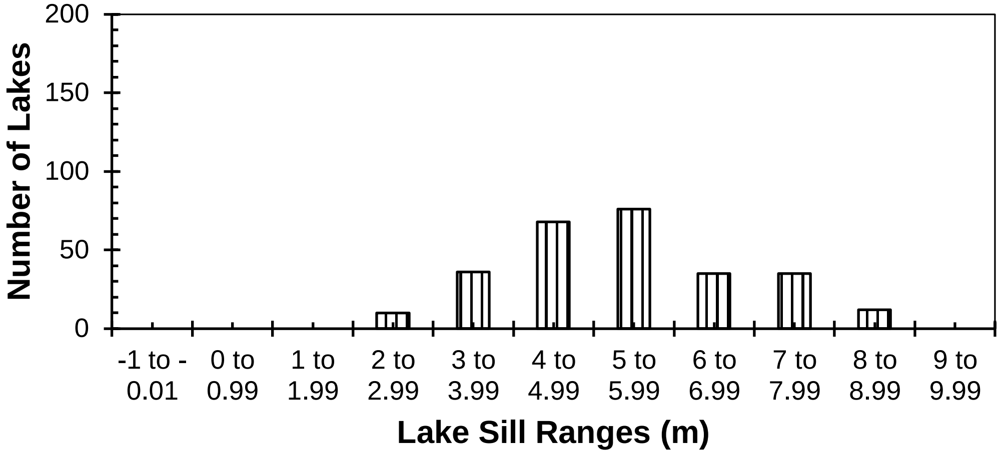
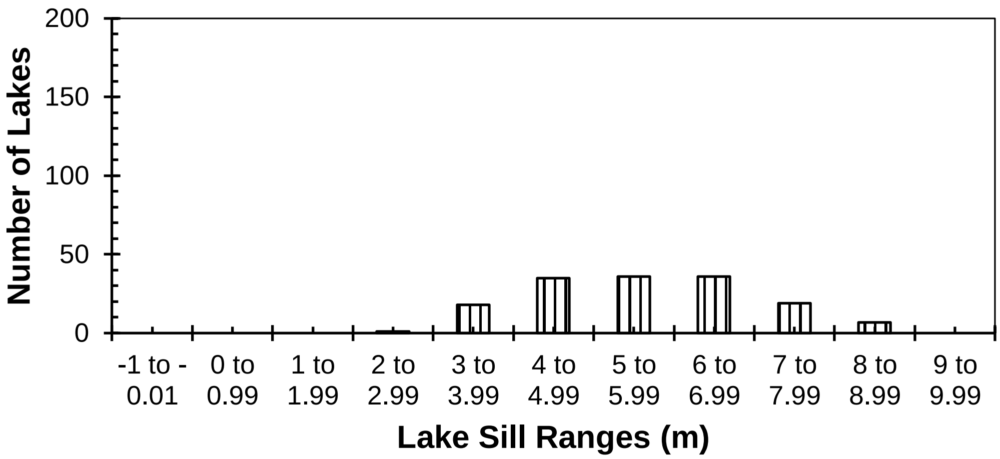


Figure 5.14 Storage (A_0) to conveyance area (A) ratio for all zones used for the model in the Delta.

a)



b)



c)

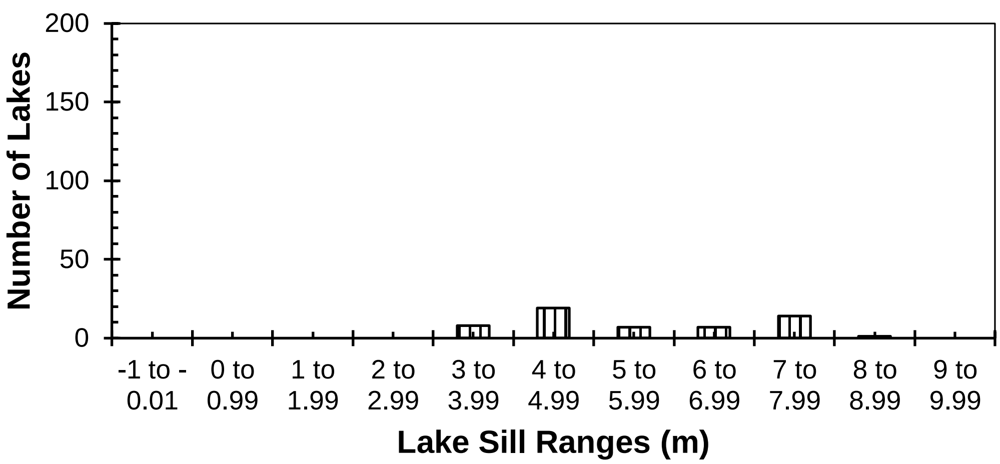


Figure 5.15 Elevation ranges of lake sills in the Southern Transect for the a) West Zone b) Middle Zone c) East Zone.

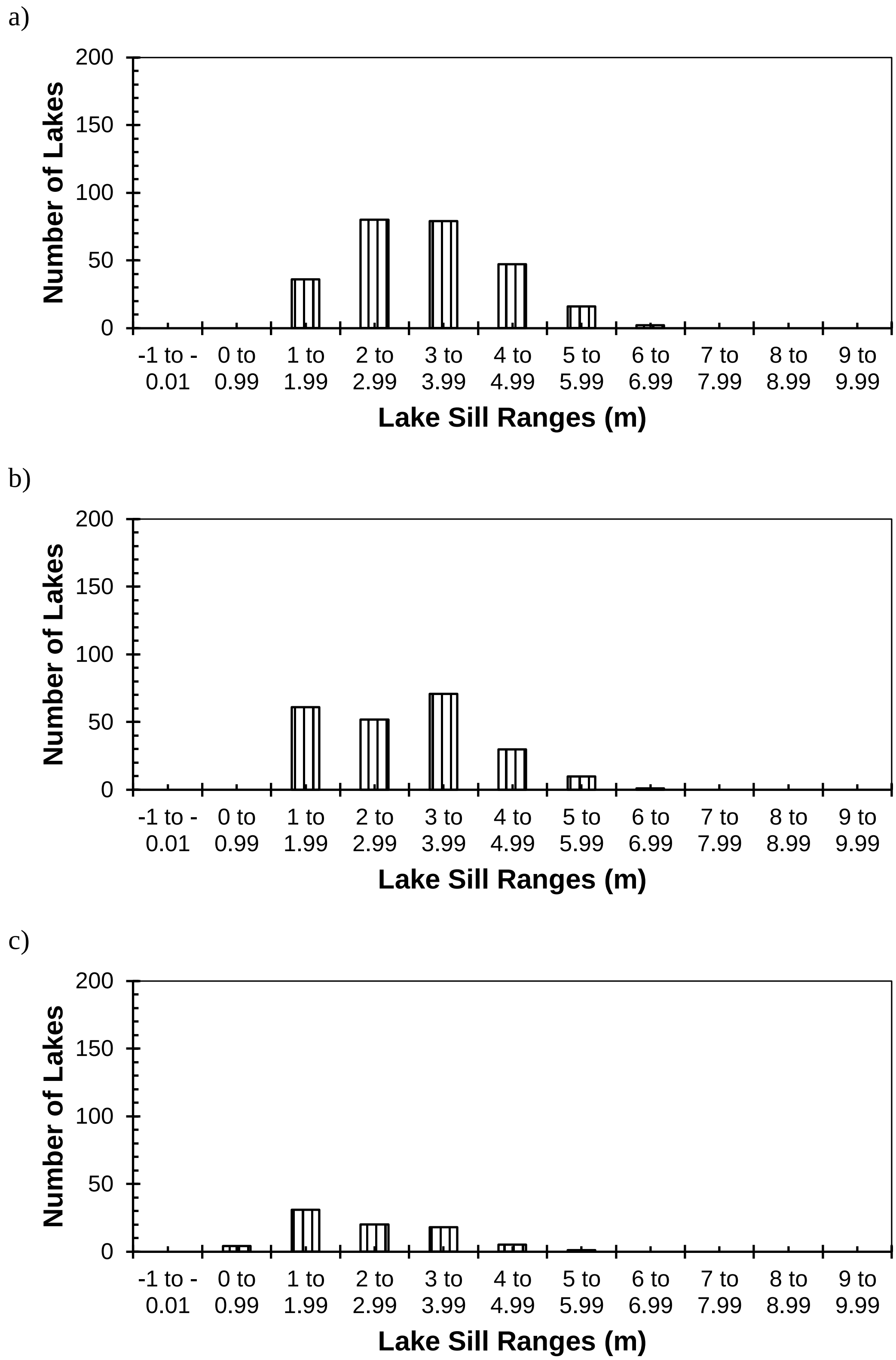


Figure 5.16 Elevation ranges of lake sills in the Inuvik Transect for the a) West Zone b) Middle Zone c) East Zone.

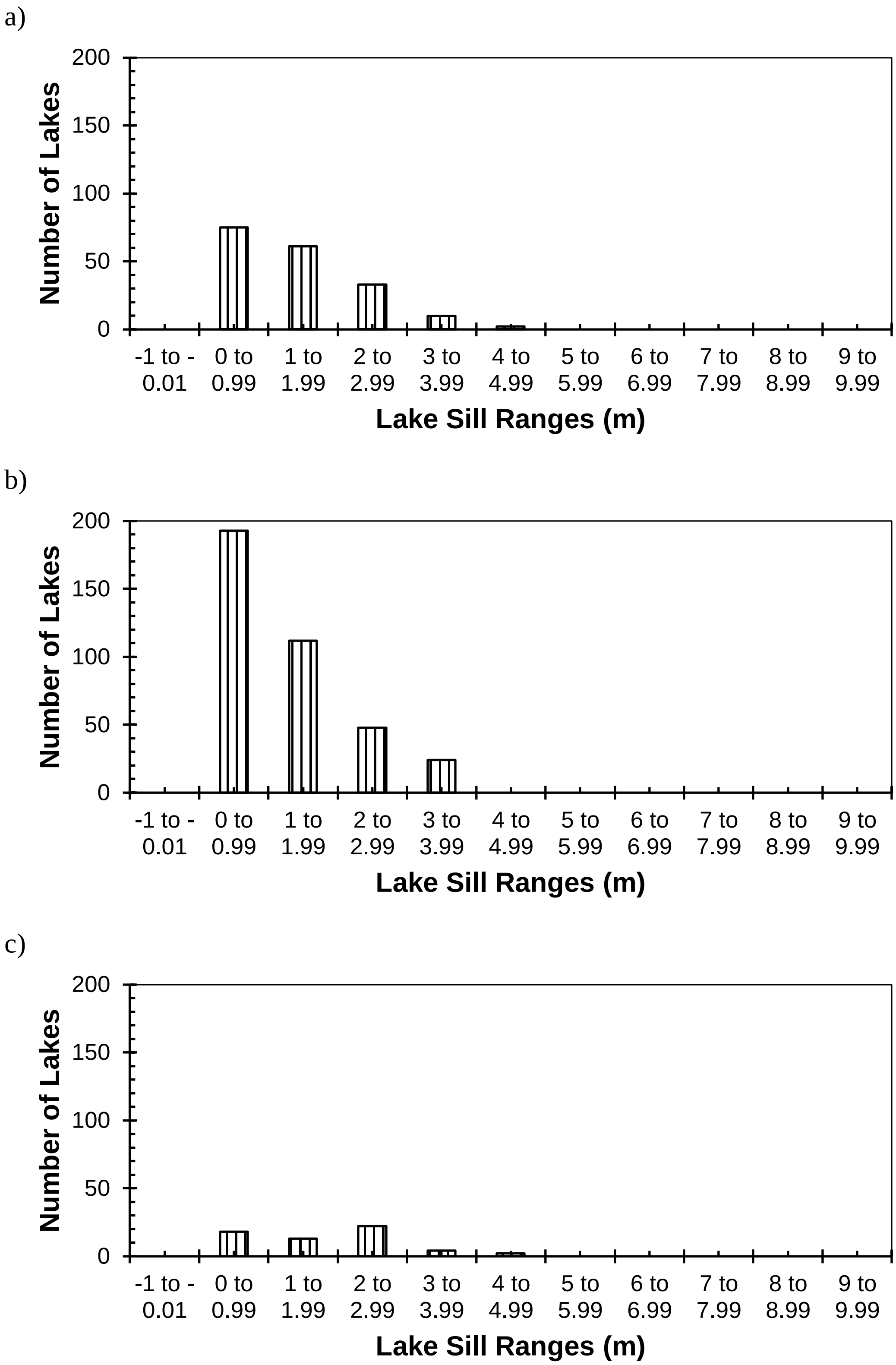


Figure 5.17 Elevation ranges of lake sills in the Northern Transect for the a) West Zone b) Middle Zone c) East Zone.

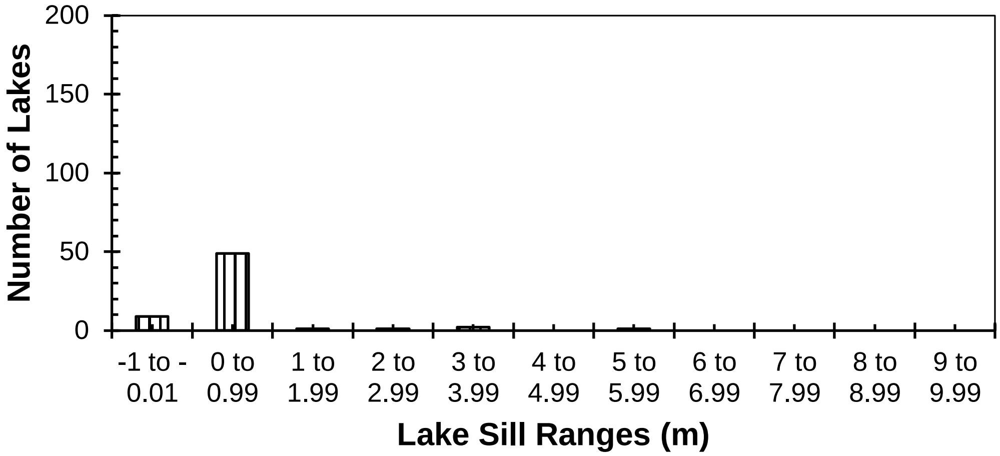
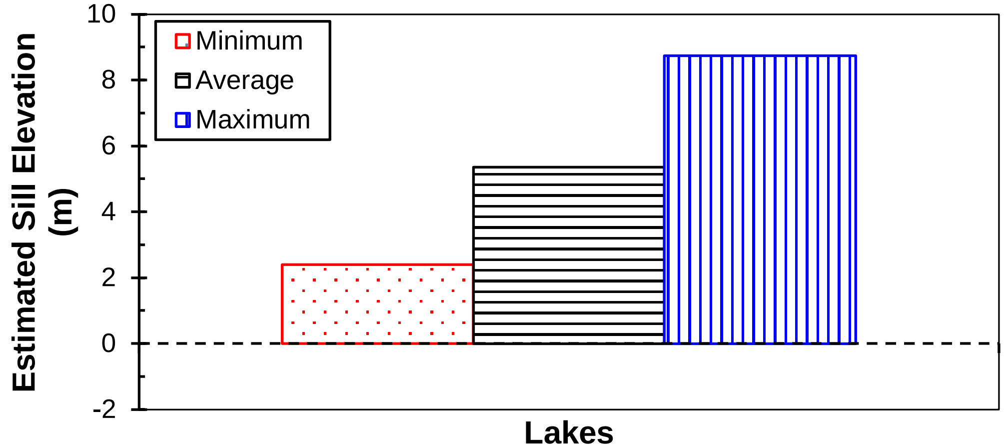
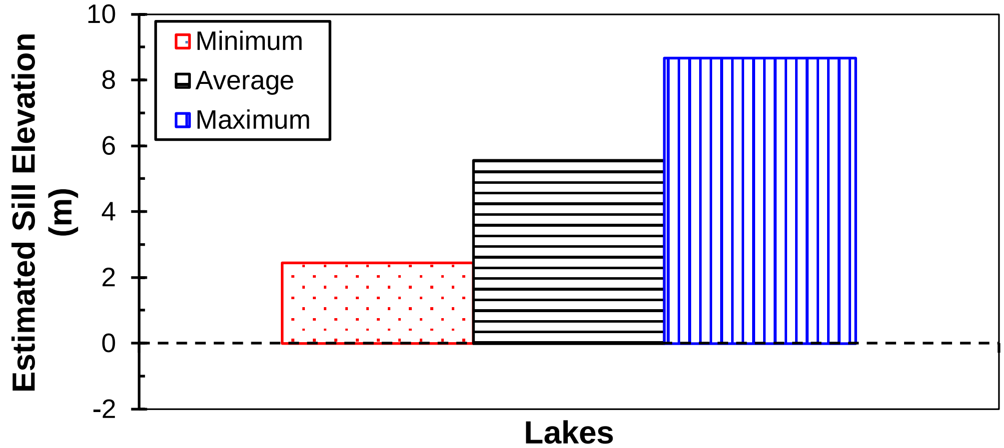


Figure 5.18 Elevation ranges of lake sills in the Outer Delta Transect.

a)



b)



c)

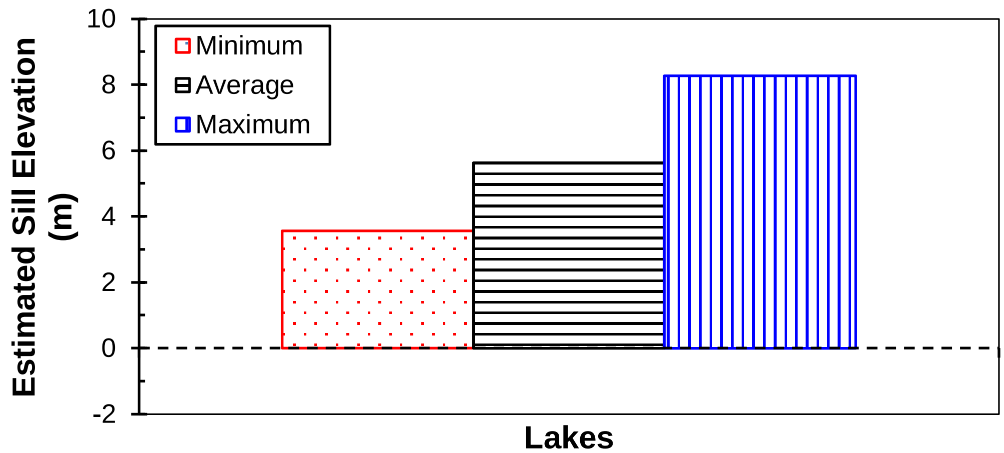
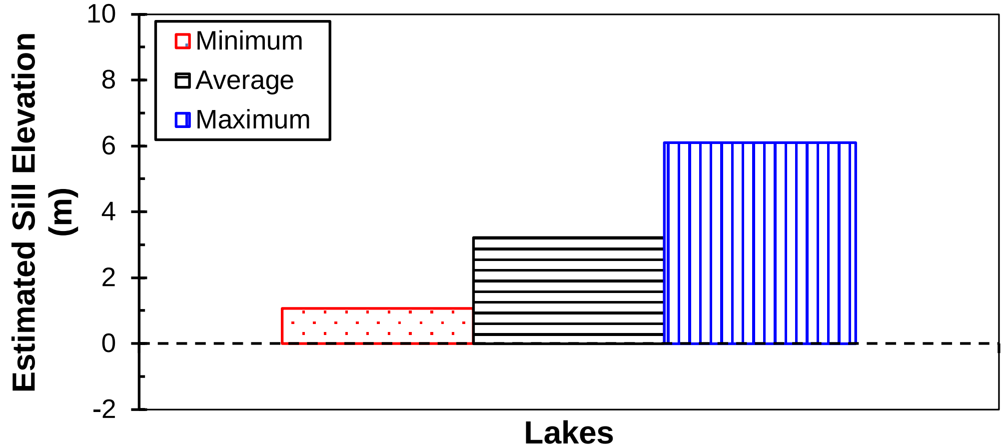
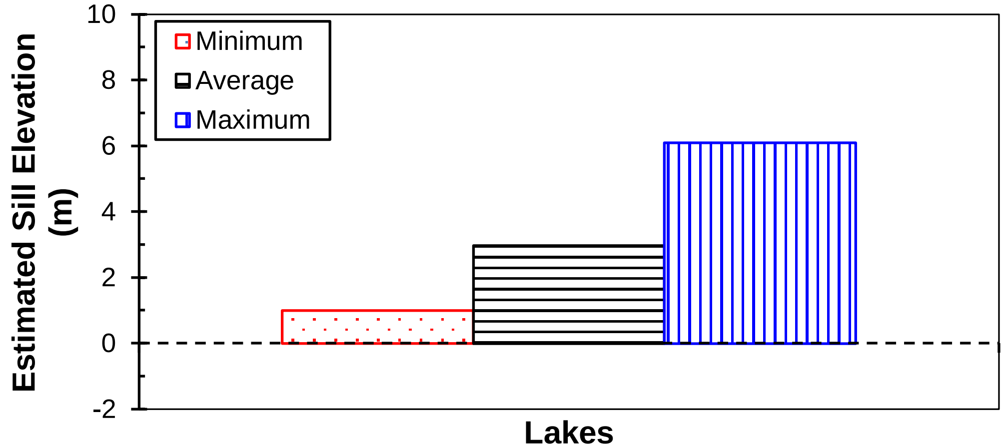


Figure 5.19 Estimated minimum, average, and maximum lake sill elevation in the Southern Transect for a) West Zone b) Middle Zone c) East Zone.

a)



b)



c)

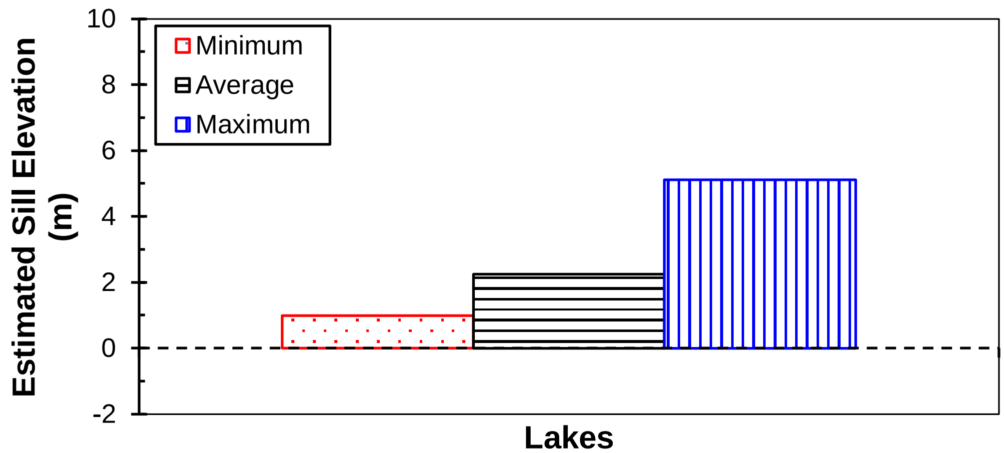


Figure 5.20 Estimated minimum, average, and maximum lake sill elevation in the Inuvik Transect for a) West Zone b) Middle Zone c) East Zone.

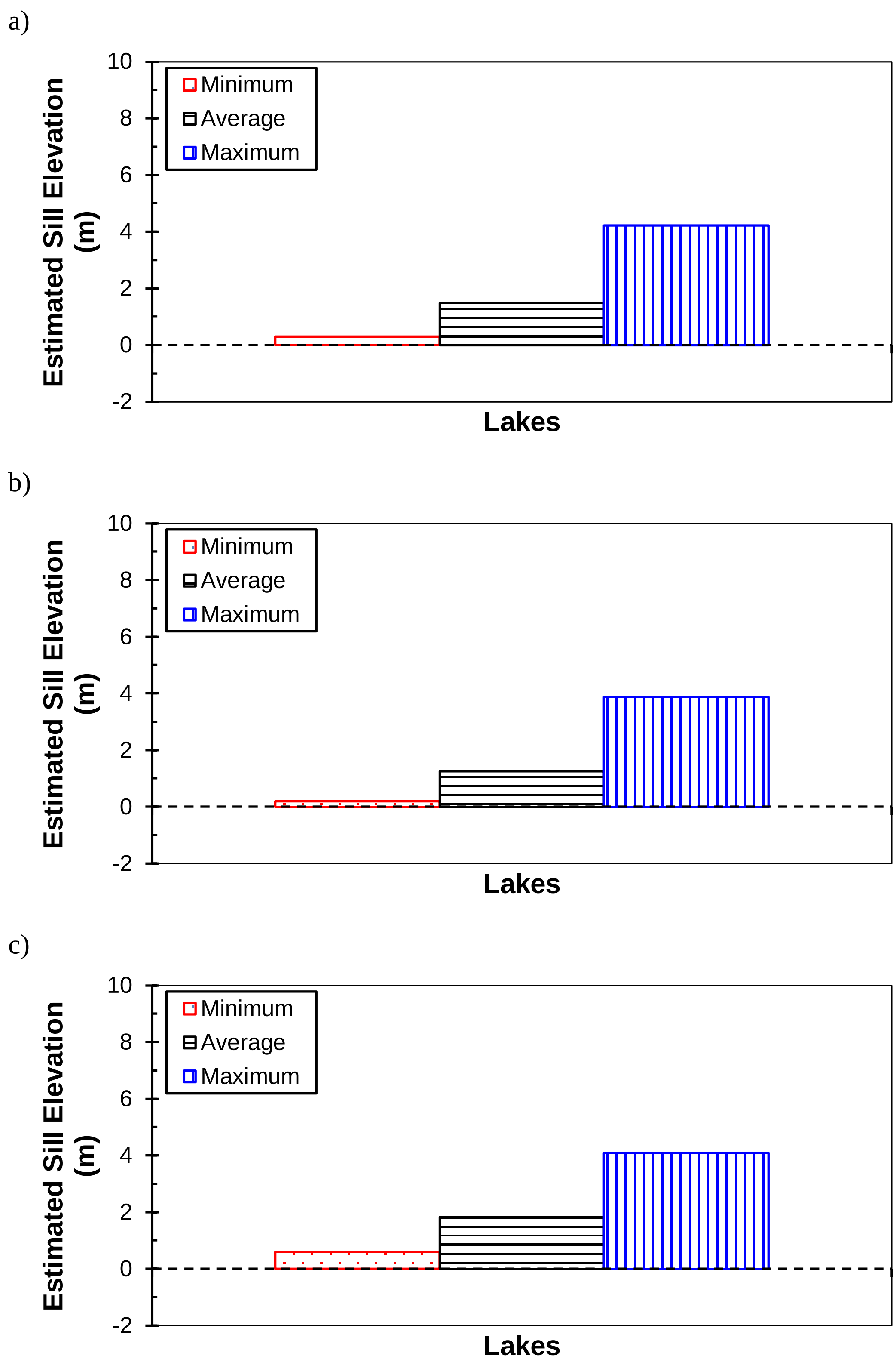


Figure 5.21 Estimated minimum, average, and maximum lake sill elevation in the Northern Transect for a) West Zone b) Middle Zone c) East Zone.

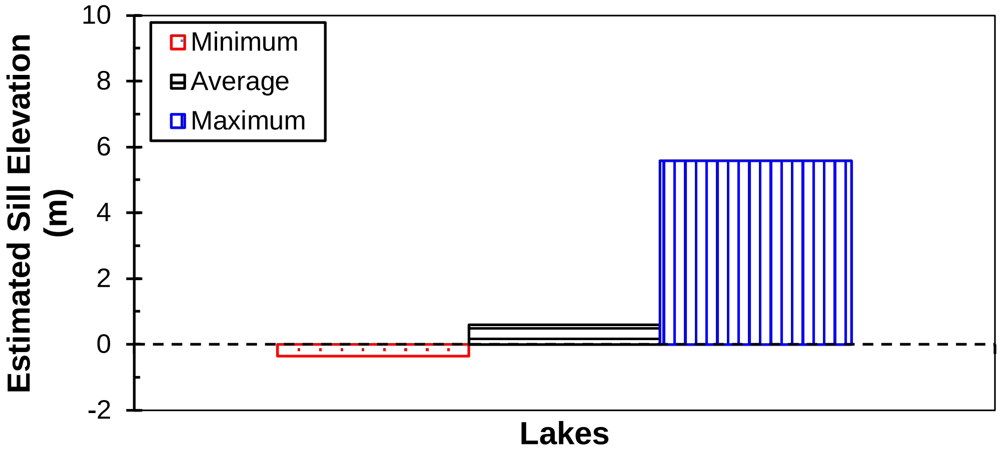
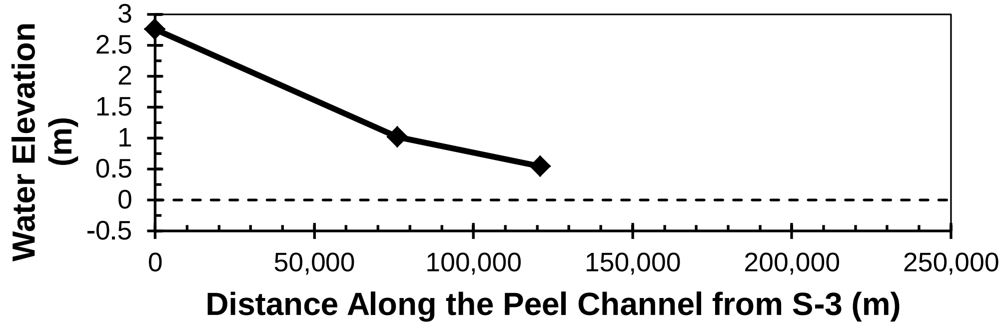
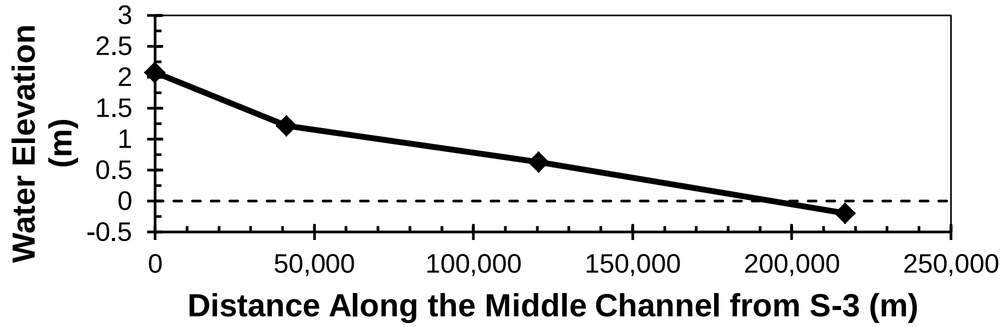


Figure 5.22 Estimated minimum, average, and maximum lake sill elevation in the Outer Delta Transect.

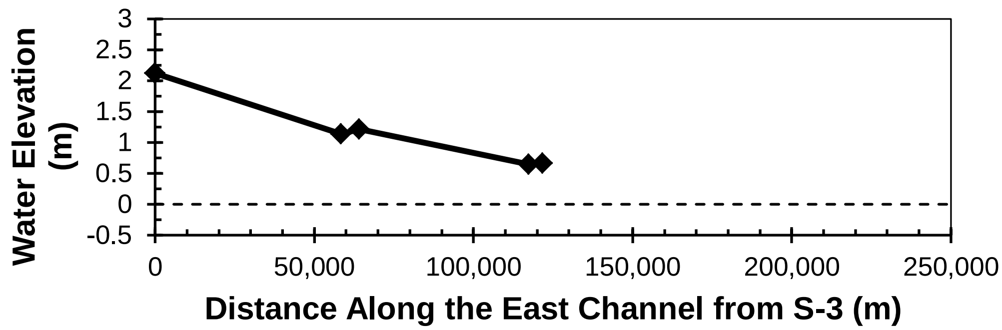
a)



b)



c)



d)

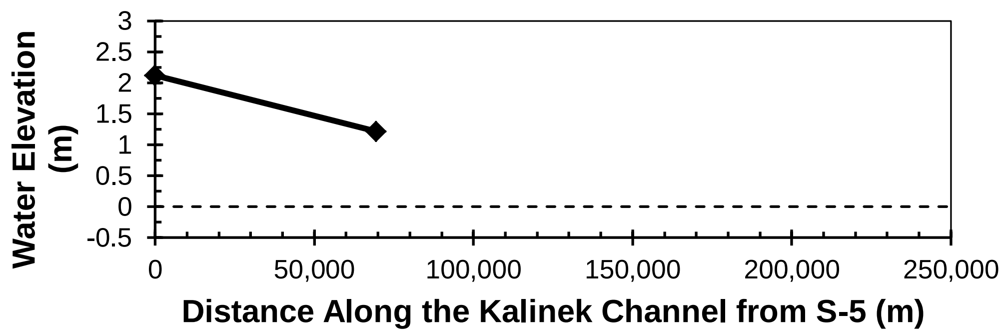


Figure 5.23 The elevation of the a) Peel Channel b) Middle Channel c) East Channel and d) Kalinek Channel at each transect.

6.0 Summary and Recommendations

The first goal of this study was to characterize the floodplain storage characteristics of the Mackenzie Delta in the areas surveyed with LiDAR data by determining the storage area in the lakes and overland areas. The second goal was to identify geographic trends in the storage characteristics that could be used to develop a zone-based storage relationship for a hydraulic model. The trends of interest were increases or decreases in the conveyance and storage area from north to south and west to east. To understand the conveyance and storage trends, water levels ranging from low flow to flood had to be characterized. The peak water levels in the Mackenzie Delta normally occur during spring breakup due to snowmelt and ice jams (Marsh and Hey 1989). This study cannot predict the location of ice jams in the Delta, but it does help determine the water storage in the Delta.

The Mackenzie Delta has a surface area of about 13,000 km^2, making it the largest northern delta in North America (Emmerton et al. 2008; Marsh et al. 1993). Water from the Mackenzie River Basin that flows through the Delta has the potential to be stored in the 49,046 lakes or in the overbank floodplain area. The storage volume in the Mackenzie Delta has been estimated to range from 26 to 31 km^3, with about 11.7 km^3 of water being added to lakes during the spring breakup (Emmerton et al. 2007). This storage is significant when compared to the average flow in the Mackenzie and Peel Channels, which convey about 90% and 7 to 8% of the flow in the Mackenzie Delta (Emmerton et al. 2008; Marsh and Hey 1988). The mean annual volume of water discharged in the Middle and Peel

Channels is about 286 km^3 and 21.9 km^3 respectively (Burn 1995). Based on its size and storage capacity, the Mackenzie Delta has a significant impact on the timing and magnitude of discharge into the Beaufort Sea (Marsh et al. 2009).

In order to determine the cross sectional area of water in the channels, lakes, and overland areas, accurate topographical information was required. Four LiDAR transects were flown from August 11 to 16, 2008 (Hopkinson et al. 2011). The data from these transects were DEMs with a resolution of one meter by one meter spacing with location and topographical information which allowed for the calculation of the areas in channels, lakes, and overland. These areas were used to determine the conveyance and storage areas. In order to identify the conveyance and storage areas, aerial photos were used in conjunction with the LiDAR data to determine the locations of the top of channel banks and the edges of lakes.

Dividing the LiDAR transects into West, Middle, and East Zones was difficult because of the small variation in elevation in the Delta. The locations of the divisions between zones were made based on topography. Although other methods could have been used to determine the division between zones, the only outcome that would have changed would be the storage area in each zone because it was very dependent on the size of the zone. However, it is important to note that the ratio of storage area to zone length was quite consistent across the Delta in each transect, so this ratio would only change slightly in each zone.

Since lake sill elevations vary throughout the year because of snow and ice buildup during the winter, two methods were used to calculate the storage area in the lakes. The Lake Rim Method assumed flood water did not enter the lakes until it was at a higher elevation than the edge of the lake, or “lake rim”. The Lake Rim Method represents the highest sill elevations. The Lake Sill Method assumed water entered the lakes as soon as it was as high as the average water elevation in lakes in the LiDAR. This method represented the lowest lake sill elevations by assuming the average water surface elevation was at the lake sill elevation. The Lake Sill Method assumed the lakes and channels in the Delta are more efficiently connected than the Lake Rim Method. The analysis and results used an average of these two methods to compare the zones.

The lake sills showed very consistent trends between zones throughout the Delta. The average lake sill elevation, based on the averaged or “smooth” water surface elevation (Lake Sill Method), decreased in all zones from the upper to lower Delta. Furthermore, the difference between the highest and lowest lake sill elevations in each zone decreased from the Southern Transect to the Northern Transect. The Outer Delta Transect was the only exception to the range of lake sill elevations decreasing going down the Delta, but this was because of a single high elevation lake in the transect. The decrease in the average lake sill elevation and the range between maximum and minimum elevations going down the Delta shows the topography in the lower Delta has smaller variations than in the upper Delta. The range in the lake sill elevation was the smallest in the East Zone in all transects, indicating the eastern part of the Delta has smaller variances in the topography than the middle and western parts of the Delta.

The conveyance was different in each part of the Delta. In the Middle and East zones, the majority of the conveyance area was in primary and minor channels, while in the West Zone, most of the conveyance area was in primary, secondary, and minor channels. The only zone with a significant amount of the conveyance area in tertiary channels was the Middle Zone in the Inuvik Transect. Furthermore, since large conveyance areas were found in the secondary channels in the West Zone, and the minor channels in all zones, this could suggest the need to re-evaluate the criteria used to label channels by looking at the size and any available conveyance data. Since minor channels seemed to convey more flow than tertiary channels, some of the minor channels could be re-categorized as tertiary channels. Going down the Delta, the conveyance area increased in each zone. Between the Southern and Inuvik Transects, the conveyance area approximately doubled in the West Zone, then increased further by approximately 10% between the Inuvik and Northern Transects. In the Middle Zone, the increase in the conveyance area was quite consistent (~6%) between each transect. In the East Zone, the conveyance area increased by about 1% between the Southern and Inuvik Transects, and about 20% between the Inuvik and Northern Transects. However, the area in the primary channels did not increase from the upper to lower Delta in all the zones, which shows that many smaller channels also convey flow. The Middle Zone conveyed the most flow, the West Zone the second most, and the East Zone the least in all transects. This was expected based on the Primary Channels in each zone. The relative proportions of the conveyance area attributed to each channel type varies going down the Delta. The variance and increase in the proportion of conveyance in the tertiary channels shows that some of the channels may have been classified mistakenly, or that the categorization of the channels should be re-examined.

The storage area in the Delta did not follow the same trends as the conveyance area. The East Zone had the smallest storage area in all transects because it was the smallest zone in every transect. The storage area in the Southern and Inuvik Transects was highest in the West Zone, followed by the Middle Zone, and the East Zone had the least amount of storage. In the Northern Transect, the Middle Zone has the largest storage area as it was also the largest zone. The West Zone had the second most storage and the East Zone the least. The trends in the storage area across the Delta show that the storage area is impacted by the size of the zone. Therefore, in order to see if there were any areas in the Delta that had significant storage, the lake, overland, and storage areas were divided by the length of each zone to determine a ratio of the storage area to zone length. The storage area increases down the Delta in the West Zone by about 40% between the Southern and Inuvik Transects and about 7% between the Inuvik and Northern Transects. In the Middle Zone, the increase between the Southern and Inuvik Transects and the Inuvik and Northern Transects were similar, 38% and 31%, respectively. The increase between the Northern and Outer Delta Transects is much smaller (~8%), which is likely because the Outer Delta Transect is smaller than the Northern Transect. The East Zone is the only zone in which the ratio between the storage area and zone length does not increase between each transect; it increases by about 50% between the Southern and Inuvik Transects, and then decreases by about 3% between the Inuvik and Northern Transects. The increase in the storage area to zone length ratio going down the Delta in all zones, except in the East Zone between the Inuvik and Northern Transects, suggests that the lower Delta has a larger storage area than the upper Delta. Therefore, none of the zones had any unique characteristics that contributed to a significantly larger storage area. The variance in the storage area between the zones is important because it has not been broken down in this way before.

The storage area was much larger than the conveyance area throughout the Delta. The storage was found to be divided evenly between the lakes and overland areas in the majority of the zones in the Delta, with the Middle Zone in the Southern Transect, and the Outer Delta Transect being the exceptions, since both had a larger overland storage area than lake storage area.

In the analysis done for the hydraulic model, the Primary Channels were the only channels considered to convey flow, while the secondary, tertiary, and minor channels along with the lakes and overland areas were considered storage areas. The distribution of the conveyance area is similar to what was expected because the zone with the largest conveyance area in each transect was the zone that contained the Middle Channel. Furthermore, the storage area in each zone of the hydraulic model was represented mainly by the lake and overland areas. These results suggest that assuming all conveyance is in the Primary Channels and that everything else is storage should not result in large errors.

A ratio between the storage area (A_0) and the conveyance area (A) in each zone of the hydraulic model was calculated. The results showed that the storage area ranged from 4 to 100 times the conveyance area in each zone; therefore, the storage area is significant and must be included in future model studies of the Delta. There were no increasing or decreasing trends in the storage area to conveyance ratio in the Delta, suggesting that the storage area is significant in all areas of the Delta.

The number of lakes varies significantly in zones in the study. The East Zone had the fewest lakes in all transects because it is the smallest zone. The number of lakes increased down the Delta in the Middle Zone, aside from the Outer Delta Transect, decreased down the Delta in the West Zone, and did not show any trend down the Delta in the East Zone. These trends suggest that the number of lakes in a zone depends largely on the size of the zone. Therefore, a ratio of the number of lakes in each zone to the zone length was calculated to determine if any zones had a larger proportion of lakes than others. The results indicated that the western and northern parts of the Delta had the highest number of lakes per kilometer. The number of lakes per kilometer remained very constant in the West Zone of each transect and increased down the Delta in both the Middle and East Zones. The Outer Delta Transect was the exception, with the lowest number of lakes per kilometer. Furthermore, the relationship between the number of lakes and the lake storage area in the Southern Transect, when compared to the Inuvik Transect, agrees with findings from Bigras (1990), Lesack et al. (1998), and Marsh and Hey (1989) in that the upper Delta has a high number of small high closure lakes.

All primary channel slopes were steeper in the upper Delta than the lower Delta. This result agreed with findings from Morley (2012) who found the slope of the East and Middle Channels decreases between the upper and lower Delta. The channel slopes found were between 5.40×10^{-6} m/m and 2.28×10^{-5} m/m, which also agrees with the recommended water surface slope of 0.00002 from Morley (2012). The change in channel slope and ranges of lake sill elevation showed similar results about the topography in the Delta. The larger range in lake sill elevations, and the steeper channel slopes in the upper Delta show there are larger variations in the topography in the upper Delta than the lower Delta.

Additional analysis of the Mackenzie Delta is recommended to analyse flood storage and conveyance. Marsh et al. (1999) stated the Mackenzie River water has a high concentration of suspended sediment, so it can easily be differentiated from local meltwater, which allows for the timing of the first flooding into lakes to be determined from aerial observations. Therefore, aerial photographs or surveys during spring breakup could be used to verify flooding predictions and results from data using the LiDAR data that is available. The aerial photographs during spring breakup could be used to examine the clarity of the water in lakes. As previously indicated water in the Mackenzie River has a high sediment concentration, so as the lakes are photographed, the ones with high sediment concentrations would be the lakes with lower sill elevations because they are connected to the channels first. The aerial photos could be used in conjunction with a study of the LiDAR data, analysing it from a plan view, which would be beneficial as it could show which areas will be flooded first as channel water levels rise. This study would also give the volume of water in storage in the areas that have been surveyed using LiDAR in the Mackenzie Delta. This study would be important because it could be used to refine an understanding of variations in lake sill elevations across and down the Delta. Furthermore, increased measurements and data in the Mackenzie Delta would improve the accuracy of future studies. Finally, additional LiDAR data would result in less interpolation between the existing LiDAR transects and thus a better representation of the Delta characteristics.

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Appendix A. Profile view of all Cross sections

This appendix shows the cross-sections of the West, Middle, and East Zone in each of the Southern, Inuvik, and Northern Transects, as well as the Outer Delta Transect.

List of Figures in Appendix A

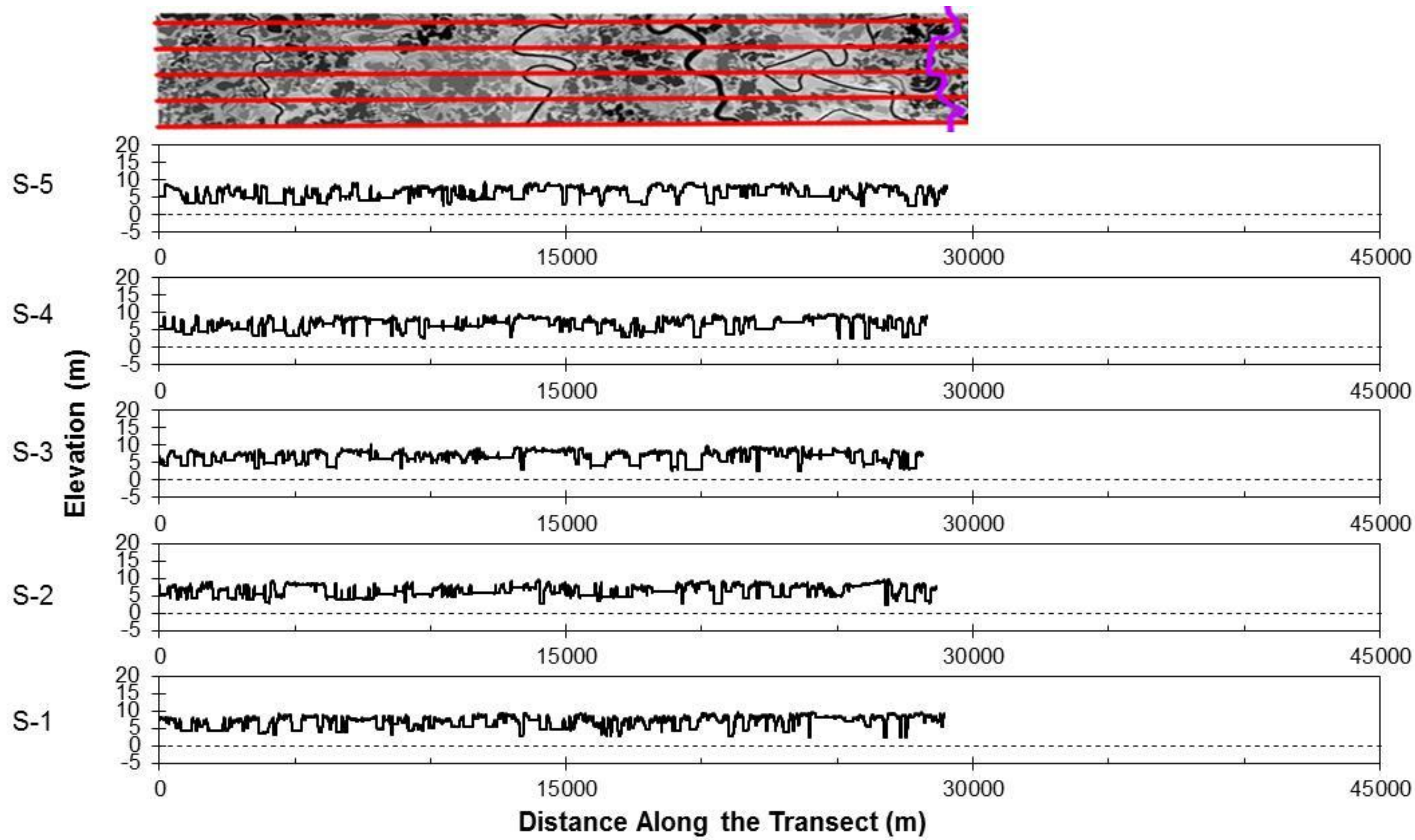

Figure A-1 Cross sections of the West Zone in the Southern Transect.

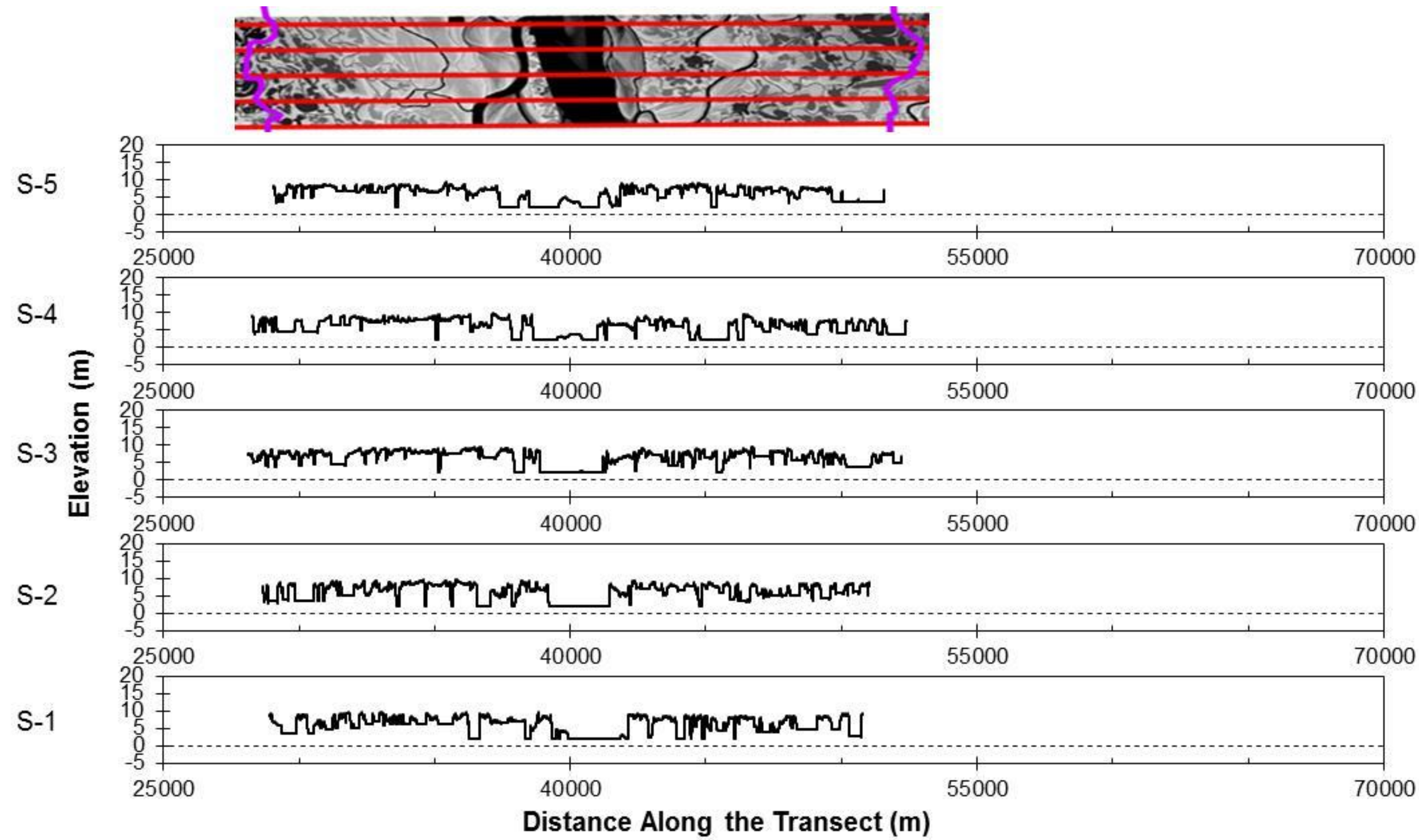

Figure A-2 Cross sections of the Middle Zone in the Southern Transect.

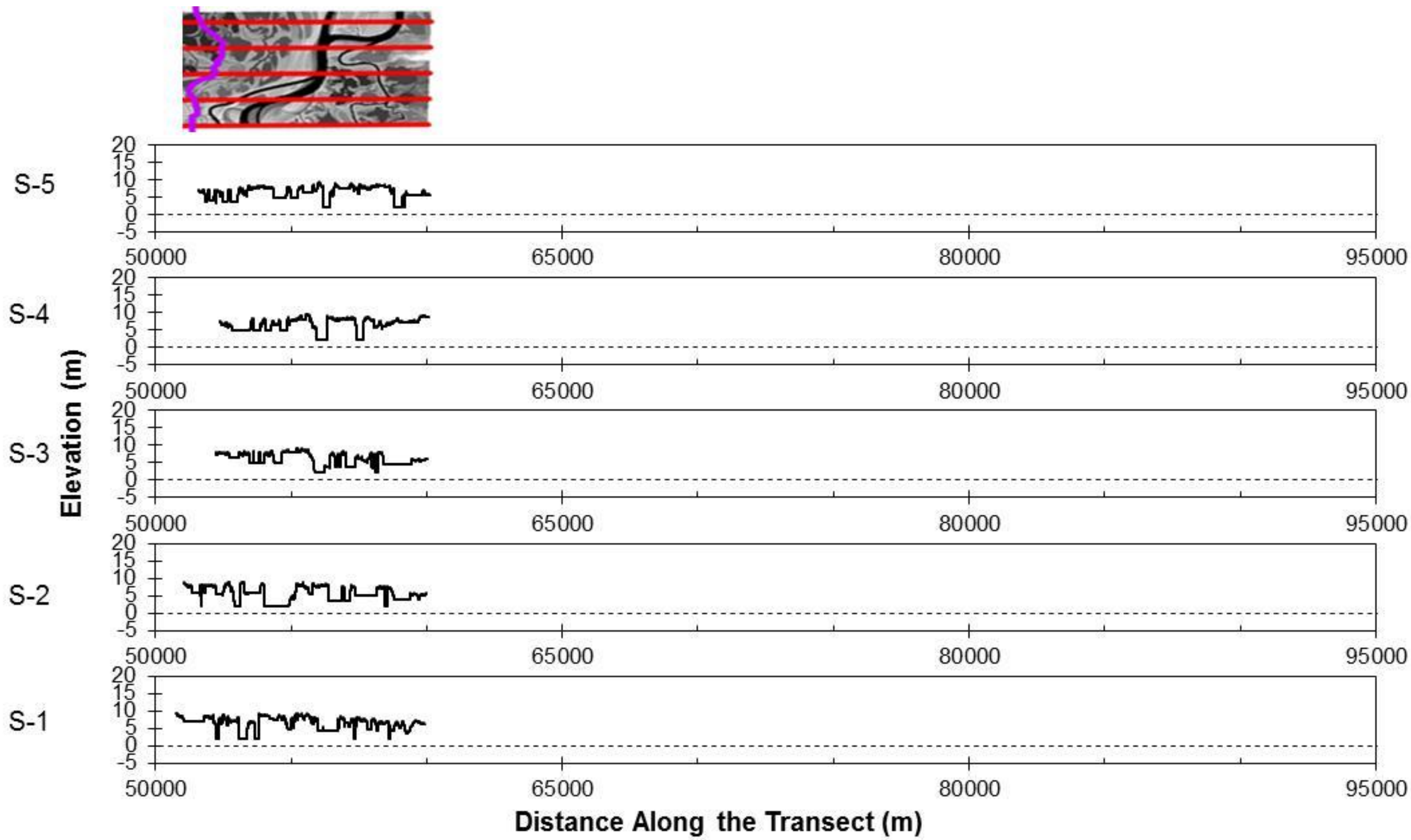

Figure A-3 Cross sections of the East Zone in the Southern Transect.

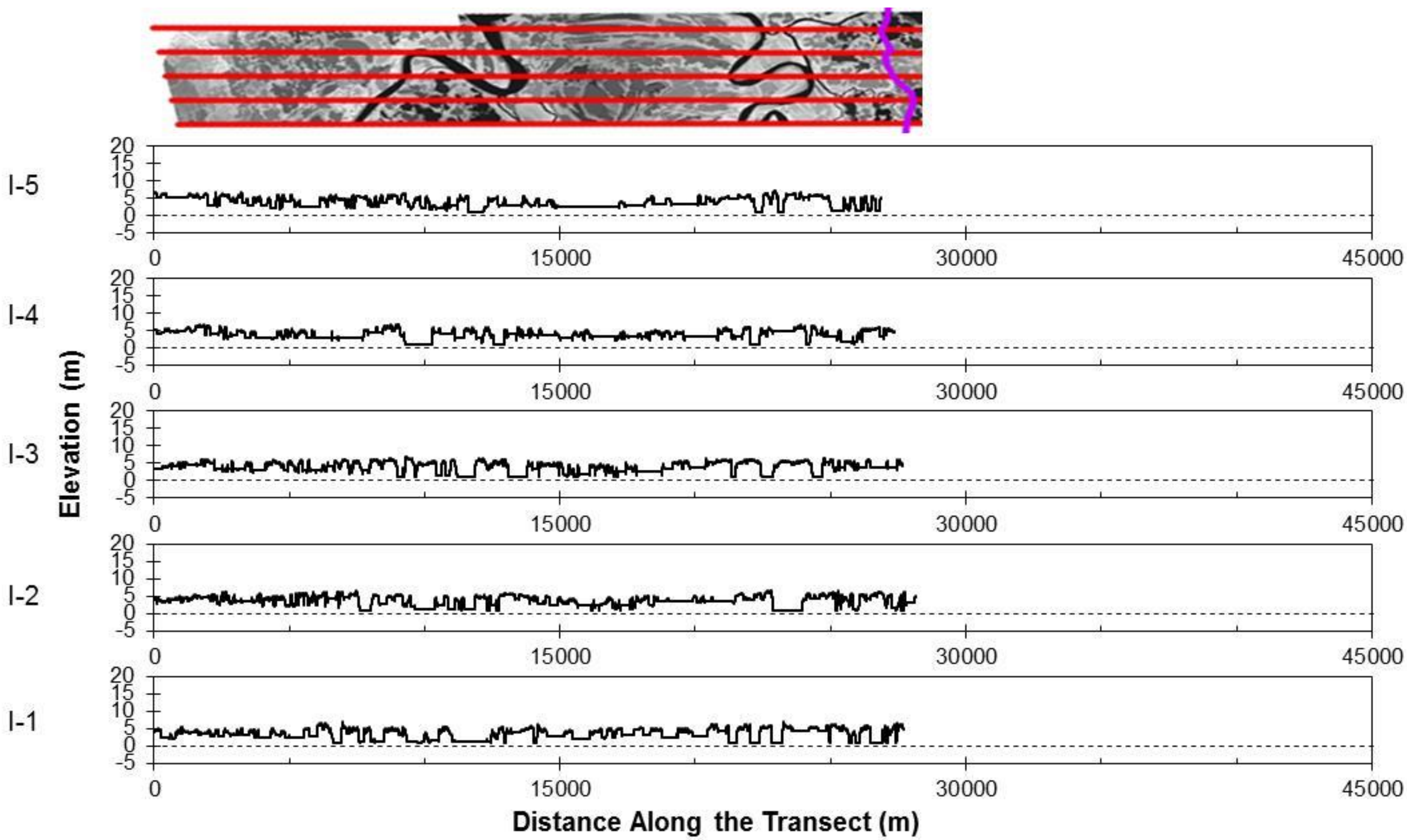

Figure A-4 Cross sections of the West Zone in the Inuvik Transect.

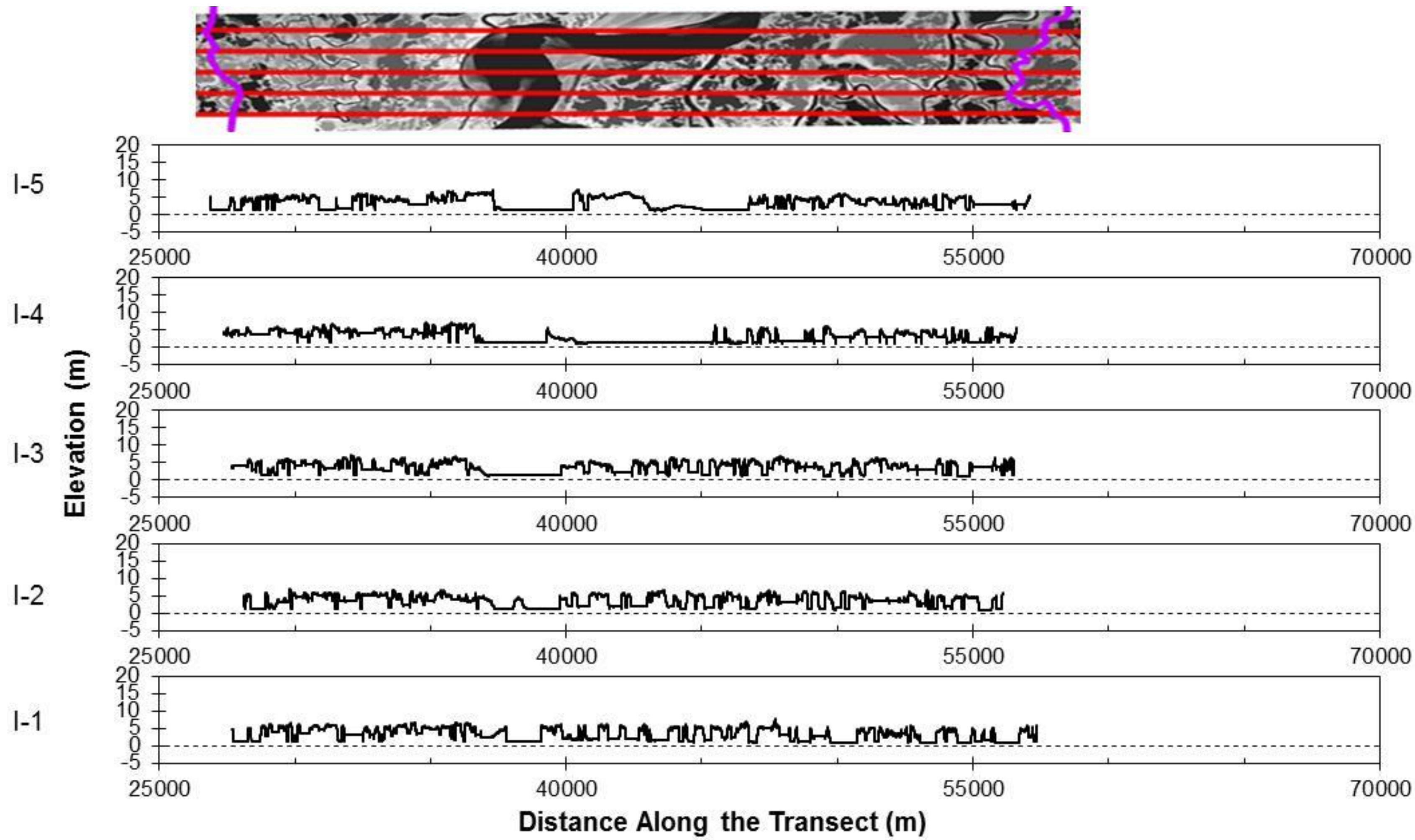

Figure A-5 Cross sections of the Middle Zone in the Inuvik Transect.

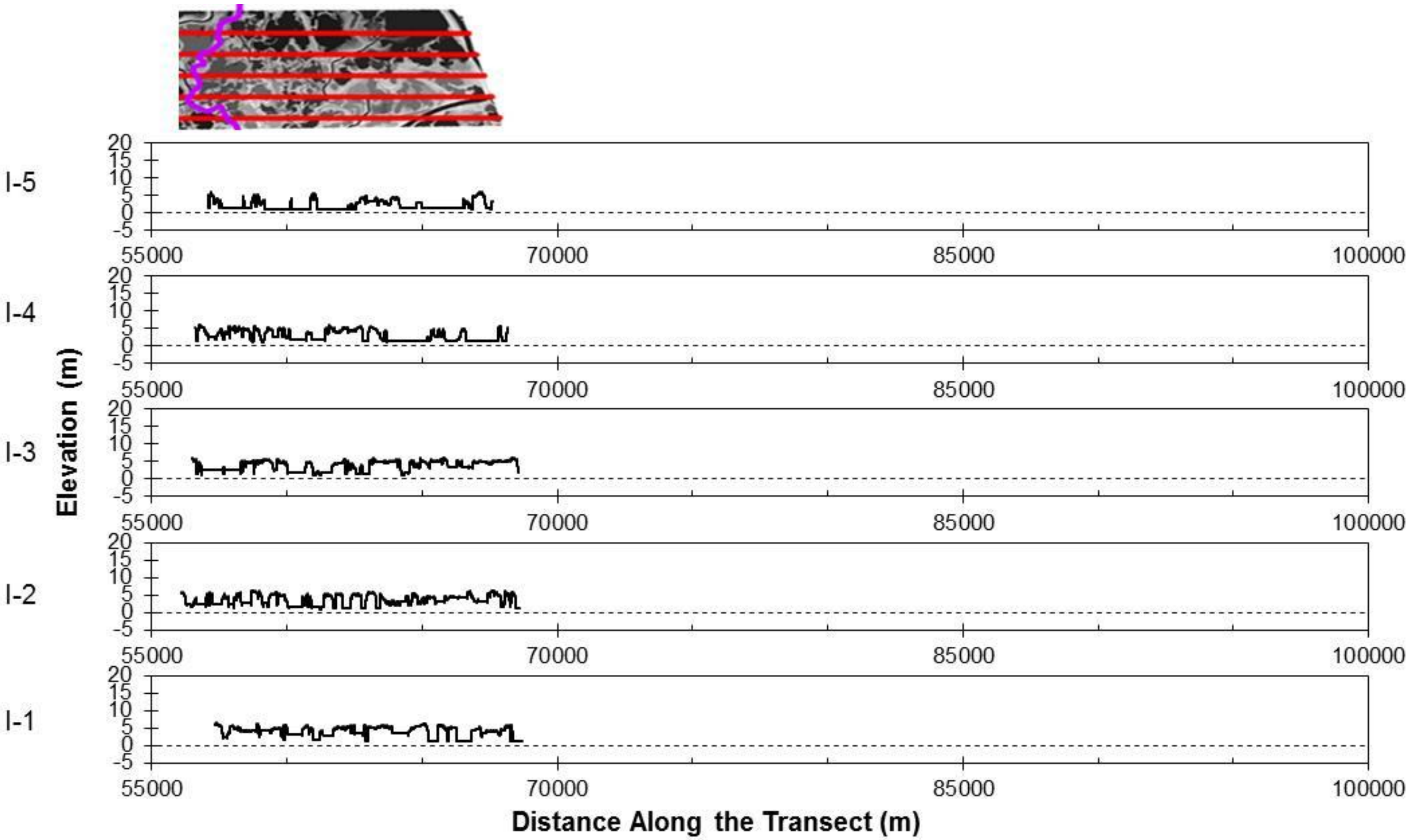

Figure A-6 Cross sections of the East Zone in the Inuvik Transect.

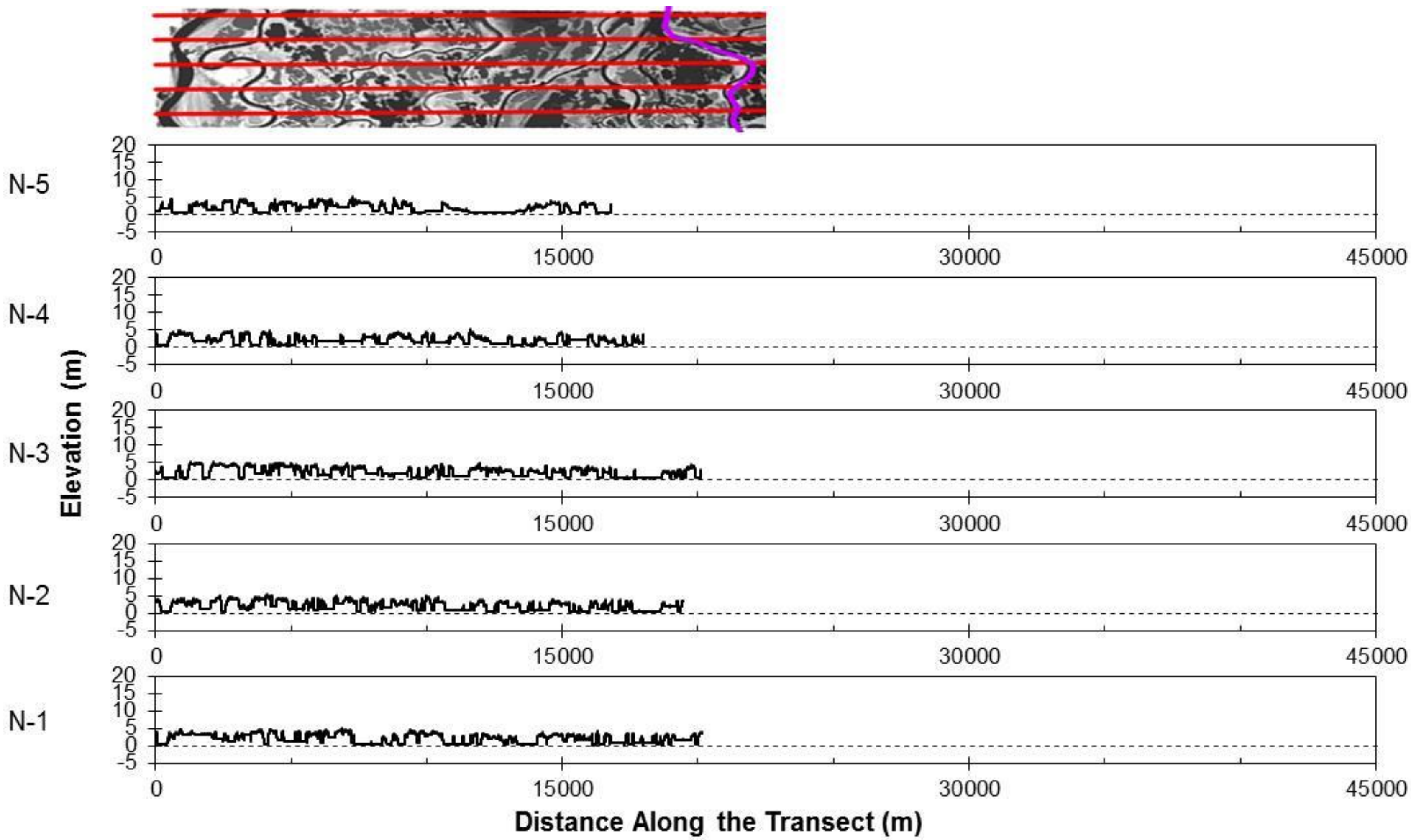

Figure A-7 Cross sections of the West Zone in the Northern Transect.

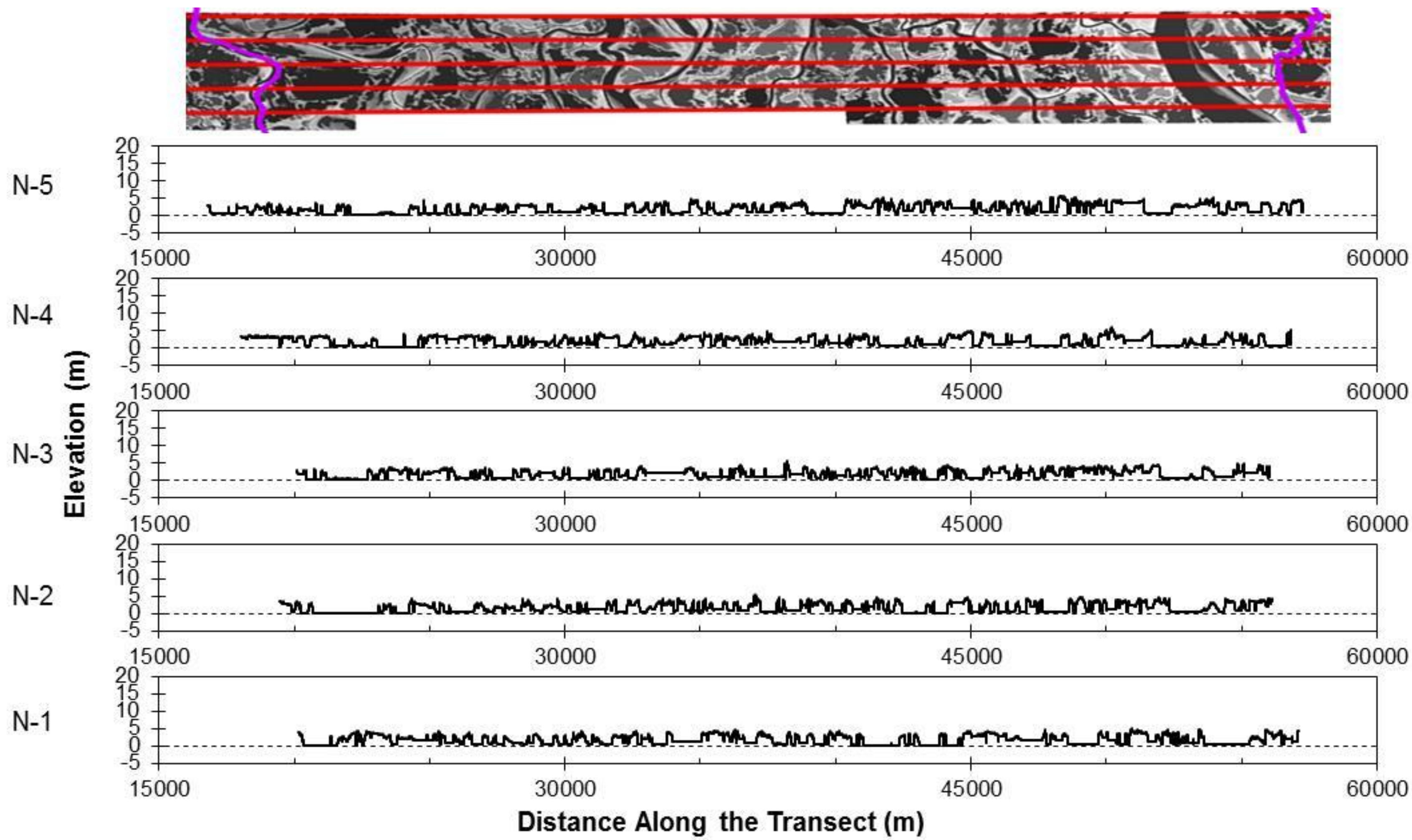

Figure A-8 Cross sections of the Middle Zone in the Northern Transect.

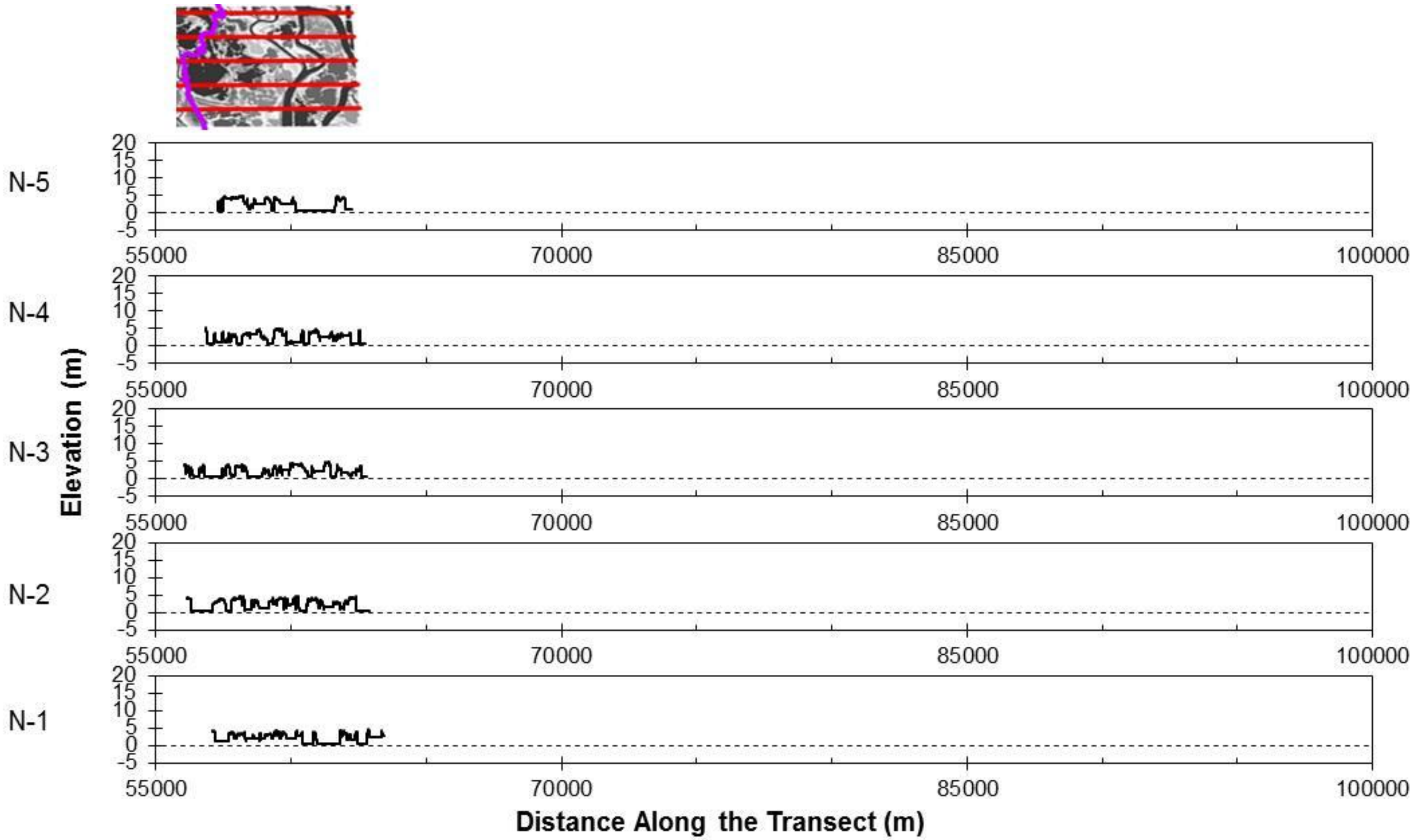

Figure A-9 Cross sections of the East Zone in the Northern Transect.

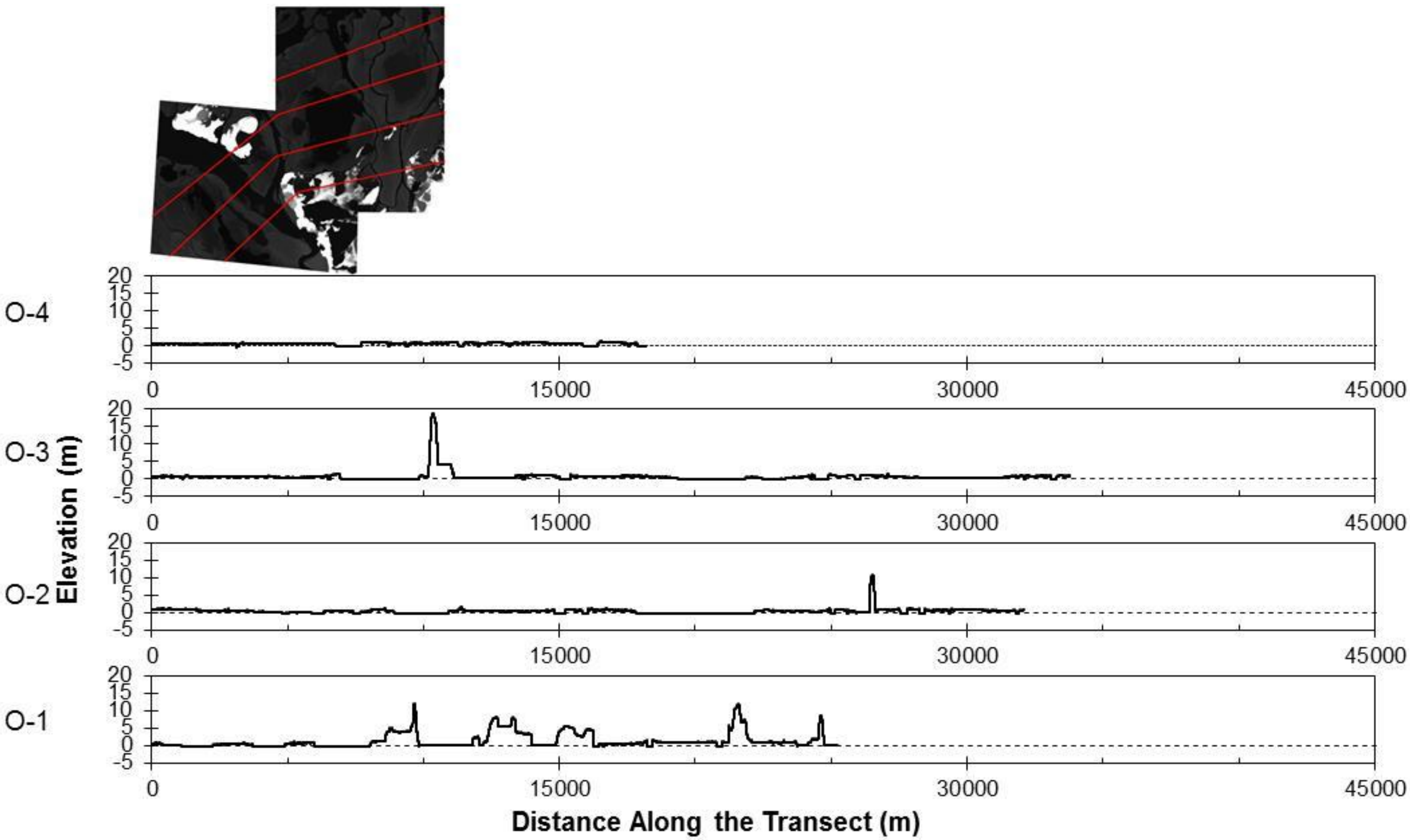

Figure A-10 Cross sections in the Outer Delta Transect.

Appendix B. Issues in the LiDAR Data

This appendix lists the locations and discrepancies that were identified in the LiDAR data during the course of this study.

List of Tables in Appendix B

Table B.1 Locations of issues in the LiDAR data in the Southern Transect.

Transect	Cross section	Easting	Northing	Issue
Southern	S-1	134°26'8"	67°54'1"	The LiDAR shows a lake and the aerial photos do not
Southern	S-4	133°59'20"	67°58'24"	The averaged water surface has been extended beyond the water surface in the aerial photos
Southern	S-5	133°57'57"	67°59'13"	The LiDAR shows a lake and the aerial photos do not

Table B.2 Locations of issues in the LiDAR data in the Inuvik Transect.

Transect	Cross section	Easting	Northing	Issue
Inuvik	I-5	134°52'6"	68°15'16"	The LiDAR shows a lake, aerial photos do not
Inuvik	I-5	134°21'20"	68°17'48"	The averaged water surface has been extended beyond the water surface in the aerial photos

Table B.3 Locations of issues in the LiDAR data in the Northern Transect.

Transect	Cross section	Easting	Northing	Issue
Northern	N-1	135°1'52"	68°31'46"	The LiDAR shows a lake, aerial photos do not
Northern	N-1	134°25'17"	68°39'53"	The LiDAR shows a lake, aerial photos do not
Northern	N-1	134°13'31"	68°42'27"	The averaged water surface has been extended beyond the water surface in the aerial photos
Northern	N-2	135°28'37"	68°26'33"	The averaged lake elevation is higher than the surrounding ground area
Northern	N-2	135°27'48"	68°26'44"	The averaged lake elevation is higher than the surrounding ground area
Northern	N-2	135°27'35"	68°26'47"	The LiDAR is missing a lake that is in the aerial photos
Northern	N-2	135°19'12"	68°28'41"	The averaged water surface has been extended beyond the water surface in the aerial photos
Northern	N-2	134°28'35"	68°39'57"	The averaged lake elevation is higher than the surrounding ground area
Northern	N-2	134°16'41"	68°42'32"	The averaged lake elevation is higher than the surrounding ground area
Northern	N-4	135°2'26"	68°34'5"	The averaged lake elevation is higher than the surrounding ground area
Northern	N-4	134°47'29"	68°37'23"	The averaged water surface has been extended beyond the water surface in the aerial photos
Northern	N-5	135°28'40"	68°29'4"	The LiDAR is missing a minor channel that is in the aerial photos
Northern	N-5	135°22'6"	68°30'32"	The averaged water surface has been extended beyond the water surface in the aerial photos
Northern	N-5	134°41'11"	68°39'33"	The LiDAR is missing a lake that is in the aerial photos

Table B.4 Locations of issues in the LiDAR data in the Outer Delta Transect.

Transect	Cross section	Easting	Northing	Issue
Outer Delta	O-1	135°3'40"	69°18'51"	The averaged water surface has been extended beyond the water surface in the aerial photos
Outer Delta	O-1	135°3'10"	69°18'53"	The averaged water surface has been extended beyond the water surface in the aerial photos
Outer Delta	O-1	134°52'23"	69°19'42"	There is a large area that is at a constant elevation that is not water in the aerial photos
Outer Delta	O-2	135°32'0"	69°14'46"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°28'22"	69°16'0"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°28'20"	69°16'1"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°28'17"	69°16'1"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°27'55"	69°16'9"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°27'52"	69°16'10"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°26'12"	69°16'44"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°26'3"	69°16'46"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°24'19"	69°17'22"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°18'27"	69°19'20"	The averaged water surface has been extended beyond the water surface in the aerial photos
Outer Delta	O-2	135°17'51"	69°19'32"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°16'55"	69°19'50"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°16'29"	69°19'59"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°16'24"	69°20'1"	The LiDAR shows a lake and the aerial photos do not

Table B.4 (continued) Locations of issues in the LiDAR data in the Outer Delta Transect.

Transect	Cross section	Easting	Northing	Issue
Outer Delta	O-2	135°16'14"	69°20'5"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-2	135°14'17"	69°20'16"	The averaged water surface has been extended beyond the water surface in the aerial photos
Outer Delta	O-3	135°32'41"	69°17'30"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-3	135°31'19"	69°17'54"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-3	135°30'48"	69°18'3"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-3	135°18'56"	69°21'29"	The averaged water surfaces has been extended beyond the water surface in the aerial photos
Outer Delta	O-3	135°16'47"	69°22'5"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-3	135°16'31"	69°22'10"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-3	135°11'42"	69°22'50"	The LiDAR shows a lake and the aerial photos do not
Outer Delta	O-4	135°8'31"	69°25'16"	The averaged water surface has been extended beyond the water surface in the aerial photos

Appendix C. Storage to Conveyance Ratio in the Hydraulic Model

A ratio of the hydraulic model storage area, A_0, and the model conveyance area, A, is calculated above the average top of bank elevations for the Primary channel in each zone. This appendix shows tables for the hydraulic model storage to conveyance area ratio (A_0/A).

List of Tables in Appendix C

Table C.1 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.35	0.02	2932.9	338.6	8.7
4.40	0.07	3119.6	349.3	8.9
4.45	0.12	3312.6	360.0	9.2
4.50	0.17	3525.3	370.8	9.5
4.55	0.22	3739.9	381.5	9.8
4.60	0.27	3951.1	392.2	10.1
4.65	0.32	4167.5	402.9	10.3
4.70	0.37	4399.8	413.6	10.6
4.75	0.42	4640.9	424.3	10.9
4.80	0.47	4891.0	435.1	11.2
4.85	0.52	5184.0	445.8	11.6
4.90	0.57	5450.2	456.5	11.9
4.95	0.62	5735.3	467.3	12.3
5.00	0.67	6047.4	478.0	12.7
5.05	0.72	6378.8	488.8	13.1
5.10	0.77	6707.1	499.6	13.4
5.15	0.82	7068.6	510.3	13.9
5.20	0.87	7413.7	521.1	14.2
5.25	0.92	7758.6	531.8	14.6
5.30	0.97	8163.5	542.6	15.0
5.35	1.02	8565.6	553.4	15.5
5.40	1.07	8938.2	564.2	15.8
5.45	1.12	9321.8	575.0	16.2
5.50	1.17	9716.5	585.8	16.6
5.55	1.22	10138.6	596.6	17.0
5.60	1.27	10580.5	607.4	17.4
5.65	1.32	11007.5	618.2	17.8
5.70	1.37	11448.7	629.0	18.2
5.75	1.42	11907.0	639.8	18.6
5.80	1.47	12380.2	650.7	19.0
5.85	1.52	12898.2	661.5	19.5
5.90	1.57	13388.4	672.3	19.9
5.95	1.62	13887.8	683.1	20.3
6.00	1.67	14385.5	694.0	20.7
6.05	1.72	14892.8	704.8	21.1
6.10	1.77	15458.5	715.6	21.6

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.15	1.82	16040.5	726.5	22.1
6.20	1.87	16572.1	737.3	22.5
6.25	1.92	17155.2	748.1	22.9
6.30	1.97	17700.7	759.0	23.3
6.35	2.02	18264.3	769.8	23.7
6.40	2.07	18842.2	780.6	24.1
6.45	2.12	19420.5	791.5	24.5
6.50	2.17	20007.8	802.3	24.9
6.55	2.22	20632.0	813.1	25.4
6.60	2.27	21271.4	824.0	25.8
6.65	2.32	21903.2	834.8	26.2
6.70	2.37	22528.9	845.6	26.6
6.75	2.42	23168.4	856.5	27.1
6.80	2.47	23819.6	867.3	27.5
6.85	2.52	24473.2	878.2	27.9
6.90	2.57	25137.5	889.0	28.3
6.95	2.62	25815.5	899.8	28.7
7.00	2.67	26501.5	910.7	29.1
7.05	2.72	27208.7	921.5	29.5
7.10	2.77	27940.2	932.4	30.0
7.15	2.82	28672.5	943.2	30.4
7.20	2.87	29419.1	954.1	30.8
7.25	2.92	30244.8	964.9	31.3
7.30	2.97	31037.3	975.8	31.8
7.35	3.02	31857.2	986.6	32.3
7.40	3.07	32700.5	997.4	32.8
7.45	3.12	33568.2	1008.3	33.3
7.50	3.17	34430.4	1019.1	33.8
7.55	3.22	35305.1	1030.0	34.3
7.60	3.27	36196.1	1040.8	34.8
7.65	3.32	37102.7	1051.7	35.3
7.70	3.37	38029.7	1062.5	35.8
7.75	3.42	39001.5	1073.4	36.3
7.80	3.47	39975.4	1084.2	36.9
7.85	3.52	40969.5	1095.1	37.4

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.90	3.57	41982.1	1105.9	38.0
7.95	3.62	43017.0	1116.8	38.5
8.00	3.67	44073.9	1127.6	39.1
8.05	3.72	45151.4	1138.5	39.7
8.10	3.77	46250.5	1149.3	40.2
8.15	3.82	47371.4	1160.2	40.8
8.20	3.87	48514.4	1171.0	41.4
8.25	3.92	49686.4	1181.9	42.0
8.30	3.97	50873.8	1192.7	42.7
8.35	4.02	52080.6	1203.6	43.3
8.40	4.07	53313.8	1214.4	43.9
8.45	4.12	54562.7	1225.3	44.5
8.50	4.17	55827.8	1236.1	45.2
8.55	4.22	57111.5	1247.0	45.8
8.60	4.27	58408.0	1257.8	46.4
8.65	4.32	59717.4	1268.7	47.1
8.70	4.37	61038.4	1279.5	47.7
8.75	4.42	62371.2	1290.4	48.3
8.80	4.47	63714.7	1301.2	49.0
8.85	4.52	65068.3	1312.0	49.6
8.90	4.57	66430.7	1322.9	50.2
8.95	4.62	67801.4	1333.7	50.8
9.00	4.67	69181.4	1344.6	51.5
9.05	4.72	70566.4	1355.4	52.1
9.10	4.77	71956.4	1366.3	52.7
9.15	4.82	73351.2	1377.1	53.3
9.20	4.87	74750.9	1388.0	53.9
9.25	4.92	76154.3	1398.8	54.4
9.30	4.97	77560.5	1409.7	55.0
9.35	5.02	78969.1	1420.5	55.6
9.40	5.07	80379.7	1431.4	56.2
9.45	5.12	81791.8	1442.2	56.7
9.50	5.17	83204.7	1453.1	57.3
9.55	5.22	84618.4	1463.9	57.8
9.60	5.27	86032.7	1474.8	58.3
9.65	5.32	87447.2	1485.6	58.9

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.70	5.37	88861.9	1496.5	59.4
9.75	5.42	90276.8	1507.3	59.9
9.80	5.47	91691.8	1518.2	60.4
9.85	5.52	93106.8	1529.0	60.9
9.90	5.57	94521.9	1539.9	61.4
9.95	5.62	95937.0	1550.7	61.9
10.00	5.67	97352.2	1561.6	62.3
10.05	5.72	98767.3	1572.4	62.8
10.10	5.77	100182.4	1583.3	63.3
10.15	5.82	101597.6	1594.1	63.7
10.20	5.87	103012.8	1605.0	64.2
10.25	5.92	104428.0	1615.8	64.6
10.30	5.97	105843.2	1626.7	65.1
10.35	6.02	107258.4	1637.5	65.5
10.40	6.07	108673.6	1648.4	65.9
10.45	6.12	110088.8	1659.2	66.3
10.50	6.17	111504.0	1670.1	66.8
10.55	6.22	112919.2	1680.9	67.2
10.60	6.27	114334.4	1691.8	67.6
10.65	6.32	115749.6	1702.6	68.0
10.70	6.37	117164.8	1713.5	68.4
10.75	6.42	118580.0	1724.3	68.8
10.80	6.47	119995.2	1735.2	69.2
10.85	6.52	121410.4	1746.0	69.5
10.90	6.57	122825.6	1756.9	69.9
10.95	6.62	124240.8	1767.7	70.3
11.00	6.67	125656.0	1778.6	70.7
11.05	6.72	127071.2	1789.4	71.0
11.10	6.77	128486.4	1800.3	71.4
11.15	6.82	129901.6	1811.1	71.7
11.20	6.87	131316.8	1822.0	72.1
11.25	6.92	132732.0	1832.8	72.4
11.30	6.97	134147.2	1843.7	72.8
11.35	7.02	135562.4	1854.5	73.1
11.40	7.07	136977.6	1865.4	73.4
11.45	7.12	138392.8	1876.2	73.8

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.50	7.17	139808.0	1887.1	74.1
11.55	7.22	141223.2	1897.9	74.4
11.60	7.27	142638.4	1908.8	74.7
11.65	7.32	144053.6	1919.6	75.0
11.70	7.37	145468.8	1930.5	75.4
11.75	7.42	146884.0	1941.3	75.7
11.80	7.47	148299.2	1952.2	76.0
11.85	7.52	149714.4	1963.0	76.3
11.90	7.57	151129.6	1973.8	76.6
11.95	7.62	152544.8	1984.7	76.9
12.00	7.67	153960.0	1995.5	77.2
12.05	7.72	155375.2	2006.4	77.4
12.10	7.77	156790.4	2017.2	77.7
12.15	7.82	158205.6	2028.1	78.0
12.20	7.87	159620.8	2038.9	78.3
12.25	7.92	161036.0	2049.8	78.6
12.30	7.97	162451.2	2060.6	78.8
12.35	8.02	163866.4	2071.5	79.1
12.40	8.07	165281.6	2082.3	79.4
12.45	8.12	166696.8	2093.2	79.6
12.50	8.17	168112.0	2104.0	79.9
12.55	8.22	169527.2	2114.9	80.2
12.60	8.27	170942.3	2125.7	80.4
12.65	8.32	172357.5	2136.6	80.7
12.70	8.37	173772.7	2147.4	80.9
12.75	8.42	175187.9	2158.3	81.2
12.80	8.47	176603.1	2169.1	81.4
12.85	8.52	178018.3	2180.0	81.7
12.90	8.57	179433.5	2190.8	81.9
12.95	8.62	180848.7	2201.7	82.1
13.00	8.67	182263.9	2212.5	82.4
13.05	8.72	183679.1	2223.4	82.6
13.10	8.77	185094.3	2234.2	82.8
13.15	8.82	186509.5	2245.1	83.1
13.20	8.87	187924.7	2255.9	83.3
13.25	8.92	189339.9	2266.8	83.5

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.30	8.97	190755.1	2277.6	83.8
13.35	9.02	192170.3	2288.5	84.0
13.40	9.07	193585.5	2299.3	84.2
13.45	9.12	195000.7	2310.2	84.4
13.50	9.17	196415.9	2321.0	84.6
13.55	9.22	197831.1	2331.9	84.8
13.60	9.27	199246.3	2342.7	85.0
13.65	9.32	200661.5	2353.6	85.3
13.70	9.37	202076.7	2364.4	85.5
13.75	9.42	203491.9	2375.3	85.7
13.80	9.47	204907.1	2386.1	85.9
13.85	9.52	206322.3	2397.0	86.1
13.90	9.57	207737.5	2407.8	86.3
13.95	9.62	209152.7	2418.7	86.5
14.00	9.67	210567.9	2429.5	86.7
14.05	9.72	211983.1	2440.4	86.9
14.10	9.77	213398.3	2451.2	87.1
14.15	9.82	214813.5	2462.1	87.2
14.20	9.87	216228.7	2472.9	87.4
14.25	9.92	217643.9	2483.8	87.6
14.30	9.97	219059.1	2494.6	87.8
14.35	10.02	220474.3	2505.5	88.0
14.40	10.07	221889.5	2516.3	88.2
14.45	10.12	223304.7	2527.2	88.4
14.50	10.17	224719.9	2538.0	88.5
14.55	10.22	226135.1	2548.9	88.7
14.60	10.27	227550.3	2559.7	88.9
14.65	10.32	228965.5	2570.6	89.1
14.70	10.37	230380.7	2581.4	89.2
14.75	10.42	231795.9	2592.3	89.4
14.80	10.47	233211.1	2603.1	89.6
14.85	10.52	234626.3	2614.0	89.8
14.90	10.57	236041.5	2624.8	89.9
14.95	10.62	237456.7	2635.6	90.1
15.00	10.67	238871.9	2646.5	90.3
15.05	10.72	240287.1	2657.3	90.4

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.10	10.77	241702.3	2668.2	90.6
15.15	10.82	243117.5	2679.0	90.7
15.20	10.87	244532.7	2689.9	90.9
15.25	10.92	245947.9	2700.7	91.1
15.30	10.97	247363.1	2711.6	91.2
15.35	11.02	248778.3	2722.4	91.4
15.40	11.07	250193.5	2733.3	91.5
15.45	11.12	251608.7	2744.1	91.7
15.50	11.17	253023.9	2755.0	91.8
15.55	11.22	254439.1	2765.8	92.0
15.60	11.27	255854.3	2776.7	92.1
15.65	11.32	257269.5	2787.5	92.3
15.70	11.37	258684.7	2798.4	92.4
15.75	11.42	260099.9	2809.2	92.6
15.80	11.47	261515.1	2820.1	92.7
15.85	11.52	262930.3	2830.9	92.9
15.90	11.57	264345.5	2841.8	93.0
15.95	11.62	265760.7	2852.6	93.2
16.00	11.67	267175.9	2863.5	93.3
16.05	11.72	268591.1	2874.3	93.4
16.10	11.77	270006.3	2885.2	93.6
16.15	11.82	271421.5	2896.0	93.7
16.20	11.87	272836.7	2906.9	93.9
16.25	11.92	274251.9	2917.7	94.0
16.30	11.97	275667.1	2928.6	94.1
16.35	12.02	277082.3	2939.4	94.3
16.40	12.07	278497.5	2950.3	94.4
16.45	12.12	279912.7	2961.1	94.5
16.50	12.17	281327.9	2972.0	94.7
16.55	12.22	282743.1	2982.8	94.8
16.60	12.27	284158.3	2993.7	94.9
16.65	12.32	285573.5	3004.5	95.0
16.70	12.37	286988.7	3015.4	95.2
16.75	12.42	288403.9	3026.2	95.3
16.80	12.47	289819.1	3037.1	95.4
16.85	12.52	291234.3	3047.9	95.6

Table C.1 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.90	12.57	292649.5	3058.8	95.7
16.95	12.62	294064.7	3069.6	95.8
17.00	12.67	295479.9	3080.5	95.9
17.05	12.72	296895.1	3091.3	96.0
17.10	12.77	298310.3	3102.2	96.2
17.15	12.82	299725.5	3113.0	96.3
17.20	12.87	301140.7	3123.9	96.4
17.25	12.92	302555.9	3134.7	96.5
17.30	12.97	303971.1	3145.6	96.6
17.35	13.02	305386.3	3156.4	96.8
17.40	13.07	306801.5	3167.3	96.9
17.45	13.12	308216.7	3178.1	97.0
17.50	13.17	309631.9	3189.0	97.1
17.55	13.22	311047.1	3199.8	97.2
17.60	13.27	312462.3	3210.7	97.3
17.65	13.32	313877.5	3221.5	97.4
17.70	13.37	315292.7	3232.4	97.5
17.75	13.42	316707.9	3243.2	97.7
17.80	13.47	318123.1	3254.1	97.8
17.85	13.52	319538.3	3264.9	97.9
17.90	13.57	320953.5	3275.8	98.0
17.95	13.62	322368.7	3286.6	98.1
18.00	13.67	323783.9	3297.4	98.2
18.05	13.72	325199.1	3308.3	98.3
18.10	13.77	326614.3	3319.1	98.4
18.15	13.82	328029.5	3330.0	98.5
18.20	13.87	329444.7	3340.8	98.6
18.25	13.92	330859.9	3351.7	98.7
18.30	13.97	332275.1	3362.5	98.8
18.35	14.02	333690.3	3373.4	98.9
18.40	14.07	335105.5	3384.2	99.0
18.45	14.12	336520.7	3395.1	99.1
18.50	14.17	337935.9	3405.9	99.2
18.55	14.22	339351.1	3416.8	99.3

Table C.2 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.95	0.01	2870.9	3724.2	0.8
4.00	0.06	3050.3	3833.2	0.8
4.05	0.11	3186.1	3942.4	0.8
4.10	0.16	3362.1	4051.7	0.8
4.15	0.21	3507.1	4161.1	0.8
4.20	0.26	3662.0	4270.5	0.9
4.25	0.31	3882.7	4380.1	0.9
4.30	0.36	4049.7	4489.7	0.9
4.35	0.41	4220.5	4599.5	0.9
4.40	0.46	4392.9	4709.4	0.9
4.45	0.51	4566.1	4819.5	0.9
4.50	0.56	4749.1	4929.8	1.0
4.55	0.61	4944.2	5040.2	1.0
4.60	0.66	5154.5	5150.8	1.0
4.65	0.71	5389.6	5261.6	1.0
4.70	0.76	5600.9	5372.7	1.0
4.75	0.81	5821.1	5484.0	1.1
4.80	0.86	6039.0	5595.4	1.1
4.85	0.91	6261.3	5707.0	1.1
4.90	0.96	6487.8	5819.0	1.1
4.95	1.01	6721.7	5931.2	1.1
5.00	1.06	6953.5	6043.4	1.2
5.05	1.11	7192.2	6155.7	1.2
5.10	1.16	7450.5	6268.0	1.2
5.15	1.21	7699.1	6380.3	1.2
5.20	1.26	8008.6	6492.6	1.2
5.25	1.31	8267.6	6604.9	1.3
5.30	1.36	8608.0	6717.2	1.3
5.35	1.41	8892.1	6829.5	1.3
5.40	1.46	9170.6	6941.9	1.3
5.45	1.51	9468.7	7054.2	1.3
5.50	1.56	9755.3	7166.5	1.4
5.55	1.61	10050.7	7278.8	1.4
5.60	1.66	10345.9	7391.2	1.4
5.65	1.71	10647.8	7503.5	1.4
5.70	1.76	10960.5	7615.8	1.4

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.75	1.81	11345.7	7728.1	1.5
5.80	1.86	11666.2	7840.5	1.5
5.85	1.91	12000.0	7952.8	1.5
5.90	1.96	12341.6	8065.1	1.5
5.95	2.01	12686.1	8177.5	1.6
6.00	2.06	13028.7	8289.8	1.6
6.05	2.11	13381.4	8402.1	1.6
6.10	2.16	13738.6	8514.5	1.6
6.15	2.21	14118.3	8626.8	1.6
6.20	2.26	14491.2	8739.1	1.7
6.25	2.31	14870.5	8851.5	1.7
6.30	2.36	15270.3	8963.8	1.7
6.35	2.41	15671.3	9076.2	1.7
6.40	2.46	16080.1	9188.5	1.8
6.45	2.51	16499.4	9300.9	1.8
6.50	2.56	16948.1	9413.3	1.8
6.55	2.61	17392.3	9525.6	1.8
6.60	2.66	17862.9	9638.0	1.9
6.65	2.71	18349.2	9750.4	1.9
6.70	2.76	18829.0	9862.8	1.9
6.75	2.81	19341.8	9975.2	1.9
6.80	2.86	19842.6	10087.6	2.0
6.85	2.91	20344.6	10200.0	2.0
6.90	2.96	20854.0	10312.4	2.0
6.95	3.01	21371.4	10424.9	2.1
7.00	3.06	21895.7	10537.3	2.1
7.05	3.11	22467.6	10649.7	2.1
7.10	3.16	23010.8	10762.1	2.1
7.15	3.21	23603.0	10874.6	2.2
7.20	3.26	24193.3	10987.0	2.2
7.25	3.31	24770.4	11099.4	2.2
7.30	3.36	25360.0	11211.8	2.3
7.35	3.41	25961.0	11324.2	2.3
7.40	3.46	26574.0	11436.7	2.3
7.45	3.51	27199.2	11549.1	2.4
7.50	3.56	27836.0	11661.5	2.4

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.55	3.61	28495.7	11773.9	2.4
7.60	3.66	29164.7	11886.3	2.5
7.65	3.71	29861.8	11998.8	2.5
7.70	3.76	30559.1	12111.2	2.5
7.75	3.81	31267.6	12223.6	2.6
7.80	3.86	31988.8	12336.0	2.6
7.85	3.91	32723.2	12448.5	2.6
7.90	3.96	33474.4	12560.9	2.7
7.95	4.01	34241.2	12673.3	2.7
8.00	4.06	35021.6	12785.7	2.7
8.05	4.11	35815.8	12898.1	2.8
8.10	4.16	36654.4	13010.6	2.8
8.15	4.21	37479.5	13123.0	2.9
8.20	4.26	38319.9	13235.4	2.9
8.25	4.31	39174.9	13347.8	2.9
8.30	4.36	40044.0	13460.2	3.0
8.35	4.41	40925.6	13572.7	3.0
8.40	4.46	41820.9	13685.1	3.1
8.45	4.51	42729.2	13797.5	3.1
8.50	4.56	43649.9	13909.9	3.1
8.55	4.61	44580.6	14022.4	3.2
8.60	4.66	45523.1	14134.8	3.2
8.65	4.71	46476.7	14247.2	3.3
8.70	4.76	47441.1	14359.6	3.3
8.75	4.81	48416.5	14472.0	3.3
8.80	4.86	49399.9	14584.5	3.4
8.85	4.91	50391.1	14696.9	3.4
8.90	4.96	51388.8	14809.3	3.5
8.95	5.01	52392.1	14921.7	3.5
9.00	5.06	53399.8	15034.1	3.6
9.05	5.11	54412.3	15146.6	3.6
9.10	5.16	55428.9	15259.0	3.6
9.15	5.21	56448.8	15371.4	3.7
9.20	5.26	57471.4	15483.8	3.7
9.25	5.31	58496.6	15596.3	3.8
9.30	5.36	59523.8	15708.7	3.8

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.35	5.41	60552.9	15821.1	3.8
9.40	5.46	61583.4	15933.5	3.9
9.45	5.51	62615.0	16045.9	3.9
9.50	5.56	63647.2	16158.4	3.9
9.55	5.61	64680.1	16270.8	4.0
9.60	5.66	65713.3	16383.2	4.0
9.65	5.71	66746.7	16495.6	4.0
9.70	5.76	67780.3	16608.0	4.1
9.75	5.81	68813.9	16720.5	4.1
9.80	5.86	69847.5	16832.9	4.1
9.85	5.91	70881.2	16945.3	4.2
9.90	5.96	71914.9	17057.7	4.2
9.95	6.01	72948.6	17170.2	4.2
10.00	6.06	73982.3	17282.6	4.3
10.05	6.11	75016.0	17395.0	4.3
10.10	6.16	76049.7	17507.4	4.3
10.15	6.21	77083.4	17619.8	4.4
10.20	6.26	78117.1	17732.3	4.4
10.25	6.31	79150.8	17844.7	4.4
10.30	6.36	80184.5	17957.1	4.5
10.35	6.41	81218.2	18069.5	4.5
10.40	6.46	82251.9	18181.9	4.5
10.45	6.51	83285.6	18294.4	4.6
10.50	6.56	84319.3	18406.8	4.6
10.55	6.61	85353.0	18519.2	4.6
10.60	6.66	86386.7	18631.6	4.6
10.65	6.71	87420.4	18744.1	4.7
10.70	6.76	88454.1	18856.5	4.7
10.75	6.81	89487.8	18968.9	4.7
10.80	6.86	90521.5	19081.3	4.7
10.85	6.91	91555.2	19193.7	4.8
10.90	6.96	92588.9	19306.2	4.8
10.95	7.01	93622.6	19418.6	4.8
11.00	7.06	94656.3	19531.0	4.8
11.05	7.11	95690.0	19643.4	4.9
11.10	7.16	96723.7	19755.8	4.9

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.15	7.21	97757.4	19868.3	4.9
11.20	7.26	98791.1	19980.7	4.9
11.25	7.31	99824.8	20093.1	5.0
11.30	7.36	100858.5	20205.5	5.0
11.35	7.41	101892.2	20318.0	5.0
11.40	7.46	102925.9	20430.4	5.0
11.45	7.51	103959.6	20542.8	5.1
11.50	7.56	104993.3	20655.2	5.1
11.55	7.61	106027.0	20767.6	5.1
11.60	7.66	107060.7	20880.1	5.1
11.65	7.71	108094.4	20992.5	5.1
11.70	7.76	109128.1	21104.9	5.2
11.75	7.81	110161.8	21217.3	5.2
11.80	7.86	111195.5	21329.7	5.2
11.85	7.91	112229.2	21442.2	5.2
11.90	7.96	113262.9	21554.6	5.3
11.95	8.01	114296.6	21667.0	5.3
12.00	8.06	115330.3	21779.4	5.3
12.05	8.11	116364.0	21891.9	5.3
12.10	8.16	117397.8	22004.3	5.3
12.15	8.21	118431.5	22116.7	5.4
12.20	8.26	119465.2	22229.1	5.4
12.25	8.31	120498.9	22341.5	5.4
12.30	8.36	121532.6	22454.0	5.4
12.35	8.41	122566.3	22566.4	5.4
12.40	8.46	123600.0	22678.8	5.5
12.45	8.51	124633.7	22791.2	5.5
12.50	8.56	125667.4	22903.6	5.5
12.55	8.61	126701.1	23016.1	5.5
12.60	8.66	127734.8	23128.5	5.5
12.65	8.71	128768.5	23240.9	5.5
12.70	8.76	129802.2	23353.3	5.6
12.75	8.81	130835.9	23465.8	5.6
12.80	8.86	131869.6	23578.2	5.6
12.85	8.91	132903.3	23690.6	5.6
12.90	8.96	133937.0	23803.0	5.6

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.95	9.01	134970.7	23915.4	5.6
13.00	9.06	136004.4	24027.9	5.7
13.05	9.11	137038.1	24140.3	5.7
13.10	9.16	138071.8	24252.7	5.7
13.15	9.21	139105.5	24365.1	5.7
13.20	9.26	140139.2	24477.5	5.7
13.25	9.31	141172.9	24590.0	5.7
13.30	9.36	142206.6	24702.4	5.8
13.35	9.41	143240.3	24814.8	5.8
13.40	9.46	144274.0	24927.2	5.8
13.45	9.51	145307.7	25039.7	5.8
13.50	9.56	146341.4	25152.1	5.8
13.55	9.61	147375.1	25264.5	5.8
13.60	9.66	148408.8	25376.9	5.8
13.65	9.71	149442.5	25489.3	5.9
13.70	9.76	150476.2	25601.8	5.9
13.75	9.81	151509.9	25714.2	5.9
13.80	9.86	152543.6	25826.6	5.9
13.85	9.91	153577.3	25939.0	5.9
13.90	9.96	154611.0	26051.4	5.9
13.95	10.01	155644.7	26163.9	5.9
14.00	10.06	156678.4	26276.3	6.0
14.05	10.11	157712.1	26388.7	6.0
14.10	10.16	158745.8	26501.1	6.0
14.15	10.21	159779.5	26613.6	6.0
14.20	10.26	160813.2	26726.0	6.0
14.25	10.31	161846.9	26838.4	6.0
14.30	10.36	162880.6	26950.8	6.0
14.35	10.41	163914.3	27063.2	6.1
14.40	10.46	164948.0	27175.7	6.1
14.45	10.51	165981.7	27288.1	6.1
14.50	10.56	167015.5	27400.5	6.1
14.55	10.61	168049.2	27512.9	6.1
14.60	10.66	169082.9	27625.3	6.1
14.65	10.71	170116.6	27737.8	6.1
14.70	10.76	171150.3	27850.2	6.1

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.75	10.81	172184.0	27962.6	6.2
14.80	10.86	173217.7	28075.0	6.2
14.85	10.91	174251.4	28187.5	6.2
14.90	10.96	175285.1	28299.9	6.2
14.95	11.01	176318.8	28412.3	6.2
15.00	11.06	177352.5	28524.7	6.2
15.05	11.11	178386.2	28637.1	6.2
15.10	11.16	179419.9	28749.6	6.2
15.15	11.21	180453.6	28862.0	6.3
15.20	11.26	181487.3	28974.4	6.3
15.25	11.31	182521.0	29086.8	6.3
15.30	11.36	183554.7	29199.2	6.3
15.35	11.41	184588.4	29311.7	6.3
15.40	11.46	185622.1	29424.1	6.3
15.45	11.51	186655.8	29536.5	6.3
15.50	11.56	187689.5	29648.9	6.3
15.55	11.61	188723.2	29761.4	6.3
15.60	11.66	189756.9	29873.8	6.4
15.65	11.71	190790.6	29986.2	6.4
15.70	11.76	191824.3	30098.6	6.4
15.75	11.81	192858.0	30211.0	6.4
15.80	11.86	193891.7	30323.5	6.4
15.85	11.91	194925.4	30435.9	6.4
15.90	11.96	195959.1	30548.3	6.4
15.95	12.01	196992.8	30660.7	6.4
16.00	12.06	198026.5	30773.1	6.4
16.05	12.11	199060.2	30885.6	6.4
16.10	12.16	200093.9	30998.0	6.5
16.15	12.21	201127.6	31110.4	6.5
16.20	12.26	202161.3	31222.8	6.5
16.25	12.31	203195.0	31335.3	6.5
16.30	12.36	204228.7	31447.7	6.5
16.35	12.41	205262.4	31560.1	6.5
16.40	12.46	206296.1	31672.5	6.5
16.45	12.51	207329.8	31784.9	6.5
16.50	12.56	208363.5	31897.4	6.5

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.55	12.61	209397.2	32009.8	6.5
16.60	12.66	210430.9	32122.2	6.6
16.65	12.71	211464.6	32234.6	6.6
16.70	12.76	212498.3	32347.0	6.6
16.75	12.81	213532.0	32459.5	6.6
16.80	12.86	214565.7	32571.9	6.6
16.85	12.91	215599.4	32684.3	6.6
16.90	12.96	216633.1	32796.7	6.6
16.95	13.01	217666.9	32909.2	6.6
17.00	13.06	218700.6	33021.6	6.6
17.05	13.11	219734.3	33134.0	6.6
17.10	13.16	220768.0	33246.4	6.6
17.15	13.21	221801.7	33358.8	6.6
17.20	13.26	222835.4	33471.3	6.7
17.25	13.31	223869.1	33583.7	6.7
17.30	13.36	224902.8	33696.1	6.7
17.35	13.41	225936.5	33808.5	6.7
17.40	13.46	226970.2	33920.9	6.7
17.45	13.51	228003.9	34033.4	6.7
17.50	13.56	229037.6	34145.8	6.7
17.55	13.61	230071.3	34258.2	6.7
17.60	13.66	231105.0	34370.6	6.7
17.65	13.71	232138.7	34483.1	6.7
17.70	13.76	233172.4	34595.5	6.7
17.75	13.81	234206.1	34707.9	6.7
17.80	13.86	235239.8	34820.3	6.8
17.85	13.91	236273.5	34932.7	6.8
17.90	13.96	237307.2	35045.2	6.8
17.95	14.01	238340.9	35157.6	6.8
18.00	14.06	239374.6	35270.0	6.8
18.05	14.11	240408.3	35382.4	6.8
18.10	14.16	241442.0	35494.8	6.8
18.15	14.21	242475.7	35607.3	6.8
18.20	14.26	243509.4	35719.7	6.8
18.25	14.31	244543.1	35832.1	6.8
18.30	14.36	245576.8	35944.5	6.8

Table C.2 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
18.35	14.41	246610.5	36057.0	6.8
18.40	14.46	247644.2	36169.4	6.8
18.45	14.51	248677.9	36281.8	6.9
18.50	14.56	249711.6	36394.2	6.9
18.55	14.61	250745.3	36506.6	6.9

Table C.3 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.60	0.00	1075.8	806.7	1.3
4.65	0.05	1127.3	823.2	1.4
4.70	0.10	1205.2	839.8	1.4
4.75	0.15	1260.0	856.4	1.5
4.80	0.20	1320.2	873.0	1.5
4.85	0.25	1415.4	889.6	1.6
4.90	0.30	1487.4	906.2	1.6
4.95	0.35	1620.2	922.9	1.8
5.00	0.40	1716.3	939.5	1.8
5.05	0.45	1818.4	956.2	1.9
5.10	0.50	1933.2	972.9	2.0
5.15	0.55	2054.4	989.6	2.1
5.20	0.60	2157.8	1006.3	2.1
5.25	0.65	2256.8	1023.0	2.2
5.30	0.70	2358.1	1039.8	2.3
5.35	0.75	2473.4	1056.6	2.3
5.40	0.80	2581.7	1073.3	2.4
5.45	0.85	2692.4	1090.2	2.5
5.50	0.90	2830.9	1107.0	2.6
5.55	0.95	2953.2	1123.8	2.6
5.60	1.00	3079.9	1140.7	2.7
5.65	1.05	3209.0	1157.6	2.8
5.70	1.10	3340.0	1174.4	2.8
5.75	1.15	3514.3	1191.4	2.9
5.80	1.20	3655.0	1208.3	3.0
5.85	1.25	3799.1	1225.3	3.1
5.90	1.30	3946.6	1242.3	3.2
5.95	1.35	4096.4	1259.3	3.3
6.00	1.40	4249.8	1276.3	3.3
6.05	1.45	4405.2	1293.3	3.4
6.10	1.50	4566.7	1310.3	3.5
6.15	1.55	4725.2	1327.3	3.6
6.20	1.60	4885.3	1344.4	3.6
6.25	1.65	5046.5	1361.4	3.7
6.30	1.70	5211.1	1378.5	3.8
6.35	1.75	5377.4	1395.7	3.9

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.40	1.80	5546.9	1412.8	3.9
6.45	1.85	5719.8	1430.0	4.0
6.50	1.90	5897.2	1447.2	4.1
6.55	1.95	6083.9	1464.4	4.2
6.60	2.00	6269.3	1481.5	4.2
6.65	2.05	6457.2	1498.7	4.3
6.70	2.10	6647.8	1515.9	4.4
6.75	2.15	6841.2	1533.1	4.5
6.80	2.20	7037.2	1550.3	4.5
6.85	2.25	7236.3	1567.4	4.6
6.90	2.30	7438.6	1584.6	4.7
6.95	2.35	7643.7	1601.8	4.8
7.00	2.40	7851.4	1619.0	4.8
7.05	2.45	8061.6	1636.1	4.9
7.10	2.50	8277.0	1653.3	5.0
7.15	2.55	8532.7	1670.5	5.1
7.20	2.60	8762.8	1687.7	5.2
7.25	2.65	8995.5	1704.9	5.3
7.30	2.70	9233.4	1722.0	5.4
7.35	2.75	9497.2	1739.2	5.5
7.40	2.80	9750.6	1756.4	5.6
7.45	2.85	10008.5	1773.6	5.6
7.50	2.90	10270.1	1790.8	5.7
7.55	2.95	10583.5	1807.9	5.9
7.60	3.00	10859.8	1825.1	6.0
7.65	3.05	11141.8	1842.3	6.0
7.70	3.10	11429.3	1859.5	6.1
7.75	3.15	11726.0	1876.6	6.2
7.80	3.20	12026.3	1893.8	6.4
7.85	3.25	12336.4	1911.0	6.5
7.90	3.30	12652.0	1928.2	6.6
7.95	3.35	12974.3	1945.4	6.7
8.00	3.40	13301.3	1962.5	6.8
8.05	3.45	13635.1	1979.7	6.9
8.10	3.50	13973.2	1996.9	7.0
8.15	3.55	14321.8	2014.1	7.1

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.20	3.60	14672.6	2031.2	7.2
8.25	3.65	15027.9	2048.4	7.3
8.30	3.70	15387.1	2065.6	7.4
8.35	3.75	15749.3	2082.8	7.6
8.40	3.80	16114.0	2100.0	7.7
8.45	3.85	16481.5	2117.1	7.8
8.50	3.90	16851.7	2134.3	7.9
8.55	3.95	17224.5	2151.5	8.0
8.60	4.00	17600.1	2168.7	8.1
8.65	4.05	17978.6	2185.8	8.2
8.70	4.10	18359.9	2203.0	8.3
8.75	4.15	18743.5	2220.2	8.4
8.80	4.20	19129.2	2237.4	8.5
8.85	4.25	19516.9	2254.6	8.7
8.90	4.30	19906.2	2271.7	8.8
8.95	4.35	20296.9	2288.9	8.9
9.00	4.40	20688.4	2306.1	9.0
9.05	4.45	21080.9	2323.3	9.1
9.10	4.50	21474.5	2340.4	9.2
9.15	4.55	21869.1	2357.6	9.3
9.20	4.60	22264.5	2374.8	9.4
9.25	4.65	22660.6	2392.0	9.5
9.30	4.70	23056.9	2409.2	9.6
9.35	4.75	23453.4	2426.3	9.7
9.40	4.80	23850.2	2443.5	9.8
9.45	4.85	24247.1	2460.7	9.9
9.50	4.90	24644.0	2477.9	9.9
9.55	4.95	25041.0	2495.1	10.0
9.60	5.00	25438.0	2512.2	10.1
9.65	5.05	25834.9	2529.4	10.2
9.70	5.10	26231.9	2546.6	10.3
9.75	5.15	26628.9	2563.8	10.4
9.80	5.20	27025.9	2580.9	10.5
9.85	5.25	27422.8	2598.1	10.6
9.90	5.30	27819.8	2615.3	10.6
9.95	5.35	28216.8	2632.5	10.7

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.00	5.40	28613.7	2649.7	10.8
10.05	5.45	29010.7	2666.8	10.9
10.10	5.50	29407.7	2684.0	11.0
10.15	5.55	29804.6	2701.2	11.0
10.20	5.60	30201.6	2718.4	11.1
10.25	5.65	30598.6	2735.5	11.2
10.30	5.70	30995.5	2752.7	11.3
10.35	5.75	31392.5	2769.9	11.3
10.40	5.80	31789.5	2787.1	11.4
10.45	5.85	32186.4	2804.3	11.5
10.50	5.90	32583.4	2821.4	11.5
10.55	5.95	32980.4	2838.6	11.6
10.60	6.00	33377.3	2855.8	11.7
10.65	6.05	33774.3	2873.0	11.8
10.70	6.10	34171.3	2890.1	11.8
10.75	6.15	34568.2	2907.3	11.9
10.80	6.20	34965.2	2924.5	12.0
10.85	6.25	35362.2	2941.7	12.0
10.90	6.30	35759.1	2958.9	12.1
10.95	6.35	36156.1	2976.0	12.1
11.00	6.40	36553.1	2993.2	12.2
11.05	6.45	36950.0	3010.4	12.3
11.10	6.50	37347.0	3027.6	12.3
11.15	6.55	37744.0	3044.7	12.4
11.20	6.60	38140.9	3061.9	12.5
11.25	6.65	38537.9	3079.1	12.5
11.30	6.70	38934.9	3096.3	12.6
11.35	6.75	39331.8	3113.5	12.6
11.40	6.80	39728.8	3130.6	12.7
11.45	6.85	40125.8	3147.8	12.7
11.50	6.90	40522.7	3165.0	12.8
11.55	6.95	40919.7	3182.2	12.9
11.60	7.00	41316.7	3199.3	12.9
11.65	7.05	41713.6	3216.5	13.0
11.70	7.10	42110.6	3233.7	13.0
11.75	7.15	42507.6	3250.9	13.1

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.80	7.20	42904.5	3268.1	13.1
11.85	7.25	43301.5	3285.2	13.2
11.90	7.30	43698.5	3302.4	13.2
11.95	7.35	44095.4	3319.6	13.3
12.00	7.40	44492.4	3336.8	13.3
12.05	7.45	44889.4	3354.0	13.4
12.10	7.50	45286.3	3371.1	13.4
12.15	7.55	45683.3	3388.3	13.5
12.20	7.60	46080.3	3405.5	13.5
12.25	7.65	46477.2	3422.7	13.6
12.30	7.70	46874.2	3439.8	13.6
12.35	7.75	47271.2	3457.0	13.7
12.40	7.80	47668.1	3474.2	13.7
12.45	7.85	48065.1	3491.4	13.8
12.50	7.90	48462.1	3508.6	13.8
12.55	7.95	48859.0	3525.7	13.9
12.60	8.00	49256.0	3542.9	13.9
12.65	8.05	49653.0	3560.1	13.9
12.70	8.10	50049.9	3577.3	14.0
12.75	8.15	50446.9	3594.4	14.0
12.80	8.20	50843.9	3611.6	14.1
12.85	8.25	51240.8	3628.8	14.1
12.90	8.30	51637.8	3646.0	14.2
12.95	8.35	52034.8	3663.2	14.2
13.00	8.40	52431.7	3680.3	14.2
13.05	8.45	52828.7	3697.5	14.3
13.10	8.50	53225.7	3714.7	14.3
13.15	8.55	53622.6	3731.9	14.4
13.20	8.60	54019.6	3749.0	14.4
13.25	8.65	54416.6	3766.2	14.4
13.30	8.70	54813.5	3783.4	14.5
13.35	8.75	55210.5	3800.6	14.5
13.40	8.80	55607.5	3817.8	14.6
13.45	8.85	56004.4	3834.9	14.6
13.50	8.90	56401.4	3852.1	14.6
13.55	8.95	56798.4	3869.3	14.7

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.60	9.00	57195.3	3886.5	14.7
13.65	9.05	57592.3	3903.6	14.8
13.70	9.10	57989.3	3920.8	14.8
13.75	9.15	58386.2	3938.0	14.8
13.80	9.20	58783.2	3955.2	14.9
13.85	9.25	59180.2	3972.4	14.9
13.90	9.30	59577.1	3989.5	14.9
13.95	9.35	59974.1	4006.7	15.0
14.00	9.40	60371.1	4023.9	15.0
14.05	9.45	60768.1	4041.1	15.0
14.10	9.50	61165.0	4058.2	15.1
14.15	9.55	61562.0	4075.4	15.1
14.20	9.60	61959.0	4092.6	15.1
14.25	9.65	62355.9	4109.8	15.2
14.30	9.70	62752.9	4127.0	15.2
14.35	9.75	63149.9	4144.1	15.2
14.40	9.80	63546.8	4161.3	15.3
14.45	9.85	63943.8	4178.5	15.3
14.50	9.90	64340.8	4195.7	15.3
14.55	9.95	64737.7	4212.9	15.4
14.60	10.00	65134.7	4230.0	15.4
14.65	10.05	65531.7	4247.2	15.4
14.70	10.10	65928.6	4264.4	15.5
14.75	10.15	66325.6	4281.6	15.5
14.80	10.20	66722.6	4298.7	15.5
14.85	10.25	67119.5	4315.9	15.6
14.90	10.30	67516.5	4333.1	15.6
14.95	10.35	67913.5	4350.3	15.6
15.00	10.40	68310.4	4367.5	15.6
15.05	10.45	68707.4	4384.6	15.7
15.10	10.50	69104.4	4401.8	15.7
15.15	10.55	69501.3	4419.0	15.7
15.20	10.60	69898.3	4436.2	15.8
15.25	10.65	70295.3	4453.3	15.8
15.30	10.70	70692.2	4470.5	15.8
15.35	10.75	71089.2	4487.7	15.8

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.40	10.80	71486.2	4504.9	15.9
15.45	10.85	71883.1	4522.1	15.9
15.50	10.90	72280.1	4539.2	15.9
15.55	10.95	72677.1	4556.4	16.0
15.60	11.00	73074.0	4573.6	16.0
15.65	11.05	73471.0	4590.8	16.0
15.70	11.10	73868.0	4607.9	16.0
15.75	11.15	74264.9	4625.1	16.1
15.80	11.20	74661.9	4642.3	16.1
15.85	11.25	75058.9	4659.5	16.1
15.90	11.30	75455.8	4676.7	16.1
15.95	11.35	75852.8	4693.8	16.2
16.00	11.40	76249.8	4711.0	16.2
16.05	11.45	76646.7	4728.2	16.2
16.10	11.50	77043.7	4745.4	16.2
16.15	11.55	77440.7	4762.5	16.3
16.20	11.60	77837.6	4779.7	16.3
16.25	11.65	78234.6	4796.9	16.3
16.30	11.70	78631.6	4814.1	16.3
16.35	11.75	79028.5	4831.3	16.4
16.40	11.80	79425.5	4848.4	16.4
16.45	11.85	79822.5	4865.6	16.4
16.50	11.90	80219.4	4882.8	16.4
16.55	11.95	80616.4	4900.0	16.5
16.60	12.00	81013.4	4917.1	16.5
16.65	12.05	81410.3	4934.3	16.5
16.70	12.10	81807.3	4951.5	16.5
16.75	12.15	82204.3	4968.7	16.5
16.80	12.20	82601.2	4985.9	16.6
16.85	12.25	82998.2	5003.0	16.6
16.90	12.30	83395.2	5020.2	16.6
16.95	12.35	83792.1	5037.4	16.6
17.00	12.40	84189.1	5054.6	16.7
17.05	12.45	84586.1	5071.8	16.7
17.10	12.50	84983.0	5088.9	16.7
17.15	12.55	85380.0	5106.1	16.7

Table C.3 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Southern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.20	12.60	85777.0	5123.3	16.7
17.25	12.65	86173.9	5140.5	16.8
17.30	12.70	86570.9	5157.6	16.8
17.35	12.75	86967.9	5174.8	16.8
17.40	12.80	87364.8	5192.0	16.8
17.45	12.85	87761.8	5209.2	16.8
17.50	12.90	88158.8	5226.4	16.9
17.55	12.95	88555.7	5243.5	16.9
17.60	13.00	88952.7	5260.7	16.9
17.65	13.05	89349.7	5277.9	16.9
17.70	13.10	89746.6	5295.1	16.9
17.75	13.15	90143.6	5312.2	17.0
17.80	13.20	90540.6	5329.4	17.0
17.85	13.25	90937.5	5346.6	17.0
17.90	13.30	91334.5	5363.8	17.0
17.95	13.35	91731.5	5381.0	17.0
18.00	13.40	92128.4	5398.1	17.1
18.05	13.45	92525.4	5415.3	17.1
18.10	13.50	92922.4	5432.5	17.1
18.15	13.55	93319.3	5449.7	17.1
18.20	13.60	93716.3	5466.8	17.1
18.25	13.65	94113.3	5484.0	17.2
18.30	13.70	94510.3	5501.2	17.2
18.35	13.75	94907.2	5518.4	17.2
18.40	13.80	95304.2	5535.6	17.2
18.45	13.85	95701.2	5552.7	17.2
18.50	13.90	96098.1	5569.9	17.3
18.55	13.95	96495.1	5587.1	17.3

Table C.4 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.15	0.00	7187.8	813.8	8.8
3.20	0.05	7634.8	833.6	9.2
3.25	0.10	8099.1	853.4	9.5
3.30	0.15	8642.0	873.2	9.9
3.35	0.20	9120.7	893.1	10.2
3.40	0.25	9678.7	912.9	10.6
3.45	0.30	10162.3	932.8	10.9
3.50	0.35	10756.6	952.7	11.3
3.55	0.40	11265.8	972.6	11.6
3.60	0.45	11817.8	992.6	11.9
3.65	0.50	12412.6	1012.5	12.3
3.70	0.55	13084.1	1032.5	12.7
3.75	0.60	13956.6	1052.4	13.3
3.80	0.65	14569.6	1072.4	13.6
3.85	0.70	15186.6	1092.4	13.9
3.90	0.75	15850.8	1112.4	14.2
3.95	0.80	16551.5	1132.4	14.6
4.00	0.85	17266.3	1152.3	15.0
4.05	0.90	17980.1	1172.3	15.3
4.10	0.95	18674.2	1192.3	15.7
4.15	1.00	19429.5	1212.3	16.0
4.20	1.05	20179.4	1232.4	16.4
4.25	1.10	20979.8	1252.4	16.8
4.30	1.15	21848.3	1272.4	17.2
4.35	1.20	22641.2	1292.4	17.5
4.40	1.25	23425.8	1312.4	17.8
4.45	1.30	24243.3	1332.4	18.2
4.50	1.35	25067.2	1352.5	18.5
4.55	1.40	26149.6	1372.5	19.1
4.60	1.45	27050.3	1392.6	19.4
4.65	1.50	28027.3	1412.6	19.8
4.70	1.55	28983.9	1432.7	20.2
4.75	1.60	29904.7	1452.7	20.6
4.80	1.65	30856.1	1472.8	21.0
4.85	1.70	31897.8	1492.8	21.4
4.90	1.75	32921.8	1512.9	21.8

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.95	1.80	33953.9	1533.0	22.1
5.00	1.85	34978.4	1553.0	22.5
5.05	1.90	36023.4	1573.1	22.9
5.10	1.95	37105.0	1593.1	23.3
5.15	2.00	38221.3	1613.2	23.7
5.20	2.05	39327.8	1633.2	24.1
5.25	2.10	40449.3	1653.3	24.5
5.30	2.15	41634.4	1673.3	24.9
5.35	2.20	42807.0	1693.4	25.3
5.40	2.25	43975.3	1713.5	25.7
5.45	2.30	45156.2	1733.5	26.0
5.50	2.35	46404.2	1753.6	26.5
5.55	2.40	47630.8	1773.6	26.9
5.60	2.45	48855.1	1793.7	27.2
5.65	2.50	50108.1	1813.7	27.6
5.70	2.55	51359.3	1833.8	28.0
5.75	2.60	52619.7	1853.8	28.4
5.80	2.65	53898.2	1873.9	28.8
5.85	2.70	55177.6	1893.9	29.1
5.90	2.75	56464.9	1914.0	29.5
5.95	2.80	57758.0	1934.1	29.9
6.00	2.85	59056.8	1954.1	30.2
6.05	2.90	60361.0	1974.2	30.6
6.10	2.95	61670.3	1994.2	30.9
6.15	3.00	62985.1	2014.3	31.3
6.20	3.05	64302.8	2034.3	31.6
6.25	3.10	65624.1	2054.4	31.9
6.30	3.15	66946.9	2074.4	32.3
6.35	3.20	68271.4	2094.5	32.6
6.40	3.25	69597.6	2114.6	32.9
6.45	3.30	70925.2	2134.6	33.2
6.50	3.35	72253.8	2154.7	33.5
6.55	3.40	73583.6	2174.7	33.8
6.60	3.45	74914.3	2194.8	34.1
6.65	3.50	76245.4	2214.8	34.4
6.70	3.55	77576.8	2234.9	34.7

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.75	3.60	78908.5	2254.9	35.0
6.80	3.65	80240.3	2275.0	35.3
6.85	3.70	81572.3	2295.1	35.5
6.90	3.75	82904.4	2315.1	35.8
6.95	3.80	84236.7	2335.2	36.1
7.00	3.85	85569.0	2355.2	36.3
7.05	3.90	86901.4	2375.3	36.6
7.10	3.95	88233.9	2395.3	36.8
7.15	4.00	89566.4	2415.4	37.1
7.20	4.05	90899.0	2435.4	37.3
7.25	4.10	92231.5	2455.5	37.6
7.30	4.15	93564.1	2475.5	37.8
7.35	4.20	94896.6	2495.6	38.0
7.40	4.25	96229.2	2515.7	38.3
7.45	4.30	97561.7	2535.7	38.5
7.50	4.35	98894.3	2555.8	38.7
7.55	4.40	100226.8	2575.8	38.9
7.60	4.45	101559.4	2595.9	39.1
7.65	4.50	102891.9	2615.9	39.3
7.70	4.55	104224.5	2636.0	39.5
7.75	4.60	105557.0	2656.0	39.7
7.80	4.65	106889.6	2676.1	39.9
7.85	4.70	108222.1	2696.2	40.1
7.90	4.75	109554.7	2716.2	40.3
7.95	4.80	110887.2	2736.3	40.5
8.00	4.85	112219.8	2756.3	40.7
8.05	4.90	113552.3	2776.4	40.9
8.10	4.95	114884.9	2796.4	41.1
8.15	5.00	116217.4	2816.5	41.3
8.20	5.05	117550.0	2836.5	41.4
8.25	5.10	118882.5	2856.6	41.6
8.30	5.15	120215.1	2876.7	41.8
8.35	5.20	121547.6	2896.7	42.0
8.40	5.25	122880.2	2916.8	42.1
8.45	5.30	124212.7	2936.8	42.3
8.50	5.35	125545.3	2956.9	42.5

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.55	5.40	126877.8	2976.9	42.6
8.60	5.45	128210.4	2997.0	42.8
8.65	5.50	129542.9	3017.0	42.9
8.70	5.55	130875.5	3037.1	43.1
8.75	5.60	132208.0	3057.2	43.2
8.80	5.65	133540.6	3077.2	43.4
8.85	5.70	134873.1	3097.3	43.5
8.90	5.75	136205.7	3117.3	43.7
8.95	5.80	137538.2	3137.4	43.8
9.00	5.85	138870.8	3157.4	44.0
9.05	5.90	140203.3	3177.5	44.1
9.10	5.95	141535.9	3197.5	44.3
9.15	6.00	142868.4	3217.6	44.4
9.20	6.05	144201.0	3237.6	44.5
9.25	6.10	145533.5	3257.7	44.7
9.30	6.15	146866.1	3277.8	44.8
9.35	6.20	148198.6	3297.8	44.9
9.40	6.25	149531.2	3317.9	45.1
9.45	6.30	150863.7	3337.9	45.2
9.50	6.35	152196.3	3358.0	45.3
9.55	6.40	153528.8	3378.0	45.4
9.60	6.45	154861.4	3398.1	45.6
9.65	6.50	156193.9	3418.1	45.7
9.70	6.55	157526.5	3438.2	45.8
9.75	6.60	158859.0	3458.3	45.9
9.80	6.65	160191.6	3478.3	46.1
9.85	6.70	161524.1	3498.4	46.2
9.90	6.75	162856.7	3518.4	46.3
9.95	6.80	164189.2	3538.5	46.4
10.00	6.85	165521.8	3558.5	46.5
10.05	6.90	166854.3	3578.6	46.6
10.10	6.95	168186.9	3598.6	46.7
10.15	7.00	169519.4	3618.7	46.8
10.20	7.05	170852.0	3638.8	47.0
10.25	7.10	172184.5	3658.8	47.1
10.30	7.15	173517.1	3678.9	47.2

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.35	7.20	174849.6	3698.9	47.3
10.40	7.25	176182.2	3719.0	47.4
10.45	7.30	177514.7	3739.0	47.5
10.50	7.35	178847.3	3759.1	47.6
10.55	7.40	180179.8	3779.1	47.7
10.60	7.45	181512.4	3799.2	47.8
10.65	7.50	182844.9	3819.2	47.9
10.70	7.55	184177.5	3839.3	48.0
10.75	7.60	185510.0	3859.4	48.1
10.80	7.65	186842.6	3879.4	48.2
10.85	7.70	188175.1	3899.5	48.3
10.90	7.75	189507.7	3919.5	48.3
10.95	7.80	190840.2	3939.6	48.4
11.00	7.85	192172.8	3959.6	48.5
11.05	7.90	193505.3	3979.7	48.6
11.10	7.95	194837.9	3999.7	48.7
11.15	8.00	196170.4	4019.8	48.8
11.20	8.05	197503.0	4039.9	48.9
11.25	8.10	198835.5	4059.9	49.0
11.30	8.15	200168.1	4080.0	49.1
11.35	8.20	201500.6	4100.0	49.1
11.40	8.25	202833.2	4120.1	49.2
11.45	8.30	204165.7	4140.1	49.3
11.50	8.35	205498.3	4160.2	49.4
11.55	8.40	206830.8	4180.2	49.5
11.60	8.45	208163.4	4200.3	49.6
11.65	8.50	209495.9	4220.4	49.6
11.70	8.55	210828.5	4240.4	49.7
11.75	8.60	212161.0	4260.5	49.8
11.80	8.65	213493.6	4280.5	49.9
11.85	8.70	214826.1	4300.6	50.0
11.90	8.75	216158.7	4320.6	50.0
11.95	8.80	217491.2	4340.7	50.1
12.00	8.85	218823.8	4360.7	50.2
12.05	8.90	220156.3	4380.8	50.3
12.10	8.95	221488.9	4400.9	50.3

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.15	9.00	222821.4	4420.9	50.4
12.20	9.05	224154.0	4441.0	50.5
12.25	9.10	225486.5	4461.0	50.5
12.30	9.15	226819.1	4481.1	50.6
12.35	9.20	228151.6	4501.1	50.7
12.40	9.25	229484.2	4521.2	50.8
12.45	9.30	230816.7	4541.2	50.8
12.50	9.35	232149.3	4561.3	50.9
12.55	9.40	233481.8	4581.3	51.0
12.60	9.45	234814.4	4601.4	51.0
12.65	9.50	236146.9	4621.5	51.1
12.70	9.55	237479.5	4641.5	51.2
12.75	9.60	238812.0	4661.6	51.2
12.80	9.65	240144.6	4681.6	51.3
12.85	9.70	241477.1	4701.7	51.4
12.90	9.75	242809.7	4721.7	51.4
12.95	9.80	244142.2	4741.8	51.5
13.00	9.85	245474.8	4761.8	51.6
13.05	9.90	246807.3	4781.9	51.6
13.10	9.95	248139.9	4802.0	51.7
13.15	10.00	249472.4	4822.0	51.7
13.20	10.05	250805.0	4842.1	51.8
13.25	10.10	252137.5	4862.1	51.9
13.30	10.15	253470.1	4882.2	51.9
13.35	10.20	254802.6	4902.2	52.0
13.40	10.25	256135.2	4922.3	52.0
13.45	10.30	257467.7	4942.3	52.1
13.50	10.35	258800.3	4962.4	52.2
13.55	10.40	260132.8	4982.5	52.2
13.60	10.45	261465.4	5002.5	52.3
13.65	10.50	262797.9	5022.6	52.3
13.70	10.55	264130.5	5042.6	52.4
13.75	10.60	265463.0	5062.7	52.4
13.80	10.65	266795.6	5082.7	52.5
13.85	10.70	268128.1	5102.8	52.5
13.90	10.75	269460.7	5122.8	52.6

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.95	10.80	270793.2	5142.9	52.7
14.00	10.85	272125.8	5162.9	52.7
14.05	10.90	273458.3	5183.0	52.8
14.10	10.95	274790.9	5203.1	52.8
14.15	11.00	276123.4	5223.1	52.9
14.20	11.05	277456.0	5243.2	52.9
14.25	11.10	278788.5	5263.2	53.0
14.30	11.15	280121.1	5283.3	53.0
14.35	11.20	281453.6	5303.3	53.1
14.40	11.25	282786.2	5323.4	53.1
14.45	11.30	284118.7	5343.4	53.2
14.50	11.35	285451.3	5363.5	53.2
14.55	11.40	286783.8	5383.6	53.3
14.60	11.45	288116.4	5403.6	53.3
14.65	11.50	289448.9	5423.7	53.4
14.70	11.55	290781.5	5443.7	53.4
14.75	11.60	292114.0	5463.8	53.5
14.80	11.65	293446.6	5483.8	53.5
14.85	11.70	294779.1	5503.9	53.6
14.90	11.75	296111.7	5523.9	53.6
14.95	11.80	297444.2	5544.0	53.7
15.00	11.85	298776.8	5564.1	53.7
15.05	11.90	300109.3	5584.1	53.7
15.10	11.95	301441.9	5604.2	53.8
15.15	12.00	302774.4	5624.2	53.8
15.20	12.05	304107.0	5644.3	53.9
15.25	12.10	305439.5	5664.3	53.9
15.30	12.15	306772.1	5684.4	54.0
15.35	12.20	308104.6	5704.4	54.0
15.40	12.25	309437.2	5724.5	54.1
15.45	12.30	310769.7	5744.6	54.1
15.50	12.35	312102.3	5764.6	54.1
15.55	12.40	313434.8	5784.7	54.2
15.60	12.45	314767.4	5804.7	54.2
15.65	12.50	316099.9	5824.8	54.3
15.70	12.55	317432.5	5844.8	54.3

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.75	12.60	318765.0	5864.9	54.4
15.80	12.65	320097.6	5884.9	54.4
15.85	12.70	321430.1	5905.0	54.4
15.90	12.75	322762.7	5925.0	54.5
15.95	12.80	324095.2	5945.1	54.5
16.00	12.85	325427.8	5965.2	54.6
16.05	12.90	326760.3	5985.2	54.6
16.10	12.95	328092.9	6005.3	54.6
16.15	13.00	329425.4	6025.3	54.7
16.20	13.05	330758.0	6045.4	54.7
16.25	13.10	332090.5	6065.4	54.8
16.30	13.15	333423.1	6085.5	54.8
16.35	13.20	334755.6	6105.5	54.8
16.40	13.25	336088.2	6125.6	54.9
16.45	13.30	337420.7	6145.7	54.9
16.50	13.35	338753.3	6165.7	54.9
16.55	13.40	340085.8	6185.8	55.0
16.60	13.45	341418.4	6205.8	55.0
16.65	13.50	342750.9	6225.9	55.1
16.70	13.55	344083.5	6245.9	55.1
16.75	13.60	345416.0	6266.0	55.1
16.80	13.65	346748.6	6286.0	55.2
16.85	13.70	348081.1	6306.1	55.2
16.90	13.75	349413.7	6326.2	55.2
16.95	13.80	350746.2	6346.2	55.3
17.00	13.85	352078.8	6366.3	55.3
17.05	13.90	353411.3	6386.3	55.3
17.10	13.95	354743.9	6406.4	55.4
17.15	14.00	356076.4	6426.4	55.4
17.20	14.05	357409.0	6446.5	55.4
17.25	14.10	358741.5	6466.5	55.5
17.30	14.15	360074.1	6486.6	55.5
17.35	14.20	361406.6	6506.6	55.5
17.40	14.25	362739.2	6526.7	55.6
17.45	14.30	364071.7	6546.8	55.6
17.50	14.35	365404.3	6566.8	55.6

Table C.4 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the West Channel in the Inuvik Transect.

Water Level from Raw Data (m)	**Elevation above the top of bank (m)**	**A_0**	**A**	**A_0/A**
17.55	14.40	366736.8	6586.9	55.7
17.60	14.45	368069.4	6606.9	55.7
17.65	14.50	369401.9	6627.0	55.7
17.70	14.55	370734.5	6647.0	55.8
17.75	14.60	372067.0	6667.1	55.8
17.80	14.65	373399.6	6687.1	55.8
17.85	14.70	374732.1	6707.2	55.9
17.90	14.75	376064.7	6727.3	55.9
17.95	14.80	377397.2	6747.3	55.9
18.00	14.85	378729.8	6767.4	56.0
18.05	14.90	380062.3	6787.4	56.0
18.10	14.95	381394.9	6807.5	56.0
18.15	15.00	382727.4	6827.5	56.1
18.20	15.05	384060.0	6847.6	56.1
18.25	15.10	385392.5	6867.6	56.1
18.30	15.15	386725.1	6887.7	56.1
18.35	15.20	388057.6	6907.8	56.2
18.40	15.25	389390.2	6927.8	56.2
18.45	15.30	390722.7	6947.9	56.2
18.50	15.35	392055.3	6967.9	56.3
18.55	15.40	393387.8	6988.0	56.3

Table C.5 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
2.85	0.01	8367.4	2965.5	2.8
2.90	0.06	8765.7	3056.9	2.9
2.95	0.11	9186.6	3148.4	2.9
3.00	0.16	9647.3	3239.8	3.0
3.05	0.21	10149.6	3331.3	3.0
3.10	0.26	10582.4	3422.8	3.1
3.15	0.31	11024.1	3514.2	3.1
3.20	0.36	11482.2	3605.7	3.2
3.25	0.41	12101.9	3697.2	3.3
3.30	0.46	12577.9	3788.7	3.3
3.35	0.51	13163.8	3880.2	3.4
3.40	0.56	13661.2	3971.7	3.4
3.45	0.61	14456.8	4063.2	3.6
3.50	0.66	15045.9	4154.7	3.6
3.55	0.71	15581.0	4246.2	3.7
3.60	0.76	16157.5	4337.7	3.7
3.65	0.81	16758.3	4429.2	3.8
3.70	0.86	17332.6	4520.8	3.8
3.75	0.91	18043.3	4612.3	3.9
3.80	0.96	18664.1	4703.9	4.0
3.85	1.01	19299.2	4795.4	4.0
3.90	1.06	19974.3	4887.0	4.1
3.95	1.11	20652.3	4978.5	4.1
4.00	1.16	21382.7	5070.1	4.2
4.05	1.21	22193.0	5161.7	4.3
4.10	1.26	22908.1	5253.3	4.4
4.15	1.31	23711.5	5344.9	4.4
4.20	1.36	24482.6	5436.5	4.5
4.25	1.41	25243.1	5528.1	4.6
4.30	1.46	26094.7	5619.7	4.6
4.35	1.51	26926.4	5711.3	4.7
4.40	1.56	27730.2	5802.9	4.8
4.45	1.61	28537.1	5894.6	4.8
4.50	1.66	29567.3	5986.2	4.9
4.55	1.71	30431.0	6077.8	5.0
4.60	1.76	31381.0	6169.5	5.1

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.65	1.81	32248.9	6261.1	5.2
4.70	1.86	33132.9	6352.8	5.2
4.75	1.91	34089.3	6444.4	5.3
4.80	1.96	35010.3	6536.1	5.4
4.85	2.01	35944.4	6627.8	5.4
4.90	2.06	36893.6	6719.4	5.5
4.95	2.11	37853.0	6811.1	5.6
5.00	2.16	38828.6	6902.8	5.6
5.05	2.21	39831.2	6994.5	5.7
5.10	2.26	40838.2	7086.1	5.8
5.15	2.31	41860.2	7177.8	5.8
5.20	2.36	42901.1	7269.5	5.9
5.25	2.41	43966.9	7361.1	6.0
5.30	2.46	45042.1	7452.8	6.0
5.35	2.51	46125.1	7544.5	6.1
5.40	2.56	47223.6	7636.2	6.2
5.45	2.61	48336.5	7727.9	6.3
5.50	2.66	49463.3	7819.5	6.3
5.55	2.71	50642.5	7911.2	6.4
5.60	2.76	51794.7	8002.9	6.5
5.65	2.81	52958.8	8094.6	6.5
5.70	2.86	54134.0	8186.2	6.6
5.75	2.91	55324.8	8277.9	6.7
5.80	2.96	56519.7	8369.6	6.8
5.85	3.01	57722.1	8461.3	6.8
5.90	3.06	58931.9	8552.9	6.9
5.95	3.11	60150.8	8644.6	7.0
6.00	3.16	61377.7	8736.3	7.0
6.05	3.21	62610.6	8828.0	7.1
6.10	3.26	63849.2	8919.6	7.2
6.15	3.31	65093.6	9011.3	7.2
6.20	3.36	66342.5	9103.0	7.3
6.25	3.41	67596.0	9194.7	7.4
6.30	3.46	68853.5	9286.3	7.4
6.35	3.51	70114.6	9378.0	7.5
6.40	3.56	71378.5	9469.7	7.5

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.45	3.61	72644.3	9561.4	7.6
6.50	3.66	73911.9	9653.1	7.7
6.55	3.71	75180.8	9744.7	7.7
6.60	3.76	76450.5	9836.4	7.8
6.65	3.81	77720.7	9928.1	7.8
6.70	3.86	78991.4	10019.8	7.9
6.75	3.91	80262.8	10111.4	7.9
6.80	3.96	81534.8	10203.1	8.0
6.85	4.01	82807.4	10294.8	8.0
6.90	4.06	84080.5	10386.5	8.1
6.95	4.11	85354.2	10478.1	8.1
7.00	4.16	86628.2	10569.8	8.2
7.05	4.21	87902.2	10661.5	8.2
7.10	4.26	89176.2	10753.2	8.3
7.15	4.31	90450.3	10844.8	8.3
7.20	4.36	91724.4	10936.5	8.4
7.25	4.41	92998.5	11028.2	8.4
7.30	4.46	94272.6	11119.9	8.5
7.35	4.51	95546.7	11211.5	8.5
7.40	4.56	96820.9	11303.2	8.6
7.45	4.61	98095.0	11394.9	8.6
7.50	4.66	99369.2	11486.6	8.7
7.55	4.71	100643.4	11578.3	8.7
7.60	4.76	101917.7	11669.9	8.7
7.65	4.81	103192.0	11761.6	8.8
7.70	4.86	104466.4	11853.3	8.8
7.75	4.91	105740.8	11945.0	8.9
7.80	4.96	107015.2	12036.6	8.9
7.85	5.01	108289.7	12128.3	8.9
7.90	5.06	109564.1	12220.0	9.0
7.95	5.11	110838.5	12311.7	9.0
8.00	5.16	112113.0	12403.3	9.0
8.05	5.21	113387.4	12495.0	9.1
8.10	5.26	114661.8	12586.7	9.1
8.15	5.31	115936.2	12678.4	9.1
8.20	5.36	117210.7	12770.0	9.2

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.25	5.41	118485.1	12861.7	9.2
8.30	5.46	119759.5	12953.4	9.2
8.35	5.51	121034.0	13045.1	9.3
8.40	5.56	122308.4	13136.7	9.3
8.45	5.61	123582.8	13228.4	9.3
8.50	5.66	124857.3	13320.1	9.4
8.55	5.71	126131.7	13411.8	9.4
8.60	5.76	127406.1	13503.5	9.4
8.65	5.81	128680.5	13595.1	9.5
8.70	5.86	129955.0	13686.8	9.5
8.75	5.91	131229.4	13778.5	9.5
8.80	5.96	132503.8	13870.2	9.6
8.85	6.01	133778.3	13961.8	9.6
8.90	6.06	135052.7	14053.5	9.6
8.95	6.11	136327.1	14145.2	9.6
9.00	6.16	137601.6	14236.9	9.7
9.05	6.21	138876.0	14328.5	9.7
9.10	6.26	140150.4	14420.2	9.7
9.15	6.31	141424.9	14511.9	9.7
9.20	6.36	142699.3	14603.6	9.8
9.25	6.41	143973.7	14695.2	9.8
9.30	6.46	145248.1	14786.9	9.8
9.35	6.51	146522.6	14878.6	9.8
9.40	6.56	147797.0	14970.3	9.9
9.45	6.61	149071.4	15061.9	9.9
9.50	6.66	150345.9	15153.6	9.9
9.55	6.71	151620.3	15245.3	9.9
9.60	6.76	152894.7	15337.0	10.0
9.65	6.81	154169.2	15428.6	10.0
9.70	6.86	155443.6	15520.3	10.0
9.75	6.91	156718.0	15612.0	10.0
9.80	6.96	157992.4	15703.7	10.1
9.85	7.01	159266.9	15795.4	10.1
9.90	7.06	160541.3	15887.0	10.1
9.95	7.11	161815.7	15978.7	10.1
10.00	7.16	163090.2	16070.4	10.1

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.05	7.21	164364.6	16162.1	10.2
10.10	7.26	165639.0	16253.7	10.2
10.15	7.31	166913.5	16345.4	10.2
10.20	7.36	168187.9	16437.1	10.2
10.25	7.41	169462.3	16528.8	10.3
10.30	7.46	170736.8	16620.4	10.3
10.35	7.51	172011.2	16712.1	10.3
10.40	7.56	173285.6	16803.8	10.3
10.45	7.61	174560.0	16895.5	10.3
10.50	7.66	175834.5	16987.1	10.4
10.55	7.71	177108.9	17078.8	10.4
10.60	7.76	178383.3	17170.5	10.4
10.65	7.81	179657.8	17262.2	10.4
10.70	7.86	180932.2	17353.8	10.4
10.75	7.91	182206.6	17445.5	10.4
10.80	7.96	183481.1	17537.2	10.5
10.85	8.01	184755.5	17628.9	10.5
10.90	8.06	186029.9	17720.6	10.5
10.95	8.11	187304.3	17812.2	10.5
11.00	8.16	188578.8	17903.9	10.5
11.05	8.21	189853.2	17995.6	10.5
11.10	8.26	191127.6	18087.3	10.6
11.15	8.31	192402.1	18178.9	10.6
11.20	8.36	193676.5	18270.6	10.6
11.25	8.41	194950.9	18362.3	10.6
11.30	8.46	196225.4	18454.0	10.6
11.35	8.51	197499.8	18545.6	10.6
11.40	8.56	198774.2	18637.3	10.7
11.45	8.61	200048.7	18729.0	10.7
11.50	8.66	201323.1	18820.7	10.7
11.55	8.71	202597.5	18912.3	10.7
11.60	8.76	203871.9	19004.0	10.7
11.65	8.81	205146.4	19095.7	10.7
11.70	8.86	206420.8	19187.4	10.8
11.75	8.91	207695.2	19279.0	10.8
11.80	8.96	208969.7	19370.7	10.8

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.85	9.01	210244.1	19462.4	10.8
11.90	9.06	211518.5	19554.1	10.8
11.95	9.11	212793.0	19645.8	10.8
12.00	9.16	214067.4	19737.4	10.8
12.05	9.21	215341.8	19829.1	10.9
12.10	9.26	216616.2	19920.8	10.9
12.15	9.31	217890.7	20012.5	10.9
12.20	9.36	219165.1	20104.1	10.9
12.25	9.41	220439.5	20195.8	10.9
12.30	9.46	221714.0	20287.5	10.9
12.35	9.51	222988.4	20379.2	10.9
12.40	9.56	224262.8	20470.8	11.0
12.45	9.61	225537.3	20562.5	11.0
12.50	9.66	226811.7	20654.2	11.0
12.55	9.71	228086.1	20745.9	11.0
12.60	9.76	229360.6	20837.5	11.0
12.65	9.81	230635.0	20929.2	11.0
12.70	9.86	231909.4	21020.9	11.0
12.75	9.91	233183.8	21112.6	11.0
12.80	9.96	234458.3	21204.2	11.1
12.85	10.01	235732.7	21295.9	11.1
12.90	10.06	237007.1	21387.6	11.1
12.95	10.11	238281.6	21479.3	11.1
13.00	10.16	239556.0	21571.0	11.1
13.05	10.21	240830.4	21662.6	11.1
13.10	10.26	242104.9	21754.3	11.1
13.15	10.31	243379.3	21846.0	11.1
13.20	10.36	244653.7	21937.7	11.2
13.25	10.41	245928.1	22029.3	11.2
13.30	10.46	247202.6	22121.0	11.2
13.35	10.51	248477.0	22212.7	11.2
13.40	10.56	249751.4	22304.4	11.2
13.45	10.61	251025.9	22396.0	11.2
13.50	10.66	252300.3	22487.7	11.2
13.55	10.71	253574.7	22579.4	11.2
13.60	10.76	254849.2	22671.1	11.2

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.65	10.81	256123.6	22762.7	11.3
13.70	10.86	257398.0	22854.4	11.3
13.75	10.91	258672.5	22946.1	11.3
13.80	10.96	259946.9	23037.8	11.3
13.85	11.01	261221.3	23129.4	11.3
13.90	11.06	262495.7	23221.1	11.3
13.95	11.11	263770.2	23312.8	11.3
14.00	11.16	265044.6	23404.5	11.3
14.05	11.21	266319.0	23496.2	11.3
14.10	11.26	267593.5	23587.8	11.3
14.15	11.31	268867.9	23679.5	11.4
14.20	11.36	270142.3	23771.2	11.4
14.25	11.41	271416.8	23862.9	11.4
14.30	11.46	272691.2	23954.5	11.4
14.35	11.51	273965.6	24046.2	11.4
14.40	11.56	275240.0	24137.9	11.4
14.45	11.61	276514.5	24229.6	11.4
14.50	11.66	277788.9	24321.2	11.4
14.55	11.71	279063.3	24412.9	11.4
14.60	11.76	280337.8	24504.6	11.4
14.65	11.81	281612.2	24596.3	11.4
14.70	11.86	282886.6	24687.9	11.5
14.75	11.91	284161.1	24779.6	11.5
14.80	11.96	285435.5	24871.3	11.5
14.85	12.01	286709.9	24963.0	11.5
14.90	12.06	287984.4	25054.6	11.5
14.95	12.11	289258.8	25146.3	11.5
15.00	12.16	290533.2	25238.0	11.5
15.05	12.21	291807.6	25329.7	11.5
15.10	12.26	293082.1	25421.4	11.5
15.15	12.31	294356.5	25513.0	11.5
15.20	12.36	295630.9	25604.7	11.5
15.25	12.41	296905.4	25696.4	11.6
15.30	12.46	298179.8	25788.1	11.6
15.35	12.51	299454.2	25879.7	11.6
15.40	12.56	300728.7	25971.4	11.6

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.45	12.61	302003.1	26063.1	11.6
15.50	12.66	303277.5	26154.8	11.6
15.55	12.71	304551.9	26246.4	11.6
15.60	12.76	305826.4	26338.1	11.6
15.65	12.81	307100.8	26429.8	11.6
15.70	12.86	308375.2	26521.5	11.6
15.75	12.91	309649.7	26613.1	11.6
15.80	12.96	310924.1	26704.8	11.6
15.85	13.01	312198.5	26796.5	11.7
15.90	13.06	313473.0	26888.2	11.7
15.95	13.11	314747.4	26979.8	11.7
16.00	13.16	316021.8	27071.5	11.7
16.05	13.21	317296.2	27163.2	11.7
16.10	13.26	318570.7	27254.9	11.7
16.15	13.31	319845.1	27346.6	11.7
16.20	13.36	321119.5	27438.2	11.7
16.25	13.41	322394.0	27529.9	11.7
16.30	13.46	323668.4	27621.6	11.7
16.35	13.51	324942.8	27713.3	11.7
16.40	13.56	326217.3	27804.9	11.7
16.45	13.61	327491.7	27896.6	11.7
16.50	13.66	328766.1	27988.3	11.7
16.55	13.71	330040.6	28080.0	11.8
16.60	13.76	331315.0	28171.6	11.8
16.65	13.81	332589.4	28263.3	11.8
16.70	13.86	333863.8	28355.0	11.8
16.75	13.91	335138.3	28446.7	11.8
16.80	13.96	336412.7	28538.3	11.8
16.85	14.01	337687.1	28630.0	11.8
16.90	14.06	338961.6	28721.7	11.8
16.95	14.11	340236.0	28813.4	11.8
17.00	14.16	341510.4	28905.0	11.8
17.05	14.21	342784.9	28996.7	11.8
17.10	14.26	344059.3	29088.4	11.8
17.15	14.31	345333.7	29180.1	11.8
17.20	14.36	346608.1	29271.8	11.8

Table C.5 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.25	14.41	347882.6	29363.4	11.8
17.30	14.46	349157.0	29455.1	11.9
17.35	14.51	350431.4	29546.8	11.9
17.40	14.56	351705.9	29638.5	11.9
17.45	14.61	352980.3	29730.1	11.9
17.50	14.66	354254.7	29821.8	11.9
17.55	14.71	355529.2	29913.5	11.9
17.60	14.76	356803.6	30005.2	11.9
17.65	14.81	358078.0	30096.8	11.9
17.70	14.86	359352.5	30188.5	11.9
17.75	14.91	360626.9	30280.2	11.9
17.80	14.96	361901.3	30371.9	11.9
17.85	15.01	363175.7	30463.5	11.9
17.90	15.06	364450.2	30555.2	11.9
17.95	15.11	365724.6	30646.9	11.9
18.00	15.16	366999.0	30738.6	11.9
18.05	15.21	368273.5	30830.2	11.9
18.10	15.26	369547.9	30921.9	12.0
18.15	15.31	370822.3	31013.6	12.0
18.20	15.36	372096.8	31105.3	12.0
18.25	15.41	373371.2	31196.9	12.0
18.30	15.46	374645.6	31288.6	12.0
18.35	15.51	375920.0	31380.3	12.0
18.40	15.56	377194.5	31472.0	12.0
18.45	15.61	378468.9	31563.7	12.0
18.50	15.66	379743.3	31655.3	12.0
18.55	15.71	381017.8	31747.0	12.0

Table C.6 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.20	0.01	7030.4	373.9	18.8
3.25	0.06	7295.8	383.8	19.0
3.30	0.11	7553.2	393.8	19.2
3.35	0.16	7822.9	403.7	19.4
3.40	0.21	8252.2	413.6	20.0
3.45	0.26	8539.3	423.6	20.2
3.50	0.31	8813.7	433.5	20.3
3.55	0.36	9091.5	443.5	20.5
3.60	0.41	9431.6	453.4	20.8
3.65	0.46	9896.4	463.4	21.4
3.70	0.51	10288.7	473.4	21.7
3.75	0.56	10590.9	483.4	21.9
3.80	0.61	10923.8	493.4	22.1
3.85	0.66	11303.3	503.4	22.5
3.90	0.71	11622.0	513.4	22.6
3.95	0.76	11943.7	523.4	22.8
4.00	0.81	12269.1	533.4	23.0
4.05	0.86	12598.1	543.4	23.2
4.10	0.91	12931.1	553.4	23.4
4.15	0.96	13268.5	563.4	23.6
4.20	1.01	13611.3	573.4	23.7
4.25	1.06	13961.7	583.4	23.9
4.30	1.11	14320.9	593.4	24.1
4.35	1.16	14686.3	603.4	24.3
4.40	1.21	15058.1	613.4	24.5
4.45	1.26	15435.9	623.4	24.8
4.50	1.31	15823.9	633.4	25.0
4.55	1.36	16241.5	643.4	25.2
4.60	1.41	16654.9	653.4	25.5
4.65	1.46	17064.0	663.4	25.7
4.70	1.51	17568.9	673.5	26.1
4.75	1.56	17997.2	683.5	26.3
4.80	1.61	18434.6	693.5	26.6
4.85	1.66	18891.0	703.5	26.9
4.90	1.71	19346.4	713.5	27.1
4.95	1.76	19809.9	723.5	27.4

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.00	1.81	20280.3	733.5	27.6
5.05	1.86	20804.8	743.5	28.0
5.10	1.91	21291.3	753.5	28.3
5.15	1.96	21785.6	763.5	28.5
5.20	2.01	22287.9	773.5	28.8
5.25	2.06	22797.6	783.5	29.1
5.30	2.11	23314.0	793.5	29.4
5.35	2.16	23841.6	803.5	29.7
5.40	2.21	24388.6	813.5	30.0
5.45	2.26	24921.4	823.5	30.3
5.50	2.31	25458.7	833.5	30.5
5.55	2.36	26000.3	843.5	30.8
5.60	2.41	26545.7	853.5	31.1
5.65	2.46	27094.6	863.5	31.4
5.70	2.51	27646.7	873.5	31.6
5.75	2.56	28202.5	883.5	31.9
5.80	2.61	28761.2	893.6	32.2
5.85	2.66	29321.6	903.6	32.5
5.90	2.71	29883.3	913.6	32.7
5.95	2.76	30446.0	923.6	33.0
6.00	2.81	31009.4	933.6	33.2
6.05	2.86	31573.8	943.6	33.5
6.10	2.91	32139.4	953.6	33.7
6.15	2.96	32705.7	963.6	33.9
6.20	3.01	33273.1	973.6	34.2
6.25	3.06	33841.5	983.6	34.4
6.30	3.11	34410.5	993.6	34.6
6.35	3.16	34980.0	1003.6	34.9
6.40	3.21	35549.7	1013.6	35.1
6.45	3.26	36119.5	1023.6	35.3
6.50	3.31	36689.4	1033.6	35.5
6.55	3.36	37259.4	1043.6	35.7
6.60	3.41	37829.4	1053.6	35.9
6.65	3.46	38399.4	1063.6	36.1
6.70	3.51	38969.4	1073.6	36.3
6.75	3.56	39539.3	1083.6	36.5

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.80	3.61	40109.3	1093.6	36.7
6.85	3.66	40679.3	1103.6	36.9
6.90	3.71	41249.3	1113.7	37.0
6.95	3.76	41819.3	1123.7	37.2
7.00	3.81	42389.3	1133.7	37.4
7.05	3.86	42959.3	1143.7	37.6
7.10	3.91	43529.3	1153.7	37.7
7.15	3.96	44099.3	1163.7	37.9
7.20	4.01	44669.3	1173.7	38.1
7.25	4.06	45239.3	1183.7	38.2
7.30	4.11	45809.3	1193.7	38.4
7.35	4.16	46379.3	1203.7	38.5
7.40	4.21	46949.3	1213.7	38.7
7.45	4.26	47519.3	1223.7	38.8
7.50	4.31	48089.3	1233.7	39.0
7.55	4.36	48659.3	1243.7	39.1
7.60	4.41	49229.3	1253.7	39.3
7.65	4.46	49799.3	1263.7	39.4
7.70	4.51	50369.3	1273.7	39.5
7.75	4.56	50939.3	1283.7	39.7
7.80	4.61	51509.3	1293.7	39.8
7.85	4.66	52079.3	1303.7	39.9
7.90	4.71	52649.3	1313.7	40.1
7.95	4.76	53219.2	1323.7	40.2
8.00	4.81	53789.2	1333.8	40.3
8.05	4.86	54359.2	1343.8	40.5
8.10	4.91	54929.2	1353.8	40.6
8.15	4.96	55499.2	1363.8	40.7
8.20	5.01	56069.2	1373.8	40.8
8.25	5.06	56639.2	1383.8	40.9
8.30	5.11	57209.2	1393.8	41.0
8.35	5.16	57779.2	1403.8	41.2
8.40	5.21	58349.2	1413.8	41.3
8.45	5.26	58919.2	1423.8	41.4
8.50	5.31	59489.2	1433.8	41.5
8.55	5.36	60059.2	1443.8	41.6

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.60	5.41	60629.2	1453.8	41.7
8.65	5.46	61199.2	1463.8	41.8
8.70	5.51	61769.2	1473.8	41.9
8.75	5.56	62339.2	1483.8	42.0
8.80	5.61	62909.2	1493.8	42.1
8.85	5.66	63479.2	1503.8	42.2
8.90	5.71	64049.2	1513.8	42.3
8.95	5.76	64619.2	1523.8	42.4
9.00	5.81	65189.2	1533.8	42.5
9.05	5.86	65759.2	1543.8	42.6
9.10	5.91	66329.2	1553.9	42.7
9.15	5.96	66899.1	1563.9	42.8
9.20	6.01	67469.1	1573.9	42.9
9.25	6.06	68039.1	1583.9	43.0
9.30	6.11	68609.1	1593.9	43.0
9.35	6.16	69179.1	1603.9	43.1
9.40	6.21	69749.1	1613.9	43.2
9.45	6.26	70319.1	1623.9	43.3
9.50	6.31	70889.1	1633.9	43.4
9.55	6.36	71459.1	1643.9	43.5
9.60	6.41	72029.1	1653.9	43.6
9.65	6.46	72599.1	1663.9	43.6
9.70	6.51	73169.1	1673.9	43.7
9.75	6.56	73739.1	1683.9	43.8
9.80	6.61	74309.1	1693.9	43.9
9.85	6.66	74879.1	1703.9	43.9
9.90	6.71	75449.1	1713.9	44.0
9.95	6.76	76019.1	1723.9	44.1
10.00	6.81	76589.1	1733.9	44.2
10.05	6.86	77159.1	1743.9	44.2
10.10	6.91	77729.1	1753.9	44.3
10.15	6.96	78299.1	1763.9	44.4
10.20	7.01	78869.1	1774.0	44.5
10.25	7.06	79439.1	1784.0	44.5
10.30	7.11	80009.1	1794.0	44.6
10.35	7.16	80579.0	1804.0	44.7

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.40	7.21	81149.0	1814.0	44.7
10.45	7.26	81719.0	1824.0	44.8
10.50	7.31	82289.0	1834.0	44.9
10.55	7.36	82859.0	1844.0	44.9
10.60	7.41	83429.0	1854.0	45.0
10.65	7.46	83999.0	1864.0	45.1
10.70	7.51	84569.0	1874.0	45.1
10.75	7.56	85139.0	1884.0	45.2
10.80	7.61	85709.0	1894.0	45.3
10.85	7.66	86279.0	1904.0	45.3
10.90	7.71	86849.0	1914.0	45.4
10.95	7.76	87419.0	1924.0	45.4
11.00	7.81	87989.0	1934.0	45.5
11.05	7.86	88559.0	1944.0	45.6
11.10	7.91	89129.0	1954.0	45.6
11.15	7.96	89699.0	1964.0	45.7
11.20	8.01	90269.0	1974.0	45.7
11.25	8.06	90839.0	1984.0	45.8
11.30	8.11	91409.0	1994.1	45.8
11.35	8.16	91979.0	2004.1	45.9
11.40	8.21	92549.0	2014.1	46.0
11.45	8.26	93119.0	2024.1	46.0
11.50	8.31	93689.0	2034.1	46.1
11.55	8.36	94258.9	2044.1	46.1
11.60	8.41	94828.9	2054.1	46.2
11.65	8.46	95398.9	2064.1	46.2
11.70	8.51	95968.9	2074.1	46.3
11.75	8.56	96538.9	2084.1	46.3
11.80	8.61	97108.9	2094.1	46.4
11.85	8.66	97678.9	2104.1	46.4
11.90	8.71	98248.9	2114.1	46.5
11.95	8.76	98818.9	2124.1	46.5
12.00	8.81	99388.9	2134.1	46.6
12.05	8.86	99958.9	2144.1	46.6
12.10	8.91	100528.9	2154.1	46.7
12.15	8.96	101098.9	2164.1	46.7

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.20	9.01	101668.9	2174.1	46.8
12.25	9.06	102238.9	2184.1	46.8
12.30	9.11	102808.9	2194.1	46.9
12.35	9.16	103378.9	2204.2	46.9
12.40	9.21	103948.9	2214.2	46.9
12.45	9.26	104518.9	2224.2	47.0
12.50	9.31	105088.9	2234.2	47.0
12.55	9.36	105658.9	2244.2	47.1
12.60	9.41	106228.9	2254.2	47.1
12.65	9.46	106798.9	2264.2	47.2
12.70	9.51	107368.9	2274.2	47.2
12.75	9.56	107938.9	2284.2	47.3
12.80	9.61	108508.8	2294.2	47.3
12.85	9.66	109078.8	2304.2	47.3
12.90	9.71	109648.8	2314.2	47.4
12.95	9.76	110218.8	2324.2	47.4
13.00	9.81	110788.8	2334.2	47.5
13.05	9.86	111358.8	2344.2	47.5
13.10	9.91	111928.8	2354.2	47.5
13.15	9.96	112498.8	2364.2	47.6
13.20	10.01	113068.8	2374.2	47.6
13.25	10.06	113638.8	2384.2	47.7
13.30	10.11	114208.8	2394.2	47.7
13.35	10.16	114778.8	2404.2	47.7
13.40	10.21	115348.8	2414.2	47.8
13.45	10.26	115918.8	2424.3	47.8
13.50	10.31	116488.8	2434.3	47.9
13.55	10.36	117058.8	2444.3	47.9
13.60	10.41	117628.8	2454.3	47.9
13.65	10.46	118198.8	2464.3	48.0
13.70	10.51	118768.8	2474.3	48.0
13.75	10.56	119338.8	2484.3	48.0
13.80	10.61	119908.8	2494.3	48.1
13.85	10.66	120478.8	2504.3	48.1
13.90	10.71	121048.8	2514.3	48.1
13.95	10.76	121618.8	2524.3	48.2

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.00	10.81	122188.7	2534.3	48.2
14.05	10.86	122758.7	2544.3	48.2
14.10	10.91	123328.7	2554.3	48.3
14.15	10.96	123898.7	2564.3	48.3
14.20	11.01	124468.7	2574.3	48.4
14.25	11.06	125038.7	2584.3	48.4
14.30	11.11	125608.7	2594.3	48.4
14.35	11.16	126178.7	2604.3	48.4
14.40	11.21	126748.7	2614.3	48.5
14.45	11.26	127318.7	2624.3	48.5
14.50	11.31	127888.7	2634.3	48.5
14.55	11.36	128458.7	2644.4	48.6
14.60	11.41	129028.7	2654.4	48.6
14.65	11.46	129598.7	2664.4	48.6
14.70	11.51	130168.7	2674.4	48.7
14.75	11.56	130738.7	2684.4	48.7
14.80	11.61	131308.7	2694.4	48.7
14.85	11.66	131878.7	2704.4	48.8
14.90	11.71	132448.7	2714.4	48.8
14.95	11.76	133018.7	2724.4	48.8
15.00	11.81	133588.7	2734.4	48.9
15.05	11.86	134158.7	2744.4	48.9
15.10	11.91	134728.7	2754.4	48.9
15.15	11.96	135298.7	2764.4	48.9
15.20	12.01	135868.6	2774.4	49.0
15.25	12.06	136438.6	2784.4	49.0
15.30	12.11	137008.6	2794.4	49.0
15.35	12.16	137578.6	2804.4	49.1
15.40	12.21	138148.6	2814.4	49.1
15.45	12.26	138718.6	2824.4	49.1
15.50	12.31	139288.6	2834.4	49.1
15.55	12.36	139858.6	2844.4	49.2
15.60	12.41	140428.6	2854.4	49.2
15.65	12.46	140998.6	2864.5	49.2
15.70	12.51	141568.6	2874.5	49.3
15.75	12.56	142138.6	2884.5	49.3

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.80	12.61	142708.6	2894.5	49.3
15.85	12.66	143278.6	2904.5	49.3
15.90	12.71	143848.6	2914.5	49.4
15.95	12.76	144418.6	2924.5	49.4
16.00	12.81	144988.6	2934.5	49.4
16.05	12.86	145558.6	2944.5	49.4
16.10	12.91	146128.6	2954.5	49.5
16.15	12.96	146698.6	2964.5	49.5
16.20	13.01	147268.6	2974.5	49.5
16.25	13.06	147838.6	2984.5	49.5
16.30	13.11	148408.6	2994.5	49.6
16.35	13.16	148978.6	3004.5	49.6
16.40	13.21	149548.5	3014.5	49.6
16.45	13.26	150118.5	3024.5	49.6
16.50	13.31	150688.5	3034.5	49.7
16.55	13.36	151258.5	3044.5	49.7
16.60	13.41	151828.5	3054.5	49.7
16.65	13.46	152398.5	3064.5	49.7
16.70	13.51	152968.5	3074.5	49.8
16.75	13.56	153538.5	3084.6	49.8
16.80	13.61	154108.5	3094.6	49.8
16.85	13.66	154678.5	3104.6	49.8
16.90	13.71	155248.5	3114.6	49.8
16.95	13.76	155818.5	3124.6	49.9
17.00	13.81	156388.5	3134.6	49.9
17.05	13.86	156958.5	3144.6	49.9
17.10	13.91	157528.5	3154.6	49.9
17.15	13.96	158098.5	3164.6	50.0
17.20	14.01	158668.5	3174.6	50.0
17.25	14.06	159238.5	3184.6	50.0
17.30	14.11	159808.5	3194.6	50.0
17.35	14.16	160378.5	3204.6	50.0
17.40	14.21	160948.5	3214.6	50.1
17.45	14.26	161518.5	3224.6	50.1
17.50	14.31	162088.5	3234.6	50.1
17.55	14.36	162658.5	3244.6	50.1

Table C.6 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Inuvik Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.60	14.41	163228.4	3254.6	50.2
17.65	14.46	163798.4	3264.6	50.2
17.70	14.51	164368.4	3274.6	50.2
17.75	14.56	164938.4	3284.6	50.2
17.80	14.61	165508.4	3294.6	50.2
17.85	14.66	166078.4	3304.7	50.3
17.90	14.71	166648.4	3314.7	50.3
17.95	14.76	167218.4	3324.7	50.3
18.00	14.81	167788.4	3334.7	50.3
18.05	14.86	168358.4	3344.7	50.3
18.10	14.91	168928.4	3354.7	50.4
18.15	14.96	169498.4	3364.7	50.4
18.20	15.01	170068.4	3374.7	50.4
18.25	15.06	170638.4	3384.7	50.4
18.30	15.11	171208.4	3394.7	50.4
18.35	15.16	171778.4	3404.7	50.5
18.40	15.21	172348.4	3414.7	50.5
18.45	15.26	172918.4	3424.7	50.5
18.50	15.31	173488.4	3434.7	50.5
18.55	15.36	174058.4	3444.7	50.5

Table C.7 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
1.65	0.01	5598.1	458.6	12.2
1.70	0.06	6019.5	479.5	12.6
1.75	0.11	6413.2	500.5	12.8
1.80	0.16	6806.0	521.5	13.1
1.85	0.21	7234.1	542.4	13.3
1.90	0.26	7632.4	563.4	13.5
1.95	0.31	8069.6	584.4	13.8
2.00	0.36	8588.9	605.5	14.2
2.05	0.41	9220.5	626.5	14.7
2.10	0.46	9698.6	647.5	15.0
2.15	0.51	10178.8	668.6	15.2
2.20	0.56	10752.4	689.6	15.6
2.25	0.61	11244.5	710.7	15.8
2.30	0.66	11762.3	731.8	16.1
2.35	0.71	12270.2	752.9	16.3
2.40	0.76	12790.1	774.0	16.5
2.45	0.81	13313.1	795.1	16.7
2.50	0.86	13880.0	816.2	17.0
2.55	0.91	14421.9	837.3	17.2
2.60	0.96	14963.6	858.4	17.4
2.65	1.01	15639.4	879.5	17.8
2.70	1.06	16226.4	900.6	18.0
2.75	1.11	16863.5	921.8	18.3
2.80	1.16	17452.7	942.9	18.5
2.85	1.21	18062.0	964.0	18.7
2.90	1.26	18669.9	985.1	19.0
2.95	1.31	19289.6	1006.2	19.2
3.00	1.36	19954.2	1027.4	19.4
3.05	1.41	20607.2	1048.5	19.7
3.10	1.46	21273.4	1069.6	19.9
3.15	1.51	21961.0	1090.7	20.1
3.20	1.56	22647.9	1111.8	20.4
3.25	1.61	23347.5	1133.0	20.6
3.30	1.66	24069.5	1154.1	20.9
3.35	1.71	24802.9	1175.2	21.1
3.40	1.76	25593.3	1196.4	21.4

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.45	1.81	26348.3	1217.5	21.6
3.50	1.86	27112.8	1238.6	21.9
3.55	1.91	27886.8	1259.7	22.1
3.60	1.96	28670.8	1280.9	22.4
3.65	2.01	29464.3	1302.0	22.6
3.70	2.06	30267.0	1323.1	22.9
3.75	2.11	31079.2	1344.3	23.1
3.80	2.16	31900.4	1365.4	23.4
3.85	2.21	32729.4	1386.6	23.6
3.90	2.26	33565.2	1407.7	23.8
3.95	2.31	34408.5	1428.8	24.1
4.00	2.36	35262.1	1450.0	24.3
4.05	2.41	36124.2	1471.1	24.6
4.10	2.46	36993.6	1492.2	24.8
4.15	2.51	37869.3	1513.4	25.0
4.20	2.56	38750.8	1534.5	25.3
4.25	2.61	39638.4	1555.6	25.5
4.30	2.66	40531.4	1576.8	25.7
4.35	2.71	41428.5	1597.9	25.9
4.40	2.76	42330.1	1619.0	26.1
4.45	2.81	43236.1	1640.2	26.4
4.50	2.86	44145.5	1661.3	26.6
4.55	2.91	45058.0	1682.4	26.8
4.60	2.96	45972.6	1703.6	27.0
4.65	3.01	46888.8	1724.7	27.2
4.70	3.06	47806.5	1745.9	27.4
4.75	3.11	48725.2	1767.0	27.6
4.80	3.16	49644.6	1788.1	27.8
4.85	3.21	50564.6	1809.3	27.9
4.90	3.26	51484.9	1830.4	28.1
4.95	3.31	52405.4	1851.5	28.3
5.00	3.36	53326.1	1872.7	28.5
5.05	3.41	54247.1	1893.8	28.6
5.10	3.46	55168.4	1914.9	28.8
5.15	3.51	56089.7	1936.1	29.0
5.20	3.56	57011.2	1957.2	29.1

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.25	3.61	57932.8	1978.3	29.3
5.30	3.66	58854.4	1999.5	29.4
5.35	3.71	59776.0	2020.6	29.6
5.40	3.76	60697.6	2041.8	29.7
5.45	3.81	61619.3	2062.9	29.9
5.50	3.86	62540.9	2084.0	30.0
5.55	3.91	63462.5	2105.2	30.1
5.60	3.96	64384.2	2126.3	30.3
5.65	4.01	65305.8	2147.4	30.4
5.70	4.06	66227.4	2168.6	30.5
5.75	4.11	67149.1	2189.7	30.7
5.80	4.16	68070.7	2210.8	30.8
5.85	4.21	68992.3	2232.0	30.9
5.90	4.26	69914.0	2253.1	31.0
5.95	4.31	70835.6	2274.2	31.1
6.00	4.36	71757.2	2295.4	31.3
6.05	4.41	72678.9	2316.5	31.4
6.10	4.46	73600.5	2337.7	31.5
6.15	4.51	74522.1	2358.8	31.6
6.20	4.56	75443.8	2379.9	31.7
6.25	4.61	76365.4	2401.1	31.8
6.30	4.66	77287.0	2422.2	31.9
6.35	4.71	78208.7	2443.3	32.0
6.40	4.76	79130.3	2464.5	32.1
6.45	4.81	80051.9	2485.6	32.2
6.50	4.86	80973.6	2506.7	32.3
6.55	4.91	81895.2	2527.9	32.4
6.60	4.96	82816.8	2549.0	32.5
6.65	5.01	83738.5	2570.1	32.6
6.70	5.06	84660.1	2591.3	32.7
6.75	5.11	85581.7	2612.4	32.8
6.80	5.16	86503.4	2633.5	32.8
6.85	5.21	87425.0	2654.7	32.9
6.90	5.26	88346.6	2675.8	33.0
6.95	5.31	89268.3	2697.0	33.1
7.00	5.36	90189.9	2718.1	33.2

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.05	5.41	91111.5	2739.2	33.3
7.10	5.46	92033.1	2760.4	33.3
7.15	5.51	92954.8	2781.5	33.4
7.20	5.56	93876.4	2802.6	33.5
7.25	5.61	94798.0	2823.8	33.6
7.30	5.66	95719.7	2844.9	33.6
7.35	5.71	96641.3	2866.0	33.7
7.40	5.76	97562.9	2887.2	33.8
7.45	5.81	98484.6	2908.3	33.9
7.50	5.86	99406.2	2929.4	33.9
7.55	5.91	100327.8	2950.6	34.0
7.60	5.96	101249.5	2971.7	34.1
7.65	6.01	102171.1	2992.9	34.1
7.70	6.06	103092.7	3014.0	34.2
7.75	6.11	104014.4	3035.1	34.3
7.80	6.16	104936.0	3056.3	34.3
7.85	6.21	105857.6	3077.4	34.4
7.90	6.26	106779.3	3098.5	34.5
7.95	6.31	107700.9	3119.7	34.5
8.00	6.36	108622.5	3140.8	34.6
8.05	6.41	109544.2	3161.9	34.6
8.10	6.46	110465.8	3183.1	34.7
8.15	6.51	111387.4	3204.2	34.8
8.20	6.56	112309.1	3225.3	34.8
8.25	6.61	113230.7	3246.5	34.9
8.30	6.66	114152.3	3267.6	34.9
8.35	6.71	115074.0	3288.8	35.0
8.40	6.76	115995.6	3309.9	35.0
8.45	6.81	116917.2	3331.0	35.1
8.50	6.86	117838.9	3352.2	35.2
8.55	6.91	118760.5	3373.3	35.2
8.60	6.96	119682.1	3394.4	35.3
8.65	7.01	120603.8	3415.6	35.3
8.70	7.06	121525.4	3436.7	35.4
8.75	7.11	122447.0	3457.8	35.4
8.80	7.16	123368.7	3479.0	35.5

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.85	7.21	124290.3	3500.1	35.5
8.90	7.26	125211.9	3521.2	35.6
8.95	7.31	126133.5	3542.4	35.6
9.00	7.36	127055.2	3563.5	35.7
9.05	7.41	127976.8	3584.6	35.7
9.10	7.46	128898.4	3605.8	35.7
9.15	7.51	129820.1	3626.9	35.8
9.20	7.56	130741.7	3648.1	35.8
9.25	7.61	131663.3	3669.2	35.9
9.30	7.66	132585.0	3690.3	35.9
9.35	7.71	133506.6	3711.5	36.0
9.40	7.76	134428.2	3732.6	36.0
9.45	7.81	135349.9	3753.7	36.1
9.50	7.86	136271.5	3774.9	36.1
9.55	7.91	137193.1	3796.0	36.1
9.60	7.96	138114.8	3817.1	36.2
9.65	8.01	139036.4	3838.3	36.2
9.70	8.06	139958.0	3859.4	36.3
9.75	8.11	140879.7	3880.5	36.3
9.80	8.16	141801.3	3901.7	36.3
9.85	8.21	142722.9	3922.8	36.4
9.90	8.26	143644.6	3944.0	36.4
9.95	8.31	144566.2	3965.1	36.5
10.00	8.36	145487.8	3986.2	36.5
10.05	8.41	146409.5	4007.4	36.5
10.10	8.46	147331.1	4028.5	36.6
10.15	8.51	148252.7	4049.6	36.6
10.20	8.56	149174.4	4070.8	36.6
10.25	8.61	150096.0	4091.9	36.7
10.30	8.66	151017.6	4113.0	36.7
10.35	8.71	151939.3	4134.2	36.8
10.40	8.76	152860.9	4155.3	36.8
10.45	8.81	153782.5	4176.4	36.8
10.50	8.86	154704.2	4197.6	36.9
10.55	8.91	155625.8	4218.7	36.9
10.60	8.96	156547.4	4239.9	36.9

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.65	9.01	157469.0	4261.0	37.0
10.70	9.06	158390.7	4282.1	37.0
10.75	9.11	159312.3	4303.3	37.0
10.80	9.16	160233.9	4324.4	37.1
10.85	9.21	161155.6	4345.5	37.1
10.90	9.26	162077.2	4366.7	37.1
10.95	9.31	162998.8	4387.8	37.1
11.00	9.36	163920.5	4408.9	37.2
11.05	9.41	164842.1	4430.1	37.2
11.10	9.46	165763.7	4451.2	37.2
11.15	9.51	166685.4	4472.3	37.3
11.20	9.56	167607.0	4493.5	37.3
11.25	9.61	168528.6	4514.6	37.3
11.30	9.66	169450.3	4535.7	37.4
11.35	9.71	170371.9	4556.9	37.4
11.40	9.76	171293.5	4578.0	37.4
11.45	9.81	172215.2	4599.2	37.4
11.50	9.86	173136.8	4620.3	37.5
11.55	9.91	174058.4	4641.4	37.5
11.60	9.96	174980.1	4662.6	37.5
11.65	10.01	175901.7	4683.7	37.6
11.70	10.06	176823.3	4704.8	37.6
11.75	10.11	177745.0	4726.0	37.6
11.80	10.16	178666.6	4747.1	37.6
11.85	10.21	179588.2	4768.2	37.7
11.90	10.26	180509.9	4789.4	37.7
11.95	10.31	181431.5	4810.5	37.7
12.00	10.36	182353.1	4831.6	37.7
12.05	10.41	183274.8	4852.8	37.8
12.10	10.46	184196.4	4873.9	37.8
12.15	10.51	185118.0	4895.1	37.8
12.20	10.56	186039.7	4916.2	37.8
12.25	10.61	186961.3	4937.3	37.9
12.30	10.66	187882.9	4958.5	37.9
12.35	10.71	188804.6	4979.6	37.9
12.40	10.76	189726.2	5000.7	37.9

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.45	10.81	190647.8	5021.9	38.0
12.50	10.86	191569.4	5043.0	38.0
12.55	10.91	192491.1	5064.1	38.0
12.60	10.96	193412.7	5085.3	38.0
12.65	11.01	194334.3	5106.4	38.1
12.70	11.06	195256.0	5127.5	38.1
12.75	11.11	196177.6	5148.7	38.1
12.80	11.16	197099.2	5169.8	38.1
12.85	11.21	198020.9	5191.0	38.1
12.90	11.26	198942.5	5212.1	38.2
12.95	11.31	199864.1	5233.2	38.2
13.00	11.36	200785.8	5254.4	38.2
13.05	11.41	201707.4	5275.5	38.2
13.10	11.46	202629.0	5296.6	38.3
13.15	11.51	203550.7	5317.8	38.3
13.20	11.56	204472.3	5338.9	38.3
13.25	11.61	205393.9	5360.0	38.3
13.30	11.66	206315.6	5381.2	38.3
13.35	11.71	207237.2	5402.3	38.4
13.40	11.76	208158.8	5423.4	38.4
13.45	11.81	209080.5	5444.6	38.4
13.50	11.86	210002.1	5465.7	38.4
13.55	11.91	210923.7	5486.8	38.4
13.60	11.96	211845.4	5508.0	38.5
13.65	12.01	212767.0	5529.1	38.5
13.70	12.06	213688.6	5550.3	38.5
13.75	12.11	214610.3	5571.4	38.5
13.80	12.16	215531.9	5592.5	38.5
13.85	12.21	216453.5	5613.7	38.6
13.90	12.26	217375.2	5634.8	38.6
13.95	12.31	218296.8	5655.9	38.6
14.00	12.36	219218.4	5677.1	38.6
14.05	12.41	220140.1	5698.2	38.6
14.10	12.46	221061.7	5719.3	38.7
14.15	12.51	221983.3	5740.5	38.7
14.20	12.56	222904.9	5761.6	38.7

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.25	12.61	223826.6	5782.7	38.7
14.30	12.66	224748.2	5803.9	38.7
14.35	12.71	225669.8	5825.0	38.7
14.40	12.76	226591.5	5846.2	38.8
14.45	12.81	227513.1	5867.3	38.8
14.50	12.86	228434.7	5888.4	38.8
14.55	12.91	229356.4	5909.6	38.8
14.60	12.96	230278.0	5930.7	38.8
14.65	13.01	231199.6	5951.8	38.8
14.70	13.06	232121.3	5973.0	38.9
14.75	13.11	233042.9	5994.1	38.9
14.80	13.16	233964.5	6015.2	38.9
14.85	13.21	234886.2	6036.4	38.9
14.90	13.26	235807.8	6057.5	38.9
14.95	13.31	236729.4	6078.6	38.9
15.00	13.36	237651.1	6099.8	39.0
15.05	13.41	238572.7	6120.9	39.0
15.10	13.46	239494.3	6142.1	39.0
15.15	13.51	240416.0	6163.2	39.0
15.20	13.56	241337.6	6184.3	39.0
15.25	13.61	242259.2	6205.5	39.0
15.30	13.66	243180.9	6226.6	39.1
15.35	13.71	244102.5	6247.7	39.1
15.40	13.76	245024.1	6268.9	39.1
15.45	13.81	245945.8	6290.0	39.1
15.50	13.86	246867.4	6311.1	39.1
15.55	13.91	247789.0	6332.3	39.1
15.60	13.96	248710.7	6353.4	39.1
15.65	14.01	249632.3	6374.5	39.2
15.70	14.06	250553.9	6395.7	39.2
15.75	14.11	251475.6	6416.8	39.2
15.80	14.16	252397.2	6437.9	39.2
15.85	14.21	253318.8	6459.1	39.2
15.90	14.26	254240.5	6480.2	39.2
15.95	14.31	255162.1	6501.4	39.2
16.00	14.36	256083.7	6522.5	39.3

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.05	14.41	257005.3	6543.6	39.3
16.10	14.46	257927.0	6564.8	39.3
16.15	14.51	258848.6	6585.9	39.3
16.20	14.56	259770.2	6607.0	39.3
16.25	14.61	260691.9	6628.2	39.3
16.30	14.66	261613.5	6649.3	39.3
16.35	14.71	262535.1	6670.4	39.4
16.40	14.76	263456.8	6691.6	39.4
16.45	14.81	264378.4	6712.7	39.4
16.50	14.86	265300.0	6733.8	39.4
16.55	14.91	266221.7	6755.0	39.4
16.60	14.96	267143.3	6776.1	39.4
16.65	15.01	268064.9	6797.3	39.4
16.70	15.06	268986.6	6818.4	39.5
16.75	15.11	269908.2	6839.5	39.5
16.80	15.16	270829.8	6860.7	39.5
16.85	15.21	271751.5	6881.8	39.5
16.90	15.26	272673.1	6902.9	39.5
16.95	15.31	273594.7	6924.1	39.5
17.00	15.36	274516.4	6945.2	39.5
17.05	15.41	275438.0	6966.3	39.5
17.10	15.46	276359.6	6987.5	39.6
17.15	15.51	277281.3	7008.6	39.6
17.20	15.56	278202.9	7029.7	39.6
17.25	15.61	279124.5	7050.9	39.6
17.30	15.66	280046.2	7072.0	39.6
17.35	15.71	280967.8	7093.2	39.6
17.40	15.76	281889.4	7114.3	39.6
17.45	15.81	282811.1	7135.4	39.6
17.50	15.86	283732.7	7156.6	39.6
17.55	15.91	284654.3	7177.7	39.7
17.60	15.96	285576.0	7198.8	39.7
17.65	16.01	286497.6	7220.0	39.7
17.70	16.06	287419.2	7241.1	39.7
17.75	16.11	288340.9	7262.2	39.7
17.80	16.16	289262.5	7283.4	39.7

Table C.7 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Peel Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.85	16.21	290184.1	7304.5	39.7
17.90	16.26	291105.7	7325.6	39.7
17.95	16.31	292027.4	7346.8	39.7
18.00	16.36	292949.0	7367.9	39.8
18.05	16.41	293870.6	7389.0	39.8
18.10	16.46	294792.3	7410.2	39.8
18.15	16.51	295713.9	7431.3	39.8
18.20	16.56	296635.5	7452.5	39.8
18.25	16.61	297557.2	7473.6	39.8
18.30	16.66	298478.8	7494.7	39.8
18.35	16.71	299400.4	7515.9	39.8
18.40	16.76	300322.1	7537.0	39.8
18.45	16.81	301243.7	7558.1	39.9
18.50	16.86	302165.3	7579.3	39.9
18.55	16.91	303087.0	7600.4	39.9

Table C.8 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
2.05	0.04	13679.0	764.4	17.9
2.10	0.09	14309.0	788.1	18.2
2.15	0.14	14919.4	811.8	18.4
2.20	0.19	15521.3	835.4	18.6
2.25	0.24	16262.3	859.1	18.9
2.30	0.29	16895.5	882.8	19.1
2.35	0.34	17530.0	906.5	19.3
2.40	0.39	18189.3	930.3	19.6
2.45	0.44	18846.3	954.0	19.8
2.50	0.49	19632.6	977.7	20.1
2.55	0.54	20313.5	1001.4	20.3
2.60	0.59	21015.3	1025.2	20.5
2.65	0.64	21726.8	1049.0	20.7
2.70	0.69	22463.3	1072.7	20.9
2.75	0.74	23194.8	1096.5	21.2
2.80	0.79	23941.5	1120.3	21.4
2.85	0.84	24706.6	1144.1	21.6
2.90	0.89	25483.6	1167.9	21.8
2.95	0.94	26283.9	1191.6	22.1
3.00	0.99	27091.0	1215.4	22.3
3.05	1.04	27915.0	1239.3	22.5
3.10	1.09	28756.5	1263.1	22.8
3.15	1.14	29615.6	1286.9	23.0
3.20	1.19	30484.6	1310.7	23.3
3.25	1.24	31365.3	1334.5	23.5
3.30	1.29	32259.0	1358.3	23.7
3.35	1.34	33158.6	1382.1	24.0
3.40	1.39	34065.6	1405.9	24.2
3.45	1.44	34978.6	1429.7	24.5
3.50	1.49	35897.7	1453.5	24.7
3.55	1.54	36822.1	1477.4	24.9
3.60	1.59	37751.5	1501.2	25.1
3.65	1.64	38685.5	1525.0	25.4
3.70	1.69	39623.1	1548.8	25.6
3.75	1.74	40563.8	1572.6	25.8
3.80	1.79	41507.2	1596.5	26.0

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.85	1.84	42452.8	1620.3	26.2
3.90	1.89	43400.5	1644.1	26.4
3.95	1.94	44350.0	1667.9	26.6
4.00	1.99	45301.1	1691.8	26.8
4.05	2.04	46253.4	1715.6	27.0
4.10	2.09	47206.7	1739.4	27.1
4.15	2.14	48161.0	1763.3	27.3
4.20	2.19	49116.1	1787.1	27.5
4.25	2.24	50072.0	1810.9	27.7
4.30	2.29	51028.3	1834.7	27.8
4.35	2.34	51985.2	1858.6	28.0
4.40	2.39	52942.3	1882.4	28.1
4.45	2.44	53899.7	1906.2	28.3
4.50	2.49	54857.3	1930.1	28.4
4.55	2.54	55815.2	1953.9	28.6
4.60	2.59	56773.2	1977.7	28.7
4.65	2.64	57731.2	2001.6	28.8
4.70	2.69	58689.4	2025.4	29.0
4.75	2.74	59647.6	2049.2	29.1
4.80	2.79	60605.9	2073.1	29.2
4.85	2.84	61564.2	2096.9	29.4
4.90	2.89	62522.6	2120.7	29.5
4.95	2.94	63481.1	2144.6	29.6
5.00	2.99	64439.6	2168.4	29.7
5.05	3.04	65398.1	2192.2	29.8
5.10	3.09	66356.8	2216.0	29.9
5.15	3.14	67315.5	2239.9	30.1
5.20	3.19	68274.3	2263.7	30.2
5.25	3.24	69233.1	2287.5	30.3
5.30	3.29	70192.0	2311.4	30.4
5.35	3.34	71151.1	2335.2	30.5
5.40	3.39	72110.1	2359.0	30.6
5.45	3.44	73069.3	2382.9	30.7
5.50	3.49	74028.4	2406.7	30.8
5.55	3.54	74987.7	2430.5	30.9
5.60	3.59	75947.0	2454.4	30.9

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.65	3.64	76906.3	2478.2	31.0
5.70	3.69	77865.7	2502.0	31.1
5.75	3.74	78825.1	2525.9	31.2
5.80	3.79	79784.4	2549.7	31.3
5.85	3.84	80743.8	2573.5	31.4
5.90	3.89	81703.1	2597.3	31.5
5.95	3.94	82662.5	2621.2	31.5
6.00	3.99	83621.9	2645.0	31.6
6.05	4.04	84581.2	2668.8	31.7
6.10	4.09	85540.6	2692.7	31.8
6.15	4.14	86499.9	2716.5	31.8
6.20	4.19	87459.3	2740.3	31.9
6.25	4.24	88418.7	2764.2	32.0
6.30	4.29	89378.0	2788.0	32.1
6.35	4.34	90337.4	2811.8	32.1
6.40	4.39	91296.8	2835.7	32.2
6.45	4.44	92256.1	2859.5	32.3
6.50	4.49	93215.5	2883.3	32.3
6.55	4.54	94174.8	2907.2	32.4
6.60	4.59	95134.2	2931.0	32.5
6.65	4.64	96093.6	2954.8	32.5
6.70	4.69	97052.9	2978.6	32.6
6.75	4.74	98012.3	3002.5	32.6
6.80	4.79	98971.7	3026.3	32.7
6.85	4.84	99931.0	3050.1	32.8
6.90	4.89	100890.4	3074.0	32.8
6.95	4.94	101849.7	3097.8	32.9
7.00	4.99	102809.1	3121.6	32.9
7.05	5.04	103768.5	3145.5	33.0
7.10	5.09	104727.8	3169.3	33.0
7.15	5.14	105687.2	3193.1	33.1
7.20	5.19	106646.5	3217.0	33.2
7.25	5.24	107605.9	3240.8	33.2
7.30	5.29	108565.3	3264.6	33.3
7.35	5.34	109524.6	3288.5	33.3
7.40	5.39	110484.0	3312.3	33.4

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.45	5.44	111443.4	3336.1	33.4
7.50	5.49	112402.7	3360.0	33.5
7.55	5.54	113362.1	3383.8	33.5
7.60	5.59	114321.4	3407.6	33.5
7.65	5.64	115280.8	3431.4	33.6
7.70	5.69	116240.2	3455.3	33.6
7.75	5.74	117199.5	3479.1	33.7
7.80	5.79	118158.9	3502.9	33.7
7.85	5.84	119118.3	3526.8	33.8
7.90	5.89	120077.6	3550.6	33.8
7.95	5.94	121037.0	3574.4	33.9
8.00	5.99	121996.3	3598.3	33.9
8.05	6.04	122955.7	3622.1	33.9
8.10	6.09	123915.1	3645.9	34.0
8.15	6.14	124874.4	3669.8	34.0
8.20	6.19	125833.8	3693.6	34.1
8.25	6.24	126793.1	3717.4	34.1
8.30	6.29	127752.5	3741.3	34.1
8.35	6.34	128711.9	3765.1	34.2
8.40	6.39	129671.2	3788.9	34.2
8.45	6.44	130630.6	3812.7	34.3
8.50	6.49	131590.0	3836.6	34.3
8.55	6.54	132549.3	3860.4	34.3
8.60	6.59	133508.7	3884.2	34.4
8.65	6.64	134468.0	3908.1	34.4
8.70	6.69	135427.4	3931.9	34.4
8.75	6.74	136386.8	3955.7	34.5
8.80	6.79	137346.1	3979.6	34.5
8.85	6.84	138305.5	4003.4	34.5
8.90	6.89	139264.9	4027.2	34.6
8.95	6.94	140224.2	4051.1	34.6
9.00	6.99	141183.6	4074.9	34.6
9.05	7.04	142142.9	4098.7	34.7
9.10	7.09	143102.3	4122.6	34.7
9.15	7.14	144061.7	4146.4	34.7
9.20	7.19	145021.0	4170.2	34.8

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.25	7.24	145980.4	4194.0	34.8
9.30	7.29	146939.7	4217.9	34.8
9.35	7.34	147899.1	4241.7	34.9
9.40	7.39	148858.5	4265.5	34.9
9.45	7.44	149817.8	4289.4	34.9
9.50	7.49	150777.2	4313.2	35.0
9.55	7.54	151736.6	4337.0	35.0
9.60	7.59	152695.9	4360.9	35.0
9.65	7.64	153655.3	4384.7	35.0
9.70	7.69	154614.6	4408.5	35.1
9.75	7.74	155574.0	4432.4	35.1
9.80	7.79	156533.4	4456.2	35.1
9.85	7.84	157492.7	4480.0	35.2
9.90	7.89	158452.1	4503.9	35.2
9.95	7.94	159411.5	4527.7	35.2
10.00	7.99	160370.8	4551.5	35.2
10.05	8.04	161330.2	4575.3	35.3
10.10	8.09	162289.5	4599.2	35.3
10.15	8.14	163248.9	4623.0	35.3
10.20	8.19	164208.3	4646.8	35.3
10.25	8.24	165167.6	4670.7	35.4
10.30	8.29	166127.0	4694.5	35.4
10.35	8.34	167086.3	4718.3	35.4
10.40	8.39	168045.7	4742.2	35.4
10.45	8.44	169005.1	4766.0	35.5
10.50	8.49	169964.4	4789.8	35.5
10.55	8.54	170923.8	4813.7	35.5
10.60	8.59	171883.2	4837.5	35.5
10.65	8.64	172842.5	4861.3	35.6
10.70	8.69	173801.9	4885.2	35.6
10.75	8.74	174761.2	4909.0	35.6
10.80	8.79	175720.6	4932.8	35.6
10.85	8.84	176680.0	4956.6	35.6
10.90	8.89	177639.3	4980.5	35.7
10.95	8.94	178598.7	5004.3	35.7
11.00	8.99	179558.1	5028.1	35.7

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.05	9.04	180517.4	5052.0	35.7
11.10	9.09	181476.8	5075.8	35.8
11.15	9.14	182436.1	5099.6	35.8
11.20	9.19	183395.5	5123.5	35.8
11.25	9.24	184354.9	5147.3	35.8
11.30	9.29	185314.2	5171.1	35.8
11.35	9.34	186273.6	5195.0	35.9
11.40	9.39	187232.9	5218.8	35.9
11.45	9.44	188192.3	5242.6	35.9
11.50	9.49	189151.7	5266.5	35.9
11.55	9.54	190111.0	5290.3	35.9
11.60	9.59	191070.4	5314.1	36.0
11.65	9.64	192029.8	5338.0	36.0
11.70	9.69	192989.1	5361.8	36.0
11.75	9.74	193948.5	5385.6	36.0
11.80	9.79	194907.8	5409.4	36.0
11.85	9.84	195867.2	5433.3	36.0
11.90	9.89	196826.6	5457.1	36.1
11.95	9.94	197785.9	5480.9	36.1
12.00	9.99	198745.3	5504.8	36.1
12.05	10.04	199704.7	5528.6	36.1
12.10	10.09	200664.0	5552.4	36.1
12.15	10.14	201623.4	5576.3	36.2
12.20	10.19	202582.7	5600.1	36.2
12.25	10.24	203542.1	5623.9	36.2
12.30	10.29	204501.5	5647.8	36.2
12.35	10.34	205460.8	5671.6	36.2
12.40	10.39	206420.2	5695.4	36.2
12.45	10.44	207379.5	5719.3	36.3
12.50	10.49	208338.9	5743.1	36.3
12.55	10.54	209298.3	5766.9	36.3
12.60	10.59	210257.6	5790.7	36.3
12.65	10.64	211217.0	5814.6	36.3
12.70	10.69	212176.4	5838.4	36.3
12.75	10.74	213135.7	5862.2	36.4
12.80	10.79	214095.1	5886.1	36.4

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.85	10.84	215054.4	5909.9	36.4
12.90	10.89	216013.8	5933.7	36.4
12.95	10.94	216973.2	5957.6	36.4
13.00	10.99	217932.5	5981.4	36.4
13.05	11.04	218891.9	6005.2	36.5
13.10	11.09	219851.3	6029.1	36.5
13.15	11.14	220810.6	6052.9	36.5
13.20	11.19	221770.0	6076.7	36.5
13.25	11.24	222729.3	6100.6	36.5
13.30	11.29	223688.7	6124.4	36.5
13.35	11.34	224648.1	6148.2	36.5
13.40	11.39	225607.4	6172.0	36.6
13.45	11.44	226566.8	6195.9	36.6
13.50	11.49	227526.1	6219.7	36.6
13.55	11.54	228485.5	6243.5	36.6
13.60	11.59	229444.9	6267.4	36.6
13.65	11.64	230404.2	6291.2	36.6
13.70	11.69	231363.6	6315.0	36.6
13.75	11.74	232323.0	6338.9	36.7
13.80	11.79	233282.3	6362.7	36.7
13.85	11.84	234241.7	6386.5	36.7
13.90	11.89	235201.0	6410.4	36.7
13.95	11.94	236160.4	6434.2	36.7
14.00	11.99	237119.8	6458.0	36.7
14.05	12.04	238079.1	6481.9	36.7
14.10	12.09	239038.5	6505.7	36.7
14.15	12.14	239997.9	6529.5	36.8
14.20	12.19	240957.2	6553.3	36.8
14.25	12.24	241916.6	6577.2	36.8
14.30	12.29	242875.9	6601.0	36.8
14.35	12.34	243835.3	6624.8	36.8
14.40	12.39	244794.7	6648.7	36.8
14.45	12.44	245754.0	6672.5	36.8
14.50	12.49	246713.4	6696.3	36.8
14.55	12.54	247672.7	6720.2	36.9
14.60	12.59	248632.1	6744.0	36.9

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.65	12.64	249591.5	6767.8	36.9
14.70	12.69	250550.8	6791.7	36.9
14.75	12.74	251510.2	6815.5	36.9
14.80	12.79	252469.6	6839.3	36.9
14.85	12.84	253428.9	6863.2	36.9
14.90	12.89	254388.3	6887.0	36.9
14.95	12.94	255347.6	6910.8	36.9
15.00	12.99	256307.0	6934.6	37.0
15.05	13.04	257266.4	6958.5	37.0
15.10	13.09	258225.7	6982.3	37.0
15.15	13.14	259185.1	7006.1	37.0
15.20	13.19	260144.5	7030.0	37.0
15.25	13.24	261103.8	7053.8	37.0
15.30	13.29	262063.2	7077.6	37.0
15.35	13.34	263022.5	7101.5	37.0
15.40	13.39	263981.9	7125.3	37.0
15.45	13.44	264941.3	7149.1	37.1
15.50	13.49	265900.6	7173.0	37.1
15.55	13.54	266860.0	7196.8	37.1
15.60	13.59	267819.3	7220.6	37.1
15.65	13.64	268778.7	7244.5	37.1
15.70	13.69	269738.1	7268.3	37.1
15.75	13.74	270697.4	7292.1	37.1
15.80	13.79	271656.8	7316.0	37.1
15.85	13.84	272616.2	7339.8	37.1
15.90	13.89	273575.5	7363.6	37.2
15.95	13.94	274534.9	7387.4	37.2
16.00	13.99	275494.2	7411.3	37.2
16.05	14.04	276453.6	7435.1	37.2
16.10	14.09	277413.0	7458.9	37.2
16.15	14.14	278372.3	7482.8	37.2
16.20	14.19	279331.7	7506.6	37.2
16.25	14.24	280291.1	7530.4	37.2
16.30	14.29	281250.4	7554.3	37.2
16.35	14.34	282209.8	7578.1	37.2
16.40	14.39	283169.1	7601.9	37.2

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.45	14.44	284128.5	7625.8	37.3
16.50	14.49	285087.9	7649.6	37.3
16.55	14.54	286047.2	7673.4	37.3
16.60	14.59	287006.6	7697.3	37.3
16.65	14.64	287966.0	7721.1	37.3
16.70	14.69	288925.3	7744.9	37.3
16.75	14.74	289884.7	7768.7	37.3
16.80	14.79	290844.0	7792.6	37.3
16.85	14.84	291803.4	7816.4	37.3
16.90	14.89	292762.8	7840.2	37.3
16.95	14.94	293722.1	7864.1	37.3
17.00	14.99	294681.5	7887.9	37.4
17.05	15.04	295640.8	7911.7	37.4
17.10	15.09	296600.2	7935.6	37.4
17.15	15.14	297559.6	7959.4	37.4
17.20	15.19	298518.9	7983.2	37.4
17.25	15.24	299478.3	8007.1	37.4
17.30	15.29	300437.7	8030.9	37.4
17.35	15.34	301397.0	8054.7	37.4
17.40	15.39	302356.4	8078.6	37.4
17.45	15.44	303315.7	8102.4	37.4
17.50	15.49	304275.1	8126.2	37.4
17.55	15.54	305234.5	8150.0	37.5
17.60	15.59	306193.8	8173.9	37.5
17.65	15.64	307153.2	8197.7	37.5
17.70	15.69	308112.6	8221.5	37.5
17.75	15.74	309071.9	8245.4	37.5
17.80	15.79	310031.3	8269.2	37.5
17.85	15.84	310990.6	8293.0	37.5
17.90	15.89	311950.0	8316.9	37.5
17.95	15.94	312909.4	8340.7	37.5
18.00	15.99	313868.7	8364.5	37.5
18.05	16.04	314828.1	8388.4	37.5
18.10	16.09	315787.4	8412.2	37.5
18.15	16.14	316746.8	8436.0	37.5
18.20	16.19	317706.2	8459.9	37.6

Table C.8 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Napoiak Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
18.25	16.24	318665.5	8483.7	37.6
18.30	16.29	319624.9	8507.5	37.6
18.35	16.34	320584.3	8531.3	37.6
18.40	16.39	321543.6	8555.2	37.6
18.45	16.44	322503.0	8579.0	37.6
18.50	16.49	323462.3	8602.8	37.6
18.55	16.54	324421.7	8626.7	37.6

Table C.9 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
1.90	0.00	8003.8	1411.3	5.7
1.95	0.05	8450.7	1467.6	5.8
2.00	0.10	8838.0	1524.0	5.8
2.05	0.15	9251.7	1580.3	5.9
2.10	0.20	9676.3	1636.7	5.9
2.15	0.25	10105.3	1693.1	6.0
2.20	0.30	10730.1	1749.5	6.1
2.25	0.35	11227.0	1805.9	6.2
2.30	0.40	11680.7	1862.3	6.3
2.35	0.45	12173.8	1918.7	6.3
2.40	0.50	12900.3	1975.1	6.5
2.45	0.55	13409.5	2031.5	6.6
2.50	0.60	13905.5	2087.9	6.7
2.55	0.65	14437.4	2144.3	6.7
2.60	0.70	14953.0	2200.7	6.8
2.65	0.75	15480.2	2257.2	6.9
2.70	0.80	16006.2	2313.6	6.9
2.75	0.85	16537.2	2370.0	7.0
2.80	0.90	17076.4	2426.4	7.0
2.85	0.95	17624.9	2482.9	7.1
2.90	1.00	18188.8	2539.3	7.2
2.95	1.05	18761.6	2595.7	7.2
3.00	1.10	19341.3	2652.2	7.3
3.05	1.15	19931.2	2708.6	7.4
3.10	1.20	20530.9	2765.0	7.4
3.15	1.25	21145.4	2821.5	7.5
3.20	1.30	21767.1	2877.9	7.6
3.25	1.35	22398.8	2934.3	7.6
3.30	1.40	23051.8	2990.8	7.7
3.35	1.45	23714.6	3047.2	7.8
3.40	1.50	24389.8	3103.6	7.9
3.45	1.55	25073.0	3160.1	7.9
3.50	1.60	25766.8	3216.5	8.0
3.55	1.65	26474.6	3272.9	8.1
3.60	1.70	27195.6	3329.4	8.2
3.65	1.75	27929.6	3385.8	8.2

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.70	1.80	28673.8	3442.3	8.3
3.75	1.85	29427.9	3498.7	8.4
3.80	1.90	30191.5	3555.1	8.5
3.85	1.95	30964.4	3611.6	8.6
3.90	2.00	31746.0	3668.0	8.7
3.95	2.05	32535.2	3724.5	8.7
4.00	2.10	33330.5	3780.9	8.8
4.05	2.15	34131.2	3837.3	8.9
4.10	2.20	34936.5	3893.8	9.0
4.15	2.25	35746.2	3950.2	9.0
4.20	2.30	36560.4	4006.6	9.1
4.25	2.35	37378.2	4063.1	9.2
4.30	2.40	38199.0	4119.5	9.3
4.35	2.45	39023.0	4176.0	9.3
4.40	2.50	39849.7	4232.4	9.4
4.45	2.55	40678.4	4288.8	9.5
4.50	2.60	41508.8	4345.3	9.6
4.55	2.65	42340.6	4401.7	9.6
4.60	2.70	43173.6	4458.2	9.7
4.65	2.75	44007.6	4514.6	9.7
4.70	2.80	44842.2	4571.0	9.8
4.75	2.85	45677.8	4627.5	9.9
4.80	2.90	46514.0	4683.9	9.9
4.85	2.95	47350.7	4740.3	10.0
4.90	3.00	48187.8	4796.8	10.0
4.95	3.05	49025.3	4853.2	10.1
5.00	3.10	49863.0	4909.7	10.2
5.05	3.15	50701.1	4966.1	10.2
5.10	3.20	51539.5	5022.5	10.3
5.15	3.25	52378.1	5079.0	10.3
5.20	3.30	53217.0	5135.4	10.4
5.25	3.35	54056.2	5191.8	10.4
5.30	3.40	54895.7	5248.3	10.5
5.35	3.45	55735.3	5304.7	10.5
5.40	3.50	56575.3	5361.2	10.6
5.45	3.55	57415.4	5417.6	10.6

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.50	3.60	58255.8	5474.0	10.6
5.55	3.65	59096.3	5530.5	10.7
5.60	3.70	59937.1	5586.9	10.7
5.65	3.75	60778.1	5643.4	10.8
5.70	3.80	61619.3	5699.8	10.8
5.75	3.85	62460.5	5756.2	10.9
5.80	3.90	63301.8	5812.7	10.9
5.85	3.95	64143.0	5869.1	10.9
5.90	4.00	64984.3	5925.5	11.0
5.95	4.05	65825.5	5982.0	11.0
6.00	4.10	66666.8	6038.4	11.0
6.05	4.15	67508.0	6094.9	11.1
6.10	4.20	68349.3	6151.3	11.1
6.15	4.25	69190.6	6207.7	11.1
6.20	4.30	70031.8	6264.2	11.2
6.25	4.35	70873.1	6320.6	11.2
6.30	4.40	71714.3	6377.1	11.2
6.35	4.45	72555.6	6433.5	11.3
6.40	4.50	73396.8	6489.9	11.3
6.45	4.55	74238.1	6546.4	11.3
6.50	4.60	75079.3	6602.8	11.4
6.55	4.65	75920.6	6659.2	11.4
6.60	4.70	76761.8	6715.7	11.4
6.65	4.75	77603.1	6772.1	11.5
6.70	4.80	78444.3	6828.6	11.5
6.75	4.85	79285.6	6885.0	11.5
6.80	4.90	80126.8	6941.4	11.5
6.85	4.95	80968.1	6997.9	11.6
6.90	5.00	81809.3	7054.3	11.6
6.95	5.05	82650.6	7110.8	11.6
7.00	5.10	83491.8	7167.2	11.6
7.05	5.15	84333.1	7223.6	11.7
7.10	5.20	85174.4	7280.1	11.7
7.15	5.25	86015.6	7336.5	11.7
7.20	5.30	86856.9	7392.9	11.7
7.25	5.35	87698.1	7449.4	11.8

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.30	5.40	88539.4	7505.8	11.8
7.35	5.45	89380.6	7562.3	11.8
7.40	5.50	90221.9	7618.7	11.8
7.45	5.55	91063.1	7675.1	11.9
7.50	5.60	91904.4	7731.6	11.9
7.55	5.65	92745.6	7788.0	11.9
7.60	5.70	93586.9	7844.4	11.9
7.65	5.75	94428.1	7900.9	12.0
7.70	5.80	95269.4	7957.3	12.0
7.75	5.85	96110.6	8013.8	12.0
7.80	5.90	96951.9	8070.2	12.0
7.85	5.95	97793.1	8126.6	12.0
7.90	6.00	98634.4	8183.1	12.1
7.95	6.05	99475.7	8239.5	12.1
8.00	6.10	100316.9	8296.0	12.1
8.05	6.15	101158.2	8352.4	12.1
8.10	6.20	101999.4	8408.8	12.1
8.15	6.25	102840.7	8465.3	12.1
8.20	6.30	103681.9	8521.7	12.2
8.25	6.35	104523.2	8578.1	12.2
8.30	6.40	105364.4	8634.6	12.2
8.35	6.45	106205.7	8691.0	12.2
8.40	6.50	107046.9	8747.5	12.2
8.45	6.55	107888.2	8803.9	12.3
8.50	6.60	108729.4	8860.3	12.3
8.55	6.65	109570.7	8916.8	12.3
8.60	6.70	110411.9	8973.2	12.3
8.65	6.75	111253.2	9029.7	12.3
8.70	6.80	112094.4	9086.1	12.3
8.75	6.85	112935.7	9142.5	12.4
8.80	6.90	113777.0	9199.0	12.4
8.85	6.95	114618.2	9255.4	12.4
8.90	7.00	115459.5	9311.8	12.4
8.95	7.05	116300.7	9368.3	12.4
9.00	7.10	117142.0	9424.7	12.4
9.05	7.15	117983.2	9481.2	12.4

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.10	7.20	118824.5	9537.6	12.5
9.15	7.25	119665.7	9594.0	12.5
9.20	7.30	120507.0	9650.5	12.5
9.25	7.35	121348.2	9706.9	12.5
9.30	7.40	122189.5	9763.3	12.5
9.35	7.45	123030.7	9819.8	12.5
9.40	7.50	123872.0	9876.2	12.5
9.45	7.55	124713.2	9932.7	12.6
9.50	7.60	125554.5	9989.1	12.6
9.55	7.65	126395.7	10045.5	12.6
9.60	7.70	127237.0	10102.0	12.6
9.65	7.75	128078.3	10158.4	12.6
9.70	7.80	128919.5	10214.9	12.6
9.75	7.85	129760.8	10271.3	12.6
9.80	7.90	130602.0	10327.7	12.6
9.85	7.95	131443.3	10384.2	12.7
9.90	8.00	132284.5	10440.6	12.7
9.95	8.05	133125.8	10497.0	12.7
10.00	8.10	133967.0	10553.5	12.7
10.05	8.15	134808.3	10609.9	12.7
10.10	8.20	135649.5	10666.4	12.7
10.15	8.25	136490.8	10722.8	12.7
10.20	8.30	137332.0	10779.2	12.7
10.25	8.35	138173.3	10835.7	12.8
10.30	8.40	139014.5	10892.1	12.8
10.35	8.45	139855.8	10948.6	12.8
10.40	8.50	140697.0	11005.0	12.8
10.45	8.55	141538.3	11061.4	12.8
10.50	8.60	142379.6	11117.9	12.8
10.55	8.65	143220.8	11174.3	12.8
10.60	8.70	144062.1	11230.7	12.8
10.65	8.75	144903.3	11287.2	12.8
10.70	8.80	145744.6	11343.6	12.8
10.75	8.85	146585.8	11400.1	12.9
10.80	8.90	147427.1	11456.5	12.9
10.85	8.95	148268.3	11512.9	12.9

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.90	9.00	149109.6	11569.4	12.9
10.95	9.05	149950.8	11625.8	12.9
11.00	9.10	150792.1	11682.3	12.9
11.05	9.15	151633.3	11738.7	12.9
11.10	9.20	152474.6	11795.1	12.9
11.15	9.25	153315.8	11851.6	12.9
11.20	9.30	154157.1	11908.0	12.9
11.25	9.35	154998.3	11964.4	13.0
11.30	9.40	155839.6	12020.9	13.0
11.35	9.45	156680.9	12077.3	13.0
11.40	9.50	157522.1	12133.8	13.0
11.45	9.55	158363.4	12190.2	13.0
11.50	9.60	159204.6	12246.6	13.0
11.55	9.65	160045.9	12303.1	13.0
11.60	9.70	160887.1	12359.5	13.0
11.65	9.75	161728.4	12415.9	13.0
11.70	9.80	162569.6	12472.4	13.0
11.75	9.85	163410.9	12528.8	13.0
11.80	9.90	164252.1	12585.3	13.1
11.85	9.95	165093.4	12641.7	13.1
11.90	10.00	165934.6	12698.1	13.1
11.95	10.05	166775.9	12754.6	13.1
12.00	10.10	167617.1	12811.0	13.1
12.05	10.15	168458.4	12867.5	13.1
12.10	10.20	169299.6	12923.9	13.1
12.15	10.25	170140.9	12980.3	13.1
12.20	10.30	170982.2	13036.8	13.1
12.25	10.35	171823.4	13093.2	13.1
12.30	10.40	172664.7	13149.6	13.1
12.35	10.45	173505.9	13206.1	13.1
12.40	10.50	174347.2	13262.5	13.1
12.45	10.55	175188.4	13319.0	13.2
12.50	10.60	176029.7	13375.4	13.2
12.55	10.65	176870.9	13431.8	13.2
12.60	10.70	177712.2	13488.3	13.2
12.65	10.75	178553.4	13544.7	13.2

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.70	10.80	179394.7	13601.2	13.2
12.75	10.85	180235.9	13657.6	13.2
12.80	10.90	181077.2	13714.0	13.2
12.85	10.95	181918.4	13770.5	13.2
12.90	11.00	182759.7	13826.9	13.2
12.95	11.05	183600.9	13883.3	13.2
13.00	11.10	184442.2	13939.8	13.2
13.05	11.15	185283.5	13996.2	13.2
13.10	11.20	186124.7	14052.7	13.2
13.15	11.25	186966.0	14109.1	13.3
13.20	11.30	187807.2	14165.5	13.3
13.25	11.35	188648.5	14222.0	13.3
13.30	11.40	189489.7	14278.4	13.3
13.35	11.45	190331.0	14334.9	13.3
13.40	11.50	191172.2	14391.3	13.3
13.45	11.55	192013.5	14447.7	13.3
13.50	11.60	192854.7	14504.2	13.3
13.55	11.65	193696.0	14560.6	13.3
13.60	11.70	194537.2	14617.0	13.3
13.65	11.75	195378.5	14673.5	13.3
13.70	11.80	196219.7	14729.9	13.3
13.75	11.85	197061.0	14786.4	13.3
13.80	11.90	197902.2	14842.8	13.3
13.85	11.95	198743.5	14899.2	13.3
13.90	12.00	199584.8	14955.7	13.3
13.95	12.05	200426.0	15012.1	13.4
14.00	12.10	201267.3	15068.5	13.4
14.05	12.15	202108.5	15125.0	13.4
14.10	12.20	202949.8	15181.4	13.4
14.15	12.25	203791.0	15237.9	13.4
14.20	12.30	204632.3	15294.3	13.4
14.25	12.35	205473.5	15350.7	13.4
14.30	12.40	206314.8	15407.2	13.4
14.35	12.45	207156.0	15463.6	13.4
14.40	12.50	207997.3	15520.1	13.4
14.45	12.55	208838.5	15576.5	13.4

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.50	12.60	209679.8	15632.9	13.4
14.55	12.65	210521.0	15689.4	13.4
14.60	12.70	211362.3	15745.8	13.4
14.65	12.75	212203.5	15802.2	13.4
14.70	12.80	213044.8	15858.7	13.4
14.75	12.85	213886.1	15915.1	13.4
14.80	12.90	214727.3	15971.6	13.4
14.85	12.95	215568.6	16028.0	13.4
14.90	13.00	216409.8	16084.4	13.5
14.95	13.05	217251.1	16140.9	13.5
15.00	13.10	218092.3	16197.3	13.5
15.05	13.15	218933.6	16253.8	13.5
15.10	13.20	219774.8	16310.2	13.5
15.15	13.25	220616.1	16366.6	13.5
15.20	13.30	221457.3	16423.1	13.5
15.25	13.35	222298.6	16479.5	13.5
15.30	13.40	223139.8	16535.9	13.5
15.35	13.45	223981.1	16592.4	13.5
15.40	13.50	224822.3	16648.8	13.5
15.45	13.55	225663.6	16705.3	13.5
15.50	13.60	226504.8	16761.7	13.5
15.55	13.65	227346.1	16818.1	13.5
15.60	13.70	228187.3	16874.6	13.5
15.65	13.75	229028.6	16931.0	13.5
15.70	13.80	229869.9	16987.4	13.5
15.75	13.85	230711.1	17043.9	13.5
15.80	13.90	231552.4	17100.3	13.5
15.85	13.95	232393.6	17156.8	13.5
15.90	14.00	233234.9	17213.2	13.5
15.95	14.05	234076.1	17269.6	13.6
16.00	14.10	234917.4	17326.1	13.6
16.05	14.15	235758.6	17382.5	13.6
16.10	14.20	236599.9	17439.0	13.6
16.15	14.25	237441.1	17495.4	13.6
16.20	14.30	238282.4	17551.8	13.6
16.25	14.35	239123.6	17608.3	13.6

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.30	14.40	239964.9	17664.7	13.6
16.35	14.45	240806.1	17721.1	13.6
16.40	14.50	241647.4	17777.6	13.6
16.45	14.55	242488.6	17834.0	13.6
16.50	14.60	243329.9	17890.5	13.6
16.55	14.65	244171.2	17946.9	13.6
16.60	14.70	245012.4	18003.3	13.6
16.65	14.75	245853.7	18059.8	13.6
16.70	14.80	246694.9	18116.2	13.6
16.75	14.85	247536.2	18172.7	13.6
16.80	14.90	248377.4	18229.1	13.6
16.85	14.95	249218.7	18285.5	13.6
16.90	15.00	250059.9	18342.0	13.6
16.95	15.05	250901.2	18398.4	13.6
17.00	15.10	251742.4	18454.8	13.6
17.05	15.15	252583.7	18511.3	13.6
17.10	15.20	253424.9	18567.7	13.6
17.15	15.25	254266.2	18624.2	13.7
17.20	15.30	255107.4	18680.6	13.7
17.25	15.35	255948.7	18737.0	13.7
17.30	15.40	256789.9	18793.5	13.7
17.35	15.45	257631.2	18849.9	13.7
17.40	15.50	258472.5	18906.4	13.7
17.45	15.55	259313.7	18962.8	13.7
17.50	15.60	260155.0	19019.2	13.7
17.55	15.65	260996.2	19075.7	13.7
17.60	15.70	261837.5	19132.1	13.7
17.65	15.75	262678.7	19188.5	13.7
17.70	15.80	263520.0	19245.0	13.7
17.75	15.85	264361.2	19301.4	13.7
17.80	15.90	265202.5	19357.9	13.7
17.85	15.95	266043.7	19414.3	13.7
17.90	16.00	266885.0	19470.7	13.7
17.95	16.05	267726.2	19527.2	13.7
18.00	16.10	268567.5	19583.6	13.7
18.05	16.15	269408.7	19640.0	13.7

Table C.9 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
18.10	16.20	270250.0	19696.5	13.7
18.15	16.25	271091.2	19752.9	13.7
18.20	16.30	271932.5	19809.4	13.7
18.25	16.35	272773.8	19865.8	13.7
18.30	16.40	273615.0	19922.2	13.7
18.35	16.45	274456.3	19978.7	13.7
18.40	16.50	275297.5	20035.1	13.7
18.45	16.55	276138.8	20091.6	13.7
18.50	16.60	276980.0	20148.0	13.7
18.55	16.65	277821.3	20204.4	13.8

Table C.10 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
1.75	0.02	1609.8	314.1	5.1
1.80	0.07	1703.6	328.7	5.2
1.85	0.12	1808.6	343.3	5.3
1.90	0.17	1905.6	357.9	5.3
1.95	0.22	2003.6	372.6	5.4
2.00	0.27	2102.5	387.3	5.4
2.05	0.32	2260.4	401.9	5.6
2.10	0.37	2410.3	416.6	5.8
2.15	0.42	2524.3	431.3	5.9
2.20	0.47	2640.5	446.0	5.9
2.25	0.52	2893.9	460.7	6.3
2.30	0.57	3019.3	475.4	6.4
2.35	0.62	3151.8	490.1	6.4
2.40	0.67	3281.6	504.8	6.5
2.45	0.72	3412.5	519.5	6.6
2.50	0.77	3550.0	534.3	6.6
2.55	0.82	3726.7	549.0	6.8
2.60	0.87	3873.7	563.8	6.9
2.65	0.92	4025.4	578.5	7.0
2.70	0.97	4198.8	593.3	7.1
2.75	1.02	4368.5	608.1	7.2
2.80	1.07	4536.2	622.9	7.3
2.85	1.12	4705.6	637.7	7.4
2.90	1.17	4878.9	652.5	7.5
2.95	1.22	5053.9	667.3	7.6
3.00	1.27	5252.2	682.1	7.7
3.05	1.32	5445.9	696.9	7.8
3.10	1.37	5631.0	711.6	7.9
3.15	1.42	5818.7	726.4	8.0
3.20	1.47	6009.2	741.2	8.1
3.25	1.52	6202.8	756.0	8.2
3.30	1.57	6423.0	770.8	8.3
3.35	1.62	6627.1	785.6	8.4
3.40	1.67	6834.0	800.4	8.5
3.45	1.72	7043.9	815.2	8.6
3.50	1.77	7257.2	830.0	8.7

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
3.55	1.82	7473.8	844.8	8.8
3.60	1.87	7694.3	859.5	9.0
3.65	1.92	7918.6	874.3	9.1
3.70	1.97	8145.9	889.1	9.2
3.75	2.02	8376.0	903.9	9.3
3.80	2.07	8609.7	918.7	9.4
3.85	2.12	8846.5	933.5	9.5
3.90	2.17	9086.0	948.3	9.6
3.95	2.22	9331.5	963.1	9.7
4.00	2.27	9579.3	977.9	9.8
4.05	2.32	9830.6	992.7	9.9
4.10	2.37	10085.5	1007.4	10.0
4.15	2.42	10343.8	1022.2	10.1
4.20	2.47	10605.1	1037.0	10.2
4.25	2.52	10869.4	1051.8	10.3
4.30	2.57	11136.8	1066.6	10.4
4.35	2.62	11406.5	1081.4	10.5
4.40	2.67	11678.3	1096.2	10.7
4.45	2.72	11951.8	1111.0	10.8
4.50	2.77	12227.0	1125.8	10.9
4.55	2.82	12503.7	1140.6	11.0
4.60	2.87	12781.5	1155.3	11.1
4.65	2.92	13060.5	1170.1	11.2
4.70	2.97	13340.2	1184.9	11.3
4.75	3.02	13620.5	1199.7	11.4
4.80	3.07	13901.1	1214.5	11.4
4.85	3.12	14181.9	1229.3	11.5
4.90	3.17	14462.7	1244.1	11.6
4.95	3.22	14743.6	1258.9	11.7
5.00	3.27	15024.5	1273.7	11.8
5.05	3.32	15305.4	1288.5	11.9
5.10	3.37	15586.3	1303.2	12.0
5.15	3.42	15867.2	1318.0	12.0
5.20	3.47	16148.1	1332.8	12.1
5.25	3.52	16429.0	1347.6	12.2
5.30	3.57	16709.9	1362.4	12.3

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.35	3.62	16990.8	1377.2	12.3
5.40	3.67	17271.7	1392.0	12.4
5.45	3.72	17552.6	1406.8	12.5
5.50	3.77	17833.5	1421.6	12.5
5.55	3.82	18114.4	1436.4	12.6
5.60	3.87	18395.3	1451.1	12.7
5.65	3.92	18676.2	1465.9	12.7
5.70	3.97	18957.1	1480.7	12.8
5.75	4.02	19238.0	1495.5	12.9
5.80	4.07	19518.9	1510.3	12.9
5.85	4.12	19799.8	1525.1	13.0
5.90	4.17	20080.7	1539.9	13.0
5.95	4.22	20361.6	1554.7	13.1
6.00	4.27	20642.5	1569.5	13.2
6.05	4.32	20923.4	1584.3	13.2
6.10	4.37	21204.3	1599.0	13.3
6.15	4.42	21485.1	1613.8	13.3
6.20	4.47	21766.0	1628.6	13.4
6.25	4.52	22046.9	1643.4	13.4
6.30	4.57	22327.8	1658.2	13.5
6.35	4.62	22608.7	1673.0	13.5
6.40	4.67	22889.6	1687.8	13.6
6.45	4.72	23170.5	1702.6	13.6
6.50	4.77	23451.4	1717.4	13.7
6.55	4.82	23732.3	1732.2	13.7
6.60	4.87	24013.2	1746.9	13.7
6.65	4.92	24294.1	1761.7	13.8
6.70	4.97	24575.0	1776.5	13.8
6.75	5.02	24855.9	1791.3	13.9
6.80	5.07	25136.8	1806.1	13.9
6.85	5.12	25417.7	1820.9	14.0
6.90	5.17	25698.6	1835.7	14.0
6.95	5.22	25979.5	1850.5	14.0
7.00	5.27	26260.4	1865.3	14.1
7.05	5.32	26541.3	1880.1	14.1
7.10	5.37	26822.2	1894.8	14.2

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.15	5.42	27103.1	1909.6	14.2
7.20	5.47	27384.0	1924.4	14.2
7.25	5.52	27664.9	1939.2	14.3
7.30	5.57	27945.8	1954.0	14.3
7.35	5.62	28226.7	1968.8	14.3
7.40	5.67	28507.6	1983.6	14.4
7.45	5.72	28788.5	1998.4	14.4
7.50	5.77	29069.4	2013.2	14.4
7.55	5.82	29350.3	2028.0	14.5
7.60	5.87	29631.2	2042.7	14.5
7.65	5.92	29912.1	2057.5	14.5
7.70	5.97	30193.0	2072.3	14.6
7.75	6.02	30473.9	2087.1	14.6
7.80	6.07	30754.8	2101.9	14.6
7.85	6.12	31035.7	2116.7	14.7
7.90	6.17	31316.6	2131.5	14.7
7.95	6.22	31597.5	2146.3	14.7
8.00	6.27	31878.4	2161.1	14.8
8.05	6.32	32159.3	2175.9	14.8
8.10	6.37	32440.2	2190.6	14.8
8.15	6.42	32721.1	2205.4	14.8
8.20	6.47	33002.0	2220.2	14.9
8.25	6.52	33282.9	2235.0	14.9
8.30	6.57	33563.8	2249.8	14.9
8.35	6.62	33844.6	2264.6	14.9
8.40	6.67	34125.5	2279.4	15.0
8.45	6.72	34406.4	2294.2	15.0
8.50	6.77	34687.3	2309.0	15.0
8.55	6.82	34968.2	2323.8	15.0
8.60	6.87	35249.1	2338.5	15.1
8.65	6.92	35530.0	2353.3	15.1
8.70	6.97	35810.9	2368.1	15.1
8.75	7.02	36091.8	2382.9	15.1
8.80	7.07	36372.7	2397.7	15.2
8.85	7.12	36653.6	2412.5	15.2
8.90	7.17	36934.5	2427.3	15.2

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.95	7.22	37215.4	2442.1	15.2
9.00	7.27	37496.3	2456.9	15.3
9.05	7.32	37777.2	2471.7	15.3
9.10	7.37	38058.1	2486.4	15.3
9.15	7.42	38339.0	2501.2	15.3
9.20	7.47	38619.9	2516.0	15.3
9.25	7.52	38900.8	2530.8	15.4
9.30	7.57	39181.7	2545.6	15.4
9.35	7.62	39462.6	2560.4	15.4
9.40	7.67	39743.5	2575.2	15.4
9.45	7.72	40024.4	2590.0	15.5
9.50	7.77	40305.3	2604.8	15.5
9.55	7.82	40586.2	2619.6	15.5
9.60	7.87	40867.1	2634.3	15.5
9.65	7.92	41148.0	2649.1	15.5
9.70	7.97	41428.9	2663.9	15.6
9.75	8.02	41709.8	2678.7	15.6
9.80	8.07	41990.7	2693.5	15.6
9.85	8.12	42271.6	2708.3	15.6
9.90	8.17	42552.5	2723.1	15.6
9.95	8.22	42833.4	2737.9	15.6
10.00	8.27	43114.3	2752.7	15.7
10.05	8.32	43395.2	2767.5	15.7
10.10	8.37	43676.1	2782.2	15.7
10.15	8.42	43957.0	2797.0	15.7
10.20	8.47	44237.9	2811.8	15.7
10.25	8.52	44518.8	2826.6	15.7
10.30	8.57	44799.7	2841.4	15.8
10.35	8.62	45080.6	2856.2	15.8
10.40	8.67	45361.5	2871.0	15.8
10.45	8.72	45642.4	2885.8	15.8
10.50	8.77	45923.3	2900.6	15.8
10.55	8.82	46204.1	2915.4	15.8
10.60	8.87	46485.0	2930.1	15.9
10.65	8.92	46765.9	2944.9	15.9
10.70	8.97	47046.8	2959.7	15.9

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
10.75	9.02	47327.7	2974.5	15.9
10.80	9.07	47608.6	2989.3	15.9
10.85	9.12	47889.5	3004.1	15.9
10.90	9.17	48170.4	3018.9	16.0
10.95	9.22	48451.3	3033.7	16.0
11.00	9.27	48732.2	3048.5	16.0
11.05	9.32	49013.1	3063.3	16.0
11.10	9.37	49294.0	3078.0	16.0
11.15	9.42	49574.9	3092.8	16.0
11.20	9.47	49855.8	3107.6	16.0
11.25	9.52	50136.7	3122.4	16.1
11.30	9.57	50417.6	3137.2	16.1
11.35	9.62	50698.5	3152.0	16.1
11.40	9.67	50979.4	3166.8	16.1
11.45	9.72	51260.3	3181.6	16.1
11.50	9.77	51541.2	3196.4	16.1
11.55	9.82	51822.1	3211.2	16.1
11.60	9.87	52103.0	3225.9	16.2
11.65	9.92	52383.9	3240.7	16.2
11.70	9.97	52664.8	3255.5	16.2
11.75	10.02	52945.7	3270.3	16.2
11.80	10.07	53226.6	3285.1	16.2
11.85	10.12	53507.5	3299.9	16.2
11.90	10.17	53788.4	3314.7	16.2
11.95	10.22	54069.3	3329.5	16.2
12.00	10.27	54350.2	3344.3	16.3
12.05	10.32	54631.1	3359.0	16.3
12.10	10.37	54912.0	3373.8	16.3
12.15	10.42	55192.9	3388.6	16.3
12.20	10.47	55473.8	3403.4	16.3
12.25	10.52	55754.7	3418.2	16.3
12.30	10.57	56035.6	3433.0	16.3
12.35	10.62	56316.5	3447.8	16.3
12.40	10.67	56597.4	3462.6	16.3
12.45	10.72	56878.3	3477.4	16.4
12.50	10.77	57159.2	3492.2	16.4

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
12.55	10.82	57440.1	3506.9	16.4
12.60	10.87	57721.0	3521.7	16.4
12.65	10.92	58001.9	3536.5	16.4
12.70	10.97	58282.8	3551.3	16.4
12.75	11.02	58563.6	3566.1	16.4
12.80	11.07	58844.5	3580.9	16.4
12.85	11.12	59125.4	3595.7	16.4
12.90	11.17	59406.3	3610.5	16.5
12.95	11.22	59687.2	3625.3	16.5
13.00	11.27	59968.1	3640.1	16.5
13.05	11.32	60249.0	3654.8	16.5
13.10	11.37	60529.9	3669.6	16.5
13.15	11.42	60810.8	3684.4	16.5
13.20	11.47	61091.7	3699.2	16.5
13.25	11.52	61372.6	3714.0	16.5
13.30	11.57	61653.5	3728.8	16.5
13.35	11.62	61934.4	3743.6	16.5
13.40	11.67	62215.3	3758.4	16.6
13.45	11.72	62496.2	3773.2	16.6
13.50	11.77	62777.1	3788.0	16.6
13.55	11.82	63058.0	3802.7	16.6
13.60	11.87	63338.9	3817.5	16.6
13.65	11.92	63619.8	3832.3	16.6
13.70	11.97	63900.7	3847.1	16.6
13.75	12.02	64181.6	3861.9	16.6
13.80	12.07	64462.5	3876.7	16.6
13.85	12.12	64743.4	3891.5	16.6
13.90	12.17	65024.3	3906.3	16.6
13.95	12.22	65305.2	3921.1	16.7
14.00	12.27	65586.1	3935.9	16.7
14.05	12.32	65867.0	3950.6	16.7
14.10	12.37	66147.9	3965.4	16.7
14.15	12.42	66428.8	3980.2	16.7
14.20	12.47	66709.7	3995.0	16.7
14.25	12.52	66990.6	4009.8	16.7
14.30	12.57	67271.5	4024.6	16.7

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.35	12.62	67552.4	4039.4	16.7
14.40	12.67	67833.3	4054.2	16.7
14.45	12.72	68114.2	4069.0	16.7
14.50	12.77	68395.1	4083.8	16.7
14.55	12.82	68676.0	4098.5	16.8
14.60	12.87	68956.9	4113.3	16.8
14.65	12.92	69237.8	4128.1	16.8
14.70	12.97	69518.7	4142.9	16.8
14.75	13.02	69799.6	4157.7	16.8
14.80	13.07	70080.5	4172.5	16.8
14.85	13.12	70361.4	4187.3	16.8
14.90	13.17	70642.3	4202.1	16.8
14.95	13.22	70923.1	4216.9	16.8
15.00	13.27	71204.0	4231.7	16.8
15.05	13.32	71484.9	4246.4	16.8
15.10	13.37	71765.8	4261.2	16.8
15.15	13.42	72046.7	4276.0	16.8
15.20	13.47	72327.6	4290.8	16.9
15.25	13.52	72608.5	4305.6	16.9
15.30	13.57	72889.4	4320.4	16.9
15.35	13.62	73170.3	4335.2	16.9
15.40	13.67	73451.2	4350.0	16.9
15.45	13.72	73732.1	4364.8	16.9
15.50	13.77	74013.0	4379.6	16.9
15.55	13.82	74293.9	4394.3	16.9
15.60	13.87	74574.8	4409.1	16.9
15.65	13.92	74855.7	4423.9	16.9
15.70	13.97	75136.6	4438.7	16.9
15.75	14.02	75417.5	4453.5	16.9
15.80	14.07	75698.4	4468.3	16.9
15.85	14.12	75979.3	4483.1	16.9
15.90	14.17	76260.2	4497.9	17.0
15.95	14.22	76541.1	4512.7	17.0
16.00	14.27	76822.0	4527.5	17.0
16.05	14.32	77102.9	4542.2	17.0
16.10	14.37	77383.8	4557.0	17.0

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.15	14.42	77664.7	4571.8	17.0
16.20	14.47	77945.6	4586.6	17.0
16.25	14.52	78226.5	4601.4	17.0
16.30	14.57	78507.4	4616.2	17.0
16.35	14.62	78788.3	4631.0	17.0
16.40	14.67	79069.2	4645.8	17.0
16.45	14.72	79350.1	4660.6	17.0
16.50	14.77	79631.0	4675.4	17.0
16.55	14.82	79911.9	4690.1	17.0
16.60	14.87	80192.8	4704.9	17.0
16.65	14.92	80473.7	4719.7	17.1
16.70	14.97	80754.6	4734.5	17.1
16.75	15.02	81035.5	4749.3	17.1
16.80	15.07	81316.4	4764.1	17.1
16.85	15.12	81597.3	4778.9	17.1
16.90	15.17	81878.2	4793.7	17.1
16.95	15.22	82159.1	4808.5	17.1
17.00	15.27	82440.0	4823.3	17.1
17.05	15.32	82720.9	4838.0	17.1
17.10	15.37	83001.8	4852.8	17.1
17.15	15.42	83282.7	4867.6	17.1
17.20	15.47	83563.5	4882.4	17.1
17.25	15.52	83844.4	4897.2	17.1
17.30	15.57	84125.3	4912.0	17.1
17.35	15.62	84406.2	4926.8	17.1
17.40	15.67	84687.1	4941.6	17.1
17.45	15.72	84968.0	4956.4	17.1
17.50	15.77	85248.9	4971.2	17.1
17.55	15.82	85529.8	4985.9	17.2
17.60	15.87	85810.7	5000.7	17.2
17.65	15.92	86091.6	5015.5	17.2
17.70	15.97	86372.5	5030.3	17.2
17.75	16.02	86653.4	5045.1	17.2
17.80	16.07	86934.3	5059.9	17.2
17.85	16.12	87215.2	5074.7	17.2
17.90	16.17	87496.1	5089.5	17.2

Table C.10 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the East Channel in the Northern Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.95	16.22	87777.0	5104.3	17.2
18.00	16.27	88057.9	5119.1	17.2
18.05	16.32	88338.8	5133.8	17.2
18.10	16.37	88619.7	5148.6	17.2
18.15	16.42	88900.6	5163.4	17.2
18.20	16.47	89181.5	5178.2	17.2
18.25	16.52	89462.4	5193.0	17.2
18.30	16.57	89743.3	5207.8	17.2
18.35	16.62	90024.2	5222.6	17.2
18.40	16.67	90305.1	5237.4	17.2
18.45	16.72	90586.0	5252.2	17.2
18.50	16.77	90866.9	5267.0	17.3
18.55	16.82	91147.8	5281.7	17.3

Table C.11 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
0.40	0.02	794.1	1444.1	0.5
0.45	0.07	976.7	1566.6	0.6
0.50	0.12	1182.5	1689.2	0.7
0.55	0.17	1415.0	1811.8	0.8
0.60	0.22	1700.1	1934.5	0.9
0.65	0.27	2019.8	2057.2	1.0
0.70	0.32	2355.3	2179.9	1.1
0.75	0.37	2718.1	2302.6	1.2
0.80	0.42	3092.3	2425.4	1.3
0.85	0.47	3477.7	2548.1	1.4
0.90	0.52	3886.5	2670.8	1.5
0.95	0.57	4292.9	2793.6	1.5
1.00	0.62	4708.7	2916.3	1.6
1.05	0.67	5131.7	3039.1	1.7
1.10	0.72	5560.9	3161.8	1.8
1.15	0.77	5994.4	3284.6	1.8
1.20	0.82	6432.0	3407.3	1.9
1.25	0.87	6871.5	3530.0	1.9
1.30	0.92	7311.7	3652.8	2.0
1.35	0.97	7753.9	3775.5	2.1
1.40	1.02	8197.1	3898.3	2.1
1.45	1.07	8640.4	4021.0	2.1
1.50	1.12	9083.7	4143.8	2.2
1.55	1.17	9527.1	4266.5	2.2
1.60	1.22	9970.5	4389.2	2.3
1.65	1.27	10414.0	4512.0	2.3
1.70	1.32	10857.7	4634.7	2.3
1.75	1.37	11301.6	4757.5	2.4
1.80	1.42	11745.6	4880.2	2.4
1.85	1.47	12189.6	5003.0	2.4
1.90	1.52	12633.6	5125.7	2.5
1.95	1.57	13077.6	5248.4	2.5
2.00	1.62	13521.7	5371.2	2.5
2.05	1.67	13965.7	5493.9	2.5
2.10	1.72	14409.8	5616.7	2.6
2.15	1.77	14853.8	5739.4	2.6

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
2.20	1.82	15297.9	5862.2	2.6
2.25	1.87	15742.0	5984.9	2.6
2.30	1.92	16186.1	6107.6	2.7
2.35	1.97	16630.2	6230.4	2.7
2.40	2.02	17074.3	6353.1	2.7
2.45	2.07	17518.4	6475.9	2.7
2.50	2.12	17962.5	6598.6	2.7
2.55	2.17	18406.6	6721.4	2.7
2.60	2.22	18850.8	6844.1	2.8
2.65	2.27	19294.9	6966.8	2.8
2.70	2.32	19739.1	7089.6	2.8
2.75	2.37	20183.2	7212.3	2.8
2.80	2.42	20627.4	7335.1	2.8
2.85	2.47	21071.5	7457.8	2.8
2.90	2.52	21515.7	7580.6	2.8
2.95	2.57	21959.9	7703.3	2.9
3.00	2.62	22404.1	7826.0	2.9
3.05	2.67	22848.2	7948.8	2.9
3.10	2.72	23292.4	8071.5	2.9
3.15	2.77	23736.6	8194.3	2.9
3.20	2.82	24180.8	8317.0	2.9
3.25	2.87	24625.0	8439.8	2.9
3.30	2.92	25069.2	8562.5	2.9
3.35	2.97	25513.4	8685.2	2.9
3.40	3.02	25957.6	8808.0	2.9
3.45	3.07	26401.9	8930.7	3.0
3.50	3.12	26846.1	9053.5	3.0
3.55	3.17	27290.3	9176.2	3.0
3.60	3.22	27734.6	9299.0	3.0
3.65	3.27	28178.8	9421.7	3.0
3.70	3.32	28623.0	9544.4	3.0
3.75	3.37	29067.3	9667.2	3.0
3.80	3.42	29511.6	9789.9	3.0
3.85	3.47	29955.8	9912.7	3.0
3.90	3.52	30400.1	10035.4	3.0
3.95	3.57	30844.4	10158.2	3.0

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.00	3.62	31288.7	10280.9	3.0
4.05	3.67	31732.9	10403.6	3.1
4.10	3.72	32177.2	10526.4	3.1
4.15	3.77	32621.5	10649.1	3.1
4.20	3.82	33065.8	10771.9	3.1
4.25	3.87	33510.1	10894.6	3.1
4.30	3.92	33954.4	11017.4	3.1
4.35	3.97	34398.7	11140.1	3.1
4.40	4.02	34843.1	11262.8	3.1
4.45	4.07	35287.4	11385.6	3.1
4.50	4.12	35731.7	11508.3	3.1
4.55	4.17	36176.0	11631.1	3.1
4.60	4.22	36620.4	11753.8	3.1
4.65	4.27	37064.7	11876.6	3.1
4.70	4.32	37509.1	11999.3	3.1
4.75	4.37	37953.4	12122.1	3.1
4.80	4.42	38397.8	12244.8	3.1
4.85	4.47	38842.2	12367.5	3.1
4.90	4.52	39286.5	12490.3	3.1
4.95	4.57	39730.9	12613.0	3.1
5.00	4.62	40175.3	12735.8	3.2
5.05	4.67	40619.6	12858.5	3.2
5.10	4.72	41064.0	12981.3	3.2
5.15	4.77	41508.4	13104.0	3.2
5.20	4.82	41952.8	13226.7	3.2
5.25	4.87	42397.2	13349.5	3.2
5.30	4.92	42841.6	13472.2	3.2
5.35	4.97	43286.0	13595.0	3.2
5.40	5.02	43730.4	13717.7	3.2
5.45	5.07	44174.8	13840.5	3.2
5.50	5.12	44619.2	13963.2	3.2
5.55	5.17	45063.6	14085.9	3.2
5.60	5.22	45508.0	14208.7	3.2
5.65	5.27	45952.5	14331.4	3.2
5.70	5.32	46396.9	14454.2	3.2
5.75	5.37	46841.3	14576.9	3.2

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
5.80	5.42	47285.8	14699.7	3.2
5.85	5.47	47730.2	14822.4	3.2
5.90	5.52	48174.7	14945.1	3.2
5.95	5.57	48619.1	15067.9	3.2
6.00	5.62	49063.6	15190.6	3.2
6.05	5.67	49508.0	15313.4	3.2
6.10	5.72	49952.5	15436.1	3.2
6.15	5.77	50397.0	15558.9	3.2
6.20	5.82	50841.4	15681.6	3.2
6.25	5.87	51285.9	15804.3	3.2
6.30	5.92	51730.4	15927.1	3.2
6.35	5.97	52174.9	16049.8	3.3
6.40	6.02	52619.4	16172.6	3.3
6.45	6.07	53063.9	16295.3	3.3
6.50	6.12	53508.4	16418.1	3.3
6.55	6.17	53952.9	16540.8	3.3
6.60	6.22	54397.5	16663.5	3.3
6.65	6.27	54842.0	16786.3	3.3
6.70	6.32	55286.5	16909.0	3.3
6.75	6.37	55731.1	17031.8	3.3
6.80	6.42	56175.6	17154.5	3.3
6.85	6.47	56620.2	17277.3	3.3
6.90	6.52	57064.7	17400.0	3.3
6.95	6.57	57509.3	17522.7	3.3
7.00	6.62	57953.8	17645.5	3.3
7.05	6.67	58398.4	17768.2	3.3
7.10	6.72	58843.0	17891.0	3.3
7.15	6.77	59287.6	18013.7	3.3
7.20	6.82	59732.1	18136.5	3.3
7.25	6.87	60176.7	18259.2	3.3
7.30	6.92	60621.3	18381.9	3.3
7.35	6.97	61065.9	18504.7	3.3
7.40	7.02	61510.5	18627.4	3.3
7.45	7.07	61955.1	18750.2	3.3
7.50	7.12	62399.7	18872.9	3.3
7.55	7.17	62844.4	18995.7	3.3

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
7.60	7.22	63289.0	19118.4	3.3
7.65	7.27	63733.6	19241.1	3.3
7.70	7.32	64178.3	19363.9	3.3
7.75	7.37	64622.9	19486.6	3.3
7.80	7.42	65067.6	19609.4	3.3
7.85	7.47	65512.2	19732.1	3.3
7.90	7.52	65956.9	19854.9	3.3
7.95	7.57	66401.6	19977.6	3.3
8.00	7.62	66846.3	20100.3	3.3
8.05	7.67	67291.0	20223.1	3.3
8.10	7.72	67735.8	20345.8	3.3
8.15	7.77	68180.5	20468.6	3.3
8.20	7.82	68625.2	20591.3	3.3
8.25	7.87	69070.0	20714.1	3.3
8.30	7.92	69514.7	20836.8	3.3
8.35	7.97	69959.5	20959.5	3.3
8.40	8.02	70404.3	21082.3	3.3
8.45	8.07	70849.1	21205.0	3.3
8.50	8.12	71293.9	21327.8	3.3
8.55	8.17	71738.7	21450.5	3.3
8.60	8.22	72183.5	21573.3	3.3
8.65	8.27	72628.3	21696.0	3.3
8.70	8.32	73073.2	21818.7	3.3
8.75	8.37	73518.0	21941.5	3.4
8.80	8.42	73962.9	22064.2	3.4
8.85	8.47	74407.8	22187.0	3.4
8.90	8.52	74852.7	22309.7	3.4
8.95	8.57	75297.6	22432.5	3.4
9.00	8.62	75742.5	22555.2	3.4
9.05	8.67	76187.4	22678.0	3.4
9.10	8.72	76632.3	22800.7	3.4
9.15	8.77	77077.3	22923.4	3.4
9.20	8.82	77522.3	23046.2	3.4
9.25	8.87	77967.3	23168.9	3.4
9.30	8.92	78412.3	23291.7	3.4
9.35	8.97	78857.3	23414.4	3.4

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.40	9.02	79302.4	23537.2	3.4
9.45	9.07	79747.5	23659.9	3.4
9.50	9.12	80192.6	23782.6	3.4
9.55	9.17	80637.8	23905.4	3.4
9.60	9.22	81083.0	24028.1	3.4
9.65	9.27	81528.2	24150.9	3.4
9.70	9.32	81973.4	24273.6	3.4
9.75	9.37	82418.6	24396.4	3.4
9.80	9.42	82863.8	24519.1	3.4
9.85	9.47	83309.1	24641.8	3.4
9.90	9.52	83754.3	24764.6	3.4
9.95	9.57	84199.6	24887.3	3.4
10.00	9.62	84644.9	25010.1	3.4
10.05	9.67	85090.2	25132.8	3.4
10.10	9.72	85535.6	25255.6	3.4
10.15	9.77	85980.9	25378.3	3.4
10.20	9.82	86426.2	25501.0	3.4
10.25	9.87	86871.6	25623.8	3.4
10.30	9.92	87317.0	25746.5	3.4
10.35	9.97	87762.4	25869.3	3.4
10.40	10.02	88207.8	25992.0	3.4
10.45	10.07	88653.2	26114.8	3.4
10.50	10.12	89098.7	26237.5	3.4
10.55	10.17	89544.1	26360.2	3.4
10.60	10.22	89989.5	26483.0	3.4
10.65	10.27	90435.0	26605.7	3.4
10.70	10.32	90880.5	26728.5	3.4
10.75	10.37	91326.0	26851.2	3.4
10.80	10.42	91771.5	26974.0	3.4
10.85	10.47	92217.0	27096.7	3.4
10.90	10.52	92662.5	27219.4	3.4
10.95	10.57	93108.0	27342.2	3.4
11.00	10.62	93553.5	27464.9	3.4
11.05	10.67	93999.1	27587.7	3.4
11.10	10.72	94444.6	27710.4	3.4
11.15	10.77	94890.1	27833.2	3.4

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.20	10.82	95335.7	27955.9	3.4
11.25	10.87	95781.3	28078.6	3.4
11.30	10.92	96226.8	28201.4	3.4
11.35	10.97	96672.4	28324.1	3.4
11.40	11.02	97118.0	28446.9	3.4
11.45	11.07	97563.5	28569.6	3.4
11.50	11.12	98009.1	28692.4	3.4
11.55	11.17	98454.7	28815.1	3.4
11.60	11.22	98900.3	28937.8	3.4
11.65	11.27	99345.9	29060.6	3.4
11.70	11.32	99791.5	29183.3	3.4
11.75	11.37	100237.2	29306.1	3.4
11.80	11.42	100682.8	29428.8	3.4
11.85	11.47	101128.4	29551.6	3.4
11.90	11.52	101574.1	29674.3	3.4
11.95	11.57	102019.7	29797.0	3.4
12.00	11.62	102465.4	29919.8	3.4
12.05	11.67	102911.0	30042.5	3.4
12.10	11.72	103356.7	30165.3	3.4
12.15	11.77	103802.4	30288.0	3.4
12.20	11.82	104248.0	30410.8	3.4
12.25	11.87	104693.7	30533.5	3.4
12.30	11.92	105139.4	30656.2	3.4
12.35	11.97	105585.1	30779.0	3.4
12.40	12.02	106030.8	30901.7	3.4
12.45	12.07	106476.5	31024.5	3.4
12.50	12.12	106922.2	31147.2	3.4
12.55	12.17	107368.0	31270.0	3.4
12.60	12.22	107813.7	31392.7	3.4
12.65	12.27	108259.5	31515.4	3.4
12.70	12.32	108705.2	31638.2	3.4
12.75	12.37	109151.0	31760.9	3.4
12.80	12.42	109596.8	31883.7	3.4
12.85	12.47	110042.6	32006.4	3.4
12.90	12.52	110488.4	32129.2	3.4
12.95	12.57	110934.1	32251.9	3.4

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.00	12.62	111379.9	32374.6	3.4
13.05	12.67	111825.7	32497.4	3.4
13.10	12.72	112271.5	32620.1	3.4
13.15	12.77	112717.4	32742.9	3.4
13.20	12.82	113163.2	32865.6	3.4
13.25	12.87	113609.0	32988.4	3.4
13.30	12.92	114054.8	33111.1	3.4
13.35	12.97	114500.7	33233.9	3.4
13.40	13.02	114946.5	33356.6	3.4
13.45	13.07	115392.4	33479.3	3.4
13.50	13.12	115838.2	33602.1	3.4
13.55	13.17	116284.1	33724.8	3.4
13.60	13.22	116730.0	33847.6	3.4
13.65	13.27	117175.8	33970.3	3.4
13.70	13.32	117621.7	34093.1	3.5
13.75	13.37	118067.6	34215.8	3.5
13.80	13.42	118513.5	34338.5	3.5
13.85	13.47	118959.4	34461.3	3.5
13.90	13.52	119405.3	34584.0	3.5
13.95	13.57	119851.2	34706.8	3.5
14.00	13.62	120297.1	34829.5	3.5
14.05	13.67	120743.0	34952.3	3.5
14.10	13.72	121188.9	35075.0	3.5
14.15	13.77	121634.9	35197.7	3.5
14.20	13.82	122080.8	35320.5	3.5
14.25	13.87	122526.7	35443.2	3.5
14.30	13.92	122972.7	35566.0	3.5
14.35	13.97	123418.6	35688.7	3.5
14.40	14.02	123864.6	35811.5	3.5
14.45	14.07	124310.5	35934.2	3.5
14.50	14.12	124756.5	36056.9	3.5
14.55	14.17	125202.4	36179.7	3.5
14.60	14.22	125648.4	36302.4	3.5
14.65	14.27	126094.3	36425.2	3.5
14.70	14.32	126540.3	36547.9	3.5
14.75	14.37	126986.4	36670.7	3.5

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
14.80	14.42	127432.4	36793.4	3.5
14.85	14.47	127878.4	36916.1	3.5
14.90	14.52	128324.5	37038.9	3.5
14.95	14.57	128770.5	37161.6	3.5
15.00	14.62	129216.6	37284.4	3.5
15.05	14.67	129662.6	37407.1	3.5
15.10	14.72	130108.7	37529.9	3.5
15.15	14.77	130554.8	37652.6	3.5
15.20	14.82	131000.9	37775.3	3.5
15.25	14.87	131447.0	37898.1	3.5
15.30	14.92	131893.1	38020.8	3.5
15.35	14.97	132339.3	38143.6	3.5
15.40	15.02	132785.4	38266.3	3.5
15.45	15.07	133231.5	38389.1	3.5
15.50	15.12	133677.7	38511.8	3.5
15.55	15.17	134123.8	38634.5	3.5
15.60	15.22	134570.0	38757.3	3.5
15.65	15.27	135016.1	38880.0	3.5
15.70	15.32	135462.3	39002.8	3.5
15.75	15.37	135908.5	39125.5	3.5
15.80	15.42	136354.7	39248.3	3.5
15.85	15.47	136800.9	39371.0	3.5
15.90	15.52	137247.1	39493.7	3.5
15.95	15.57	137693.3	39616.5	3.5
16.00	15.62	138139.6	39739.2	3.5
16.05	15.67	138585.9	39862.0	3.5
16.10	15.72	139032.1	39984.7	3.5
16.15	15.77	139478.4	40107.5	3.5
16.20	15.82	139924.7	40230.2	3.5
16.25	15.87	140371.0	40352.9	3.5
16.30	15.92	140817.3	40475.7	3.5
16.35	15.97	141263.6	40598.4	3.5
16.40	16.02	141710.0	40721.2	3.5
16.45	16.07	142156.3	40843.9	3.5
16.50	16.12	142602.7	40966.7	3.5
16.55	16.17	143049.1	41089.4	3.5

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
16.60	16.22	143495.5	41212.1	3.5
16.65	16.27	143941.9	41334.9	3.5
16.70	16.32	144388.3	41457.6	3.5
16.75	16.37	144834.8	41580.4	3.5
16.80	16.42	145281.2	41703.1	3.5
16.85	16.47	145727.7	41825.9	3.5
16.90	16.52	146174.2	41948.6	3.5
16.95	16.57	146620.7	42071.3	3.5
17.00	16.62	147067.2	42194.1	3.5
17.05	16.67	147513.7	42316.8	3.5
17.10	16.72	147960.2	42439.6	3.5
17.15	16.77	148406.8	42562.3	3.5
17.20	16.82	148853.4	42685.1	3.5
17.25	16.87	149300.0	42807.8	3.5
17.30	16.92	149746.6	42930.5	3.5
17.35	16.97	150193.2	43053.3	3.5
17.40	17.02	150639.8	43176.0	3.5
17.45	17.07	151086.5	43298.8	3.5
17.50	17.12	151533.2	43421.5	3.5
17.55	17.17	151979.9	43544.3	3.5
17.60	17.22	152426.6	43667.0	3.5
17.65	17.27	152873.3	43789.7	3.5
17.70	17.32	153320.1	43912.5	3.5
17.75	17.37	153766.9	44035.2	3.5
17.80	17.42	154213.7	44158.0	3.5
17.85	17.47	154660.6	44280.7	3.5
17.90	17.52	155107.5	44403.5	3.5
17.95	17.57	155554.4	44526.2	3.5
18.00	17.62	156001.4	44649.0	3.5
18.05	17.67	156448.5	44771.7	3.5
18.10	17.72	156895.6	44894.4	3.5
18.15	17.77	157342.8	45017.2	3.5
18.20	17.82	157790.0	45139.9	3.5
18.25	17.87	158237.2	45262.7	3.5
18.30	17.92	158684.5	45385.4	3.5
18.35	17.97	159131.8	45508.2	3.5

Table C.11 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Middle Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
18.40	18.02	159579.2	45630.9	3.5
18.45	18.07	160026.7	45753.6	3.5
18.50	18.12	160474.2	45876.4	3.5
18.55	18.17	160921.9	45999.1	3.5

Table C.12 Elevation above the average top of bank, model storage, conveyance and A_0/A ratio for the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
0.80	0.04	9949.9	382.6	26.0
0.85	0.09	10881.7	402.2	27.1
0.90	0.14	11848.0	421.7	28.1
0.95	0.19	12831.7	441.4	29.1
1.00	0.24	13831.1	461.0	30.0
1.05	0.29	14846.3	480.7	30.9
1.10	0.34	15868.4	500.4	31.7
1.15	0.39	16894.4	520.2	32.5
1.20	0.44	17922.6	540.0	33.2
1.25	0.49	18952.6	559.8	33.9
1.30	0.54	19983.3	579.6	34.5
1.35	0.59	21014.5	599.4	35.1
1.40	0.64	22045.9	619.2	35.6
1.45	0.69	23077.7	639.0	36.1
1.50	0.74	24109.5	658.8	36.6
1.55	0.79	25141.5	678.5	37.1
1.60	0.84	26173.7	698.3	37.5
1.65	0.89	27205.8	718.1	37.9
1.70	0.94	28238.1	737.9	38.3
1.75	0.99	29270.5	757.7	38.6
1.80	1.04	30302.9	777.5	39.0
1.85	1.09	31335.3	797.3	39.3
1.90	1.14	32367.9	817.1	39.6
1.95	1.19	33400.4	836.9	39.9
2.00	1.24	34433.1	856.6	40.2
2.05	1.29	35465.9	876.4	40.5
2.10	1.34	36498.7	896.2	40.7
2.15	1.39	37531.5	916.0	41.0
2.20	1.44	38564.4	935.8	41.2
2.25	1.49	39597.3	955.6	41.4
2.30	1.54	40630.2	975.4	41.7
2.35	1.59	41663.2	995.2	41.9
2.40	1.64	42696.2	1015.0	42.1
2.45	1.69	43729.2	1034.7	42.3
2.50	1.74	44762.2	1054.5	42.4
2.55	1.79	45795.3	1074.3	42.6

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
2.60	1.84	46828.4	1094.1	42.8
2.65	1.89	47861.5	1113.9	43.0
2.70	1.94	48894.6	1133.7	43.1
2.75	1.99	49927.8	1153.5	43.3
2.80	2.04	50961.0	1173.3	43.4
2.85	2.09	51994.3	1193.1	43.6
2.90	2.14	53027.6	1212.8	43.7
2.95	2.19	54061.1	1232.6	43.9
3.00	2.24	55094.5	1252.4	44.0
3.05	2.29	56128.0	1272.2	44.1
3.10	2.34	57161.5	1292.0	44.2
3.15	2.39	58195.1	1311.8	44.4
3.20	2.44	59228.6	1331.6	44.5
3.25	2.49	60262.2	1351.4	44.6
3.30	2.54	61295.8	1371.2	44.7
3.35	2.59	62329.5	1391.0	44.8
3.40	2.64	63363.2	1410.7	44.9
3.45	2.69	64396.9	1430.5	45.0
3.50	2.74	65430.7	1450.3	45.1
3.55	2.79	66464.6	1470.1	45.2
3.60	2.84	67498.5	1489.9	45.3
3.65	2.89	68532.5	1509.7	45.4
3.70	2.94	69566.6	1529.5	45.5
3.75	2.99	70600.8	1549.3	45.6
3.80	3.04	71635.0	1569.1	45.7
3.85	3.09	72669.3	1588.8	45.7
3.90	3.14	73703.6	1608.6	45.8
3.95	3.19	74737.9	1628.4	45.9
4.00	3.24	75783.5	1648.2	46.0
4.05	3.29	76830.4	1668.0	46.1
4.10	3.34	77877.5	1687.8	46.1
4.15	3.39	78924.5	1707.6	46.2
4.20	3.44	79971.5	1727.4	46.3
4.25	3.49	81018.6	1747.2	46.4
4.30	3.54	82065.7	1766.9	46.4
4.35	3.59	83112.8	1786.7	46.5

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
4.40	3.64	84160.0	1806.5	46.6
4.45	3.69	85207.2	1826.3	46.7
4.50	3.74	86254.4	1846.1	46.7
4.55	3.79	87301.6	1865.9	46.8
4.60	3.84	88348.8	1885.7	46.9
4.65	3.89	89396.1	1905.5	46.9
4.70	3.94	90443.3	1925.3	47.0
4.75	3.99	91490.6	1945.0	47.0
4.80	4.04	92537.9	1964.8	47.1
4.85	4.09	93585.2	1984.6	47.2
4.90	4.14	94632.6	2004.4	47.2
4.95	4.19	95679.9	2024.2	47.3
5.00	4.24	96727.3	2044.0	47.3
5.05	4.29	97774.6	2063.8	47.4
5.10	4.34	98822.0	2083.6	47.4
5.15	4.39	99869.4	2103.4	47.5
5.20	4.44	100916.9	2123.1	47.5
5.25	4.49	101964.3	2142.9	47.6
5.30	4.54	103011.8	2162.7	47.6
5.35	4.59	104059.3	2182.5	47.7
5.40	4.64	105106.8	2202.3	47.7
5.45	4.69	106154.3	2222.1	47.8
5.50	4.74	107201.8	2241.9	47.8
5.55	4.79	108249.4	2261.7	47.9
5.60	4.84	109296.9	2281.5	47.9
5.65	4.89	110344.5	2301.2	47.9
5.70	4.94	111392.1	2321.0	48.0
5.75	4.99	112439.7	2340.8	48.0
5.80	5.04	113487.4	2360.6	48.1
5.85	5.09	114535.0	2380.4	48.1
5.90	5.14	115582.7	2400.2	48.2
5.95	5.19	116630.4	2420.0	48.2
6.00	5.24	117678.1	2439.8	48.2
6.05	5.29	118725.9	2459.6	48.3
6.10	5.34	119773.6	2479.4	48.3
6.15	5.39	120821.4	2499.1	48.3

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
6.20	5.44	121869.2	2518.9	48.4
6.25	5.49	122917.1	2538.7	48.4
6.30	5.54	123964.9	2558.5	48.5
6.35	5.59	125012.8	2578.3	48.5
6.40	5.64	126060.6	2598.1	48.5
6.45	5.69	127108.6	2617.9	48.6
6.50	5.74	128156.5	2637.7	48.6
6.55	5.79	129204.5	2657.5	48.6
6.60	5.84	130252.5	2677.2	48.7
6.65	5.89	131300.5	2697.0	48.7
6.70	5.94	132348.6	2716.8	48.7
6.75	5.99	133396.7	2736.6	48.7
6.80	6.04	134444.8	2756.4	48.8
6.85	6.09	135493.0	2776.2	48.8
6.90	6.14	136541.2	2796.0	48.8
6.95	6.19	137589.4	2815.8	48.9
7.00	6.24	138637.8	2835.6	48.9
7.05	6.29	139686.2	2855.3	48.9
7.10	6.34	140734.6	2875.1	48.9
7.15	6.39	141783.0	2894.9	49.0
7.20	6.44	142831.5	2914.7	49.0
7.25	6.49	143880.0	2934.5	49.0
7.30	6.54	144928.5	2954.3	49.1
7.35	6.59	145977.0	2974.1	49.1
7.40	6.64	147025.6	2993.9	49.1
7.45	6.69	148074.2	3013.7	49.1
7.50	6.74	149122.8	3033.4	49.2
7.55	6.79	150171.4	3053.2	49.2
7.60	6.84	151220.1	3073.0	49.2
7.65	6.89	152268.8	3092.8	49.2
7.70	6.94	153317.5	3112.6	49.3
7.75	6.99	154366.2	3132.4	49.3
7.80	7.04	155415.0	3152.2	49.3
7.85	7.09	156463.8	3172.0	49.3
7.90	7.14	157512.6	3191.8	49.3
7.95	7.19	158561.4	3211.5	49.4

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
8.00	7.24	159610.3	3231.3	49.4
8.05	7.29	160659.1	3251.1	49.4
8.10	7.34	161708.1	3270.9	49.4
8.15	7.39	162757.0	3290.7	49.5
8.20	7.44	163806.0	3310.5	49.5
8.25	7.49	164855.0	3330.3	49.5
8.30	7.54	165904.1	3350.1	49.5
8.35	7.59	166953.2	3369.9	49.5
8.40	7.64	168002.4	3389.7	49.6
8.45	7.69	169051.5	3409.4	49.6
8.50	7.74	170100.7	3429.2	49.6
8.55	7.79	171150.0	3449.0	49.6
8.60	7.84	172199.2	3468.8	49.6
8.65	7.89	173248.5	3488.6	49.7
8.70	7.94	174297.8	3508.4	49.7
8.75	7.99	175347.1	3528.2	49.7
8.80	8.04	176396.5	3548.0	49.7
8.85	8.09	177445.9	3567.8	49.7
8.90	8.14	178495.3	3587.5	49.8
8.95	8.19	179544.8	3607.3	49.8
9.00	8.24	180594.3	3627.1	49.8
9.05	8.29	181643.9	3646.9	49.8
9.10	8.34	182693.5	3666.7	49.8
9.15	8.39	183743.1	3686.5	49.8
9.20	8.44	184792.7	3706.3	49.9
9.25	8.49	185842.4	3726.1	49.9
9.30	8.54	186892.1	3745.9	49.9
9.35	8.59	187941.8	3765.6	49.9
9.40	8.64	188991.6	3785.4	49.9
9.45	8.69	190041.5	3805.2	49.9
9.50	8.74	191091.4	3825.0	50.0
9.55	8.79	192141.4	3844.8	50.0
9.60	8.84	193191.6	3864.6	50.0
9.65	8.89	194241.9	3884.4	50.0
9.70	8.94	195292.2	3904.2	50.0
9.75	8.99	196342.5	3924.0	50.0

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
9.80	9.04	197392.9	3943.7	50.1
9.85	9.09	198443.2	3963.5	50.1
9.90	9.14	199493.6	3983.3	50.1
9.95	9.19	200544.1	4003.1	50.1
10.00	9.24	201594.6	4022.9	50.1
10.05	9.29	202645.1	4042.7	50.1
10.10	9.34	203695.6	4062.5	50.1
10.15	9.39	204746.2	4082.3	50.2
10.20	9.44	205796.9	4102.1	50.2
10.25	9.49	206847.6	4121.8	50.2
10.30	9.54	207898.4	4141.6	50.2
10.35	9.59	208949.3	4161.4	50.2
10.40	9.64	210000.3	4181.2	50.2
10.45	9.69	211051.5	4201.0	50.2
10.50	9.74	212102.8	4220.8	50.3
10.55	9.79	213154.4	4240.6	50.3
10.60	9.84	214206.1	4260.4	50.3
10.65	9.89	215258.0	4280.2	50.3
10.70	9.94	216310.1	4299.9	50.3
10.75	9.99	217362.4	4319.7	50.3
10.80	10.04	218414.8	4339.5	50.3
10.85	10.09	219467.2	4359.3	50.3
10.90	10.14	220519.7	4379.1	50.4
10.95	10.19	221572.1	4398.9	50.4
11.00	10.24	222624.5	4418.7	50.4
11.05	10.29	223677.0	4438.5	50.4
11.10	10.34	224729.4	4458.3	50.4
11.15	10.39	225781.9	4478.1	50.4
11.20	10.44	226834.3	4497.8	50.4
11.25	10.49	227886.8	4517.6	50.4
11.30	10.54	228939.3	4537.4	50.5
11.35	10.59	229991.8	4557.2	50.5
11.40	10.64	231044.3	4577.0	50.5
11.45	10.69	232096.7	4596.8	50.5
11.50	10.74	233149.2	4616.6	50.5
11.55	10.79	234201.8	4636.4	50.5

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
11.60	10.84	235254.3	4656.2	50.5
11.65	10.89	236306.8	4675.9	50.5
11.70	10.94	237359.3	4695.7	50.5
11.75	10.99	238411.8	4715.5	50.6
11.80	11.04	239464.4	4735.3	50.6
11.85	11.09	240516.9	4755.1	50.6
11.90	11.14	241569.5	4774.9	50.6
11.95	11.19	242622.0	4794.7	50.6
12.00	11.24	243674.6	4814.5	50.6
12.05	11.29	244727.1	4834.3	50.6
12.10	11.34	245779.7	4854.0	50.6
12.15	11.39	246832.3	4873.8	50.6
12.20	11.44	247884.9	4893.6	50.7
12.25	11.49	248937.5	4913.4	50.7
12.30	11.54	249990.1	4933.2	50.7
12.35	11.59	251042.7	4953.0	50.7
12.40	11.64	252095.3	4972.8	50.7
12.45	11.69	253148.0	4992.6	50.7
12.50	11.74	254200.6	5012.4	50.7
12.55	11.79	255253.2	5032.1	50.7
12.60	11.84	256305.9	5051.9	50.7
12.65	11.89	257358.6	5071.7	50.7
12.70	11.94	258411.2	5091.5	50.8
12.75	11.99	259463.9	5111.3	50.8
12.80	12.04	260516.6	5131.1	50.8
12.85	12.09	261569.3	5150.9	50.8
12.90	12.14	262622.0	5170.7	50.8
12.95	12.19	263674.7	5190.5	50.8
13.00	12.24	264727.4	5210.2	50.8
13.05	12.29	265780.1	5230.0	50.8
13.10	12.34	266832.8	5249.8	50.8
13.15	12.39	267885.6	5269.6	50.8
13.20	12.44	268938.3	5289.4	50.8
13.25	12.49	269991.1	5309.2	50.9
13.30	12.54	271043.8	5329.0	50.9
13.35	12.59	272096.6	5348.8	50.9

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
13.40	12.64	273149.3	5368.6	50.9
13.45	12.69	274202.1	5388.3	50.9
13.50	12.74	275254.9	5408.1	50.9
13.55	12.79	276307.7	5427.9	50.9
13.60	12.84	277360.5	5447.7	50.9
13.65	12.89	278413.3	5467.5	50.9
13.70	12.94	279466.1	5487.3	50.9
13.75	12.99	280518.9	5507.1	50.9
13.80	13.04	281571.8	5526.9	50.9
13.85	13.09	282624.7	5546.7	51.0
13.90	13.14	283677.5	5566.5	51.0
13.95	13.19	284730.4	5586.2	51.0
14.00	13.24	285783.3	5606.0	51.0
14.05	13.29	286836.2	5625.8	51.0
14.10	13.34	287889.1	5645.6	51.0
14.15	13.39	288942.0	5665.4	51.0
14.20	13.44	289994.9	5685.2	51.0
14.25	13.49	291047.9	5705.0	51.0
14.30	13.54	292100.8	5724.8	51.0
14.35	13.59	293153.8	5744.6	51.0
14.40	13.64	294206.7	5764.3	51.0
14.45	13.69	295259.7	5784.1	51.0
14.50	13.74	296312.7	5803.9	51.1
14.55	13.79	297365.7	5823.7	51.1
14.60	13.84	298418.7	5843.5	51.1
14.65	13.89	299471.8	5863.3	51.1
14.70	13.94	300524.8	5883.1	51.1
14.75	13.99	301577.9	5902.9	51.1
14.80	14.04	302631.0	5922.7	51.1
14.85	14.09	303684.0	5942.4	51.1
14.90	14.14	304737.1	5962.2	51.1
14.95	14.19	305790.2	5982.0	51.1
15.00	14.24	306843.4	6001.8	51.1
15.05	14.29	307896.5	6021.6	51.1
15.10	14.34	308949.6	6041.4	51.1
15.15	14.39	310002.8	6061.2	51.1

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
15.20	14.44	311056.0	6081.0	51.2
15.25	14.49	312109.2	6100.8	51.2
15.30	14.54	313162.4	6120.5	51.2
15.35	14.59	314215.6	6140.3	51.2
15.40	14.64	315268.9	6160.1	51.2
15.45	14.69	316322.2	6179.9	51.2
15.50	14.74	317375.5	6199.7	51.2
15.55	14.79	318428.8	6219.5	51.2
15.60	14.84	319482.1	6239.3	51.2
15.65	14.89	320535.5	6259.1	51.2
15.70	14.94	321588.9	6278.9	51.2
15.75	14.99	322642.3	6298.6	51.2
15.80	15.04	323695.7	6318.4	51.2
15.85	15.09	324749.2	6338.2	51.2
15.90	15.14	325802.7	6358.0	51.2
15.95	15.19	326856.2	6377.8	51.2
16.00	15.24	327909.7	6397.6	51.3
16.05	15.29	328963.3	6417.4	51.3
16.10	15.34	330016.9	6437.2	51.3
16.15	15.39	331070.5	6457.0	51.3
16.20	15.44	332124.2	6476.8	51.3
16.25	15.49	333177.9	6496.5	51.3
16.30	15.54	334231.7	6516.3	51.3
16.35	15.59	335285.5	6536.1	51.3
16.40	15.64	336339.3	6555.9	51.3
16.45	15.69	337393.1	6575.7	51.3
16.50	15.74	338447.0	6595.5	51.3
16.55	15.79	339500.9	6615.3	51.3
16.60	15.84	340554.9	6635.1	51.3
16.65	15.89	341608.9	6654.9	51.3
16.70	15.94	342662.9	6674.6	51.3
16.75	15.99	343717.0	6694.4	51.3
16.80	16.04	344771.1	6714.2	51.3
16.85	16.09	345825.3	6734.0	51.4
16.90	16.14	346879.5	6753.8	51.4
16.95	16.19	347933.7	6773.6	51.4

Table C.12 (continued) Elevation above the average top of bank, model storage, conveyance and A_0/A ratio of the Kumak Channel in the Outer Delta Transect.

Water Level from Raw Data (m)	Elevation above the top of bank (m)	A_0	A	A_0/A
17.00	16.24	348987.9	6793.4	51.4
17.05	16.29	350042.3	6813.2	51.4
17.10	16.34	351096.6	6833.0	51.4
17.15	16.39	352151.0	6852.7	51.4
17.20	16.44	353205.5	6872.5	51.4
17.25	16.49	354260.1	6892.3	51.4
17.30	16.54	355314.7	6912.1	51.4
17.35	16.59	356369.5	6931.9	51.4
17.40	16.64	357424.4	6951.7	51.4
17.45	16.69	358479.4	6971.5	51.4
17.50	16.74	359534.4	6991.3	51.4
17.55	16.79	360589.5	7011.1	51.4
17.60	16.84	361644.6	7030.8	51.4
17.65	16.89	362699.8	7050.6	51.4
17.70	16.94	363755.1	7070.4	51.4
17.75	16.99	364810.4	7090.2	51.5
17.80	17.04	365865.7	7110.0	51.5
17.85	17.09	366921.0	7129.8	51.5
17.90	17.14	367976.4	7149.6	51.5
17.95	17.19	369031.9	7169.4	51.5
18.00	17.24	370087.3	7189.2	51.5
18.05	17.29	371142.8	7208.9	51.5
18.10	17.34	372198.3	7228.7	51.5
18.15	17.39	373253.8	7248.5	51.5
18.20	17.44	374309.4	7268.3	51.5
18.25	17.49	375365.1	7288.1	51.5
18.30	17.54	376420.7	7307.9	51.5
18.35	17.59	377476.5	7327.7	51.5
18.40	17.64	378532.3	7347.5	51.5
18.45	17.69	379588.2	7367.3	51.5
18.50	17.74	380644.2	7387.0	51.5
18.55	17.79	381700.3	7406.8	51.5