Keeyask Generation Project

Aquatic Effects Monitoring Plan

Water Quality Monitoring Report

AEMP-2021-06

KEEYASK

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KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING PLAN

REPORT #AEMP-2021-06

RESULTS OF WATER QUALITY MONITORING IN THE NELSON RIVER, 2020: YEAR 7 CONSTRUCTION

Prepared for

Manitoba Hydro

By

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June 2021

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SUMMARY

Background

The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the Keeyask Generating Station (GS) on the environment. Besides measuring the accuracy of the predictions made and actual effects of the GS on the environment, monitoring results will provide information on how construction and operation of the GS will affect the environment and if more needs to be done to reduce harmful effects.

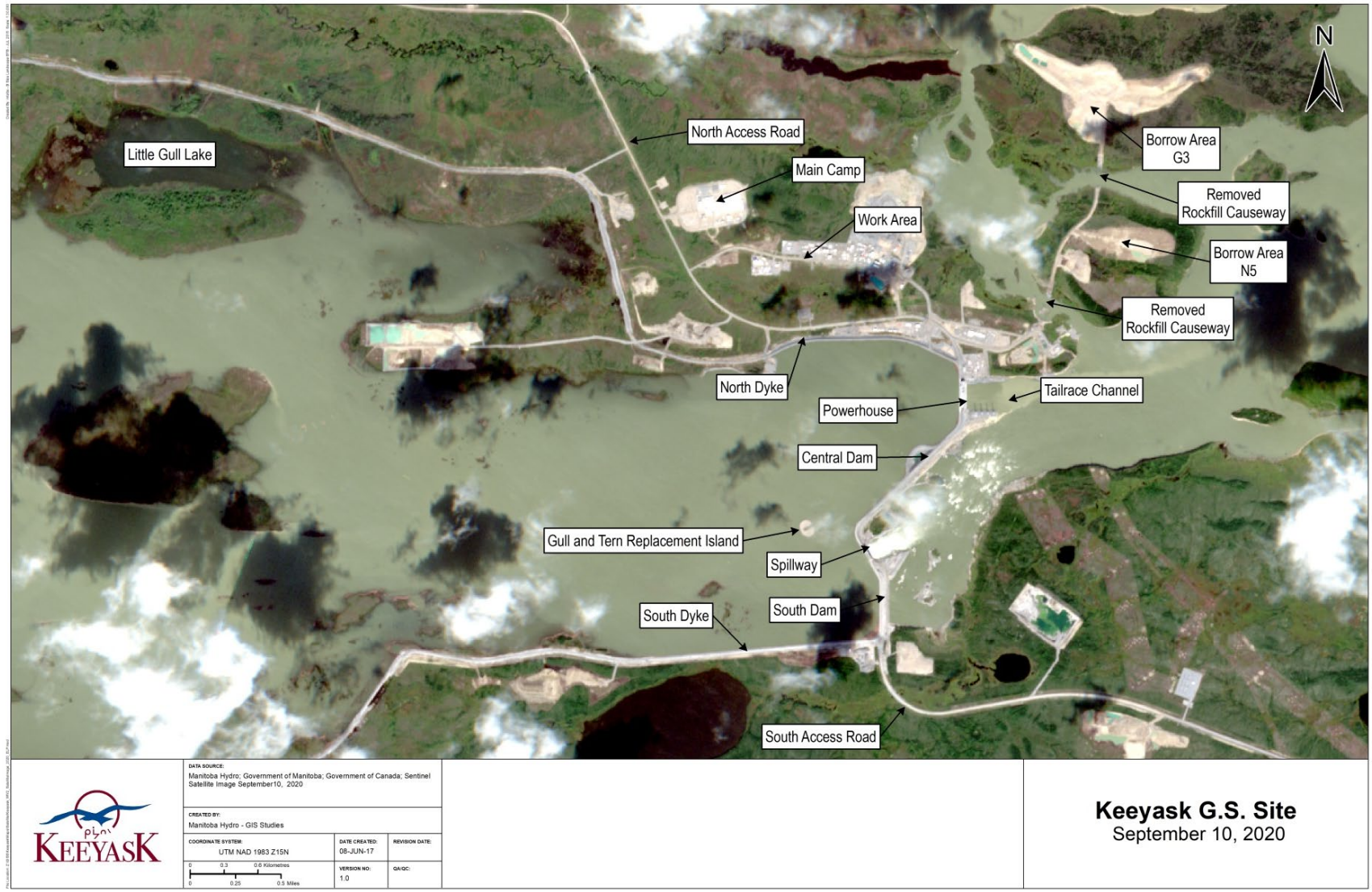
Construction of the Keeyask GS began in mid-July 2014 with the construction of cofferdams in the north and central channels of Gull Rapids. These cofferdams resulted in the dewatering of the north and central channels and the diversion of all flow to the south channel. Construction of the Spillway Cofferdam (SWCD), which extends into the south channel of Gull Rapids, was completed in 2015. The rock placement for the inner and outer groins of the Tailrace Cofferdam (TRCD) started in late 2016 and the impervious fill placement was completed in fall 2017. The spillway was commissioned between August 3 and 7, 2018. Closing the south channel with the upstream South Dam Cofferdam (SDCD) commenced at the beginning of August and river closure was achieved on August 16. This closure and the work that continued to seal the cofferdam forced the entire river flow through the spillway. In 2020, water-up of the areas kept dry by cofferdams for construction occurred between the end of February and mid-April. The cofferdams upstream of Keeyask and the North Channel Rock Groin were removed and/or lowered throughout the water-up process. Excavation of the TRCD occurred from mid-April to May 14 and then resumed on July 16 and was completed in October. Impoundment of the Keeyask reservoir took place between August 31 and September 5, 2020. Commissioning of the first generator unit started on August 31, 2020 and was still underway at the end of 2020.

Water quality is a key part of the monitoring program because it determines whether water is suitable to support aquatic life, including fish. The partner First Nations have expressed concern about changes to water quality on the Nelson River from historical hydroelectric developments, so tracking water quality during the Keeyask Project is important because human activities, including the construction and operation of the GS, can negatively affect it.

This report describes the results of water quality monitoring conducted during the seventh year of construction of the Keeyask GS and includes one sampling event after reservoir impoundment. Samples were collected at sites in Clark or Split lakes (i.e., upstream of the high water effects observed in 2014), the Nelson River upstream of construction, and at sites in Stephens Lake downstream of construction (the “local study area”) to see whether the water quality changed as it passed the construction site. In September, sampling took place at additional sites in Stephens Lake and farther downstream as far as the Nelson River estuary (the “regional study area”) to confirm that changes to water quality caused by reservoir impoundment did not occur farther

downstream than predicted. Monitoring included parameters such as suspended solids (such as sand and clay, etc.) and turbidity (i.e., “muddiness of the water”) that are expected to increase during construction. The program also measured other substances that are not expected to increase but are measured just in case.

Flooding land removes oxygen from the water as the flooded vegetation decays. Because aquatic life, such as fish, require oxygen to breathe, too little oxygen in the water could harm them. For this reason, additional monitoring was conducted after flooding of the Keeyask GS reservoir to measure dissolved oxygen concentrations. Sites included newly flooded bays where water mixes slowly with the main part of the river and dissolved oxygen is expected to decrease. The middle of the reservoir, where the dissolved oxygen is high, was sampled for comparison.



Map illustrating instream structures at the Keeyask Generating Station site after reservoir flooding, September 2020.

Why is the study being done?

The monitoring in 2020 was done to address two questions:

Are construction activities changing water quality as it passes through the Keeyask GS/Spillway to the point that fish and other aquatic life may be harmed?

The main effect of constructing the GS is that it can lead to more sand, silt, clay, and other "suspended solids" entering the Nelson River, which may impair water quality. This can be caused by building structures such as cofferdams in the river, or loss of soils and other material from the land caused by clearing vegetation or flooding shorelines. Construction may also result in the release of other potentially harmful substances, such as fuels and oils used in construction equipment (hydrocarbons), to the river. Water quality monitoring will determine whether construction is causing changes to water quality that could harm aquatic life and determine if additional measures are required to prevent effects from occurring in the future.

Suspended solids concentrations in the water are measured continuously downstream during construction and the results are relayed to the work site so that construction activities can be adjusted if the suspended solids become too high. These results are reported annually under the *Keeyask Generation Project Sediment Management Plan for In-Stream Construction* (SMP).

The water quality monitoring described in this report is much broader than what is done for the SMP. It examines water quality over a much larger area and measures other aspects of water quality besides suspended solids, such as nutrients, metals, and oil and gas (*i.e.*, hydrocarbons).

Did flooding of the Keeyask Reservoir change the water to the point that fish and other aquatic life may be harmed?

The last water quality monitoring event in 2020 happened after the Keeyask reservoir was impounded. Flooding the land in the reservoir may cause a big change to water quality in the reservoir and downstream from it, so extra sampling was conducted during this time to measure how much the water quality changed and how far downstream the changes could be seen.

What was done?

In 2020, water quality sampling was conducted four times in the local study area in Clark Lake, upstream of the Keeyask GS, and in Stephens Lake in late June, July, August, and September (open-water period). Because of travel restrictions at the start of the COVID-19 pandemic, sampling planned for winter (March/April) 2020 was not done. Sampling in the regional study area between Clark Lake and the Nelson River estuary was conducted once in mid-September, after reservoir impoundment.

Samples were collected to measure several substances in the water, including:

- total suspended solids and turbidity;

- pH;
- oxygen;
- nutrients (compounds that may increase the amount of algae present);
- chlorophyll *a* (representing the amount of algae); and
- metals and major ions (some of which are essential to aquatic life but some may also be harmful to aquatic life).

Though normally measured, hydrocarbons were not measured in 2020 because sampling was conducted from a float plane which can be a source of hydrocarbon contamination in samples. A float plane was used because of restricted access to sites via boat due to COVID-19.

Filling water quality sample bottles from a float plane.

During monitoring in the local study area, samples were collected at four locations: Clark Lake, the Nelson River, and two areas in Stephens Lake. One area upstream of the Keeyask GS ("upstream area"), was intended to serve as a reference for conditions in the Nelson River upstream of construction, but high water levels in 2014 prompted the addition of sites further upstream in Split Lake (during winter) and Clark Lake (during summer) (see local study area map

below). The third area sampled was in Stephens Lake approximately 9 km downstream of the construction activities ("near-field area"). This represents an area where some effects on water quality from construction are expected. The fourth area was also in Stephens Lake, approximately 25 km downstream of the construction site ("far-field area"). This area was used to determine whether effects observed at the near-field area extended farther downstream.

Two sites were sampled in the Clark Lake, upstream, and far-field areas, and four sites were sampled in the near-field area in June, July, August, and September. Five sites were sampled in the upstream area in September.

Some of the monitoring done in 2020 happened after flooding of the Keeyask GS reservoir in September. Extra sampling was conducted during this time to monitor water quality throughout the Nelson River between Stephens Lake and the estuary (the regional study area). Sampling took place at eight sites, including the north arm of Stephens Lake; one site immediately upstream of each of the Kettle, Long Spruce, and Limestone GSs; and four sites downstream of the Limestone GS along the Nelson River (see the regional study area map below). Individual samples were collected in September.

Additional measurements were taken at individual sites within the newly flooded reservoir in September to measure dissolved oxygen concentrations. Measurements were taken at four to six sites within four flooded bays and one mainstem area between Birthday Rapids and the Keeyask GS.

What was found?

Water quality was generally similar upstream and downstream of the Keeyask GS and along the length of the Nelson River, indicating there was minimal effect of construction on water quality and its suitability for aquatic life. This included after reservoir impoundment.

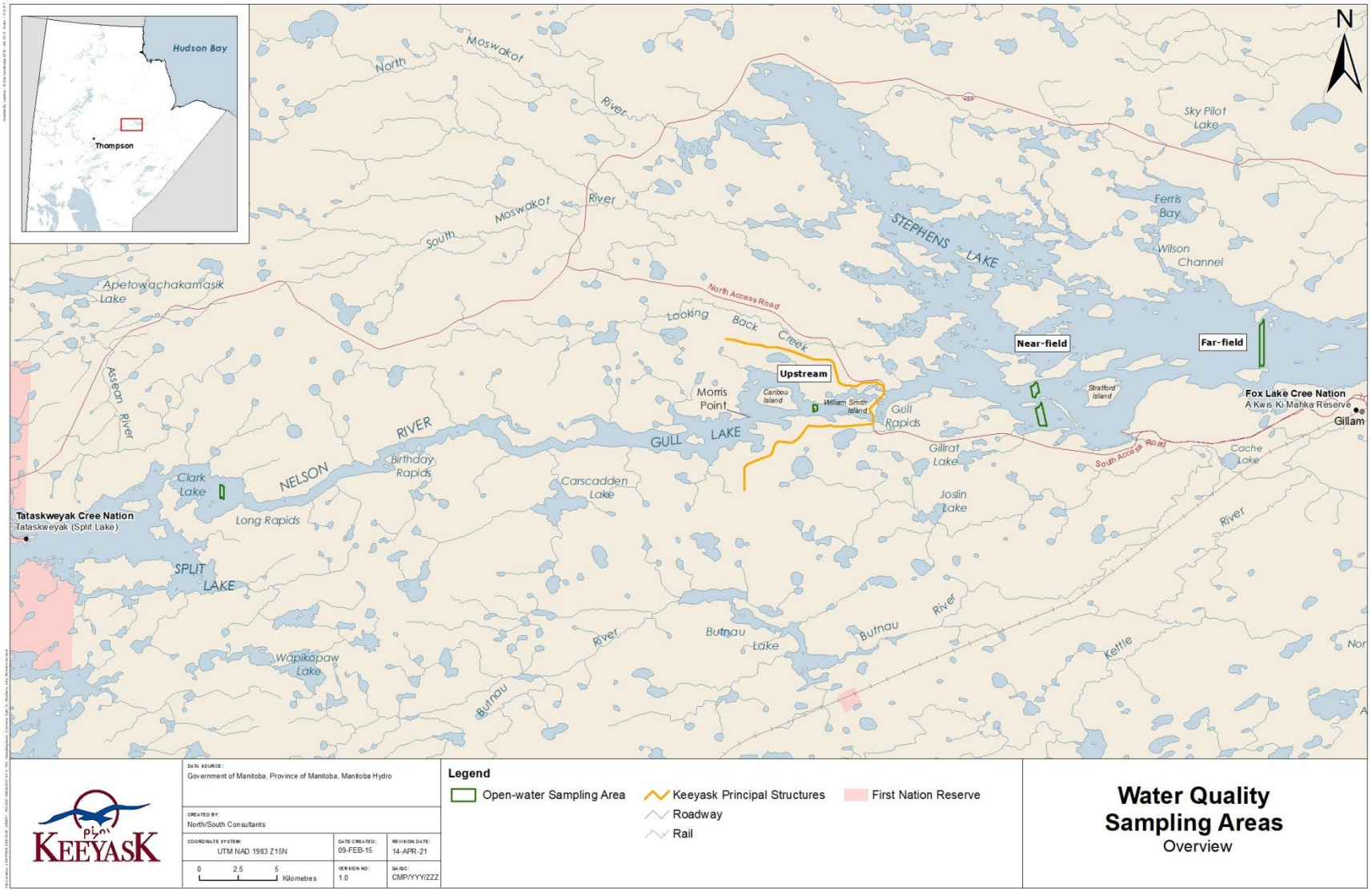
Dissolved oxygen concentrations in the Keeyask reservoir were above levels needed to protect aquatic life in 2020.

What does it mean?

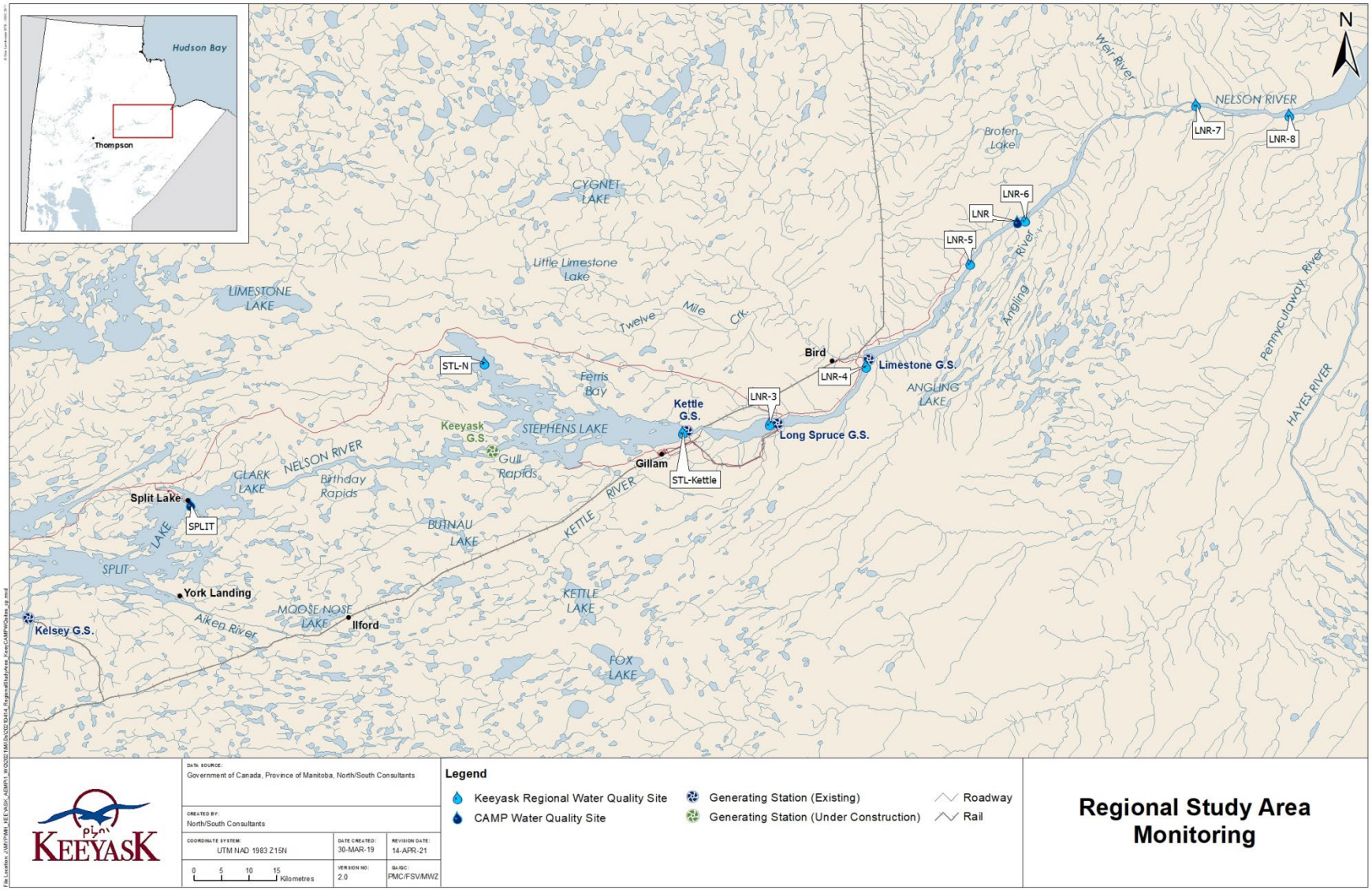
The information collected so far during the Project indicates that construction activities have had a minimal effect on water quality and its suitability to support aquatic life. Immediately following flooding of the reservoir, dissolved oxygen concentrations measured showed normal levels throughout the reservoir and in the newly flooded bays.

What will be done next?

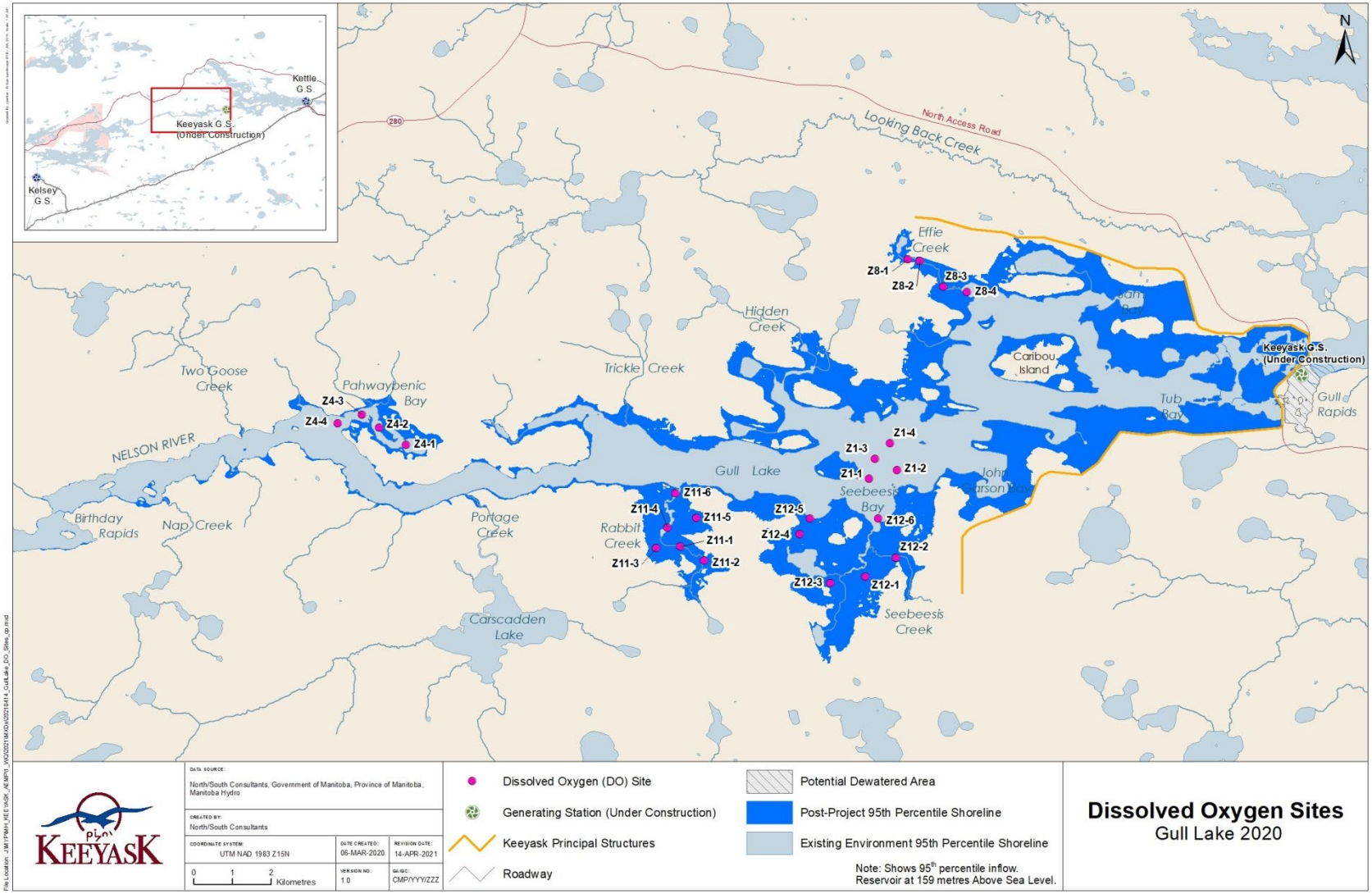
Water quality monitoring will continue in 2021. Because impoundment happened in 2020, monitoring in 2021 will include sampling the local study area, the regional study area, and flooded backbays in the Keeyask reservoir during every sampling period (i.e., March/April, June, July, August, and September).



Water quality monitoring areas in the local study area during open-water 2020.



Water quality monitoring areas in the regional study area in September 2020.



Dissolved oxygen monitoring sites in the flooded Keeyask reservoir, September 2020. Dark blue areas represent the predicted flooded shoreline.

ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull (Keeyask) Rapids on the lower Nelson River in northern Manitoba. The Project is approximately 725 kilometres (km) northeast of Winnipeg, 35 km upstream of the existing Kettle Generating Station, where Gull Lake flows into Stephens Lake, 60 km east of the community of Split Lake, 180 km east-northeast of Thompson and 30 km west of Gillam (Map 1). Construction of the Project began in July 2014.

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the aquatic environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs is provided in the *Keeyask Generation Project Environmental Impact Statement: Aquatic Environment Supporting Volume* (AE SV). As part of the licensing process for the Project, an Aquatic Effects Monitoring Plan (AEMP) was developed detailing the monitoring activities of various components of the aquatic environment including the focus of this report, water quality, for the construction and operation phases of the Project.

During the construction phase, the primary effect of the Project on water quality was predicted to be related to increases in total suspended solids (TSS), notably in relation to river management and cofferdam placement/removal. The primary mechanism for monitoring effects of construction activities on TSS/turbidity in the Nelson River was through monitoring that is being conducted under the *Keeyask Generation Project Sediment Management Plan for In-Stream Construction* (SMP) and the *Keeyask Generation Project Physical Environment Monitoring Plan* (PEMP), which included monitoring of TSS and turbidity in the Nelson River. TSS data collected under the SMP and PEMP were reported in the annual reports associated with those plans. Other pathways of effects (*i.e.*, discharge of point sources) were expected to result in highly localized and negligible to small effects on water quality, including TSS (*e.g.*, discharge of concrete batch plant effluent). The water quality monitoring program implemented during construction was intended to monitor effects on a broader array of water quality parameters in addition to TSS. This program, therefore, provided the means to monitor for potential unforeseen effects.

The study area for the water quality component of the AEMP during the construction period was composed of a local study area (LSA), which included Split Lake (ice-cover season) or Clark Lake (open-water season)[1], the reach of the Nelson River upstream of the Keeyask GS, and the southern area of Stephens Lake, as well as a regional study area (RSA) which included the lower Nelson River downstream of Stephens Lake (Map 1). The 2020 (Year 7 construction) water quality monitoring program included monitoring in the LSA and the RSA. As described in Table 2-6 of the AEMP, monitoring in the RSA is to be conducted during periods when TSS is predicted

[1] Clark Lake is the preferred reference area but does not become ice-covered in winter so Split Lake was included as the alternate winter sampling location.

to be elevated due to certain in-stream construction activities, such as reservoir impoundment, which occurred in September 2020.

Key questions presented in the AEMP to be answered about water quality during construction of the Keeyask GS were:

- Has the Project resulted in exceedances of water quality objectives or guidelines for the protection of aquatic life?
- What are the magnitude and spatial extent of effects of construction on water quality?

The objectives of monitoring during the construction period were to: determine if the Project caused or contributed to exceedances of benchmarks; determine the spatial and temporal extent of effects; confirm predictions presented in the AE SV; and monitor for unforeseen effects. The overall objective of construction monitoring was to record the net effect of various construction activities on a suite of water quality parameters along the mainstem of the Nelson River.

The AEMP identified key indicators and benchmarks for the water quality monitoring program to focus the program and provide an adaptive management framework (AMF). Key indicators were identified as those most likely to be affected by the Project, for which there is the greatest risk for direct effects on aquatic life, and for which there are objectives or guidelines for the protection of aquatic life (PAL). Benchmarks were identified based on baseline water quality conditions, Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOGs) for PAL (MWS 2011), and the Canadian Council of Ministers of the Environment (CCME) phosphorus guidance framework for freshwater systems (CCME 1999; updated to 2014[2]). Monitoring was also designed to include measurement of additional parameters for which no benchmarks were developed.

The construction monitoring program was designed to facilitate comparisons of water quality spatially (*i.e.*, upstream versus downstream of construction activities) to delineate Project-related effects. Specifically, the program was designed to facilitate statistical comparisons of water quality in an upstream reference area to water quality monitored downstream of construction activities. The reference area is an area located upstream of Project activities in the lower Nelson River. The Nelson River upstream of the Keeyask GS (previously Gull Rapids) served as the reference during years 1 and 2 of the program; however, sites further upstream (*i.e.,* Clark Lake) were added after high water levels in 2014 caused backwater effects within the Nelson River upstream of the Keeyask GS.

An AMF was developed for the water quality monitoring program, as presented in the AEMP. In brief, the framework entails initially comparing monitoring results to pre-established benchmarks (Step 1). If a benchmark is not exceeded, the assessment proceeds to Response Level 1 – trend analysis. If a benchmark is exceeded, the assessment proceeds to Step 2 – determination of whether there is a statistical difference between upstream and downstream areas (*i.e.*, control-impact). If a statistical difference is not observed, the assessment proceeds to Response Level 1. Where statistical differences are identified for key indicators, the assessment proceeds to Step

[2] All guidelines were those current at that time of AEMP development.

3, in which a determination of cause (*i.e.*, is the difference Project-related) would be undertaken (see Figure 1).

As outlined in the AEMP, reservoir impoundment is predicted to cause notable decreases in DO in isolated flooded backbays, therefore DO was to be monitored following full impoundment. Reservoir impoundment occurred over six days ending on September 5, after which an additional *in situ* dissolved oxygen (DO) survey was conducted within the reservoir.

The following report presents the results of water quality monitoring completed in open-water 2020 during Year 7 of construction, including immediately following reservoir impoundment. Results are assessed using the adaptive management framework as summarized above and detailed in the AEMP.

2.0 STUDY SETTING

The study area encompasses an approximately 236 km long reach of the Nelson River from Split Lake to the estuary (Map 1). This section of river offers a diversity of physical habitat conditions, including a variety of substrate types, and variable water depths (ranging from 0 to 30 m) and velocities.

Split Lake is located at the confluence of the Burntwood and Nelson rivers (Map 1). Due to the large inflows from the Nelson and Burntwood rivers, the lake has detectable current in several locations. Split Lake has maximum and mean depths of 28.0 m and 3.9 m, respectively, at a water surface elevation of 167.0 m above sea level (ASL; Lawrence *et al.* 1999). The surface area of Split Lake was determined to be 26,100 ha (excluding islands), with a total shoreline length, including islands, of 940.0 km (Lawrence *et al.* 1999). The numerous islands in Split Lake represent 411.6 km of the total shoreline.

Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of the Keeyask GS (Map 1). Current is restricted to the main section of the lake, with off-current bays outside the main channel. The Assean River is the only major tributary to Clark Lake, and flows into the north side. Downstream from the outlet of Clark Lake, the Nelson River narrows and water velocity increases for a 3 km stretch, known as Long Rapids. For the next 7 km, the river widens, and water velocity decreases.

Birthday Rapids is located approximately 10 km downstream of Clark Lake and 30 km upstream of the Keeyask GS (Maps 1 and 3). The drop in elevation from the upstream to downstream side of Birthday Rapids is approximately 2 m. The 14 km reach of the Nelson River between Birthday Rapids and Gull Lake is characterized as a large and somewhat uniform channel with medium to high water velocities. There are a few large bays with reduced water velocity and a number of small tributaries that drain into the Nelson River.

Gull Lake is a section of the Nelson River where the river widens, with moderate to low water velocity. Gull Lake is herein defined as the reach of the Nelson River beginning approximately 19.5 km upstream of the Keeyask GS and 14 km downstream of Birthday Rapids, where the river widens to the north into a bay around a large point of land (Maps 1 and 3), and extending to the downstream end of Caribou Island, approximately 3 km upstream of the Keeyask GS. Gull Lake has three distinct basins, the first extending from the upstream end of the lake downstream approximately 6 km to a large island; the second extending from the large island to Morris Point (a constriction in the river immediately upstream of Caribou Island); and the third extending from Morris Point to the downstream end of Caribou Island (Map 3).

In fall 2020, Gull Lake was impounded by the Keeyask GS and became part of the Keeyask reservoir, which will operate at a full supply level (FSL) of 159 m above sea level (ASL) on a permanent basis. The Keeyask reservoir is comprised of the mainstem of the original Nelson River from the outlet of Clark Lake as far as the Keeyask GS, plus 45 km^2 of adjacent, flooded terrestrial area. Reservoir impoundment formed relatively shallow bays due to flooding of

terrestrial areas, which generally have low water velocities and limited mixing with the mainstem flow. Over time the total area of the reservoir will increase as the terrestrial (peat) areas erode.

Gull Rapids, now the site of the Keeyask GS, was located approximately 3 km downstream of Caribou Island on the Nelson River (Map 1). Prior to construction, the rapids were approximately 2 km in length, and the river elevation dropped approximately 11 m along the 2 km length. Two large islands and several small islands occurred within the rapids, prior to the river narrowing; these features are within the Project footprint and have now been either dewatered, incorporated into the GS or were flooded after impoundment (Map 2). A summary of construction activities is provided in Section 2.1.

Construction of the Kettle GS flooded Moose Nose Lake (north arm) and several other small lakes that previously drained into the Nelson River, as well as the old channels of the Nelson River that now lie within the southern portion of the lake (Map 3). Major tributaries of Stephens Lake include the North and South Moswakot rivers that enter the north arm of the lake. Looking Back Creek is a second order stream that drains into the north arm of Stephens Lake (Map 1). Kettle GS is located approximately 40 km downstream of the Keeyask GS.

Long Spruce Reservoir was formed in 1979 by the construction of the Long Spruce GS. It is a 16 km reach of the Nelson River extending from Long Spruce GS upstream to Kettle GS (Manitoba Hydro Public Affairs 1999). Kettle River and Boots Creek are the only major tributaries flowing into Long Spruce Reservoir, with both tributaries entering the Reservoir on the south shore.

The Limestone Reservoir was formed in 1990 by the construction of the Limestone GS. It is a 23 km reach of the Nelson River extending from the Limestone GS upstream to Long Spruce GS. Four tributaries of the Nelson River enter the Reservoir; Wilson Creek and Brooks Creek enter from the south, and Sky Pilot Creek and Leslie Creek enter from the north. Aquatic habitat within the Reservoir ranges from a riverine environment in the upper reach, to more lacustrine conditions just upstream of the Limestone GS.

Similar to the section of the Nelson River between Split Lake and Stephens Lake, the Nelson River below the Limestone GS is also characterized by narrow sections with swiftly flowing water and wider more lacustrine sections created by the reservoir of the Long Spruce and Limestone GSs (Map 1). The Nelson River below the Limestone GS is extensively affected by discharge regulation, with diurnal fluctuations in discharge and stage changes varying on the order of 1 m (Manitoba Hydro 1994).

2.1 CONSTRUCTION SUMMARY

Construction of the Keeyask GS began in mid-July 2014 with the construction of cofferdams in the north and central channels of Gull Rapids. These cofferdams resulted in the dewatering of the north and central channels and the diversion of all flow to the south channel. Construction of the

Spillway Cofferdam (SWCD), which extends into the south channel of Gull Rapids, was completed in 2015. The rock placement for the inner and outer groins of the Tailrace Cofferdam (TRCD) started in late 2016 and the impervious fill placement was completed in fall 2017. The spillway was commissioned between August 3 and 7, 2018. Closing the south channel with the upstream South Dam Cofferdam (SDCD) commenced at the beginning of August and river closure was achieved on August 16. This closure and the work that continued to seal the cofferdam forced the entire river flow through the spillway. In 2020 water-up of the areas kept dry by cofferdams for construction occurred between the end of February and mid-April. The cofferdams upstream of Keeyask and the North Channel Rock Groin were removed and/or lowered throughout the water-up process. Excavation of the TRCD occurred from mid-April to May 14 and then resumed on July 16 and was completed in October. Impoundment of the Keeyask reservoir took place between August 31 and September 5, 2020. Commissioning of the first generator unit started on August 31, 2020 and was still underway at the end of 2020.

2.2 FLOWS AND WATER LEVELS

From October 2019 to October 2020 the calculated Split Lake outflow ranged between 2,600 m³/s in October 2019 and 5,900 m³/s in May 2020. Flows increased from about 2,600 m³/s in October 2019 to about 4,000 m³/s in December 2019 and remained fairly steady between 4,000–4,400 m³/s until the end of April 2020. In summer the flows were high and ranged between 5,000–6,000 m³/s from May through August before dropping in September through October until it reached 3,500 m³/s, slightly above the existing environment average flow.

Water levels on Gull Lake generally varied with flow and ice conditions between October 2019 and February 2020. Levels on Gull Lake rose from a low of about 153.5 m to 156 m from October to December and remained near that level until February while upstream levels varied with flow and ice conditions. From February to April, water-up activities at the construction site caused Gull Lake levels to rise about 0.3 m. After water-up, the spillway gates were used to keep levels relatively steady between about 156.3–156.8 m until the end of August prior to impoundment. The Keeyask reservoir was impounded to its operating level (158 to 159 m) from August 31 to September 5. During this period, Gull Lake was raised about 2 m to a maximum level of 158.9 m, 0.1 m below the full supply level. Upstream of Gull Lake the water level increase diminished with distance, with increases of about 0.8 m and 0.2 m immediately below and above Birthday Rapids while no increases occurred at the water level gauges immediately below and on Clark Lake. Gull Lake has since been held near 158.8 m while upstream levels vary with flow. With impoundment the Keeyask reservoir has entered its operating condition. Water levels on Gull Lake and upstream areas within the project's open water hydraulic zone of influence, which extends to about 3 km below Clark Lake, will now be permanently elevated relative to pre-project conditions.

3.0 METHODS

The following provides a description of the study design, sampling sites, sampling methods, and data analysis methods employed during the 2020 monitoring program.

3.1 STUDY DESIGN

The monitoring program is designed to facilitate comparisons of water quality spatially (*i.e.*, upstream and downstream of construction activities) to delineate Project-related effects. Specifically, the program is designed to facilitate statistical comparisons of water quality in an upstream reference area to water quality monitored downstream of construction activities (*i.e.*, areas that are predicted to be most affected by the Project); this area is defined as the local study area. Sampling in the LSA includes monitoring at replicate sites upstream and downstream of construction activities and is to be conducted annually during the construction period. The objective of monitoring during the construction period is to determine if the Project caused or contributed to exceedances of benchmarks and to confirm predictions in the AE SV.

The AEMP also indicates that water quality will be periodically monitored at single stations downstream of Stephens Lake to the Nelson River estuary (i.e., in the regional study area) in the years immediately following GS impoundment. As impoundment was completed on September 5, 2020, sampling was conducted within the RSA during the September sampling period.

As reservoir impoundment was predicted to cause notable decreases in DO in isolated flooded backbays throughout the Keeyask reservoir, a survey of *in situ* DO was conducted throughout the newly impounded reservoir in September 2020.

3.2 SAMPLING SITES

3.2.1 LOCAL STUDY AREA

The water quality monitoring program incorporated sites upstream and downstream of construction activities within the LSA (Map 3) as follows:

- Clark Lake (Map 4): Clark Lake is situated upstream of the construction site and is not affected by water level increases related to the Project;
- Nelson River Upstream Area (Map 5): the Nelson River upstream of the Keeyask GS;
- Near-Field Area (Map 6): this area is located approximately 9 km downstream of all construction activities in Stephens Lake; and

- Far-Field Area (Map 7): this area is located approximately 25 km downstream of construction activities in Stephens Lake.

Universal Transverse Mercator (UTM) coordinates for the water quality sites are provided in Table 1.

The locations of the sampling sites were defined differently for the upstream areas (*i.e.*, Nelson River upstream of the Keeyask GS and Split and Clark lakes) and the downstream near-field and far-field areas of Stephens Lake. As there are detailed bathymetry data for the areas upstream of the Keeyask GS up to and including Split Lake, the polygon boundary was defined based on open-water depths (> 5 m in depth at the 50th percentile water level), distance from shore (*i.e.*, > 100 m from shore), and length (*i.e.*, 250 m in length) (Maps 4 and 5). Due to a lack of detailed bathymetry for the two downstream sampling areas in Stephens Lake, these polygons were defined based on distance from shorelines. Specifically, the polygons were located 250 m from shorelines (including islands) and were 250 m in length (Maps 6 and 7). These boundaries were identified to ensure sites were located in relatively deep areas even under low water levels and to avoid nearshore areas where localized differences in water quality may occur (*e.g.*, localized shoreline erosion), while also being sufficiently large to accommodate five sampling sites with sufficient separation (*i.e.*, minimum of 20 m separation between sites).

Due to complications associated with sampling during the COVID-19 pandemic, sampling of the LSA in 2020 differed in several ways from previous years, as follows.

- Sampling was not conducted during the 2020 winter, ice-cover period.
- In previous years, five replicate sites were sampled in each of the sampling areas (i.e., sampling polygons) within the LSA. However, because sampling was mostly conducted in 2020 by a float plane that could not be anchored, samples were collected from two replicate stations within or as close as possible to each LSA polygon. These samples were collected as follows:
    - In Clark Lake (Map 4), site 1A was located approximately 350 m east of the polygon border in July, and approximately 450 m west in September.
    - In the upstream area (Map 5), both site 3A and 3B were approximately 50 m west of the polygon boundary in July.
    - In the near-field area of Stephens Lake (Map 6), site 1A was approximately 100 m south, 2A was approximately 200 m northwest, and 2B was approximately 150 m west of the polygon in September.
    - In the far-field area of Stephens Lake (Map 7), sites 14A and 14B were approximately 50 and 250 m east of the polygon in September.
- During the June sampling period, flooded conditions in the Nelson River upstream of the Keeyask GS prevented landing the float plane at the existing upstream water quality sampling area. Sampling was therefore conducted farther upstream, close to where winter

water quality monitoring is generally conducted. This is illustrated on Map 5 by sites US-15A and US15-B.

- During the September sampling period, sampling in the area immediately upstream of the Keeyask GS was conducted by boat, and five replicate stations were sampled within the sampling polygon.

3.2.2 REGIONAL STUDY AREA

Eight sites within the RSA were identified in the AEMP based on sampling conducted during the baseline monitoring in 2001–2004 and 2009 (Map 8). Monitoring sites included Stephens Lake North; one site immediately upstream of each of the Kettle, Long Spruce, and Limestone GSs; and four additional sites downstream of the Limestone GS along the Nelson River. The lateral location of each site was maintained within the middle of the river and/or within deep areas of each forebay. UTM coordinates for the RSA sites are provided in Table 2.

3.2.3 DISSOLVED OXYGEN SURVEY

In situ measurements of DO were taken within four backbays and one site in the Nelson River mainstem within the reservoir (Map 9). The AEMP identified flooded isolated backbays in the reservoir as areas where effects of the Project on water quality were predicted to be greatest. The AEMP predicted reduced DO concentrations within these areas, with greatest effects during the initial years following impoundment. Four backbays (including zones 4, 8, 11, and 12) and a single site in the centre of the reservoir (zone 1) outlined in the AEMP were sampled. Four to six sites were sampled in each location. Sites extended from as far within the bay as a boat could travel, to near the confluence with the mainstem. UTM coordinates for the backbay sites are provided in Table 3.

3.3 SAMPLING METHODS

Due to restrictions associated with travel during the initial period of the COVID-19 pandemic, sampling in the LSA was not conducted during the ice-cover period in 2020. However, sampling in the LSA was conducted four times during the open-water season in 2020: June 20, July 22, August 18, and September 12–17. Sites were accessed by float plane throughout the open-water period due to access restrictions caused by COVID-19. Sites upstream of the Keeyask GS were accessed using a boat during September.

Because sampling conducted in September 2020 occurred after the Keeyask reservoir was impounded to fully-supply level, additional sampling was conducted. The RSA was sampled on September 13–14. Additional in-situ DO measurements were taken within four newly-flooded backbays within the reservoir on September 22–23.

UTMs were recorded at each site using a hand-held Global Positioning System (GPS) unit and total water depth was measured using a HawkEye H22PX handheld depth sounder. General information recorded at each site included:

- Date and time of sample collection;
- Cloud cover, wind, air temperature, and precipitation, including the occurrence of precipitation prior to sampling where possible;
- Sampling equipment used;
- Site conditions and/or observations relevant to the sampling program; and
- Any deviations from field sampling protocols.

Sampling consisted of collection of *in situ* water quality measurements and collection of grab samples for laboratory analysis, as described below.

3.3.1 *IN SITU* MEASUREMENTS

Secchi disk depth was measured during the open-water season at each LSA site and each RSA site in September. Secchi disk depth was measured from the shady side of the boat by lowering the disk until it was no longer visible; the disk was then lowered approximately 1 m deeper than the previous reading, and raised until it was visible again. The Secchi disk depth was recorded as the average of the two readings.

In situ measurements of dissolved oxygen (DO), turbidity, pH, specific conductance, turbidity, and temperature were collected at each sampling site within the LSA and RSA using a YSI EXO2 water quality multi-meter. *In situ* parameters were measured at 1.0 m or 0.5 m intervals (for sites > 5.0 m and < 5.0 m, respectively) at each site beginning with a near surface measurement (*i.e.*, 0.3 m).

In situ measurements of DO were also taken at flooded backbay sites in September using a YSI EXO2 water quality multi-meter. DO was measured 0.3 m from the surface and 0.1 m from the bottom at every site.

3.3.2 SAMPLING FOR LABORATORY ANALYSES

At each LSA and RSA site, grab samples of surface water were collected for laboratory analysis. Laboratory parameters included “routine” parameters (*e.g.*, nutrients, TSS, and pH), total metals, and total mercury at all sites. In previous years, benzene, toluene, ethylbenzene, and xylene (BTEX), and F1-F4 hydrocarbons were sampled in the upstream and near-field areas (Map 3) to monitor for potential hydrocarbon contamination downstream of construction activities. However, because sampling was conducted using a float plane (a potential source), hydrocarbons were not measured during sampling in 2020.

With the exception of sample collection for ultra-trace mercury, sampling was conducted by wearing gloves and submerging each sample bottle (provided by the analytical laboratory) to elbow depth (*i.e.*, approximately 0.3 m depth) then uncapping, filling, recapping, retrieving the bottle to the surface, then adding preservatives as required. For sample bottles pre-charged with preservative by the analytical laboratory, extra care was taken to ensure preservative was not lost during sampling. Samples for ultra-trace mercury were collected using the "clean hands-dirty hands" protocol (U.S. Environmental Protection Agency 1996).

All sample bottles were filled with minimal headspace, except where instructed, to prevent chemical alteration and loss of compounds. Samples were subsequently kept cool (but not frozen) and in the dark until submission to a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory (ALS Laboratories, Winnipeg, MB).

3.4 QUALITY ASSURANCE/QUALITY CONTROL

The quality control/quality assurance (QA/QC) program included application of standard procedures to limit sample contamination in the field, submission of QA/QC samples to the analytical laboratory, and QA/QC verifications of the water quality meter.

3.4.1 GENERAL QA/QC

Standard procedures for the control of sample contamination were adhered to throughout the sampling program, including:

- Use of gloves during sampling;
- Collecting samples facing in an upstream direction to minimize sample contamination. Where possible, sites were also approached moving in an upstream direction to avoid site disturbance and contamination;
- Avoiding contact with the insides of sample bottles, including lids;
- Limiting exposure of the insides of sample bottles to the atmosphere;
- Regular cleaning, calibration, inspection, and accuracy verification of field meters and equipment; and
- Adherence to sampling protocols wherever possible.

3.4.2 TRIPLICATE SAMPLES

The sampling program incorporated the collection of one triplicate sample at a randomly selected sampling site during the September sampling period within the upstream area only. The triplicates

were collected at the same location and as close in time as practically feasible. Triplicate samples were identified with the Site ID followed by “A”, “B”, or “C”.

3.4.3 FIELD BLANKS

One field blank was submitted to the analytical laboratory (ALS Laboratories) during each sampling period. Two field blanks were submitted in September, one for sampling in the upstream area (conducted by boat) and one for sampling in the remaining LSA and RSA areas (conducted by floatplane). Field blanks were prepared by filling one set of sample bottles (provided by the analytical laboratory) with deionized water (also provided by the analytical laboratory) in the field and treating the blanks in exactly the same manner as environmental samples.

Bottles were blindly labeled, stored, and transported according to sampling and handling protocols, and submitted along with environmental samples.

3.4.4 TRIP BLANKS

One trip blank was also submitted to the analytical laboratory (ALS Laboratories) during each sampling period. As with field blanks, two trip blanks were submitted for the September sampling period. Trip blanks were prepared by the analytical laboratory by filling one set of sample bottles with deionized water and adding preservatives where appropriate.

The trip blank samples were transported to the field site, using the same handling and transport protocols as for environmental samples, and submitted along with environmental samples to the analytical laboratory for analysis. Trip blanks were treated similarly to field blanks but the bottles were not opened at any point in the field and thus were not exposed to the environment. Trip blanks were also blindly labelled.

3.4.5 WATER QUALITY METER QA/QC

The water quality meter was calibrated and inspected prior to departure for the field for each sampling trip. In the field, the functioning and accuracy of the meter was also assessed at the end of each sampling day by verifying meter measurements in standards of known values for turbidity, pH, and specific conductance. Any discrepancies from the standard values were documented in the field notes.

3.5 DATA ANALYSIS

Prior to analysis, all environmental data were evaluated qualitatively for potential outliers and transcription or analytical errors. Suspect results were noted and requests were made to the analytical laboratory to verify the values.

QA/QC samples were assessed according to standard criteria to evaluate precision and identify potential sample contamination issues (BCMELP 1998). Field and trip blank results were evaluated for evidence of sample contamination. Blank results that exceeded five times the analytical detection limit (DL) were considered to be indicative of sample contamination and/or laboratory error. Percent relative standard deviation (PRSD) was calculated for triplicate samples as follows:

PRSD = Standard deviation of the triplicate values/Mean of the triplicate values x 100.

Precision of the QA/QC samples was evaluated using the "rule of thumb" criteria for precision of 18% for triplicate samples (BCMELP 1998). Where one or more of the measurements being compared was less than five times the analytical DL, an analysis of precision was not undertaken, in accordance with guidance provided in BCMELP (1998).

Mean and standard error (SE) were also calculated for all sampling sites within each sampling area during each sampling period. Results that were reported below the analytical DL were assigned a value of one half the DL for all statistical and graphical analyses.

As summarized in Section 1.0, and detailed in the AEMP, results of the water quality monitoring program are subject to the steps identified within the AMF (Figure 1). This framework prescribes data analysis methods and other tasks to be undertaken based on results of the monitoring program. Step 1 of the AMF entails comparison of the mean values of replicate samples for key indicators measured during a single sampling period to the benchmarks identified in the AEMP. If a benchmark is not exceeded, the assessment proceeds to Response Level 1 – trend analysis. If a benchmark is exceeded, the assessment proceeds to Step 2 – determination of whether there is a statistical difference between upstream and downstream areas (*i.e.*, control-impact) and/or relative to baseline conditions (before-after). If a statistical difference is not observed, the assessment proceeds to Response Level 1. Where statistical differences are identified for key indicators, the assessment proceeds to Step 3, in which a determination of cause (*i.e.*, is the difference Project-related) would be undertaken.

For data collected in 2020, means for key indicators were first compared to benchmarks (Table 2). For each key indicator that exceeded a benchmark, a statistical comparison between upstream and downstream sampling areas was undertaken during the respective sampling period. Data subject to statistical analyses, as per the AMF, were analysed in XLStat 2014, version 3.01 by a non-parametric Kruskal-Wallis test ($\alpha = 0.05$).

In addition to the key water quality indicators, monitoring results for other water quality parameters (*e.g.,* parameters for which there are no PAL objectives or guidelines but may be indicative of

general changes in water quality, such as conductivity) were also summarized to provide supporting information regarding potential effects of construction and to assist with development of trend monitoring over the long-term.

4.0 RESULTS

Results of the water quality monitoring program for the 2020 open-water season are summarized below and presented in Tables 4 and 5 and Figures 2–76. Raw data are provided in Appendix 1 and results of the QA/QC samples are presented in Appendix 2.

4.1 KEY INDICATORS

4.1.1 NUTRIENTS

Mean ammonia and nitrate/nitrite concentrations measured in Clark Lake, the upstream, near-field, and far-field areas of the LSA, and individual measurements from sites in the RSA were within the benchmark values during each of the sampling events in June, July, August, and September (Table 4; Figures 2–7). Total phosphorous (TP) marginally exceeded the benchmark value of 0.0580 mg/L in August both in the upstream and near-field areas (means = 0.0585 and 0.0587 mg/L, respectively). However, the exceedance was negligible, and the mean TP did not differ significantly between any of the areas of the LSA (Figure 6c).

4.1.2 CHLOROPHYLL *a*

Mean chlorophyll *a* concentrations measured in the RSA and in Clark Lake, the upstream area, and the near-field areas of the LSA were below the benchmark of 10.00 µg/L in June, July, August, and September (Table 2; Figures 8 and 9). Measurements were below the benchmark in the far-field area in June, August, and September. In July, the mean chlorophyll *a* concentration measured in the far-field area was marginally above the benchmark (10.02 µg/L) and significantly higher than those measured in either Clark Lake or the upstream area (Figure 8b). The mean concentration in the far-field area in July did not differ significantly from that measured in the near-field area.

4.1.3 TOTAL SUSPENDED SOLIDS

Mean TSS concentrations measured in the LSA in June, July, and August, and September were within the chronic benchmark values, defined as a 5 mg/L increase above background (calculated from measurements at Clark Lake during each sampling period) (Table 2; Figure 10). Mean TSS concentrations measured in the RSA were above the chronic benchmark in June in the lower Nelson River but remained within the short-term benchmark (defined as a 25 mg/L increase above background measured in Split Lake) (Table 2; Figure 11).

4.1.4 DISSOLVED OXYGEN

Mean DO concentrations measured in all sampling areas in the LSA and individual sites within the RSA were within the benchmark values during each of the sampling events in June, July, August, and September (Table 2; Figures 12 and 13). Although slight variations in DO concentrations were observed across water depth during some sampling periods, all sites in the study area were well-oxygenated with DO saturation exceeding 90%. All measurements collected across the water column at every site and sampling time exceeded the DO benchmarks.

4.1.5 PH

Mean laboratory pH measurements collected in all sampling areas of the LSA and individual measurements from sites in the RSA were within the benchmark values during each of the sampling events in June, July, August, and September (Tables 4 and 5; Figures 14 and 15). The *in situ* pH measured in July at a single site in both the upstream (US-3A) and the near-field (NF-1A) areas was slightly lower than the benchmark (6.5 pH units) at several depths within the water column. However, the mean pH for both sites was within the benchmark range.

4.1.6 METALS

Mean concentrations of total metals measured in each of the LSA and RSA sampling areas were within the benchmark values during each sampling event, including: aluminum, arsenic, boron, cadmium, chromium, copper, iron, lead, mercury, molybdenum, nickel, selenium, silver, thallium, uranium, and zinc (Table 4; Figures 16–47).

In August, the detection limit for mercury was adjusted from 0.5 ng/L to 2.0 ng/L by the laboratory because of matrix effects in the samples from all areas within the LSA. Matrix effects mean that the mercury concentration of each sample was difficult to determine due to interference from other parts of the sample (such as chemical interference, colour, and turbidity). Mean concentrations of mercury measured in each of the LSA sampling areas in August were below the adjusted detection limit.

4.2 ADDITIONAL PARAMETERS

Results for parameters measured in the LSA and RSA that are not key indicators (Table 5) are presented as follows: dissolved phosphorous (Figures 48 and 49), total nitrogen (Figures 50 and 51), dissolved organic carbon (Figures 52 and 53), true colour (Figures 54 and 55), *in situ* and laboratory turbidity (Figures 56 and 57), *in situ* and laboratory specific conductance (Figures 58 and 59), total dissolved solids (Figures 60 and 61), hardness (Figures 62 and 63), and major ions (chloride, sulfate, calcium, magnesium, potassium, and sodium; Figures 64–75).

In September, *in situ* turbidity measured in the upstream area was much higher than that measured in other areas of the LSA. Sampling in the upstream area occurred 12 days after impoundment, therefore it is possible that turbidity was increased due to effects of flooding. However, these results are considered suspect as they were not consistent with the lab results, which indicate turbidity levels lower than those measured in any other area within the LSA. Further, *in situ* turbidity measurements were not elevated during September sampling downstream of the Keeyask GS. Therefore, it is likely that the increased *in situ* turbidity measured in the upstream area in September was the result of instrument error rather than Project effects.

4.3 DISSOLVED OXYGEN SURVEY (RESERVOIR)

The DO survey conducted shortly after impoundment indicated good conditions in three of the four backbays monitored, where the DO was generally 80–95% saturation with no difference between surface and bottom waters. A slight reduction in DO was observed at two sites in the fourth backbay (Zone 8; Map 9). DO saturation was 70% (7.98 mg/L) at the surface and 69% (7.95 mg/L) at the bottom at site Z8-1, and 96% (8.60 mg/L) at the surface and 76% (8.58 mg/L) at the bottom at site Z8-1. However, DO concentrations remained above the benchmark (6.5 mg/L) in all areas sampled.

5.0 DISCUSSION

With two exceptions (total phosphorous in August and chlorophyll *a* in July), the mean concentrations of all key indicators measured in the LSA and the RSA were within benchmarks during the June, July, August, and September sampling events in 2020. As per Step 1 of the AMF, no further analysis was conducted for parameters within the benchmarks.

During the August sampling period, mean total phosphorus concentrations in the upstream and near-field areas were marginally above the benchmark of 0.058 mg/L and, therefore, further analyses were triggered under the AMF. The exceedance was negligible and statistical comparisons indicated that total phosphorus did not differ between any of the sample areas, indicating that the difference observed in the upstream and near-field areas was similar to that observed under background conditions. This indicates there was no Project-related effect on total phosphorus in 2020.

During the July sampling period, mean chlorophyll *a* concentration in the far-field area was marginally above the benchmark of 10.00 µg/L and, therefore, further analyses were triggered under the AMF. Statistical comparisons indicated that chlorophyll *a* was significantly higher in the far-field area compared to Clark Lake and the upstream area, but did not differ from the near-field area. Chlorophyll *a* concentrations in the near-field area did not differ from the Clark Lake or upstream areas, indicating that conditions immediately downstream of construction were similar to background. Because of its distance from the construction area, it is not likely that increases in chlorophyll *a* observed in the far-field area in July were the result of the Project.

Phytoplankton abundance is primarily affected by concentrations of key nutrients (nitrogen and phosphorus), water temperature, and light. Therefore, monitoring results for nutrients and measures of water clarity (i.e., turbidity levels) were evaluated to explore potential explanations for the higher chlorophyll *a* observed in July in the far-field area. Concentrations of TP, TDP, and TN (i.e., the primary drivers of phytoplankton abundance) were not higher in the far-field area relative to other monitoring areas. This indicates that there was no substantive change in the key drivers affecting phytoplankton abundance that may suggest a Project-related effect had occurred.

The benchmark for chlorophyll *a* (10.00 µg/L) was derived from pre-Project (i.e., baseline) data for the LSA. Specifically, the benchmark represents the 95th percentile of concentrations measured during the open-water season in the LSA over the period of 2001–2012. The mean concentration (10.02 µg/L) in the far-field area in July was within the range of baseline concentrations (maximum of 12.0 µg/L) measured prior to construction.

The EIS predicted that DO concentrations would be reduced within flooded backbays of the reservoir due to breakdown of organic matter combined with poor mixing and long water residence times. It predicted that the effects will be greatest during the initial years after impoundment of the reservoir to the full supply level. A DO survey was conducted within two weeks of Keeyask

impoundment in September 2020. *In situ* measurements of DO indicated good conditions throughout the reservoir, with some depletion at two sites within a single backbay (Zone 8). However, all DO measurements were above the benchmark of 6.5 mg/L.

6.0 SUMMARY AND CONCLUSIONS

Key questions presented in the AEMP to be answered about water quality during construction of the Keeyask GS and reservoir impoundment are:

- *Has the Project resulted in exceedances of water quality objectives or guidelines for the protection of aquatic life?*
- *What are the magnitude and spatial extent of effects of construction on water quality?*

Water quality measured in the local and regional study areas along the lower Nelson River indicated that conditions measured during open-water 2020 were generally similar upstream and downstream of the construction activities. Any upstream to downstream differences in water quality were consistent with spatial trends observed during baseline studies.

Overall, information collected thus far indicates that construction activities have not affected water quality and its suitability to support aquatic life.

Keeyask reservoir impoundment was completed on September 5 and *in situ* monitoring of DO within the newly-formed reservoir was conducted two weeks later. DO measured within all sampling sites was higher than benchmarks, indicating minimal depletion immediately following reservoir impoundment.

7.0 LITERATURE CITED

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TABLES

Table 1: Coordinates of water quality monitoring sites sampled in the local study area in 2020.

Region	Site ID	Zone	Easting	Northing
Clark Lake	CL-1A	15V	321258	6240753
	CL-1B	15V	321323	6240681
Nelson River Upstream of the Keeyask GS (Zone 3)	US-3A	15V	359282	6246081
	US-3B	15V	359268	6246108
	US-15A	15V	355879	6245500
	US-15B	15V	355820	6245484
	US-1	15V	359565	6246159
	US-2	15V	359504	6246957
	US-3	15V	359375	6246141
	US-4	15V	359379	6246182
	US-5	15V	359439	6246070
Stephens Lake Near-field	NF-1A	15V	373648	6247248
	NF-1B	15V	373784	6247288
	NF-2A	15V	373853	6245492
	NF-2B	15V	373998	6245436
Stephens Lake Far-field	FF-2A	15V	388274	6249852
	FF-2B	15V	388375	6249922
	FF-14A	15V	388607	6251508
	FF-14B	15V	388428	6251610

Table 2: Coordinates of water quality monitoring sites sampled in the regional study area in 2020.

Program	Sample Location	Site ID	Zone	Easting	Northing
Keeyask	Stephens Lake - North Arm	STL-N	15V	361902	6262666
Keeyask	Stephens Lake - upstream of the Kettle GS	STL-Kettle	15V	398097	6249500
Keeyask	Longspruce Forebay	LNR-3	15V	413157	6251293
Keeyask	Limestone Forebay	LNR-4	15V	431375	6261768
Keeyask	Nelson River upstream of proposed Conawapa Generating Station	LNR-5	15V	451144	6282550
Keeyask	Nelson River d/s of the proposed Conawapa Generating Station (near Frank's Island)	LNR-6	15V	459110	6288142
Keeyask	Nelson River downstream of Deer Island	LNR-7	15V	492366	6309183
Keeyask	Nelson River upstream of Gillam Island	LNR-8	15V	511265	6309392
CAMP	Split Lake, near the community	SPLIT	14V	680876	6236434
CAMP	Lower Nelson River downstream of the Limestone Forebay	LNR	15V	458807	6288148

Table 3: Coordinates of water quality monitoring sites sampled in the Keeyask reservoir during the fall dissolved oxygen survey in 2020.

Region	Site ID	Zone	Easting	Northing
Nelson River Mainstem Zone 1	Z1-1	15V	352471	6243720
	Z1-2	15V	353189	6243941
	Z1-3	15V	352624	6244234
	Z1-4	15V	353005	6244640
Backbay Zone 4	Z4-1	15V	340450	6244600
	Z4-2	15V	339752	6245039
	Z4-3	15V	339312	6245376
	Z4-4	15V	338684	6245162
Backbay Zone 8	Z8-1	15V	353474	6249418
	Z8-2	15V	353784	6249363
	Z8-3	15V	354387	6248700
	Z8-4	15V	355011	6248556
Backbay Zone 11	Z11-1	15V	347573	6241964
	Z11-2	15V	348182	6241595
	Z11-3	15V	346949	6241923
	Z11-4	15V	347229	6242449
	Z11-5	15V	347983	6242696
	Z11-6	15V	347440	6243336
Backbay Zone 12	Z12-1	15V	352370	6241187
	Z12-2	15V	353167	6241674
	Z12-3	15V	351463	6241006
	Z12-4	15V	350665	6242283
	Z12-5	15V	350939	6242681
	Z12-6	15V	352707	6242683

Table 4: Benchmark and mean values of key water quality parameters measured during the water quality monitoring program, 2020.

Indicator	Unit	Benchmark[1]	June			
			Clark Lake	Upstream	Near-Field	Far-Field
Ammonia	(mg N/L)	1.97	0.113	0.050	0.074	0.052
Nitrate/ Nitrite	(mg N/L)	2.93	<0.0051	<0.0051	0.0088	0.0051
Total Phosphorous	(mg/L)	0.060	0.0365	0.0357	0.0353	0.0314
Chlorophyll *a*	(µg/L)	10.0	5.54	5.73	5.53	6.38
Total Suspended Solids	(mg/L)	16.7/36.7 [2]	11.7	12.0	12.8	9.3
Laboratory pH	-	6.5/9.0	8.14	8.12	8.13	8.12
Dissolved Oxygen	(mg/L)	6.5/9.5[3]	9.79	9.62	9.88	9.74
Aluminum	(mg/L)	1.98	0.679	0.681	0.699	0.625
Arsenic	(mg/L)	0.150	0.00104	0.00102	0.00101	0.00102
Boron	(mg/L)	1.5	0.015	0.015	0.015	0.018
Cadmium	(mg/L)	0.000271	0.0000191	<0.0000050	0.0000071	0.0000100
Chromium	(mg/L)	0.0863	0.00118	0.00117	0.00124	0.00104
Copper	(mg/L)	0.00934	0.00167	0.00161	0.00166	0.00159
Iron	(mg/L)	1.45	0.675	0.659	0.700	0.575
Lead	(mg/L)	0.00319	0.000270	0.000268	0.000291	0.000332
Mercury	(mg/L)	0.000026	0.00000135	0.00000150	0.00000143	0.00000131
Molybdenum	(mg/L)	0.073	0.000494	0.000584	0.000503	0.000590
Nickel	(mg/L)	0.0522	0.00153	0.00148	0.00152	0.00151
Selenium	(mg/L)	0.0010	0.000111	0.000094	0.000088	0.000148
Silver	(mg/L)	0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	(mg/L)	0.0008	<0.000010	<0.000010	<0.000010	0.000008
Uranium	(mg/L)	0.0330	0.000479	0.000485	0.000499	0.000573
Zinc	(mg/L)	0.120	<0.0030	<0.0030	<0.0030	<0.0030

1. Benchmark values are based on the most stringent calculation measured from the 2020 monitoring program.
2. Lower value represents chronic benchmark; higher value represents short-term benchmark. Values calculated based on the mean TSS measured at Split/Clark Lake during each sampling period.
3. 6.5 mg/L represents the benchmark for the open-water season; 9.5 mg/L is the benchmark for the ice-cover season.

Table 4: Benchmark and mean values of key water quality parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	Benchmark[1]	July			
			Clark Lake	Upstream	Near-Field	Far-Field
Ammonia	(mg N/L)	1.44	0.014	0.049	0.085	0.030
Nitrate/ Nitrite	(mg N/L)	2.93	0.0244	0.0249	0.0224	0.0102
Total Phosphorous	(mg/L)	0.058	0.0503	0.0478	0.0482	0.0494
Chlorophyll *a*	(µg/L)	10.0	4.63	4.26	6.27	**10.02**[4]
Total Suspended Solids	(mg/L)	17.5/37.5 [2]	12.5	11.3	9.6	7.9
Laboratory pH	-	6.5/9.0	8.10	8.06	8.10	8.10
Dissolved Oxygen	(mg/L)	6.5/9.5[3]	10.57	10.61	11.74	11.10
Aluminum	(mg/L)	1.98	0.966	0.990	0.866	0.813
Arsenic	(mg/L)	0.150	0.00133	0.00136	0.00132	0.00125
Boron	(mg/L)	1.5	0.021	0.021	0.022	0.021
Cadmium	(mg/L)	0.000275	0.0000096	0.0000095	0.0000084	0.0000077
Chromium	(mg/L)	0.0876	0.00169	0.00171	0.00145	0.00132
Copper	(mg/L)	0.00949	0.00200	0.00204	0.00195	0.00185
Iron	(mg/L)	1.45	0.961	0.975	0.837	0.767
Lead	(mg/L)	0.00326	0.000417	0.000400	0.000357	0.000317
Mercury	(mg/L)	0.000026	0.00000150	0.00000146	0.00000128	0.00000112
Molybdenum	(mg/L)	0.073	0.000498	0.000621	0.000551	0.000534
Nickel	(mg/L)	0.0530	0.00205	0.00202	0.00185	0.00173
Selenium	(mg/L)	0.0010	0.000121	0.000106	0.000133	0.000127
Silver	(mg/L)	0.0001	<0.000010	<0.000010	<0.000010	0.0000
Thallium	(mg/L)	0.0008	0.000014	0.000014	0.000012	<0.000010
Uranium	(mg/L)	0.0330	0.000456	0.000443	0.000453	0.000443
Zinc	(mg/L)	0.122	0.0044	0.0038	0.0033	0.00345

4. Bold indicates that the value exceeded the benchmark.

Table 4: Benchmark and mean values of key water quality parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	Benchmark[1]	August			
			Clark Lake	Upstream	Near-Field	Far-Field
Ammonia	(mg N/L)	1.32	0.034	0.047	0.035	0.025
Nitrate/ Nitrite	(mg N/L)	2.93	0.0624	0.0684	0.0721	0.0457
Total Phosphorous	(mg/L)	0.058	0.0563	**0.0585**	**0.0587**	0.0571
Chlorophyll *a*	(µg/L)	10.0	2.76	2.95	3.94	9.76
Total Suspended Solids	(mg/L)	16.1/36.1[2]	11.1	11.3	8.5	6.6
Laboratory pH	-	6.5/9.0	8.11	8.12	8.13	8.15
Dissolved Oxygen	(mg/L)	6.5/9.5[3]	8.94	8.81	9.80	10.08
Aluminum	(mg/L)	1.98	0.956	0.967	0.893	0.828
Arsenic	(mg/L)	0.150	0.00163	0.00168	0.00167	0.00167
Boron	(mg/L)	1.5	0.025	0.025	0.024	0.024
Cadmium	(mg/L)	0.000269	0.0000197	0.0000131	0.0000124	0.0000164
Chromium	(mg/L)	0.0857	0.00165	0.00161	0.00146	0.00132
Copper	(mg/L)	0.00928	0.00223	0.00214	0.00207	0.00204
Iron	(mg/L)	1.45	0.918	0.906	0.828	0.740
Lead	(mg/L)	0.00316	0.000432	0.000419	0.000385	0.000346
Mercury[6]	(mg/L)	0.000026	<0.0000020	<0.0000020	<0.0000020	<0.0000020
Molybdenum	(mg/L)	0.073	0.000458	0.000487	0.000617	0.000765
Nickel	(mg/L)	0.0519	0.00204	0.00201	0.00244	0.00356
Selenium	(mg/L)	0.0010	0.000116	0.000114	0.000106	0.000100
Silver	(mg/L)	0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	(mg/L)	0.0008	0.000014	0.000013	<0.000010	<0.000010
Uranium	(mg/L)	0.0330	0.000493	0.000511	0.000598	0.000571
Zinc	(mg/L)	0.119	0.0050	0.0042	<0.0030	<0.0030

6. Matrix effects (i.e., factors that impacted the ability to measure mercury in the sample such as chemical interference, colour, and turbidity) therefore the detection limit was increased from 0.0000005 mg/L to 0.0000020 mg/L.

Table 4: Benchmark and mean values of key water quality parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	Benchmark[1]	September			
			Clark Lake	Upstream	Near-Field	Far-Field
Ammonia	(mg N/L)	1.91	0.0233	0.0119	0.015	<0.010
Nitrate/ Nitrite	(mg N/L)	2.93	0.1000	0.0907	0.1108	0.1070
Total Phosphorous	(mg/L)	0.058	0.0446	0.0456	0.0452	0.0449
Chlorophyll *a*	(µg/L)	10.0	2.53	2.48	2.69	3.30
Total Suspended Solids	(mg/L)	13.8/33.8[2]	8.8	9.2	8.1	7.4
Laboratory pH	-	6.5/9.0	8.13	8.13	8.05	8.16
Dissolved Oxygen	(mg/L)	6.5/9.5[3]	10.37	10.78	11.54	10.91
Aluminum	(mg/L)	1.98	0.715	0.790	0.749	0.718
Arsenic	(mg/L)	0.150	0.00157	0.00146	0.00155	0.00159
Boron	(mg/L)	1.5	0.021	0.020	0.021	0.020
Cadmium	(mg/L)	0.000278	0.0000159	0.0000103	0.0000080	0.0000175
Chromium	(mg/L)	0.0886	0.00120	0.00130	0.00124	0.00115
Copper	(mg/L)	0.00961	0.00182	0.00183	0.00186	0.00189
Iron	(mg/L)	1.45	0.688	0.751	0.704	0.679
Lead	(mg/L)	0.00332	0.000325	0.000340	0.000321	0.000317
Mercury	(mg/L)	0.000026	0.00000091	0.00000079	0.00000061	0.00000082
Molybdenum	(mg/L)	0.073	0.000522	0.00047	0.000651	0.000579
Nickel	(mg/L)	0.0537	0.00167	0.00176	0.00141	0.00165
Selenium	(mg/L)	0.0010	0.000114	0.000085	0.000054	0.000123
Silver	(mg/L)	0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	(mg/L)	0.0008	0.000011	<0.000010	<0.000010	<0.000010
Uranium	(mg/L)	0.0330	0.000474	0.000485	0.000495	0.000478
Zinc	(mg/L)	0.123	<0.0030	<0.0030	<0.0030	<0.0030

Table 4: Benchmark and mean values of key water quality parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	Benchmark[1]	Open-water Season			
			Clark Lake	Upstream	Near-Field	Far-Field
Ammonia	(mg N/L)	1.32	0.046	0.032	0.052	0.028
Nitrate/ Nitrite	(mg N/L)	2.93	0.0478	0.0587	0.0535	0.0420
Total Phosphorous	(mg/L)	0.058	0.0469	0.0465	0.0468	0.0457
Chlorophyll *a*	(µg/L)	10.0	3.86	3.48	4.60	7.36
Total Suspended Solids	(mg/L)	13.8/33.8[2]	11.0	10.5	9.7	7.8
Laboratory pH	-	6.5/9.0	8.12	8.11	8.10	8.13
Dissolved Oxygen	(mg/L)	6.5/9.5[3]	9.65	10.25	10.72	10.42
Aluminum	(mg/L)	1.98	0.829	0.839	0.802	0.746
Arsenic	(mg/L)	0.150	0.00139	0.00140	0.00139	0.00138
Boron	(mg/L)	1.5	0.021	0.020	0.020	0.021
Cadmium	(mg/L)	0.000269	0.0000161	0.0000092	0.0000090	0.0000129
Chromium	(mg/L)	0.0863	0.00143	0.00141	0.00135	0.00121
Copper	(mg/L)	0.00928	0.00193	0.00188	0.00188	0.00184
Iron	(mg/L)	1.45	0.811	0.803	0.767	0.690
Lead	(mg/L)	0.00316	0.000361	0.000352	0.000339	0.000328
Mercury	(mg/L)	0.000026	0.00000125	0.00000110	0.00000119	0.00000108
Molybdenum	(mg/L)	0.073	0.000493	0.00052	0.000510	0.000555
Nickel	(mg/L)	0.0519	0.00182	0.00180	0.00175	0.00167
Selenium	(mg/L)	0.0010	0.000115	0.000096	0.000119	0.000134
Silver	(mg/L)	0.0001	<0.000010	<0.000010	<0.000010	<0.000010
Thallium	(mg/L)	0.0008	0.000011	0.000010	0.000010	<0.000010
Uranium	(mg/L)	0.0330	0.000475	0.000482	0.000488	0.000500
Zinc	(mg/L)	0.119	0.0031	<0.0030	<0.0030	<0.0030

Table 5: Mean values of additional parameters measured during the water quality monitoring program, 2020.

Indicator	Unit	June				July			
		Clark Lake	Upstream	Near-Field	Far-Field	Clark Lake	Upstream	Near-Field	Far-Field
Dissolved Phosphorous	(mg/L)	0.0152	0.0191	0.0145	0.0132	0.0249	0.0253	0.0239	0.0215
Total Nitrogen	(mg/L)	0.44	0.41	0.43	0.41	0.48	0.55	0.57	0.59
Dissolved Organic Carbon	(mg/L)	9.78	9.64	9.79	9.70	10.50	10.80	10.85	10.45
In situ Turbidity	(NTU)	18.6	18.4	20.8	18.0	26.3	25.4	23.8	22.3
Laboratory Turbidity	(NTU)	20.3	20.4	22.6	18.7	25.8	24.6	21.2	19.0
In situ Specific Conductance	(µS/cm)	247	251	249	251	241	243	246	246
Laboratory Specific Conductance	(µmhos/cm)	254	253	251	255	242	244	246	244
Total Dissolved Solids	(mg/L)	177	171	178	168	171	177	174	172
True Color	(TCU)	21.9	23.2	25.1	23.9	27.3	27.4	29.0	28.9
In situ pH	-	7.93	7.74	7.69	7.78	6.88	6.45	6.95	8.04
Hardness as $CaCO_3$	(mg/L)	102	100	104	110	102	103	104	102
Chloride	(mg/L)	13.0	12.9	12.6	12.7	11.1	11.2	11.3	11.2
Sulphate	(mg/L)	26.6	26.2	25.8	25.9	22.5	22.6	22.7	22.7
Calcium	(mg/L)	22.5	21.8	23.3	26.2	24.2	24.5	24.7	24.5
Magnesium	(mg/L)	11.2	11.2	11.1	10.9	10.2	10.2	10.2	10.0
Potassium	(mg/L)	2.37	2.40	2.36	2.31	2.28	2.31	2.36	2.35
Sodium	(mg/L)	12.5	12.6	12.3	12.2	11.6	11.8	12.1	11.9

Table 5: Mean values of additional parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	August				September			
		Clark Lake	Upstream	Near-Field	Far-Field	Clark Lake	Upstream	Near-Field	Far-Field
Dissolved Phosphorous	(mg/L)	0.0371	0.0366	0.0366	0.0374	0.0281	0.0271	0.0281	0.0286
Total Nitrogen	(mg/L)	0.59	0.67	0.62	0.60	0.56	0.54	0.52	0.55
Dissolved Organic Carbon	(mg/L)	10.80	10.35	10.80	10.60	9.45	9.95	9.70	9.61
In situ Turbidity	(NTU)	24.9	23.8	23.9	21.8	18.5	32.6[2]	18.0	18.6
Laboratory Turbidity	(NTU)	25.4	25.1	23.1	20.0	18.7	16.5	16.9	18.5
In situ Specific Conductance	(µS/cm)	232	237	240	241	243	239	241	242
Laboratory Specific Conductance	(µmhos/cm)	233	238	241	243	241	239	237	241
Total Dissolved Solids	(mg/L)	163	161	162	163	171	152	150	169
True Color	(TCU)	24.0	26.7	25.4	26.3	25.1	23.1	22.1	24.5
In situ pH	-	7.63	7.71	7.84	7.94	8.43	8.35	8.04	8.37
Hardness as $CaCO_3$	(mg/L)	99	100	101	101	104	105	108	106
Chloride	(mg/L)	9.4	9.9	10.2	10.3	10.9	9.9	10.8	10.6
Sulphate	(mg/L)	24.3	25.2	29.5	27.2	23.7	21.8	29.2	24.0
Calcium	(mg/L)	23.0	22.6	23.1	22.8	24.0	24.0	25.3	24.4
Magnesium	(mg/L)	10.2	10.5	10.5	10.6	10.7	10.9	10.9	10.8
Potassium	(mg/L)	2.46	2.50	2.45	2.44	2.24	2.23	2.33	2.28
Sodium	(mg/L)	10.5	10.8	15.1	14.2	11.2	11.2	12.5	11.2

2. *In situ* turbidity for upstream sites in September (>29.07 NTU) is considered suspect. Values were much higher than in other areas and could not be confirmed with lab results.

Table 5: Mean values of additional parameters measured during the water quality monitoring program, 2020 (continued).

Indicator	Unit	Open-water Season			
		Clark Lake	Upstream	Near-Field	Far-Field
Dissolved Phosphorous	(mg/L)	0.0263	0.0270	0.0258	0.0252
Total Nitrogen	(mg/L)	0.52	0.54	0.54	0.54
Dissolved Organic Carbon	(mg/L)	10.13	10.12	10.28	10.09
In situ Turbidity	(NTU)	22.1	28.8	21.6	20.2
Laboratory Turbidity	(NTU)	22.5	20.2	20.9	19.0
In situ Specific Conductance	(µS/cm)	241	241	244	245
Laboratory Specific Conductance	(µmhos/cm)	242	242	243	245
Total Dissolved Solids	(mg/L)	170	162	166	168
True Color	(TCU)	24.6	24.5	25.4	25.9
In situ pH	-	7.72	7.96	7.63	8.03
Hardness as $CaCO_3$	(mg/L)	102	103	104	105
Chloride	(mg/L)	11.1	10.7	11.2	11.2
Sulphate	(mg/L)	24.3	23.4	24.6	24.6
Calcium	(mg/L)	23.4	23.4	24.1	24.5
Magnesium	(mg/L)	10.6	10.7	10.7	10.6
Potassium	(mg/L)	2.33	2.32	2.39	2.37
Sodium	(mg/L)	11.4	11.5	11.7	11.6

FIGURES

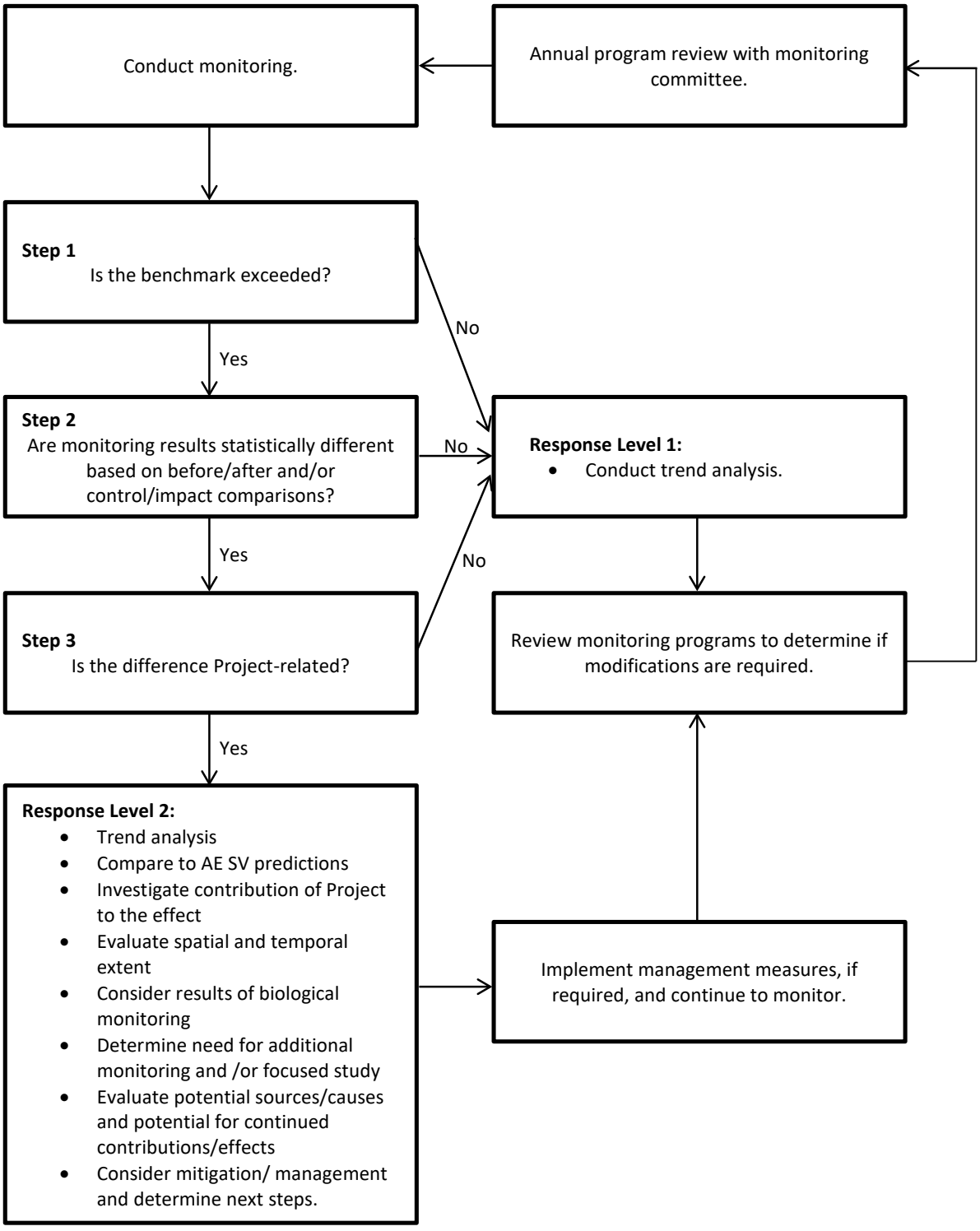


Figure 1: Water quality assessment management framework (AMF).

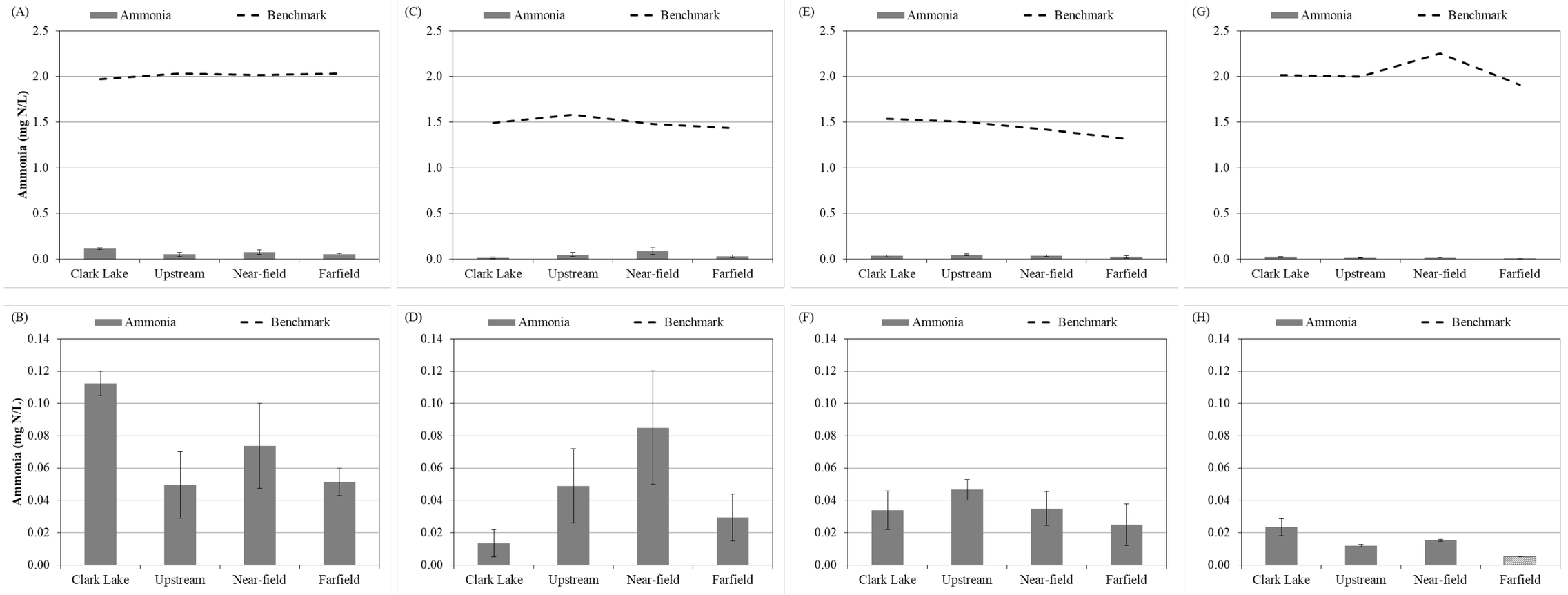


Figure 2: **Mean (± SE) ammonia concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

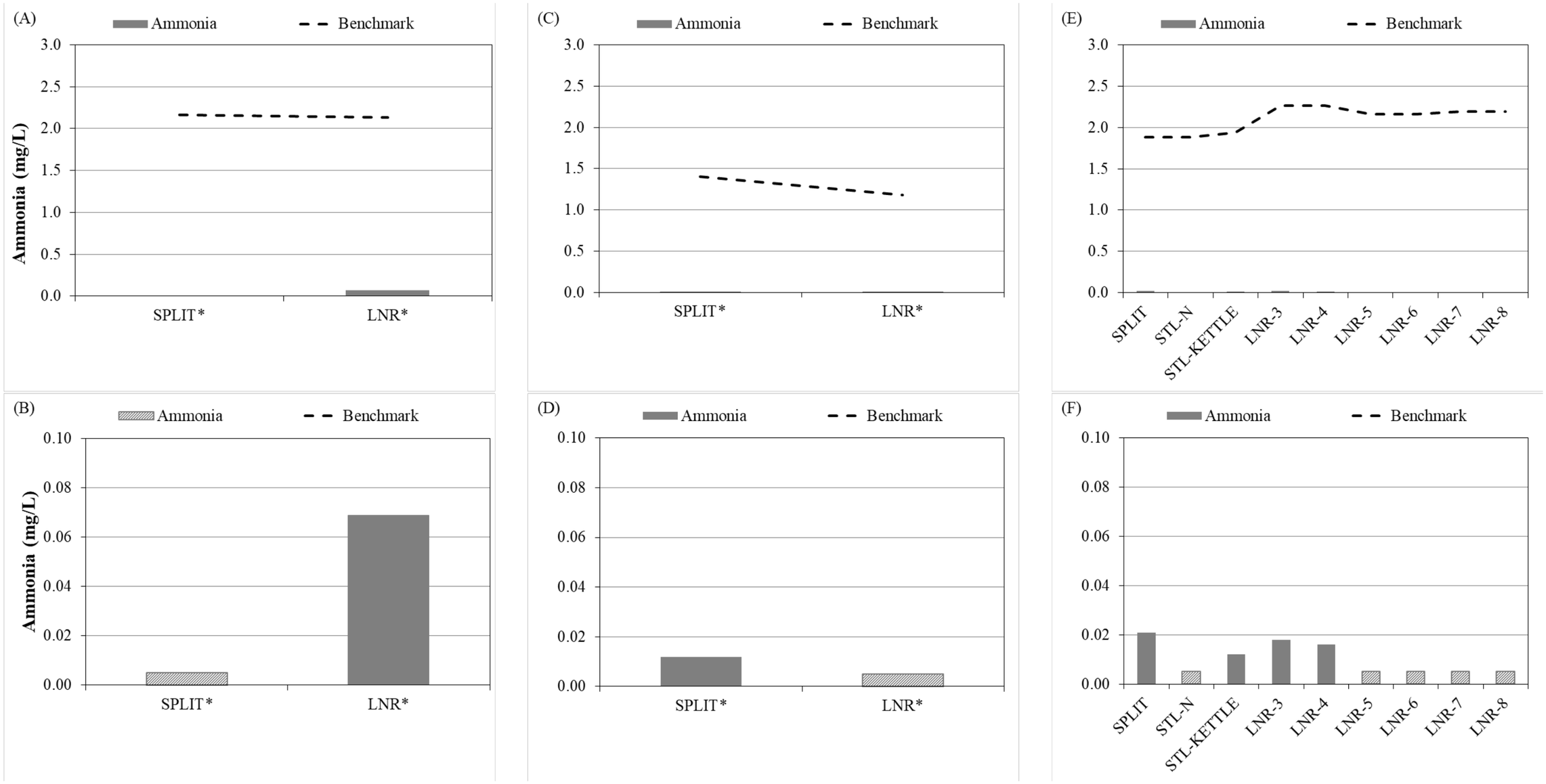


Figure 3: **Ammonia concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

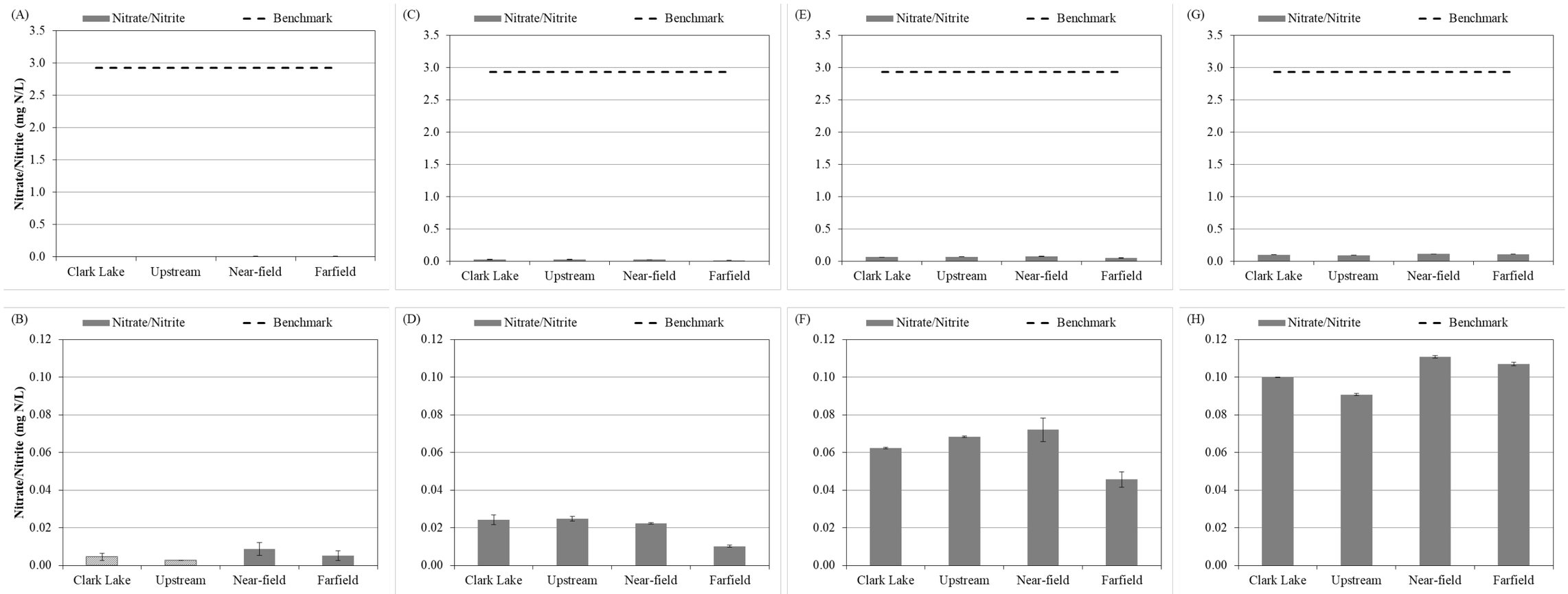


Figure 4: **Mean (± SE) nitrate/nitrite concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

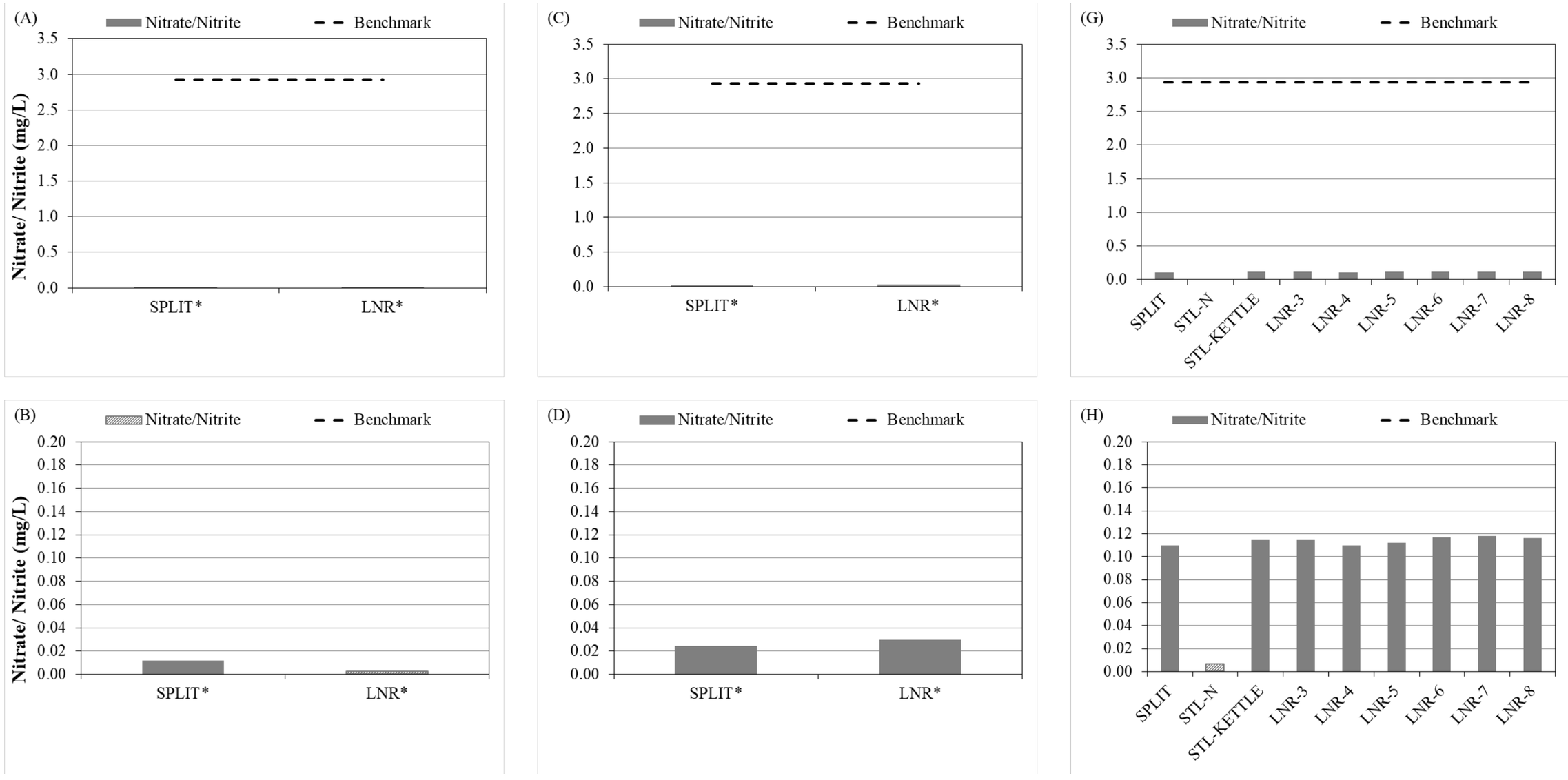


Figure 5: **Nitrate/nitrite concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

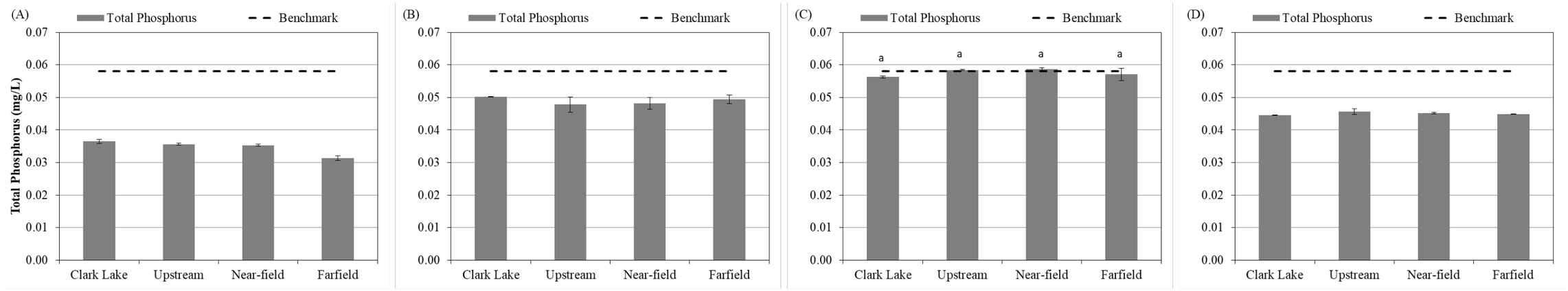


Figure 6: **Mean (± SE) concentrations of total phosphorus measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020. Letters in (C) indicate significantly (α = 0.05) different results between sampling areas.**

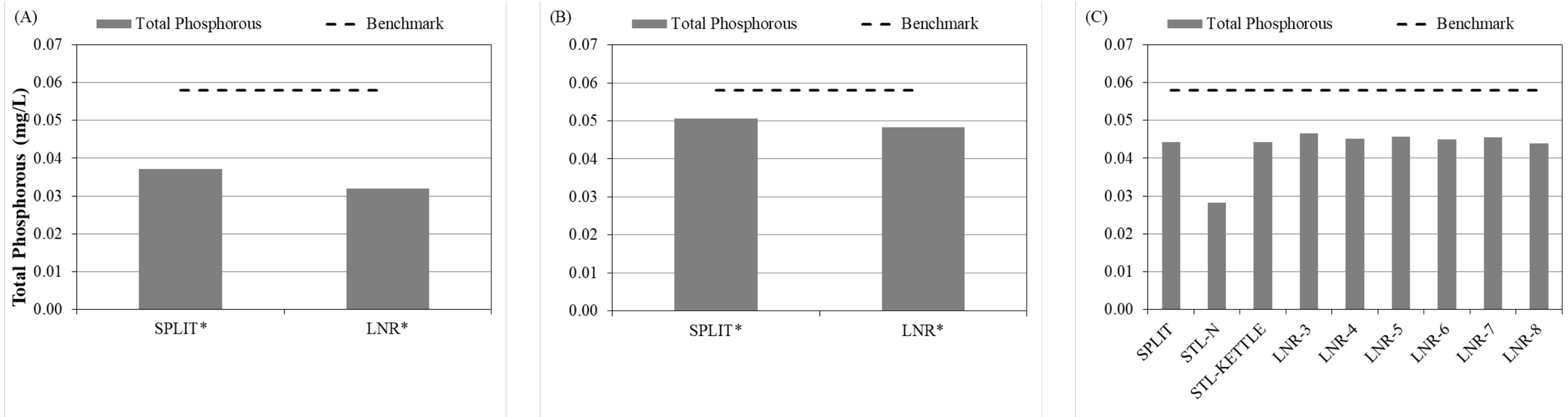


Figure 7: **Total phosphorus concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and**

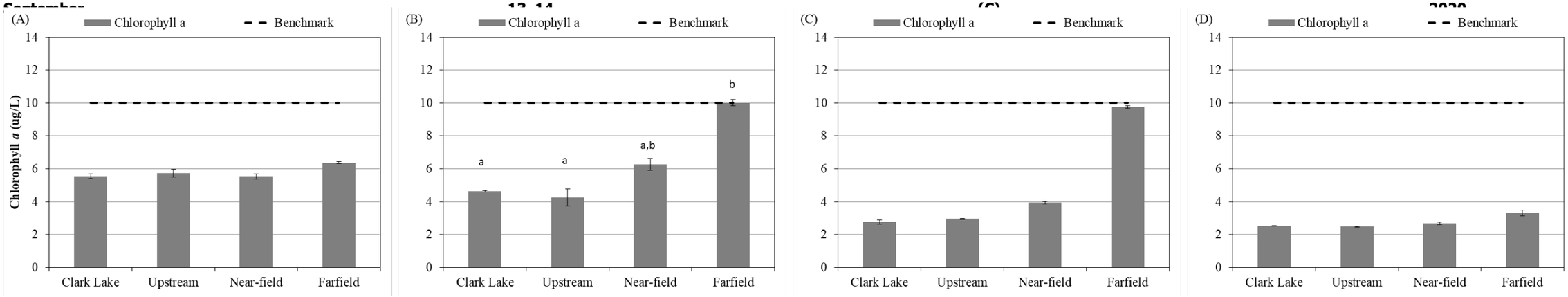


Figure 8: **Mean (± SE) chlorophyll *a* concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020. Letters in (B) indicate significantly (α = 0.05) different results between sampling areas.**

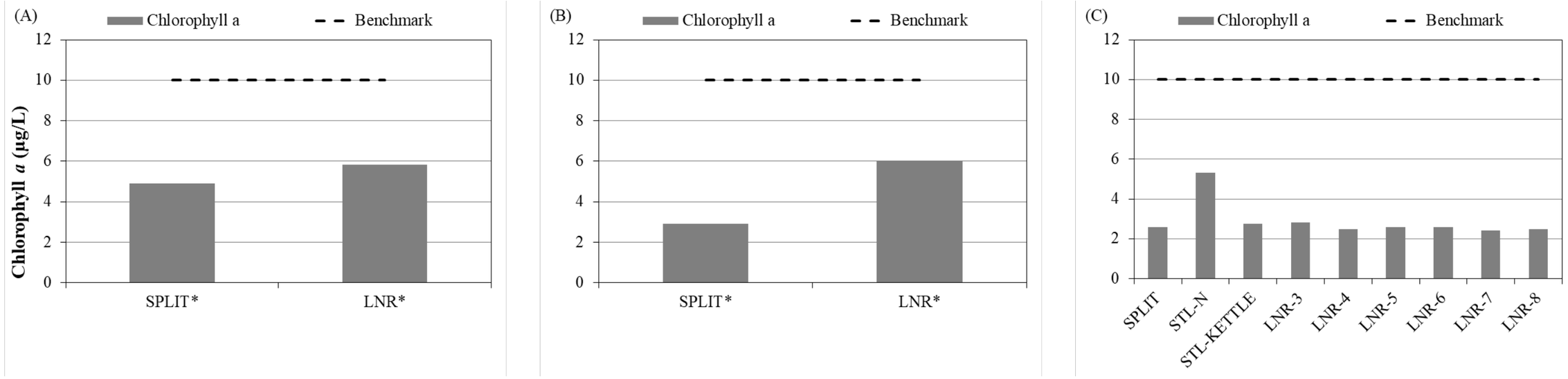


Figure 9: **Chlorophyll *a* concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

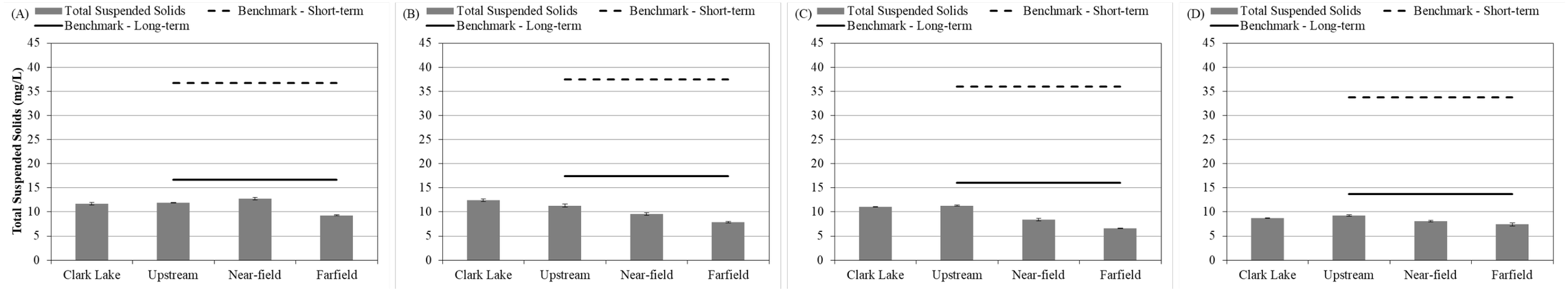


Figure 10: **Mean (± SE) concentration of total suspended solids measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

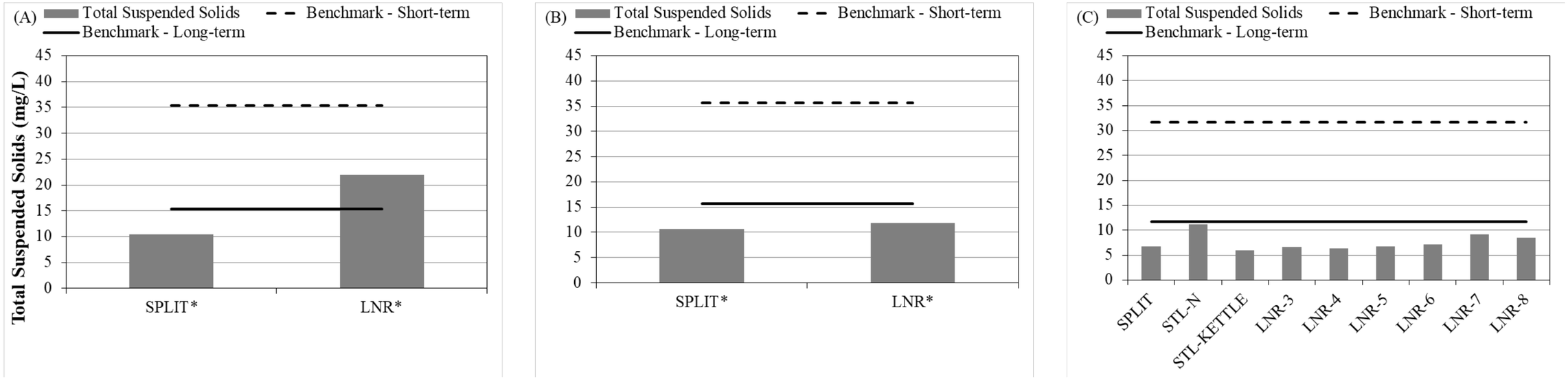


Figure 11: **Total suspended solid concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

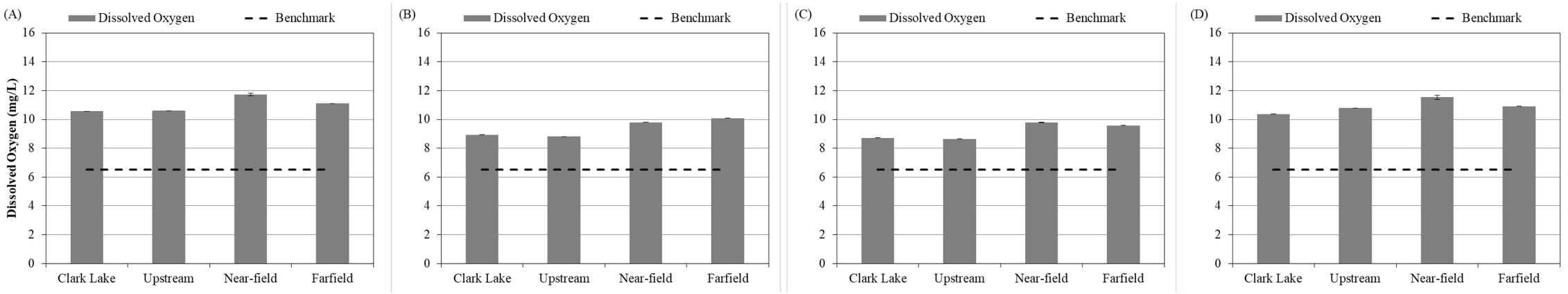


Figure 12: **Mean (± SE) dissolved oxygen concentrations measured near the surface in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

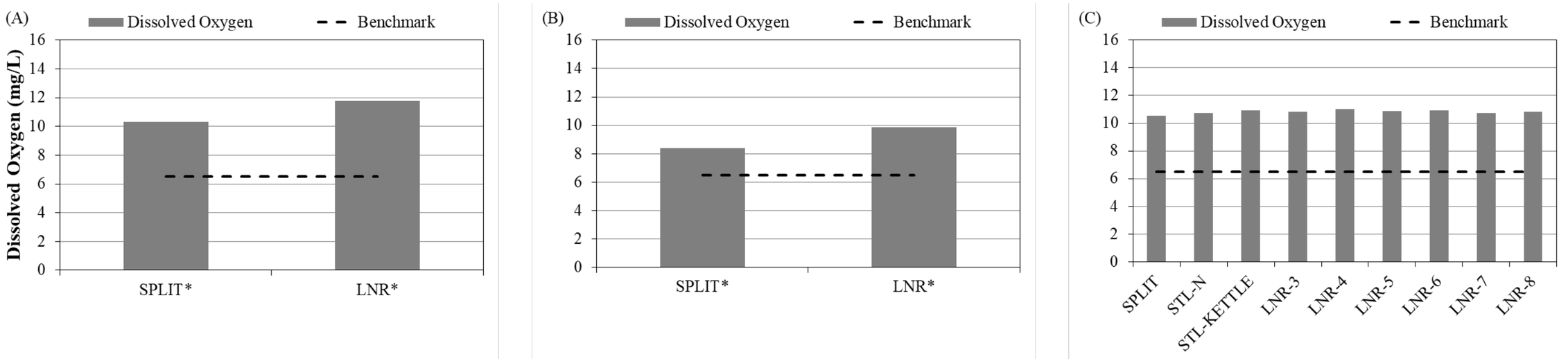


Figure 13: **Dissolved oxygen concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

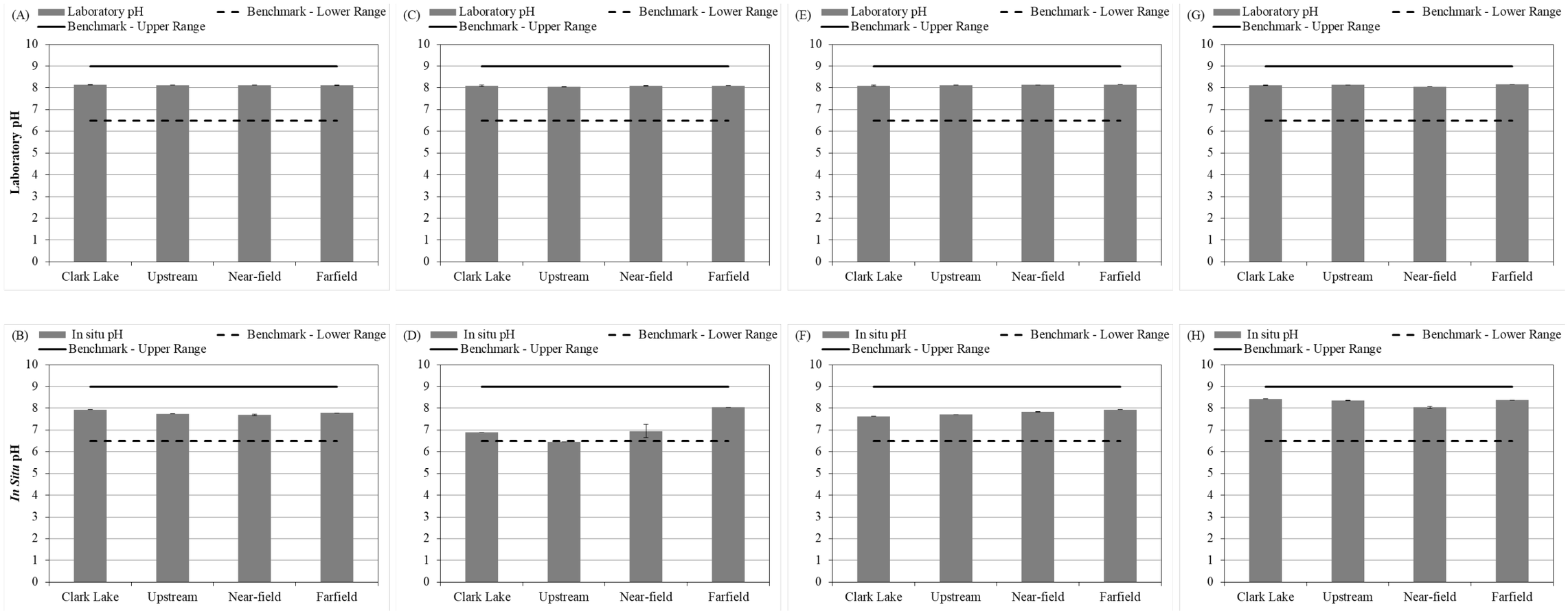


Figure 14: **Mean (± SE) laboratory (top) and *in situ* (bottom) pH measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020.**

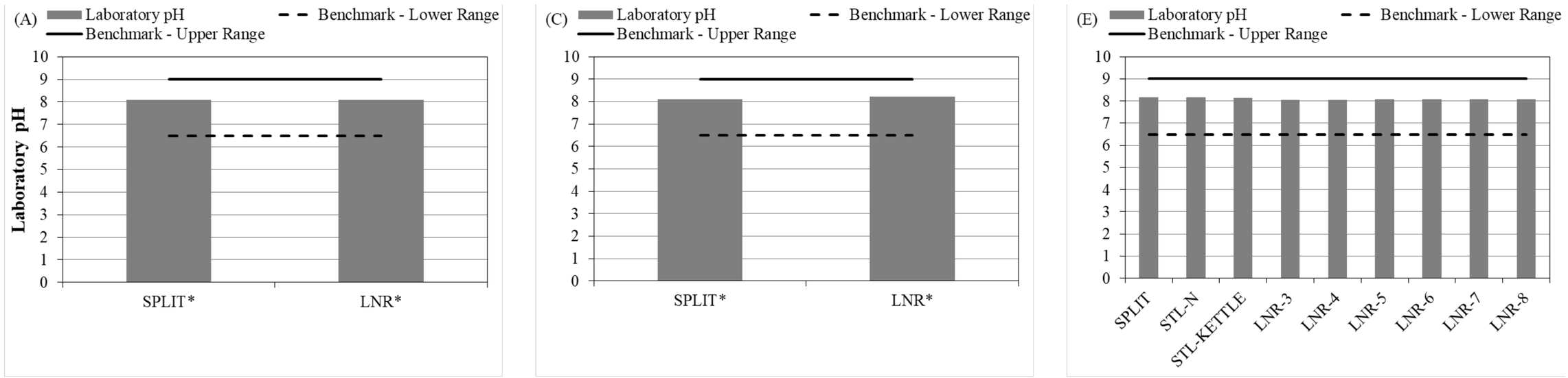


Figure 15: **Laboratory (top) and *in situ* (bottom) pH measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top.**

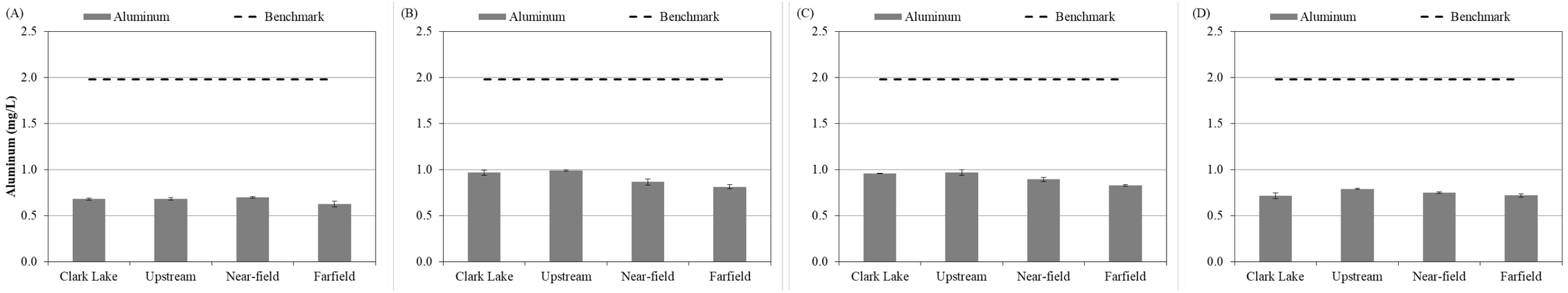


Figure 16: **Mean (± SE) aluminum concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

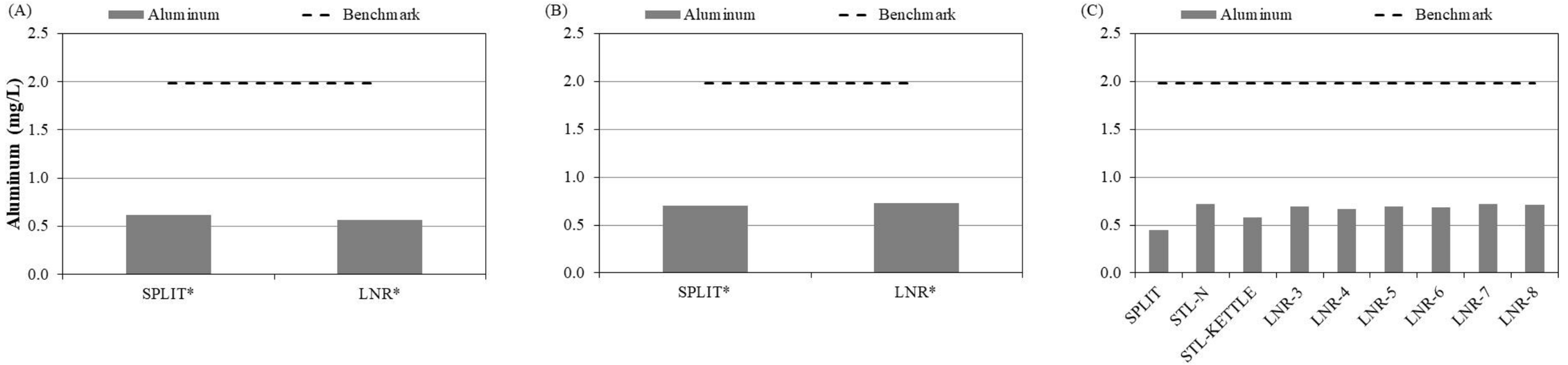


Figure 17: **Aluminum concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

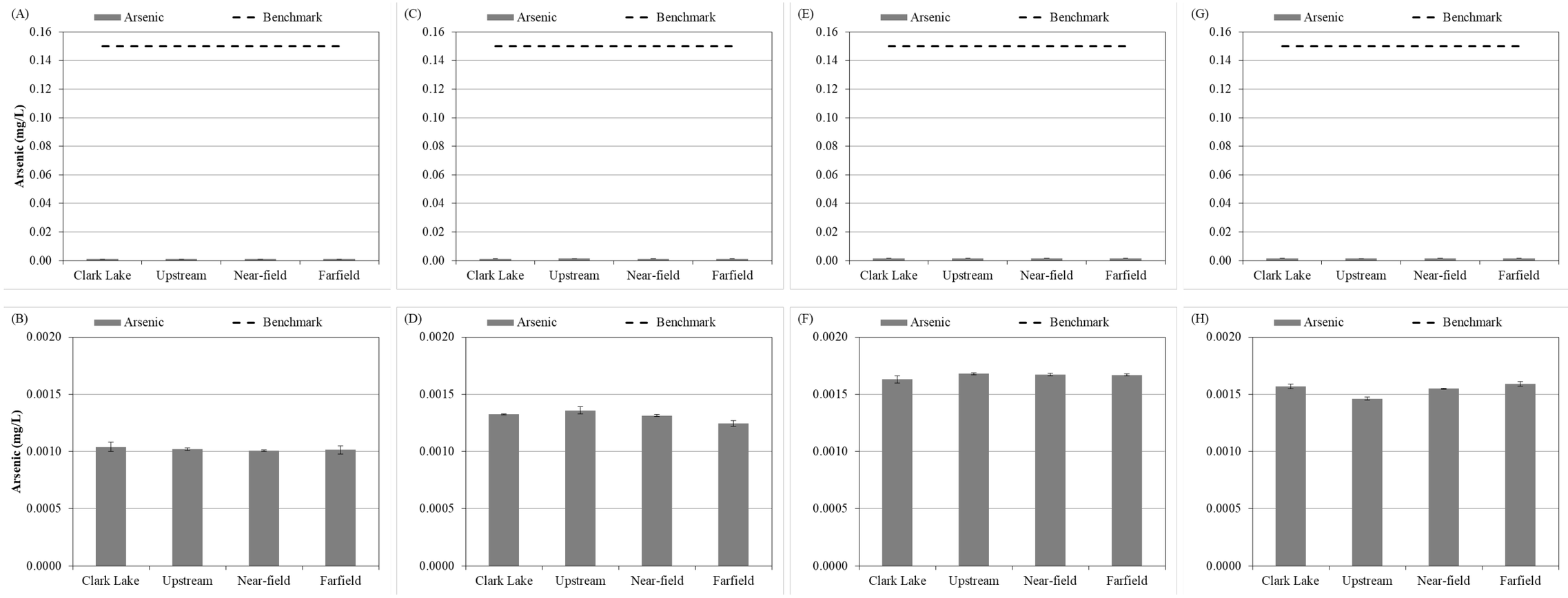


Figure 18: **Mean (± SE) arsenic concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

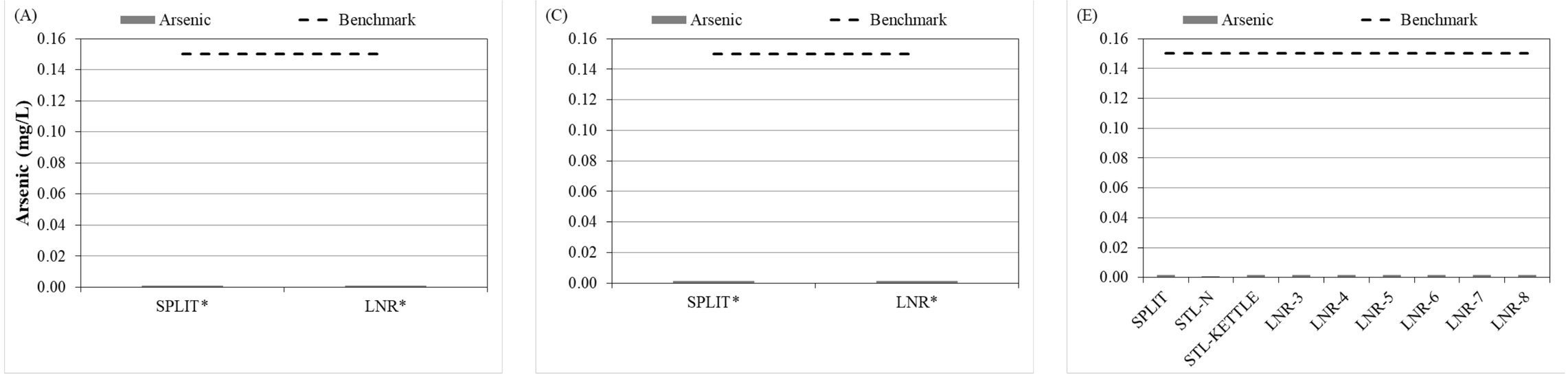


Figure 19: **Arsenic concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

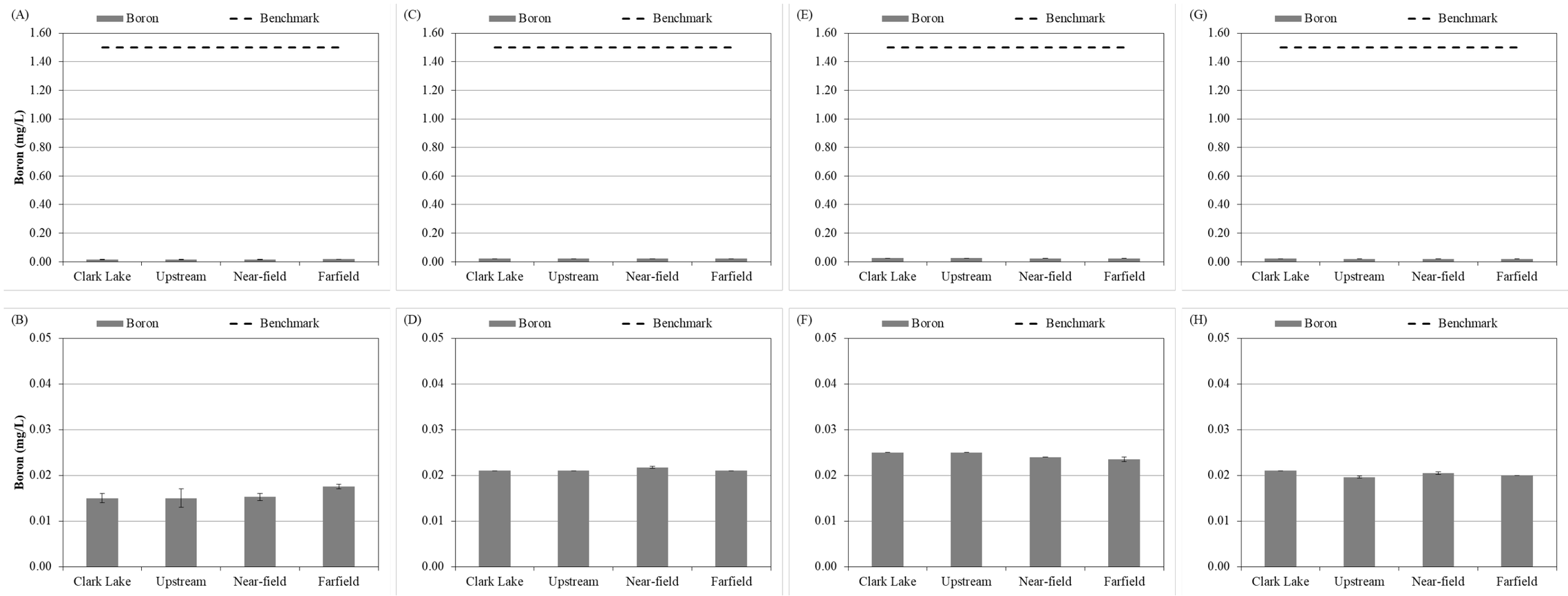


Figure 20: **Mean (± SE) boron concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

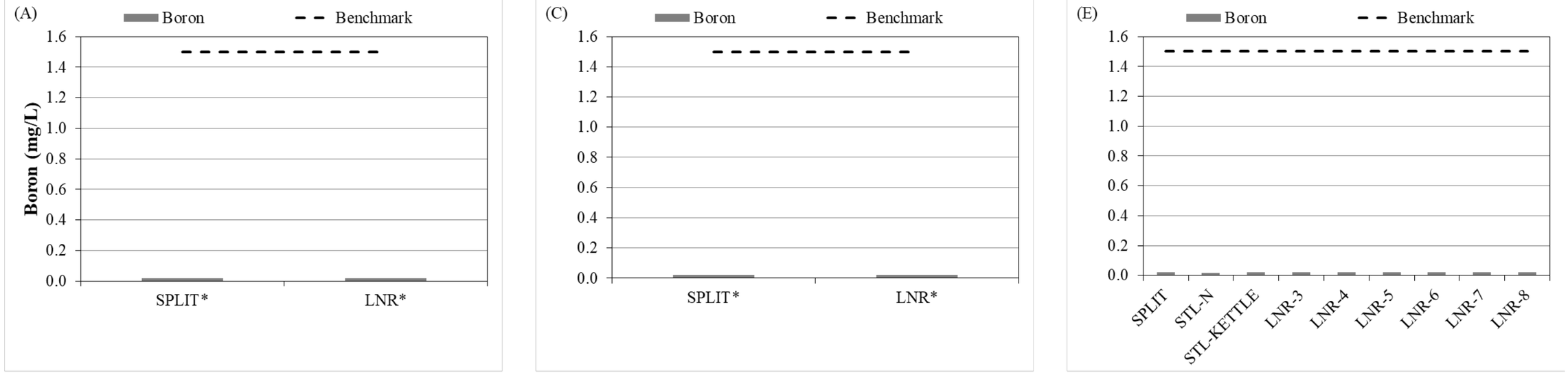


Figure 21: **Boron concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

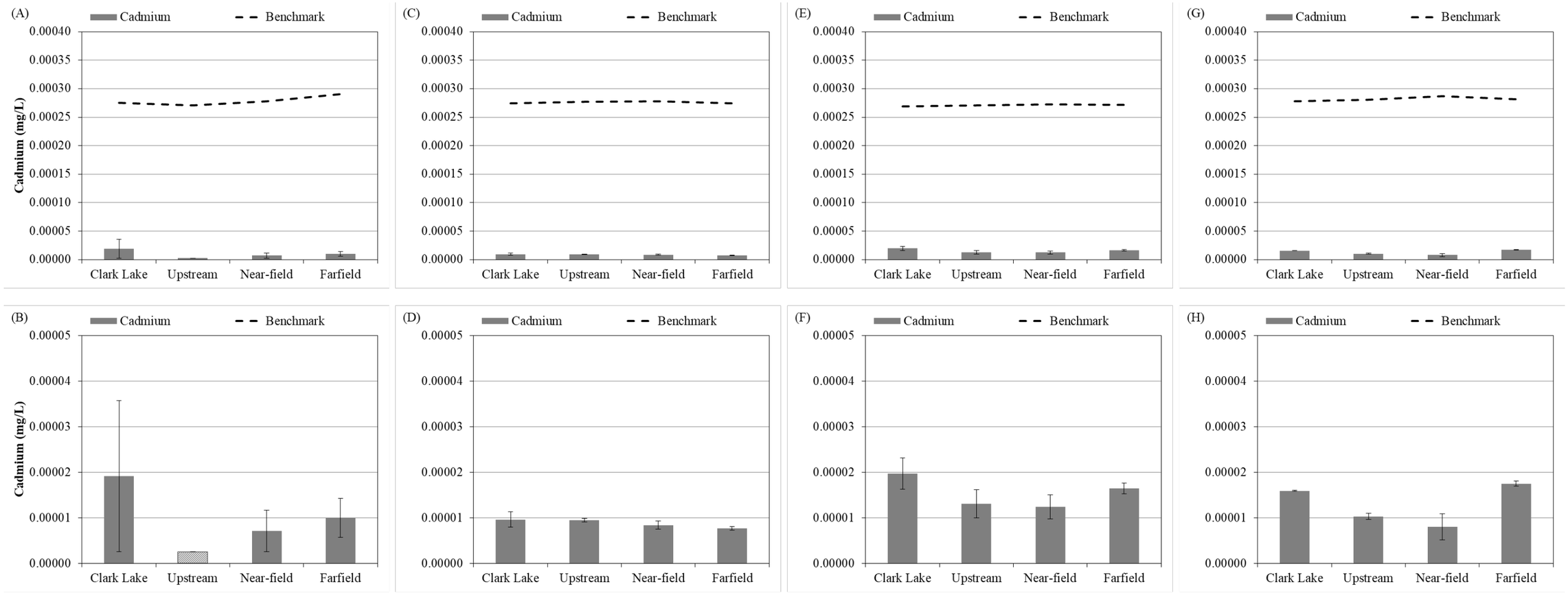


Figure 22: **Mean (± SE) cadmium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

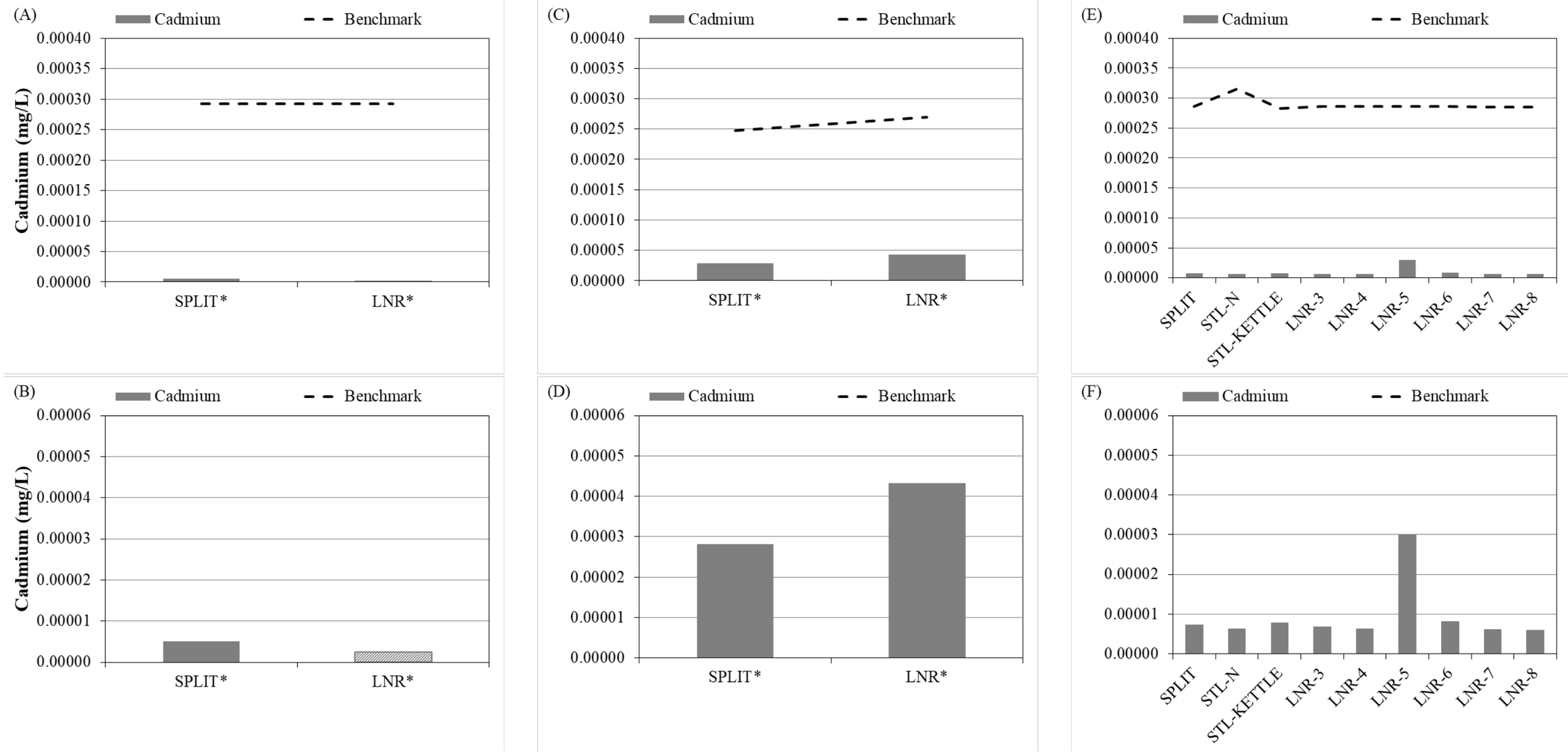


Figure 23: **Cadmium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

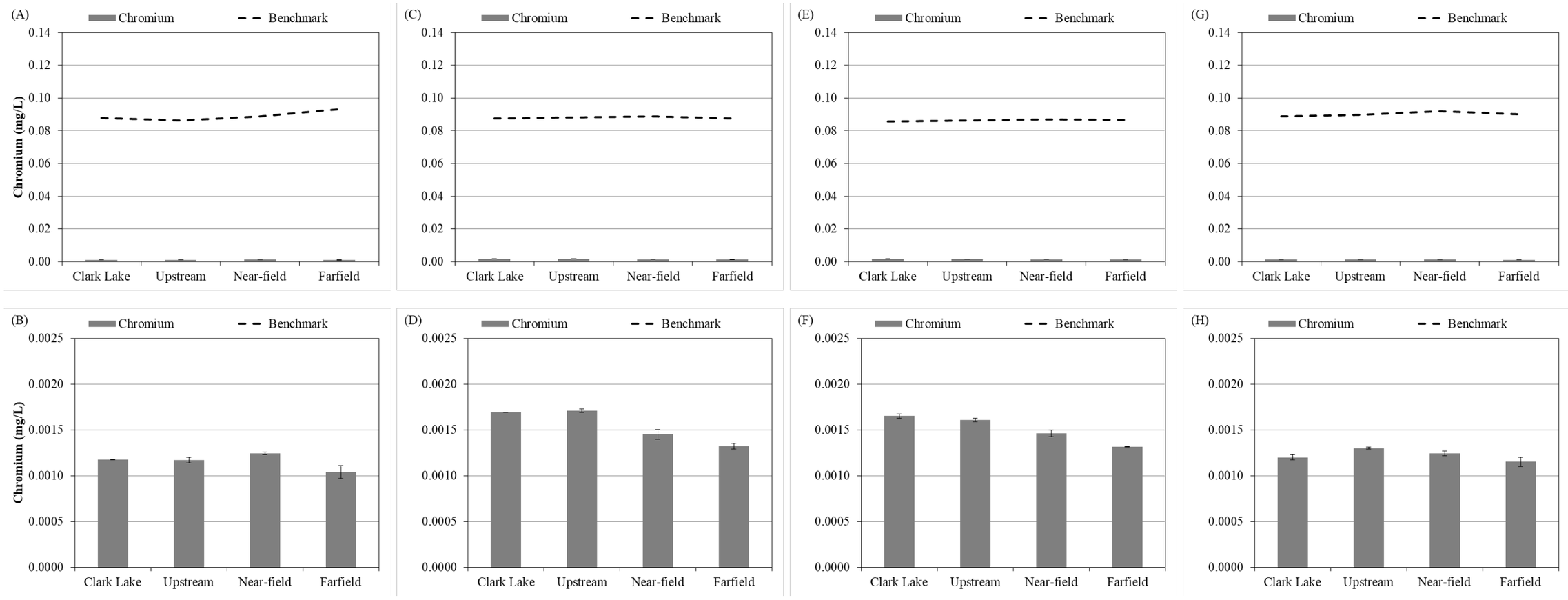


Figure 24: Mean (± SE) chromium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.

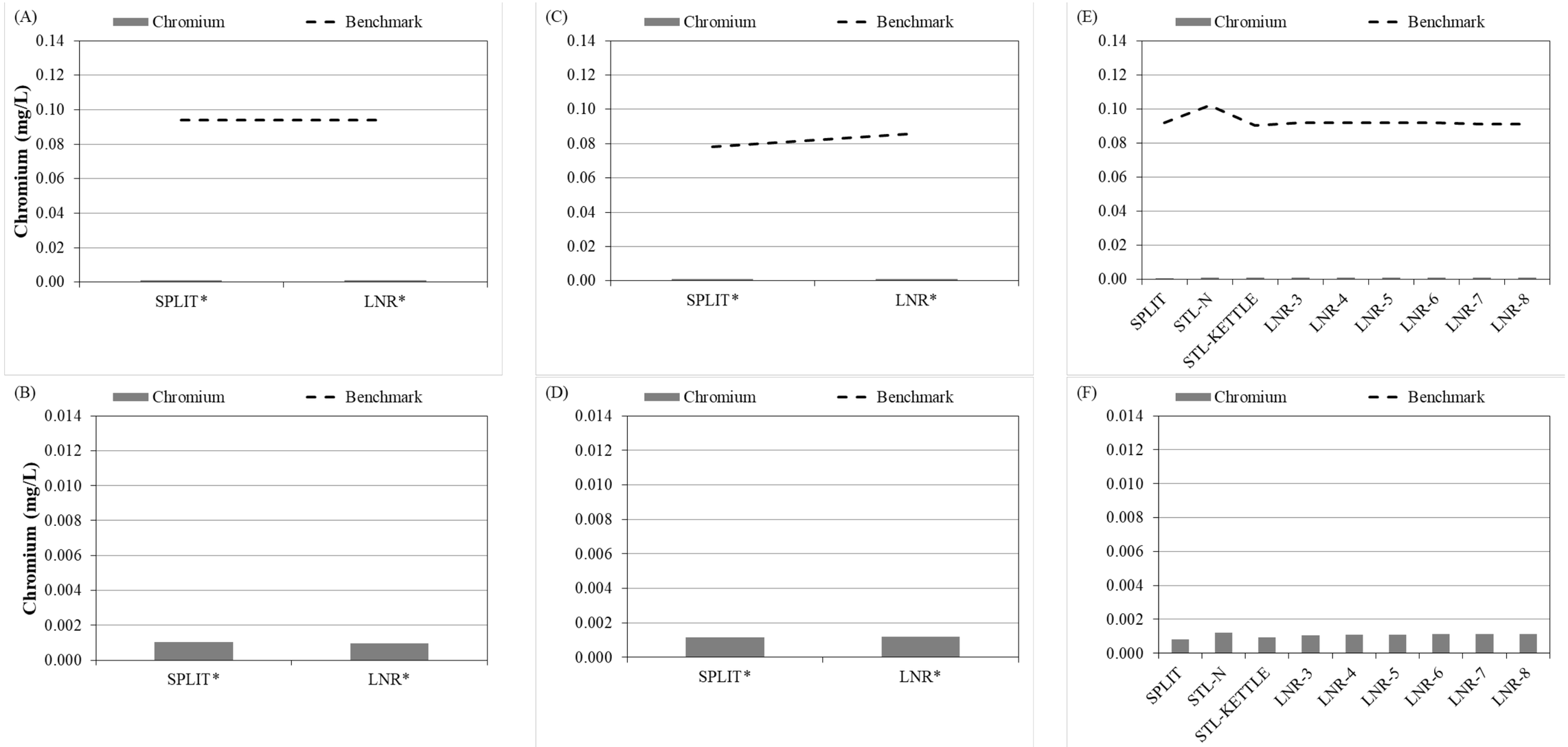


Figure 25: **Chromium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

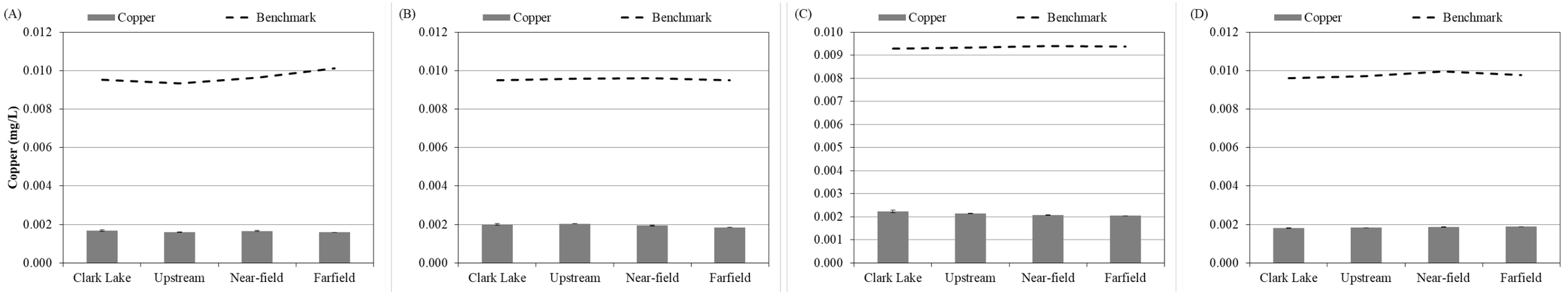


Figure 26: **Mean (± SE) copper concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

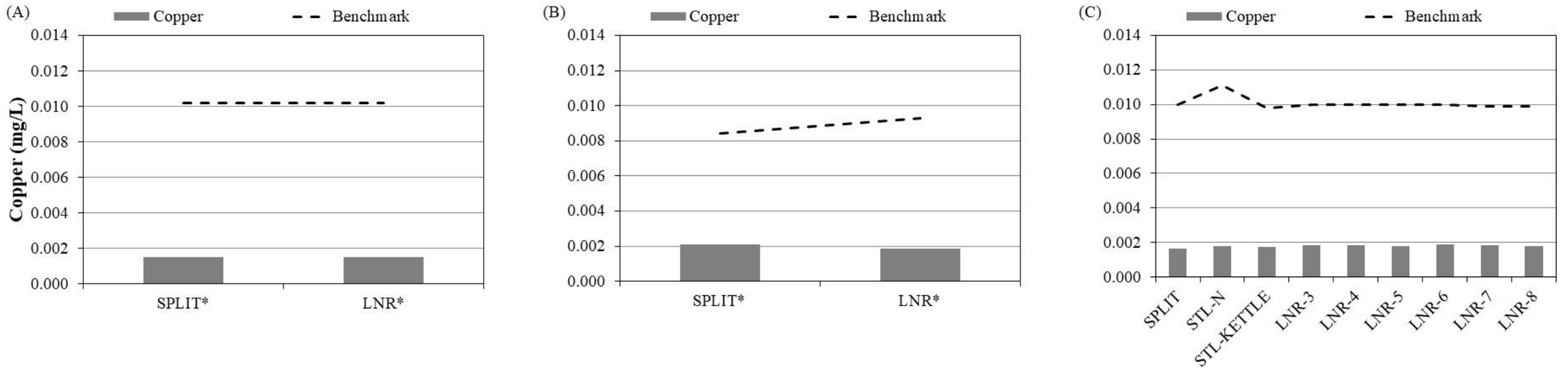


Figure 27: **Copper concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

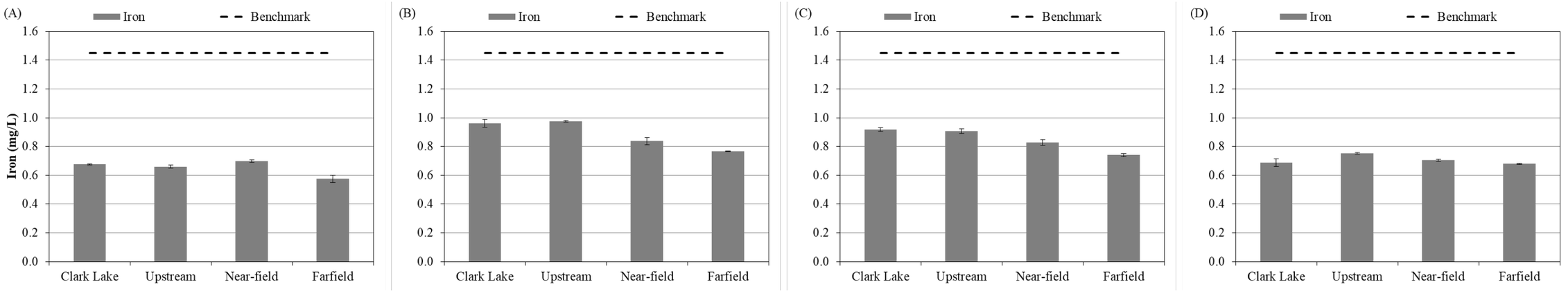


Figure 28: **Mean (± SE) iron concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

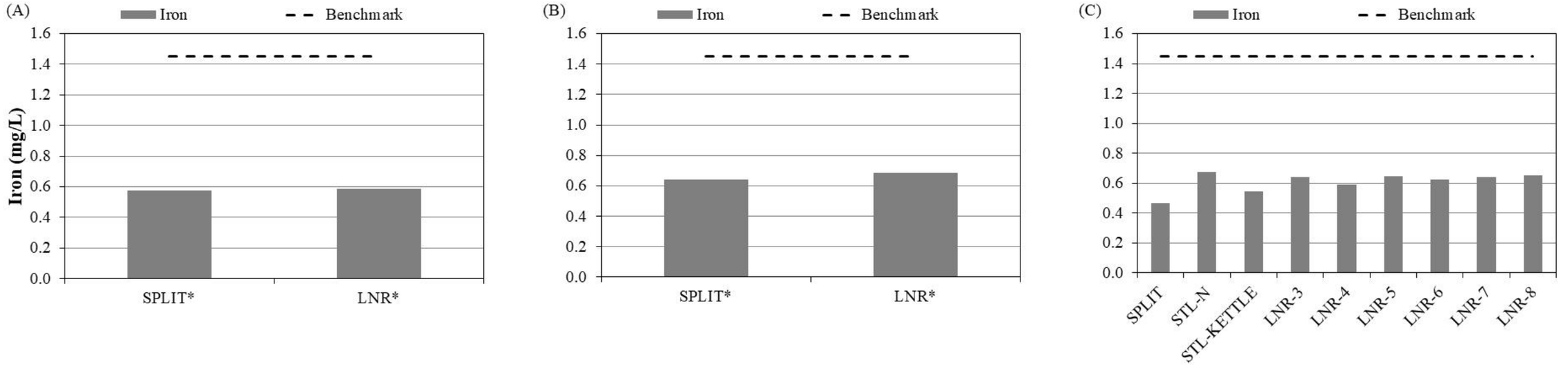


Figure 29: **Iron concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

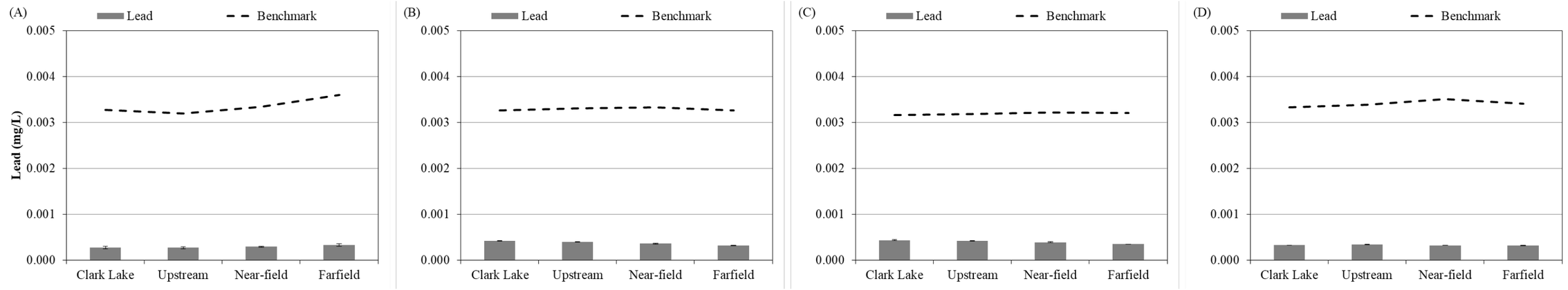


Figure 30: **Mean (± SE) lead concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

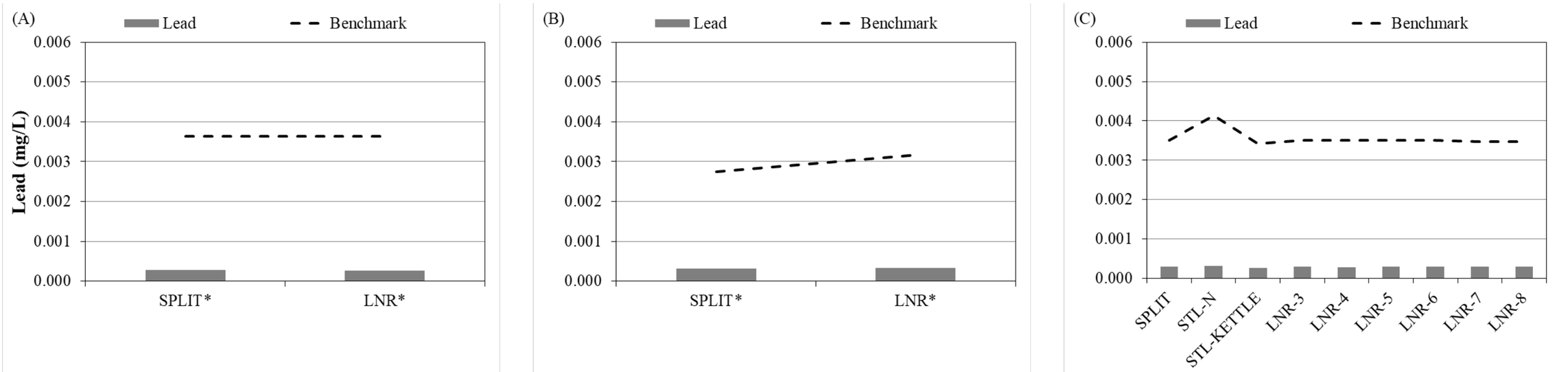


Figure 31: **Lead concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

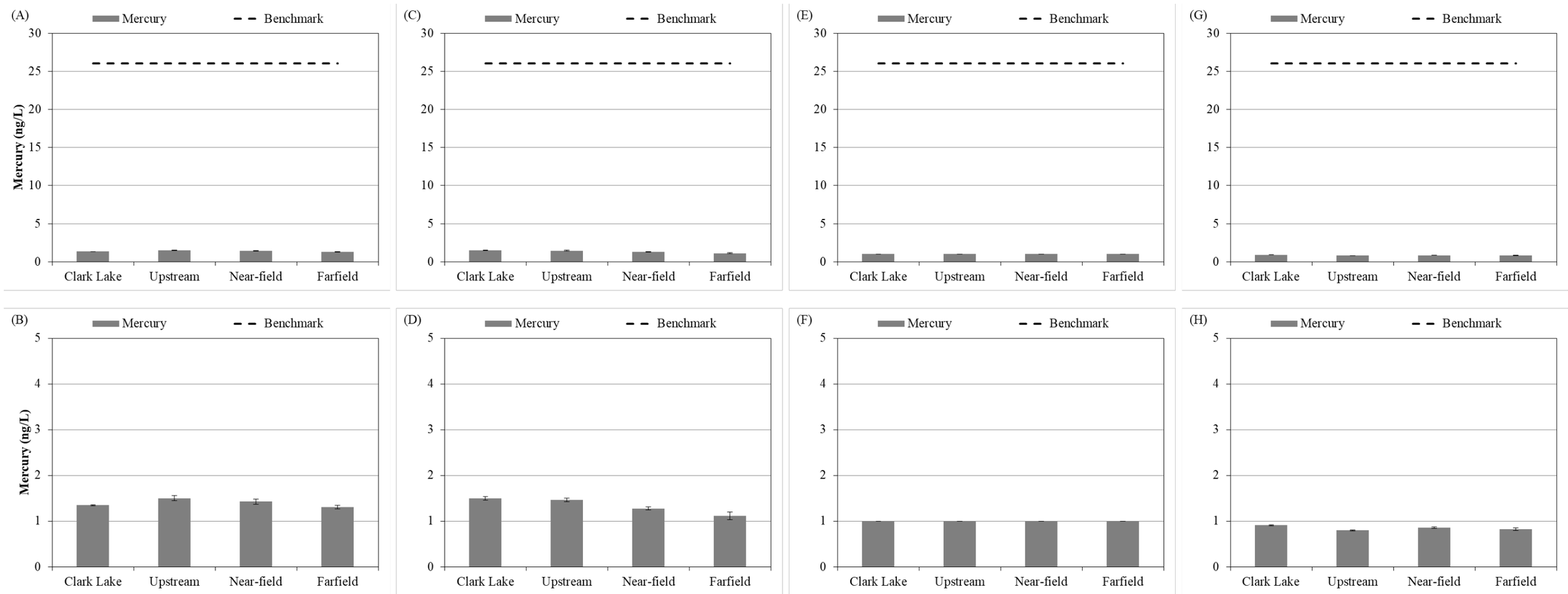


Figure 32: **Mean (± SE) mercury concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

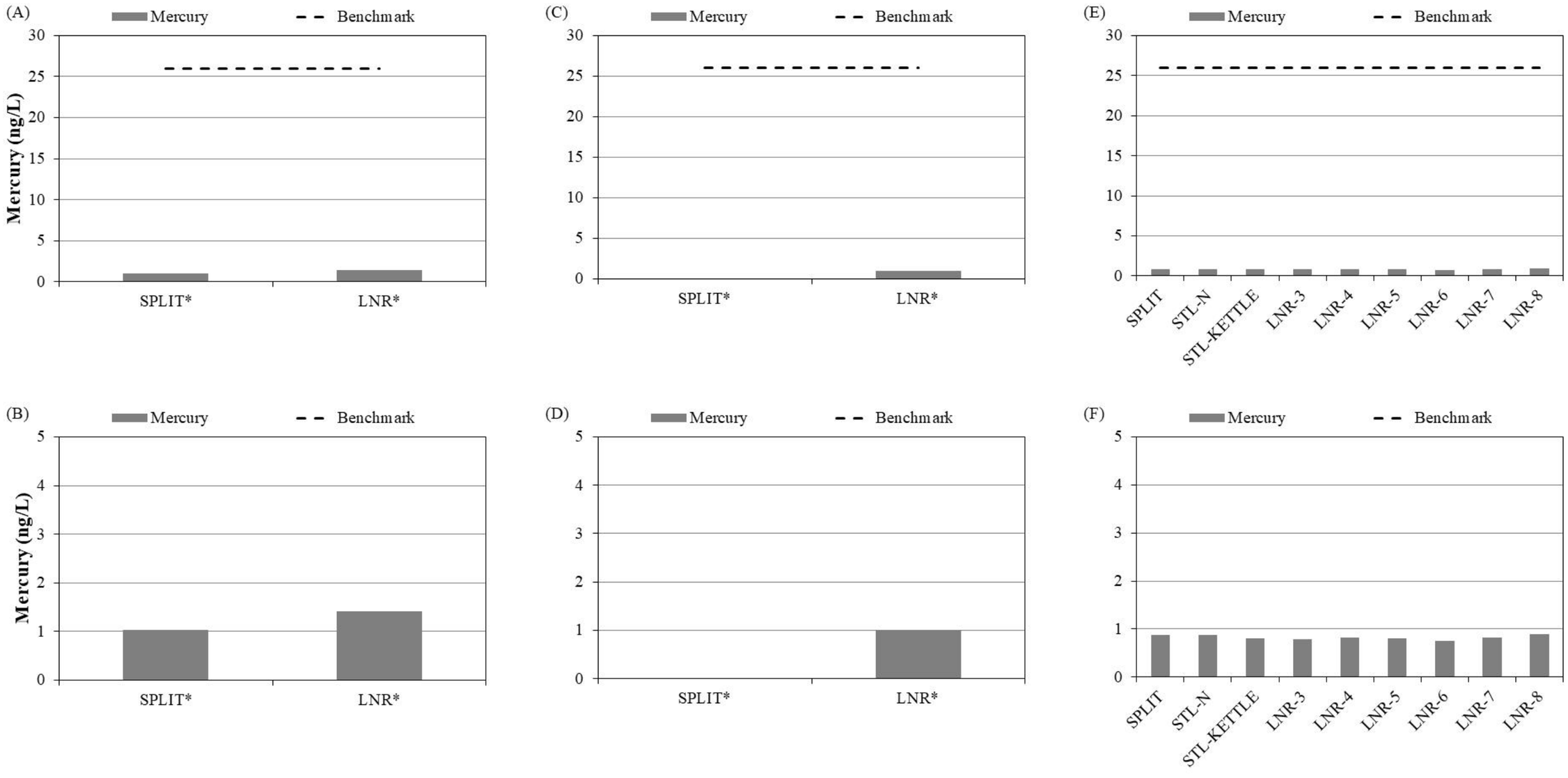


Figure 33: Mercury concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Mercury could not be sampled in Split Lake

in July as COVID-19 restrictions meant only one sampler was present, preventing the use of the clean-hands-dirty-hands technique.

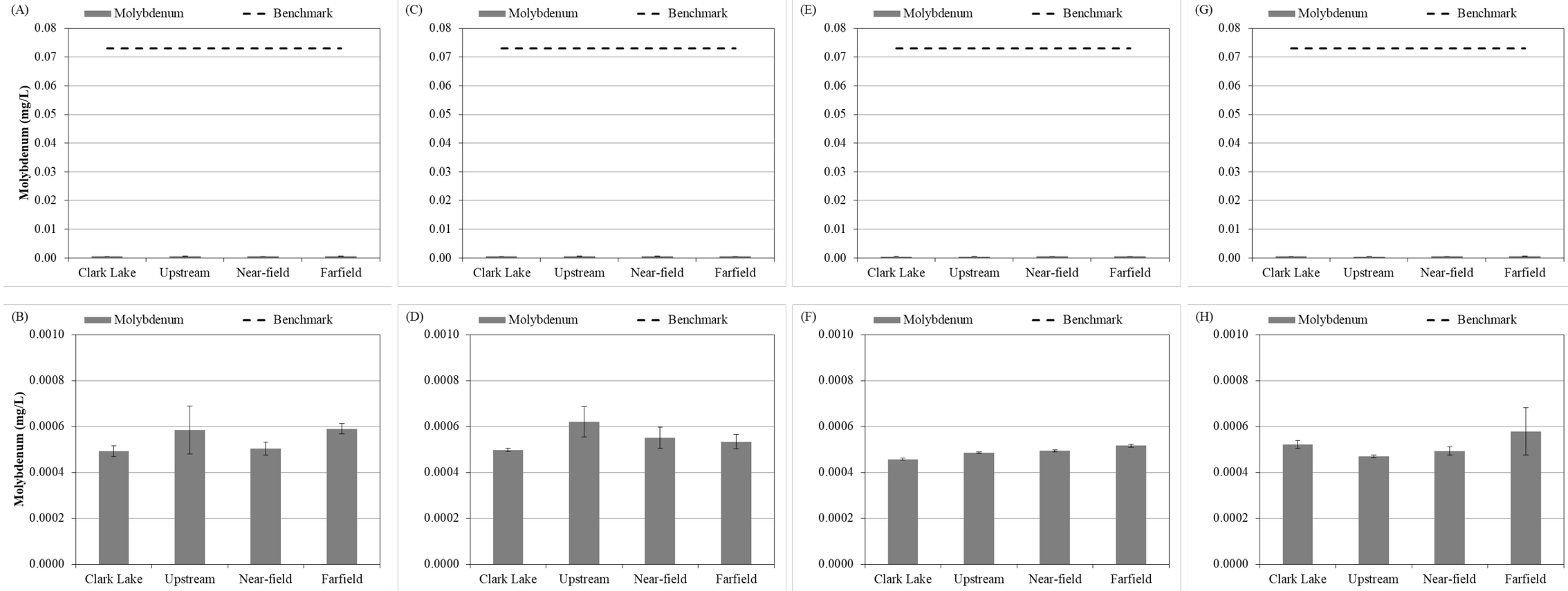


Figure 34: Mean (± SE) molybdenum concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.

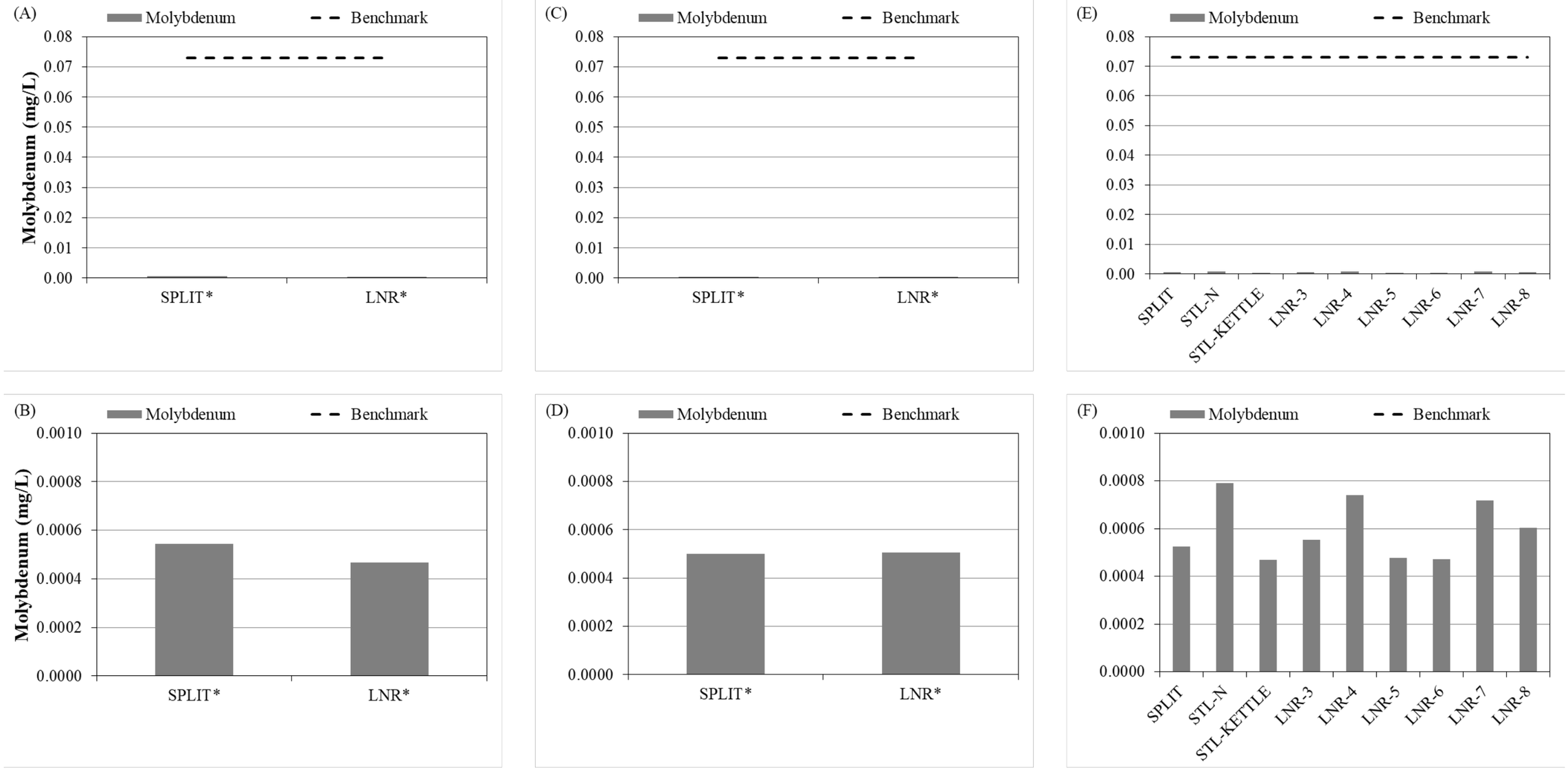


Figure 35: Molybdenum concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.

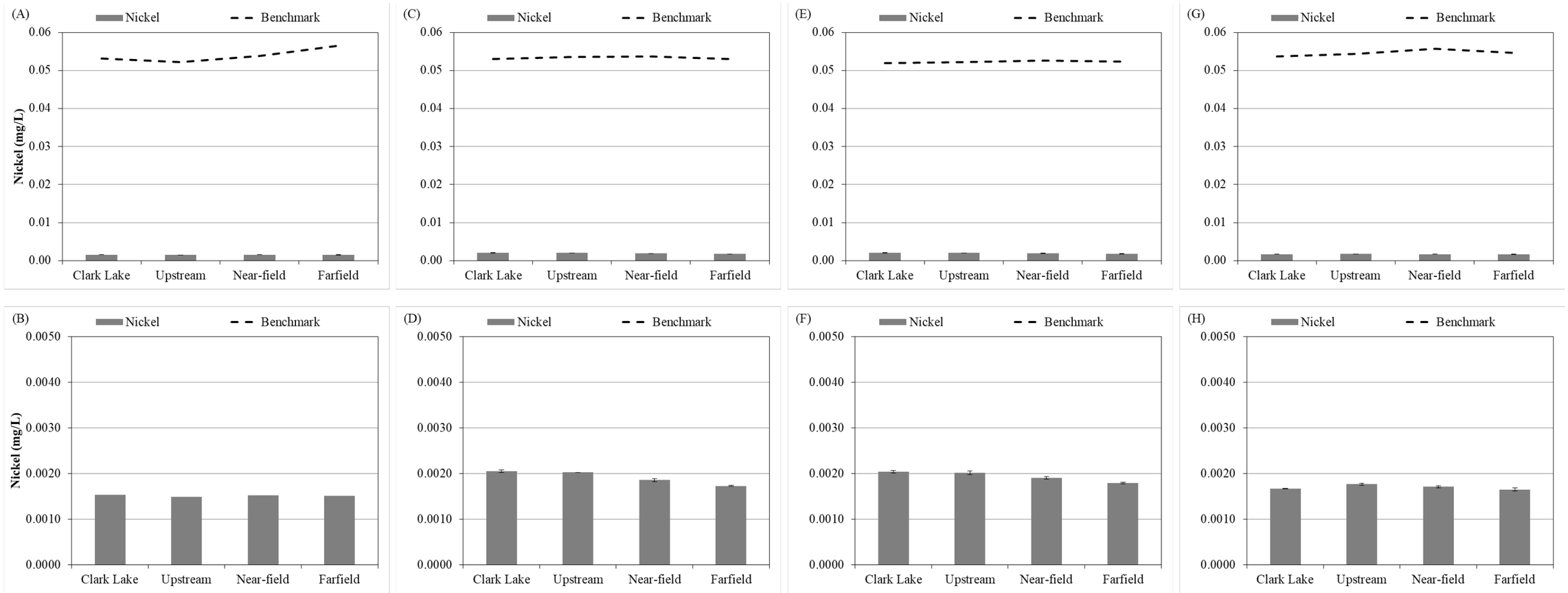


Figure 36: **Mean (± SE) nickel concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

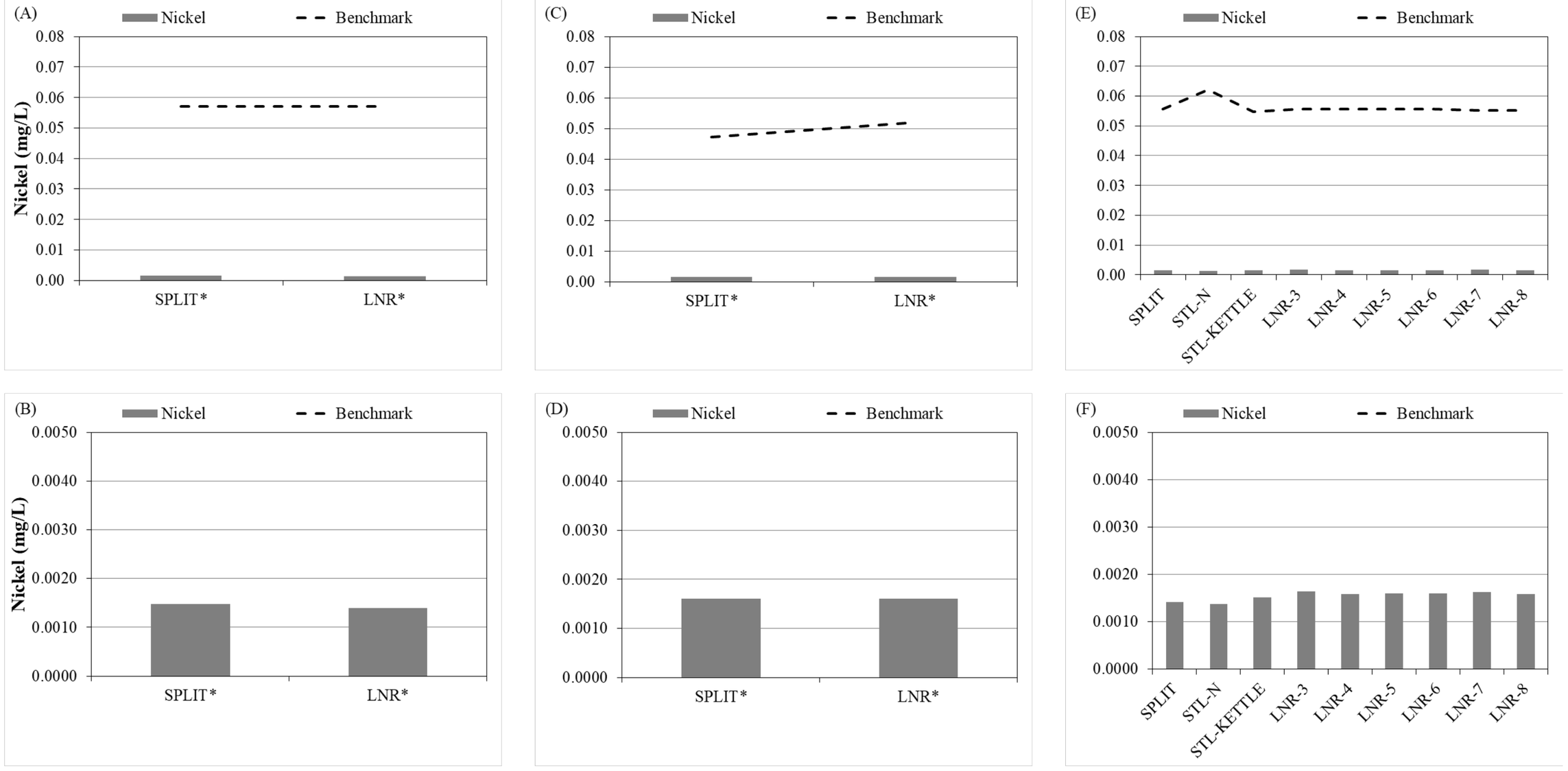


Figure 37: **Nickel concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

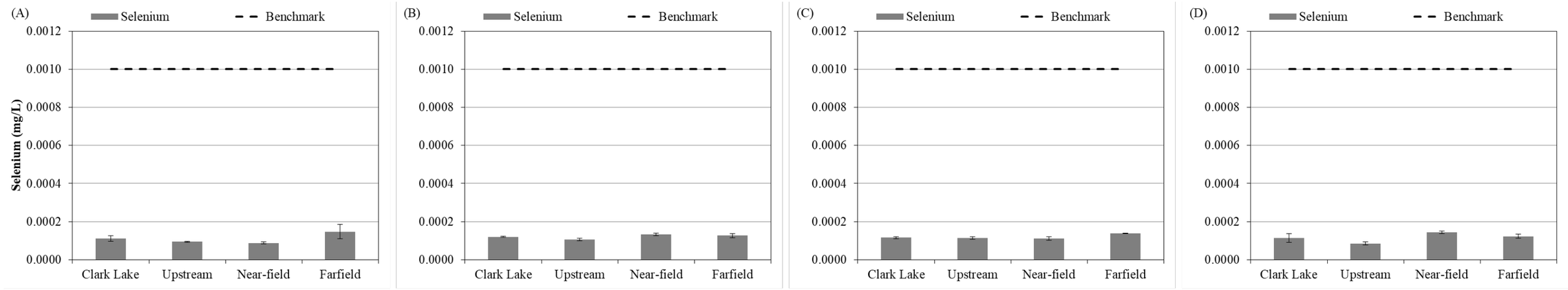


Figure 38: **Mean (± SE) selenium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

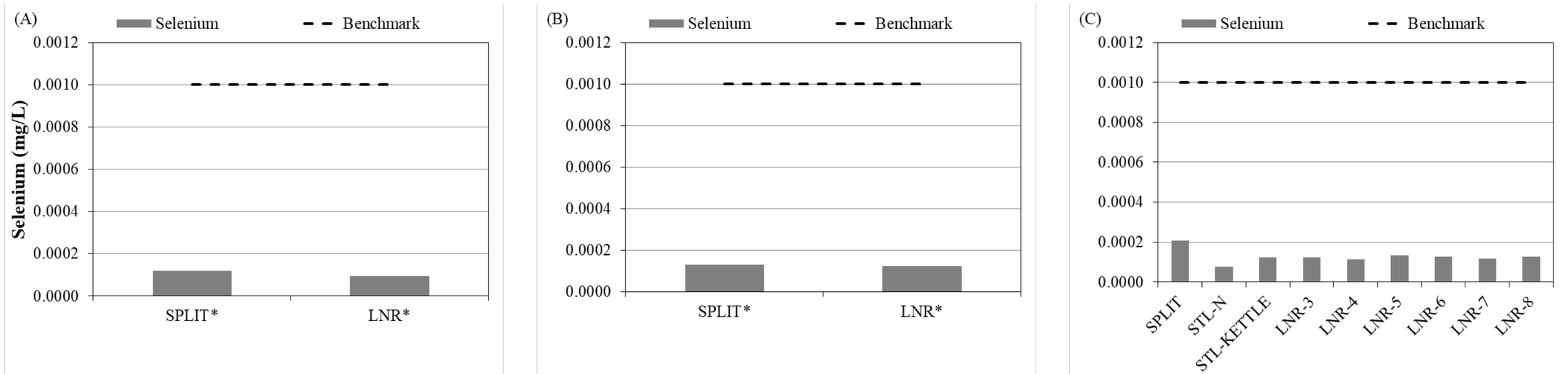


Figure 39: **Selenium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

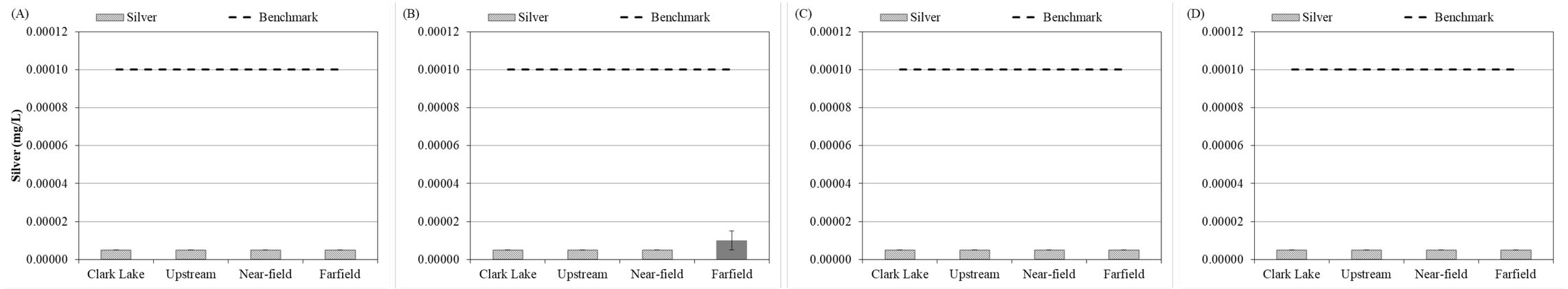


Figure 40: **Mean (± SE) silver concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020. Hashed bars represent results below the analytical detection limit.**

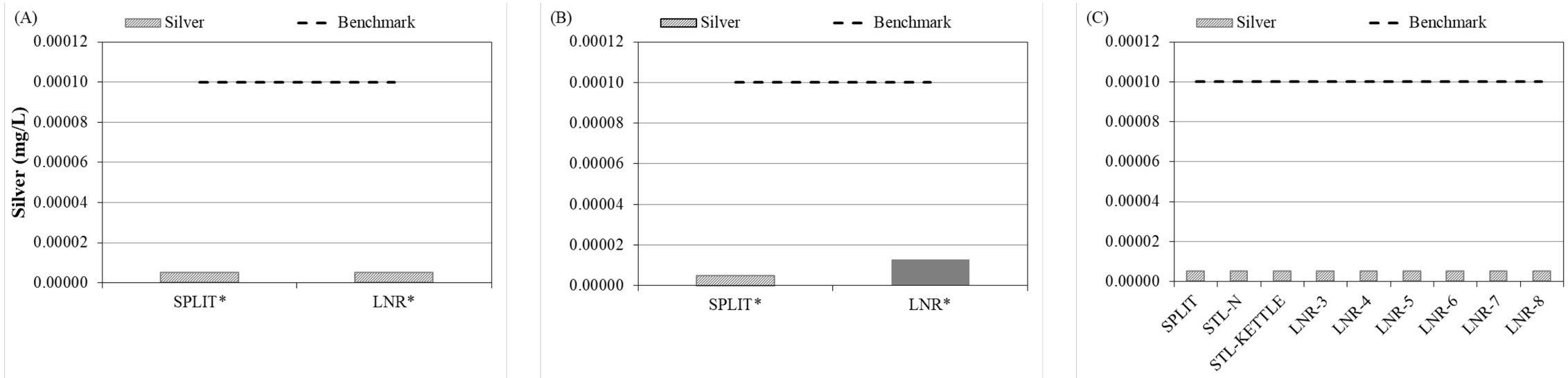


Figure 41: **Silver concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020. Hashed bars represent results below the analytical detection limit.**

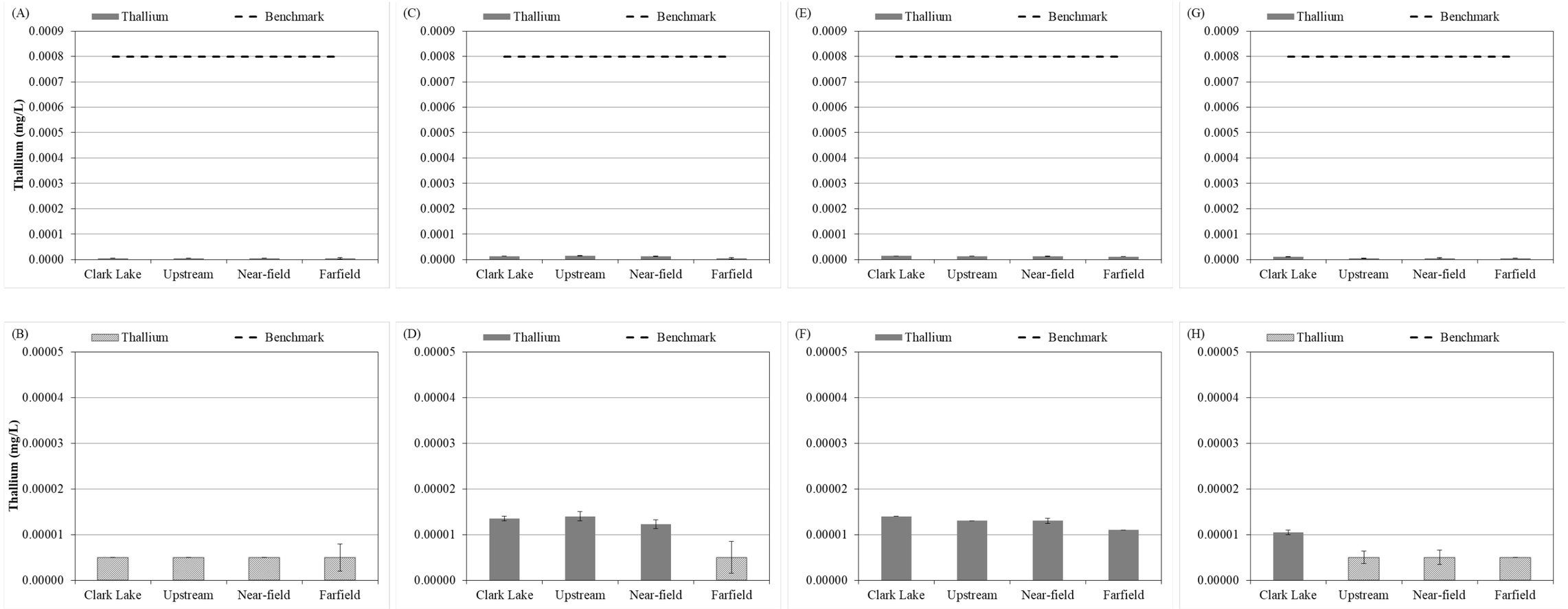


Figure 42: **Mean (± SE) thallium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

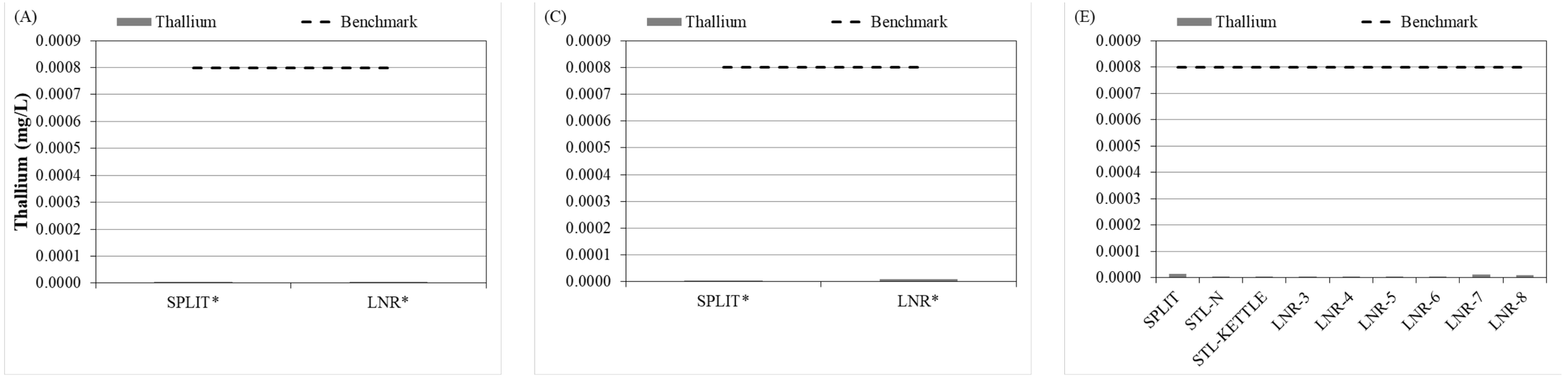


Figure 43: **Thallium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

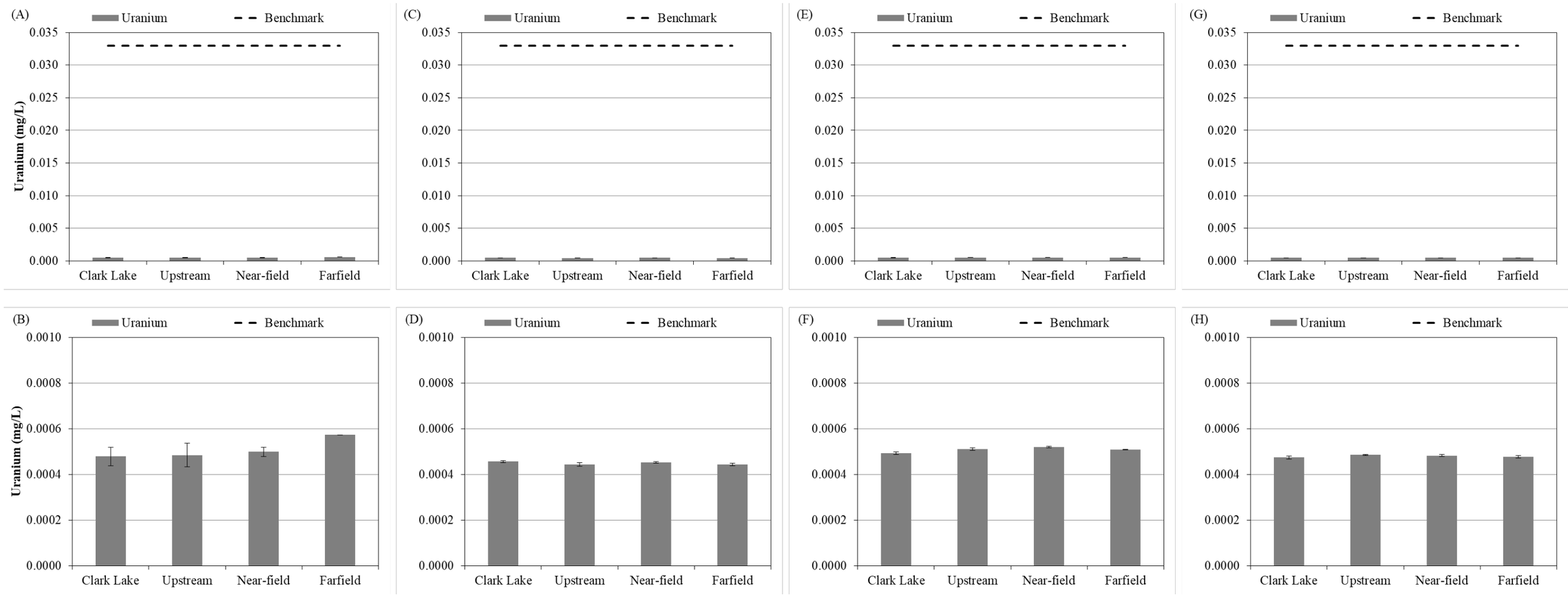


Figure 44: **Mean (± SE) uranium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

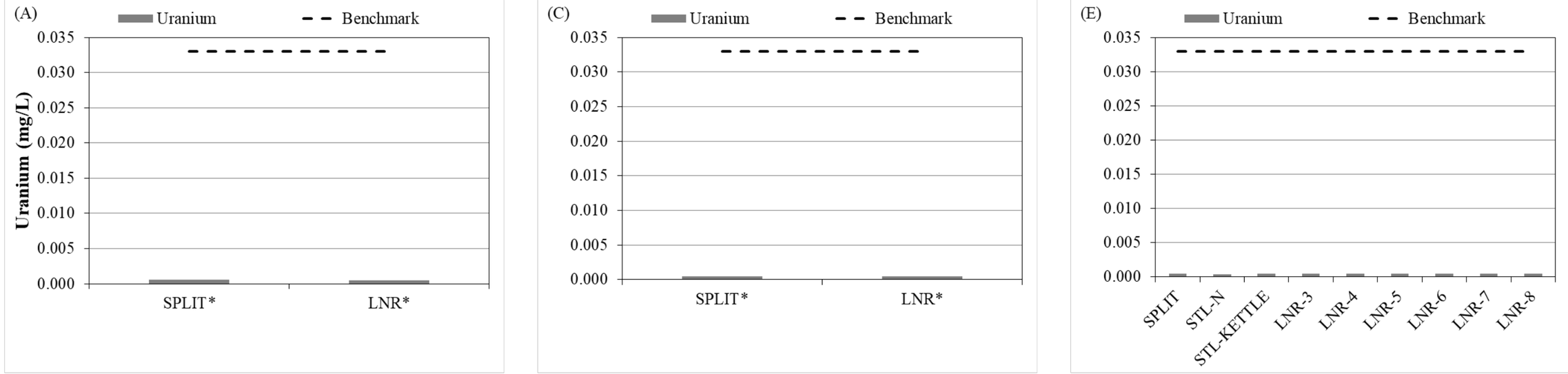


Figure 45: Uranium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.

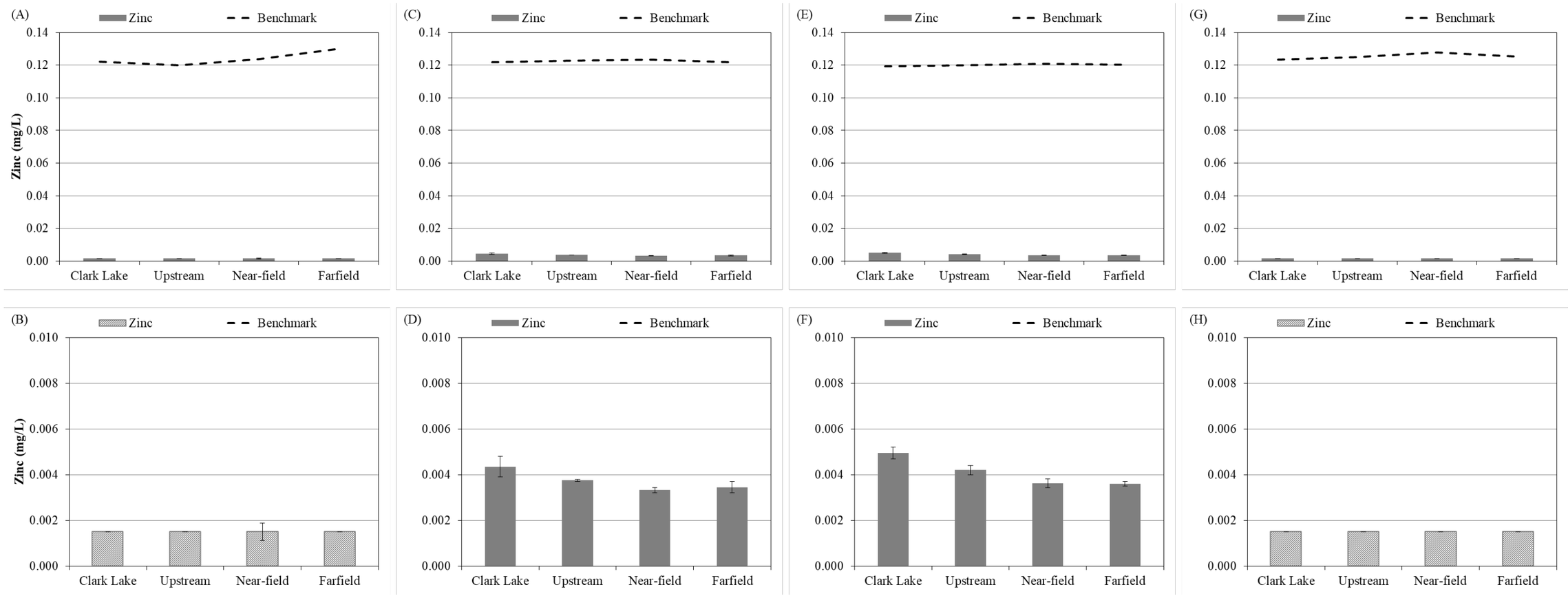


Figure 46: **Mean (± SE) zinc concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

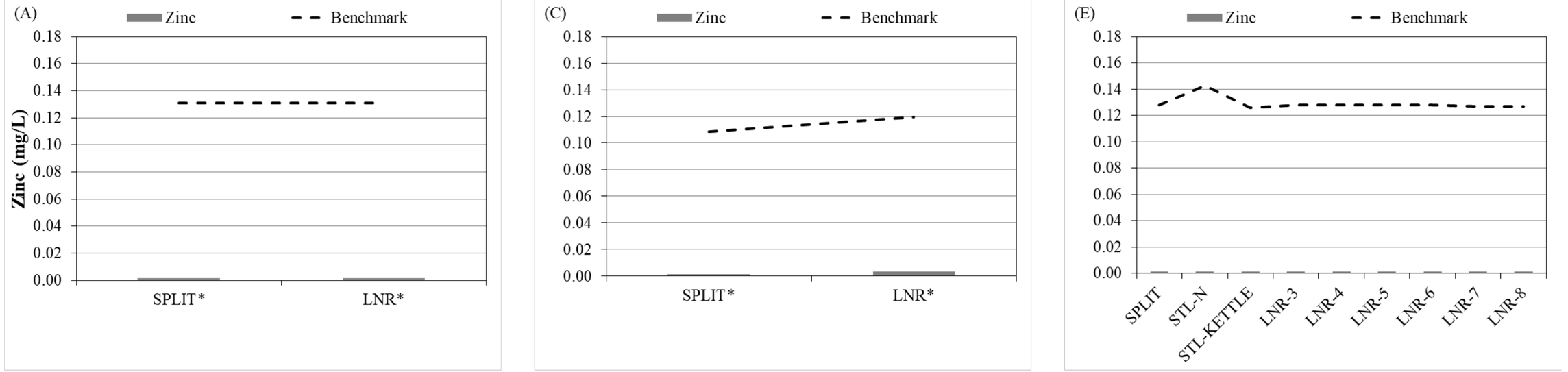


Figure 47: **Zinc concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom. Hashed bars represent results below the analytical detection limit.**

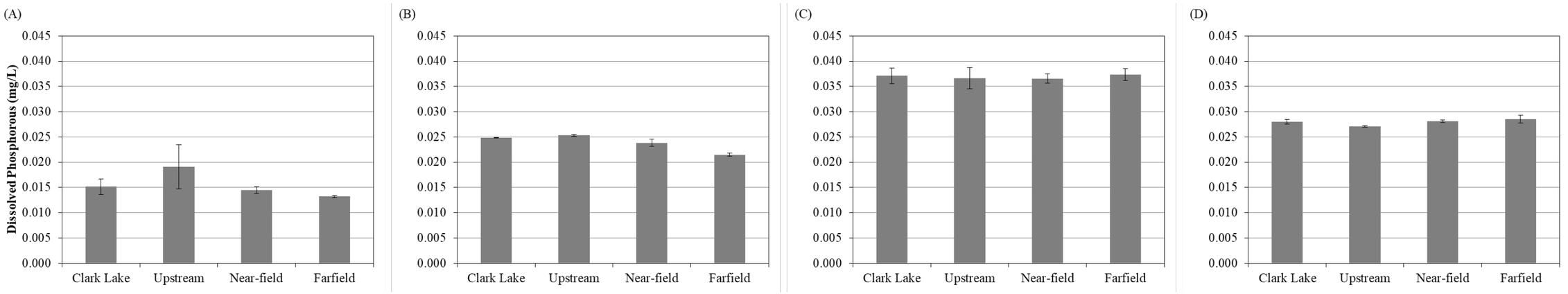


Figure 48: **Mean (± SE) dissolved phosphorous concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

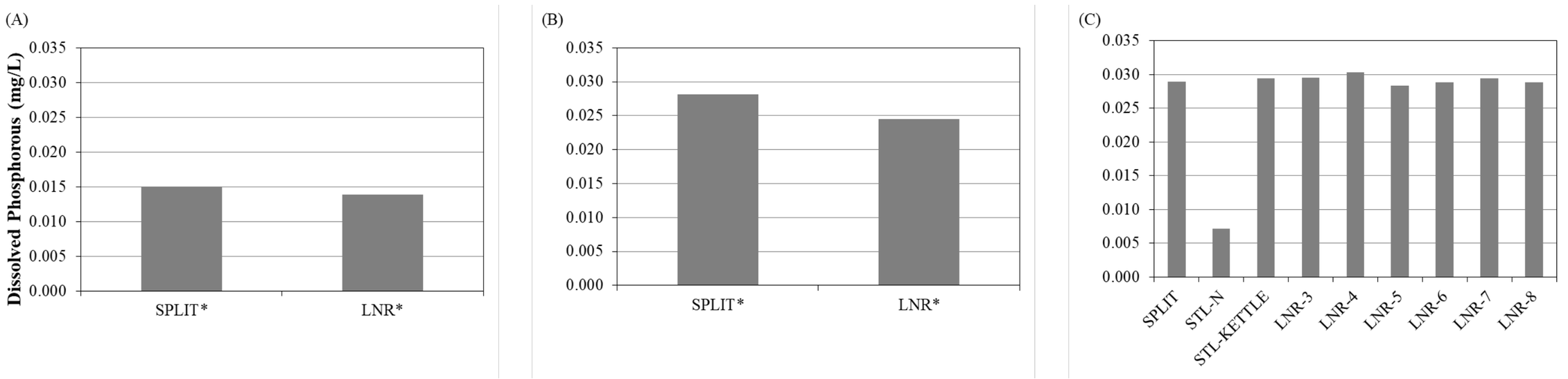


Figure 49: **Dissolved phosphorous concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

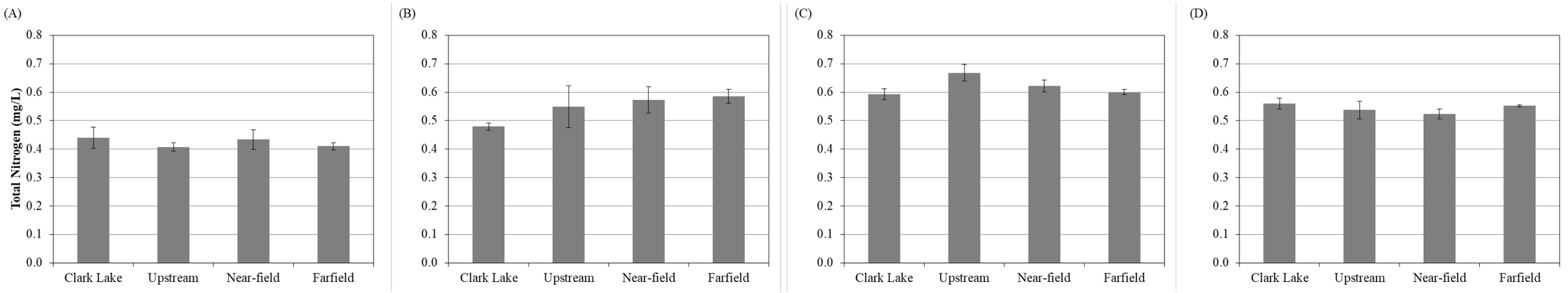


Figure 50: **Mean (± SE) concentrations of total nitrogen measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

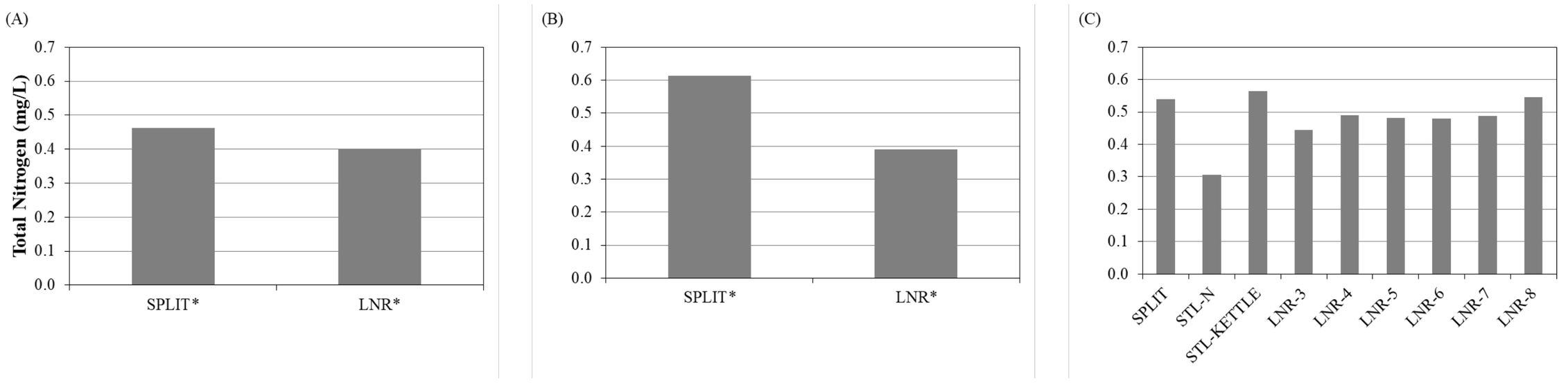


Figure 51: **Total nitrogen concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

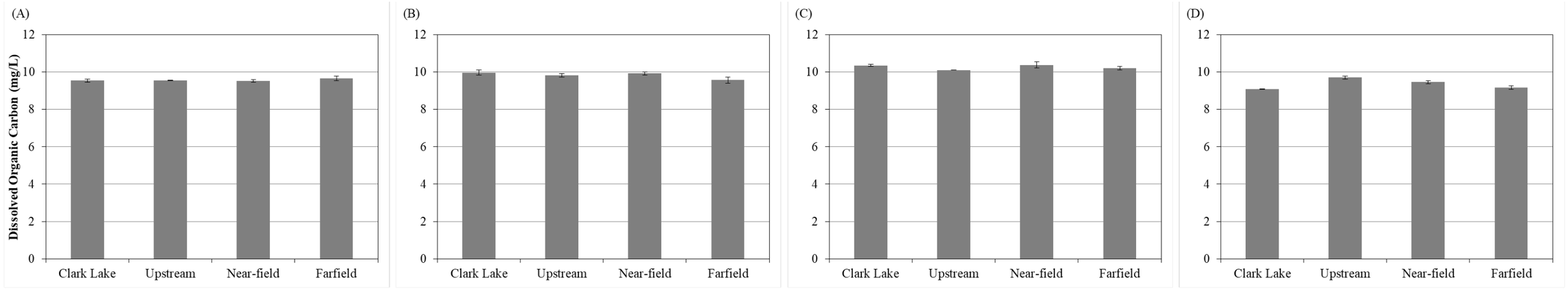


Figure 52: Mean (± SE) dissolved organic carbon concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.

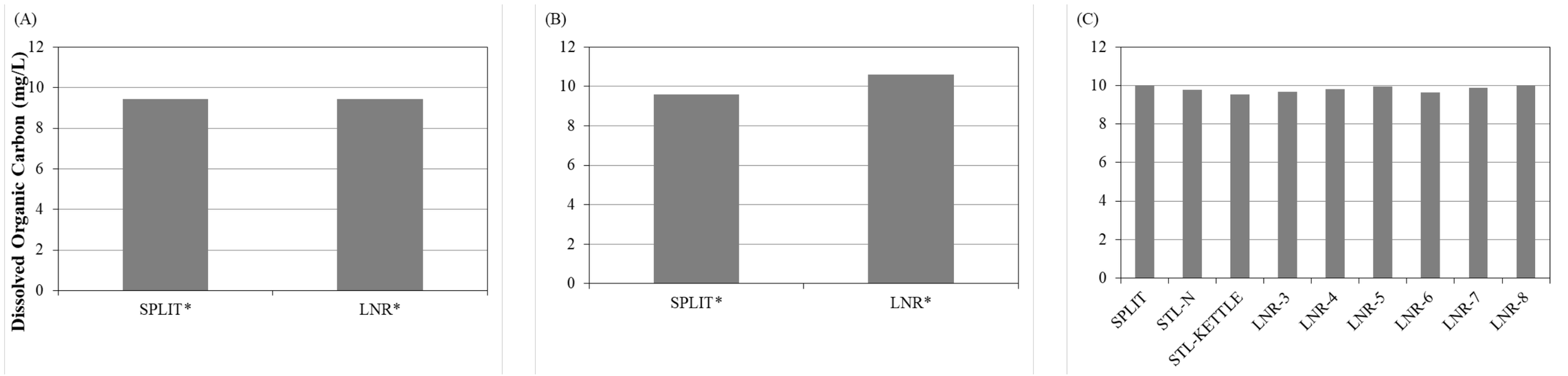


Figure 53: Dissolved organic carbon concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.

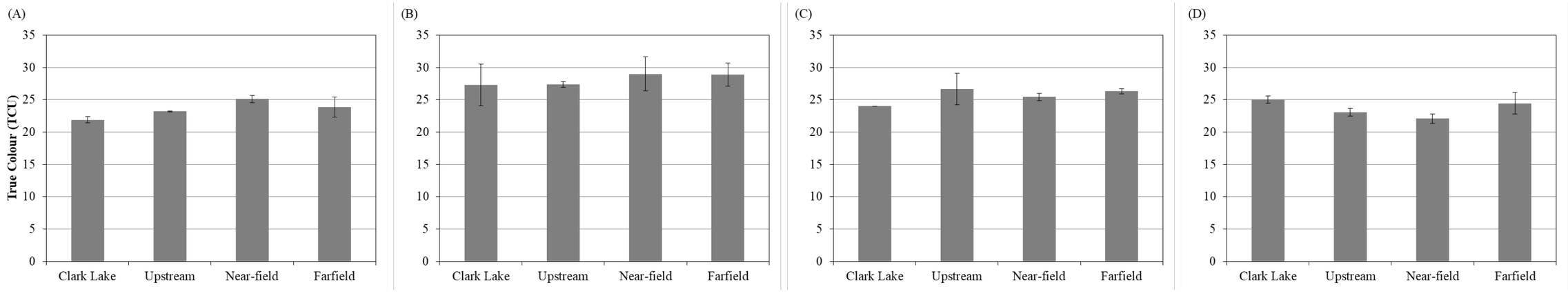


Figure 54: **Mean (± SE) colour measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

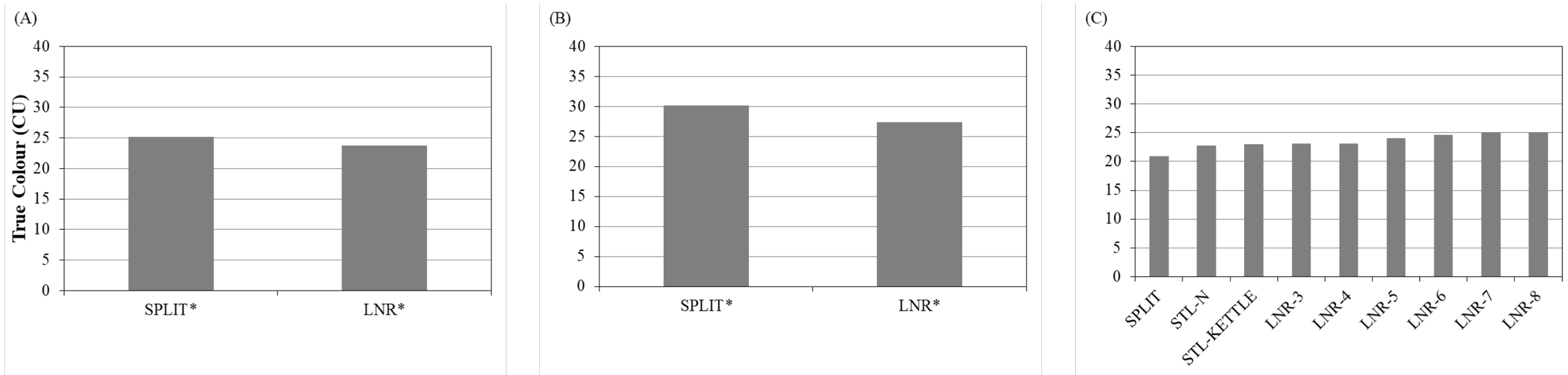


Figure 55: **Colour measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020. Hashed bars represent results below the analytical detection limit.**

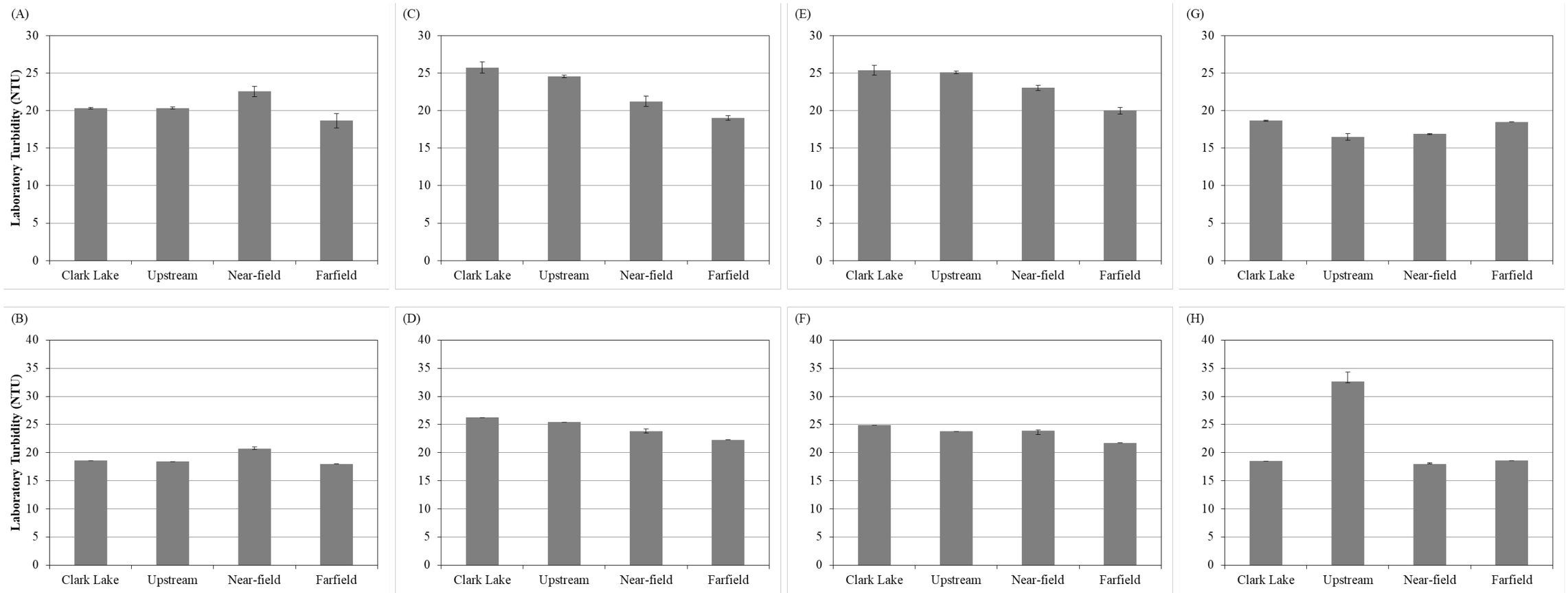


Figure 56: **Mean (± SE) laboratory (top) and *in situ* (bottom) turbidity measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

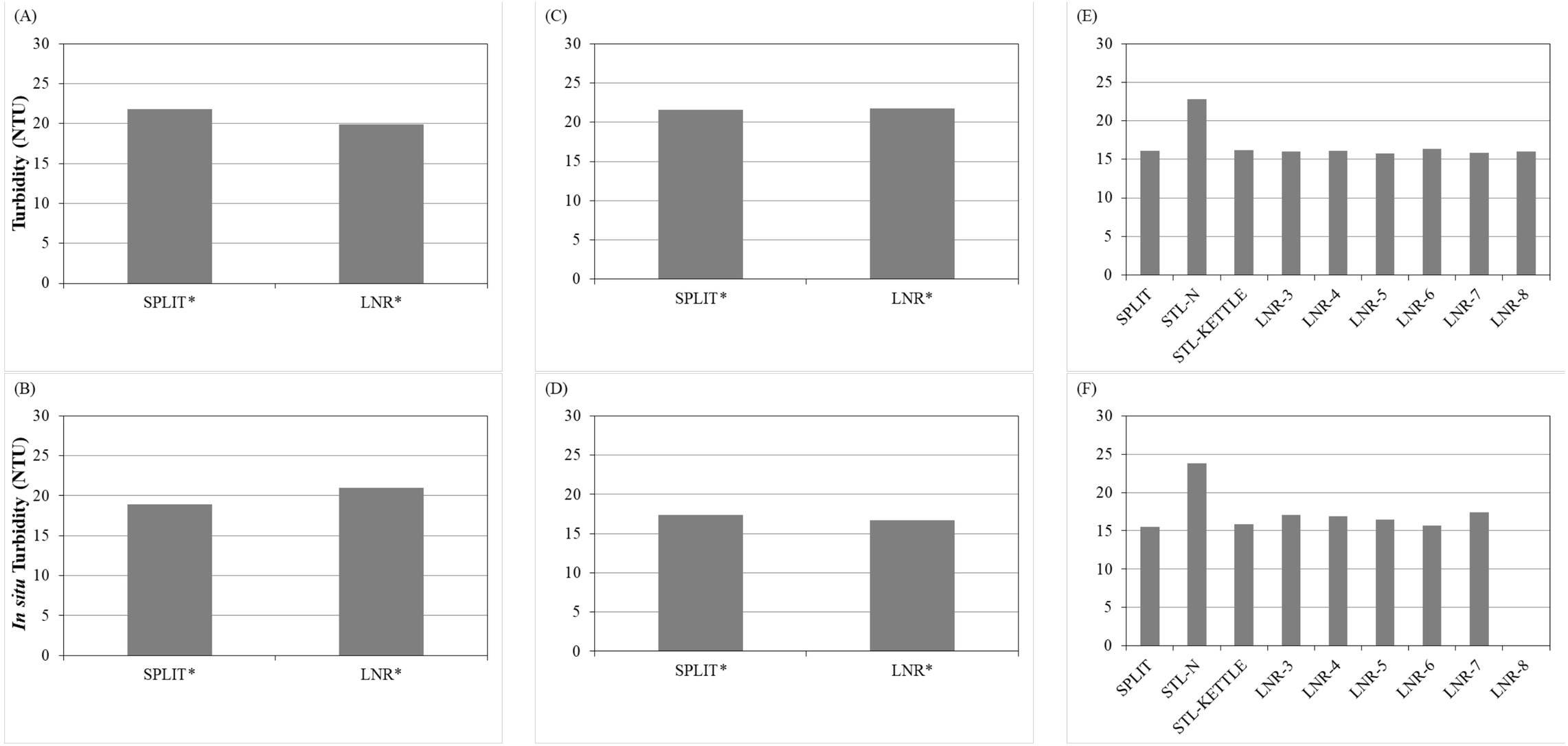


Figure 57: **Laboratory (top) and *in situ* (bottom) turbidity measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

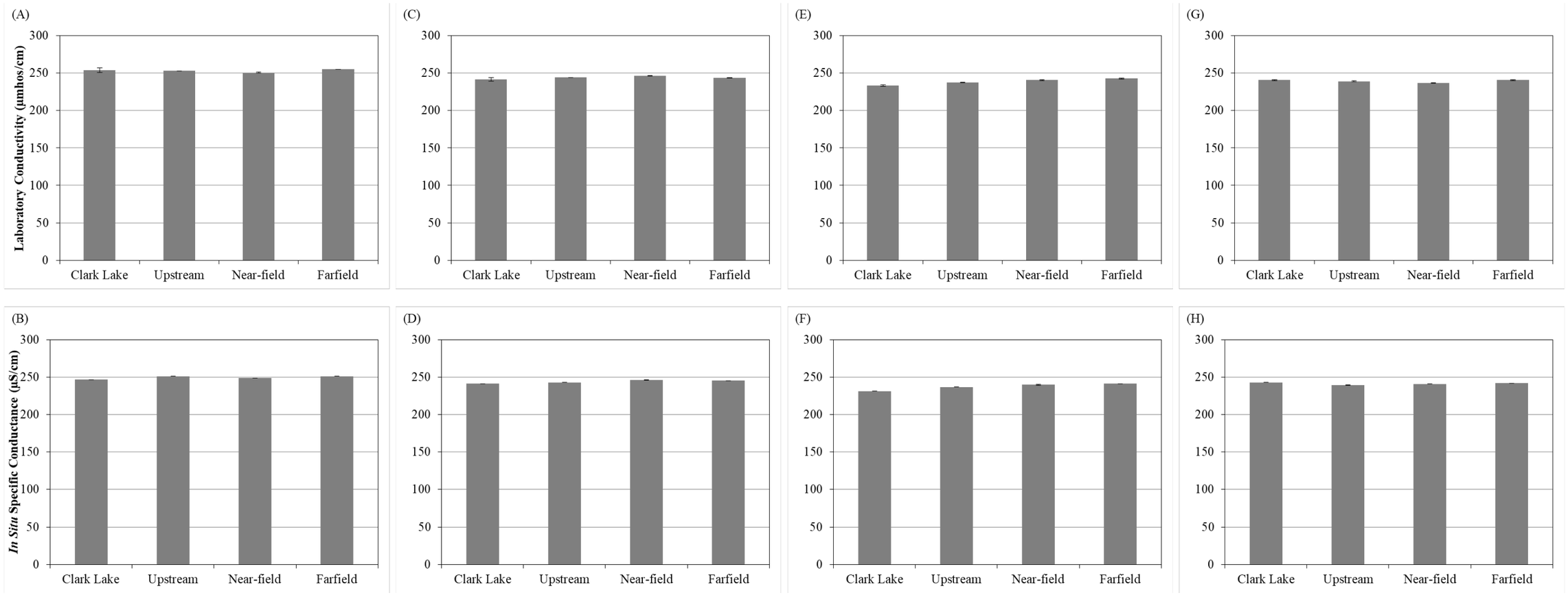


Figure 58: **Mean (± SE) laboratory (top) and *in situ* (bottom) specific conductance measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A,B), July 22 (C,D), August 18 (E,F), and September 12–17 (G,H), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.**

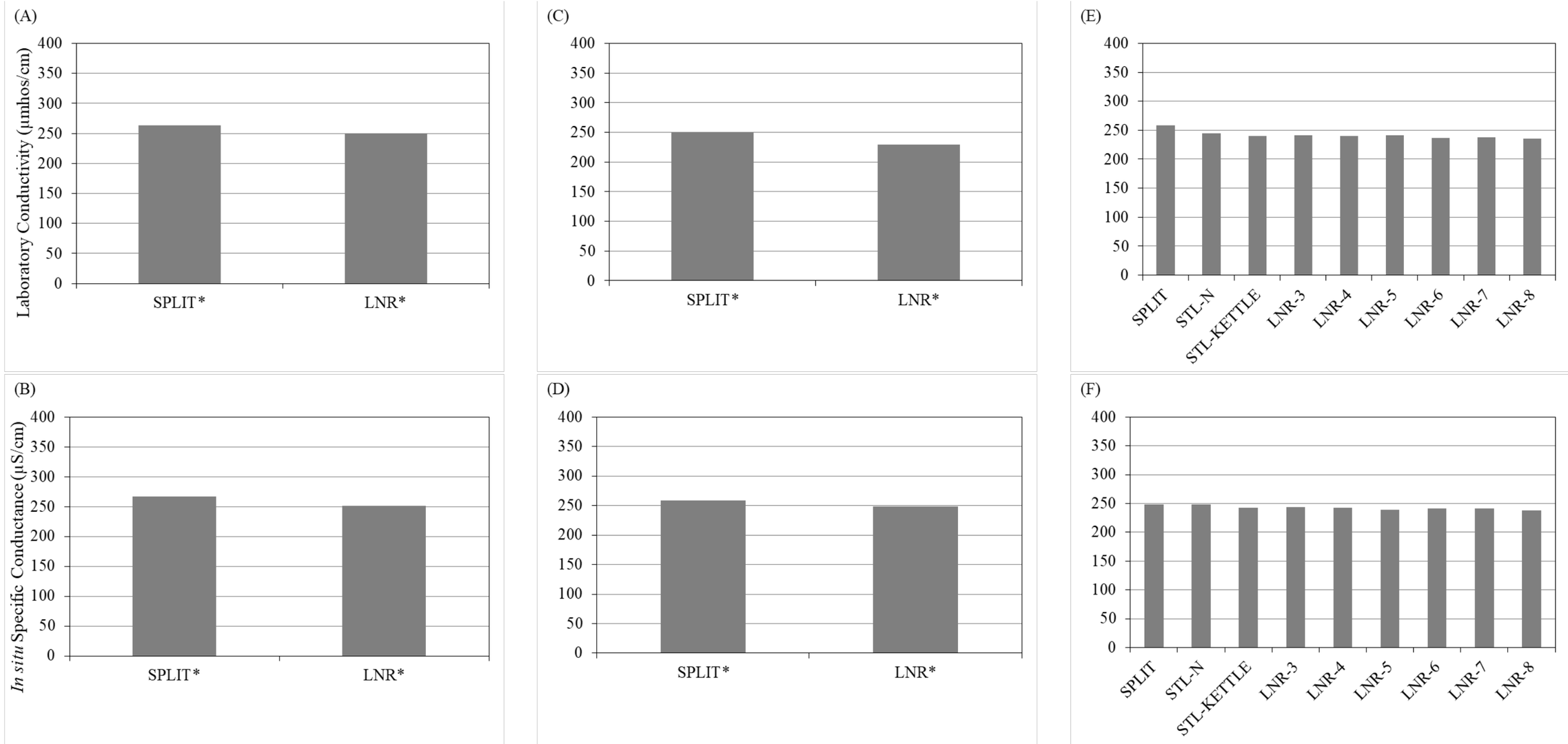


Figure 59: Laboratory (top) and *in situ* (bottom) specific conductance measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A,B), July 29–August 4 (C,D), and September 13–14 (E,F), 2020. Scales are plotted to show the comparison of the data to benchmark values on the top, and the differences in mean values on the bottom.

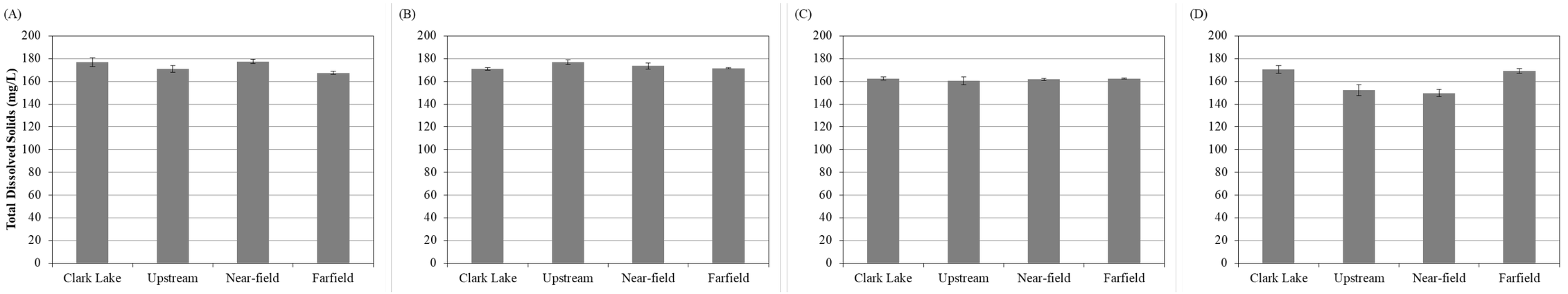


Figure 60: Mean (± SE) concentrations of total dissolved solids measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.

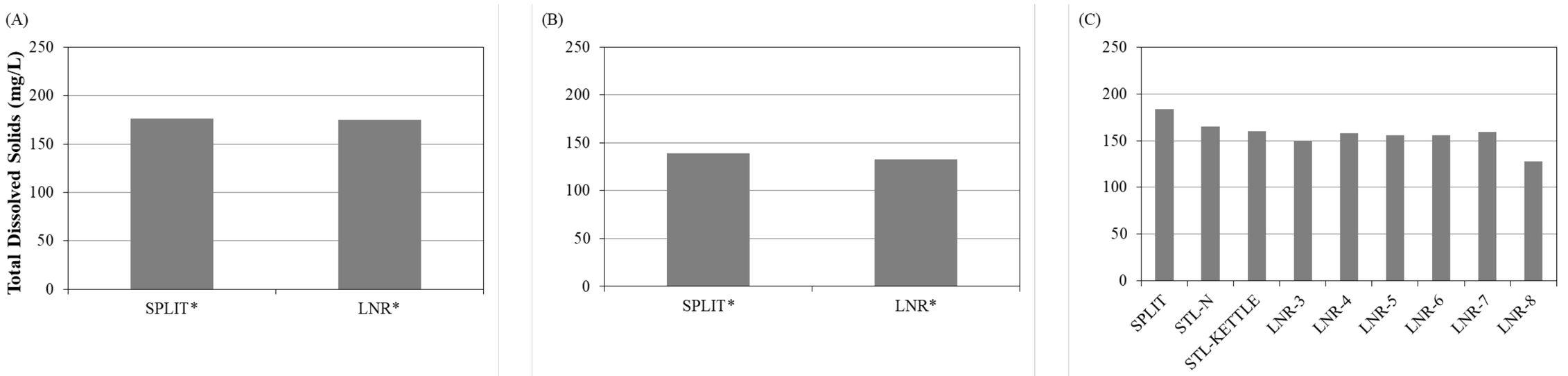


Figure 61: Concentration of total dissolved solids measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.

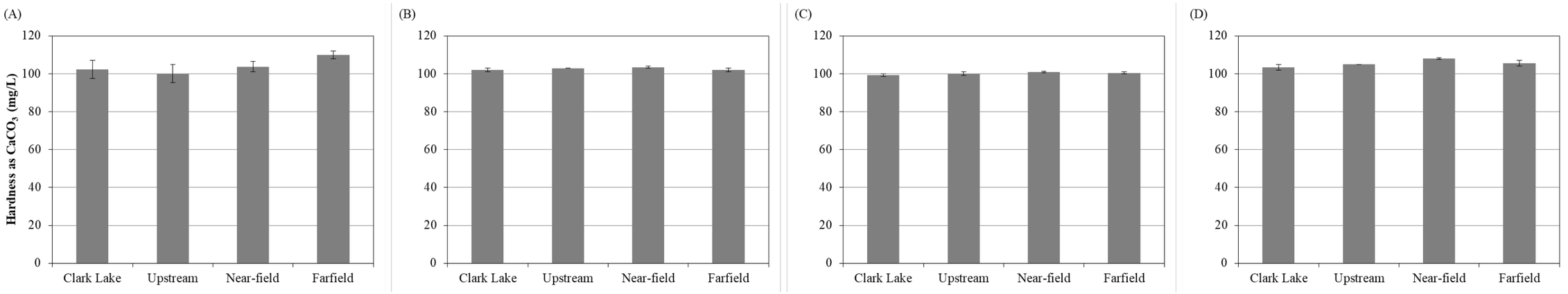


Figure 62: Mean (± SE) hardness measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.

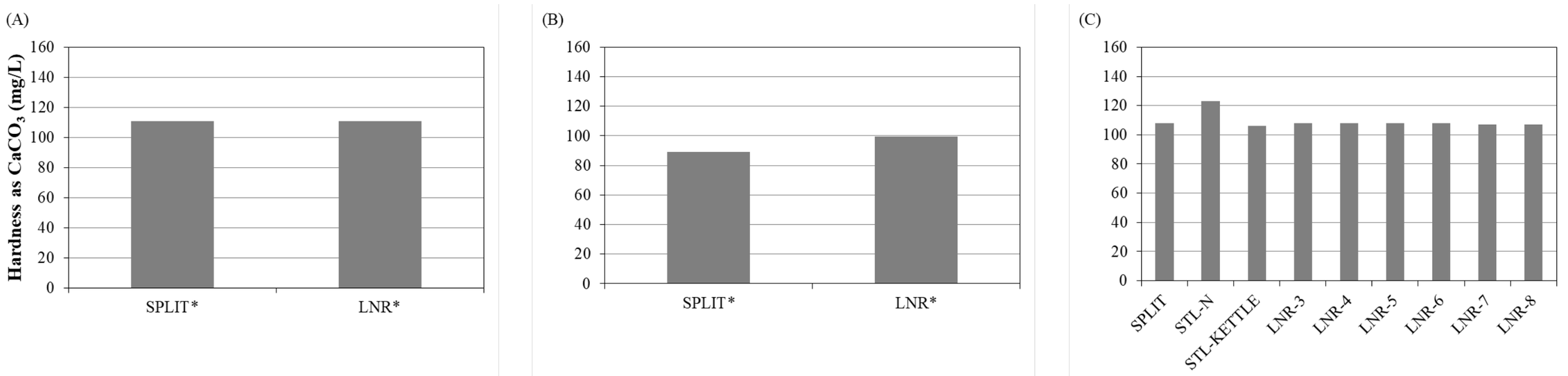


Figure 63: Hardness measured in the Keeyask regional study area under CAMP (denoted with asterisk; source: CAMP 2020) or Keeyask on June 19–22 (A), July 20–August 4 (B), and September 13–14 (C), 2020.

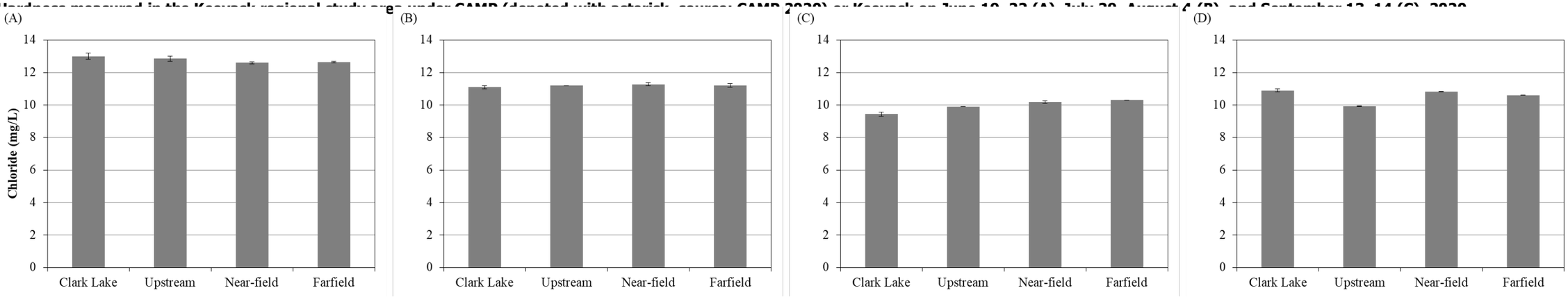


Figure 64: **Mean (± SE) chloride concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

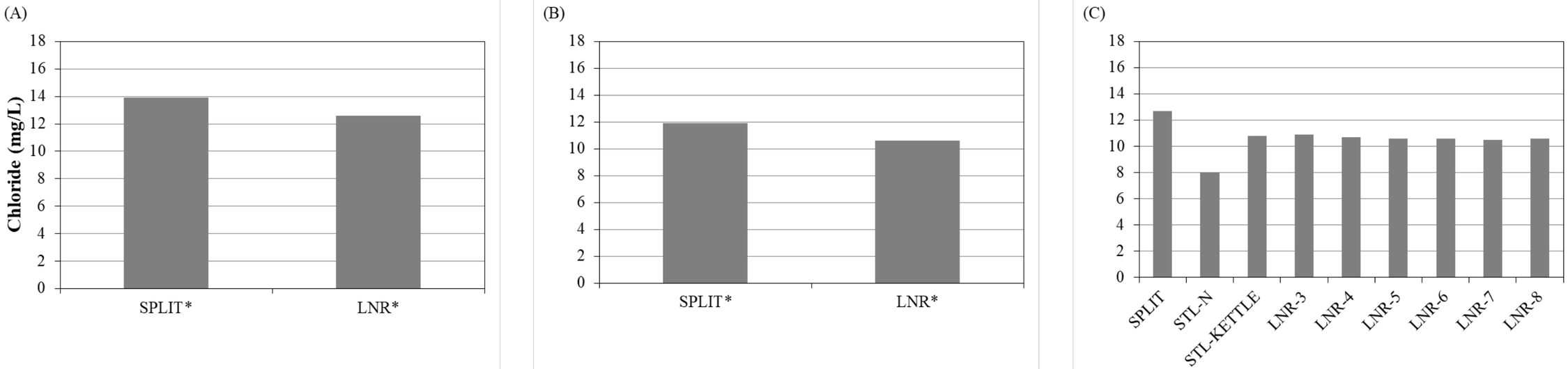


Figure 65: Chloride concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.

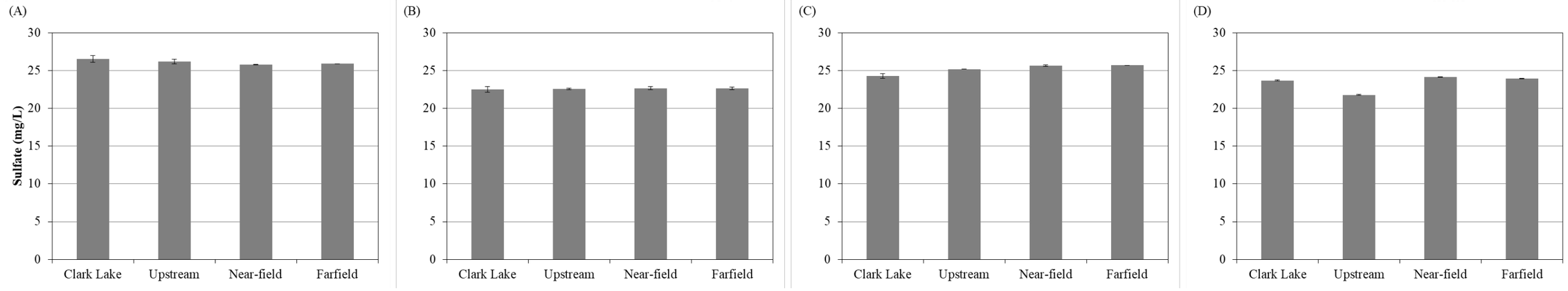


Figure 66: Mean (± SE) sulfate concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.

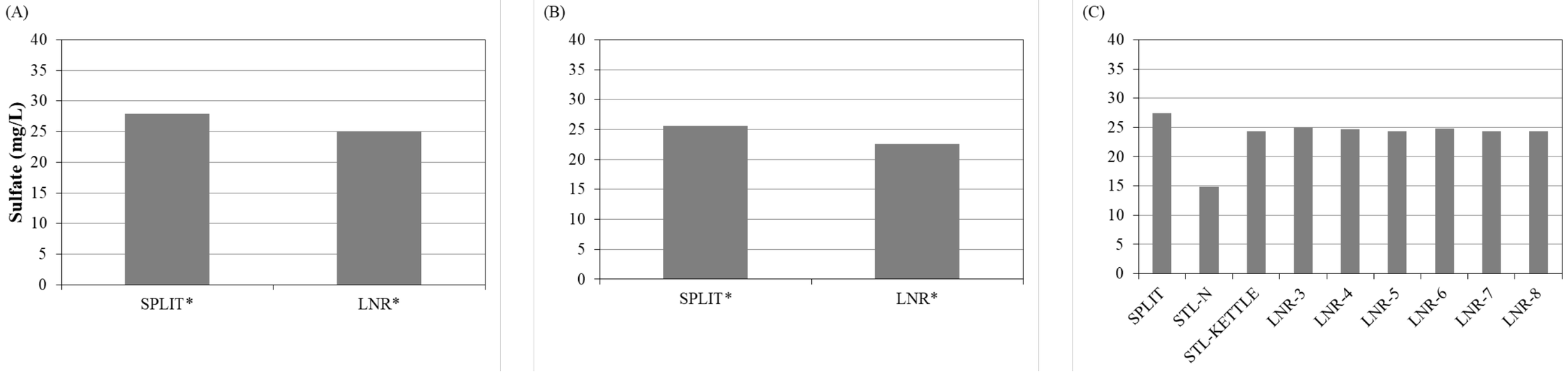


Figure 67: Sulfate concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.

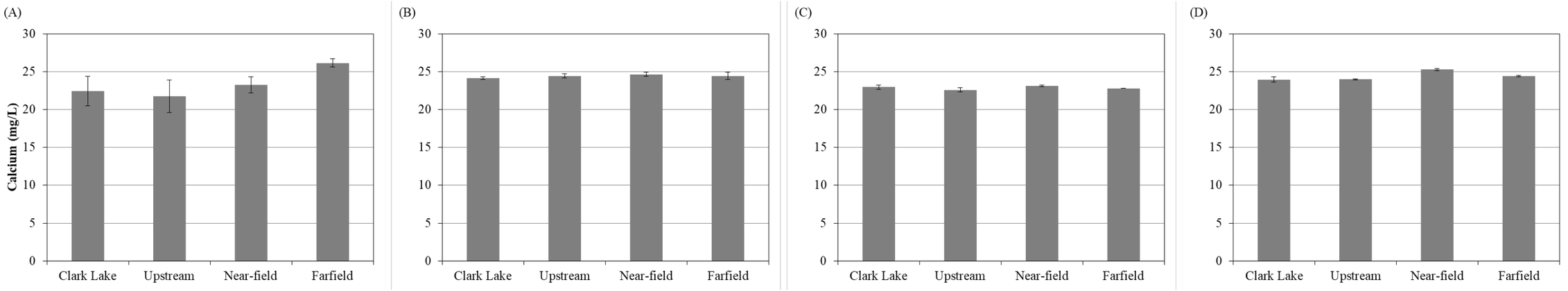


Figure 68: Mean (± SE) calcium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.

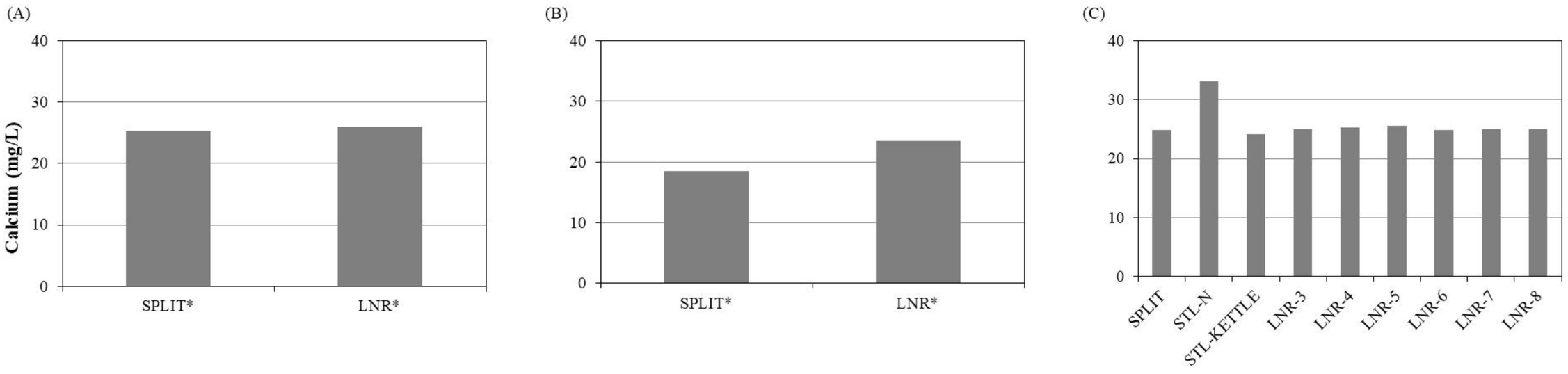


Figure 69: **Calcium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C) 2020.**

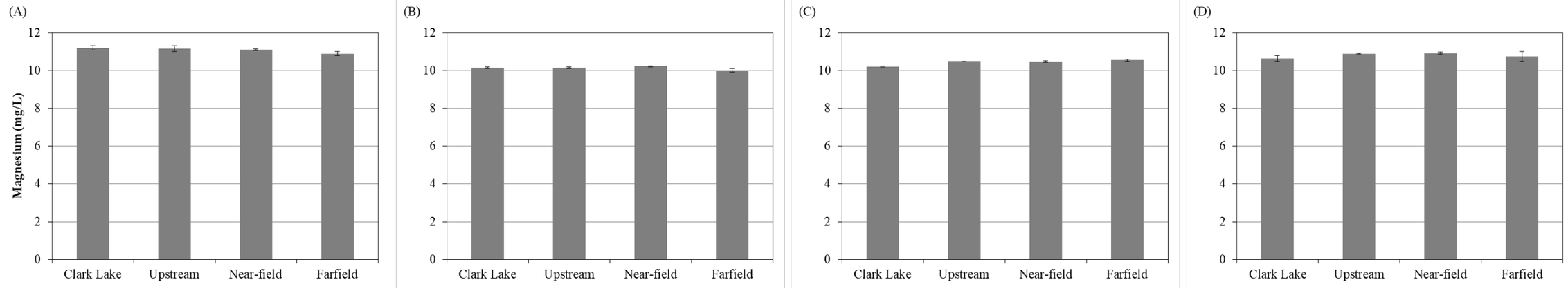


Figure 70: **Mean (± SE) magnesium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

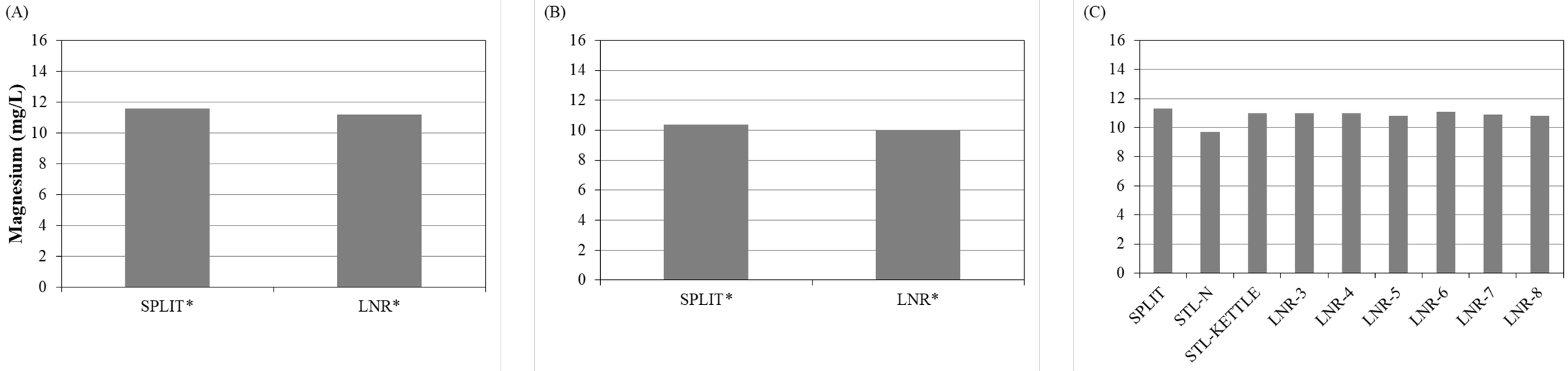


Figure 71: **Magnesium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C) 2020.**

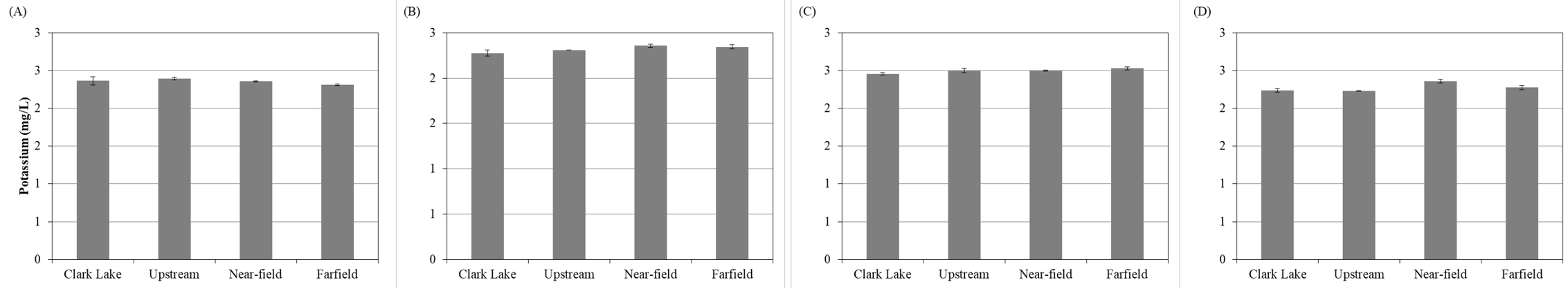


Figure 72: **Mean (± SE) potassium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

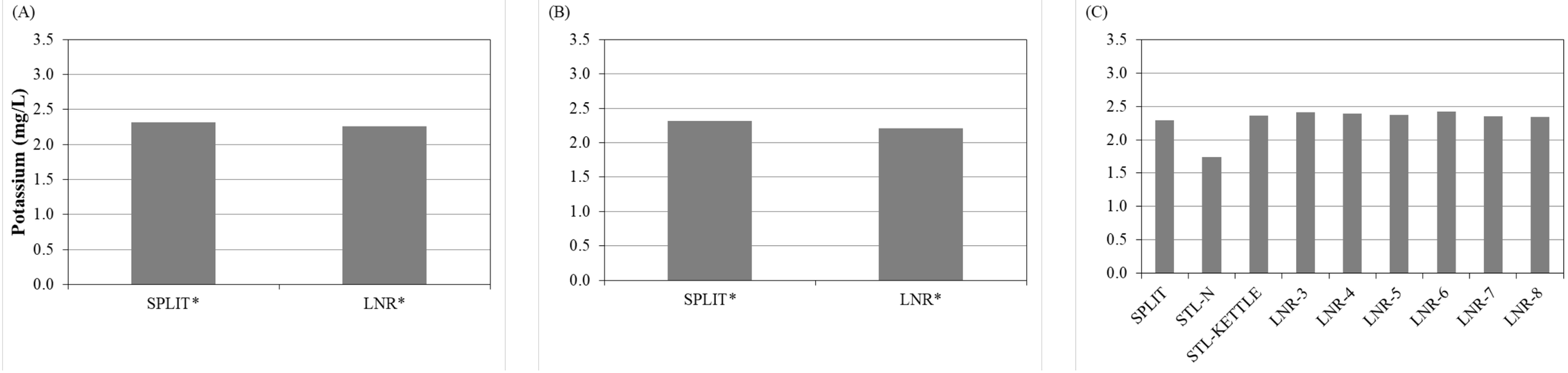


Figure 73: **Potassium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

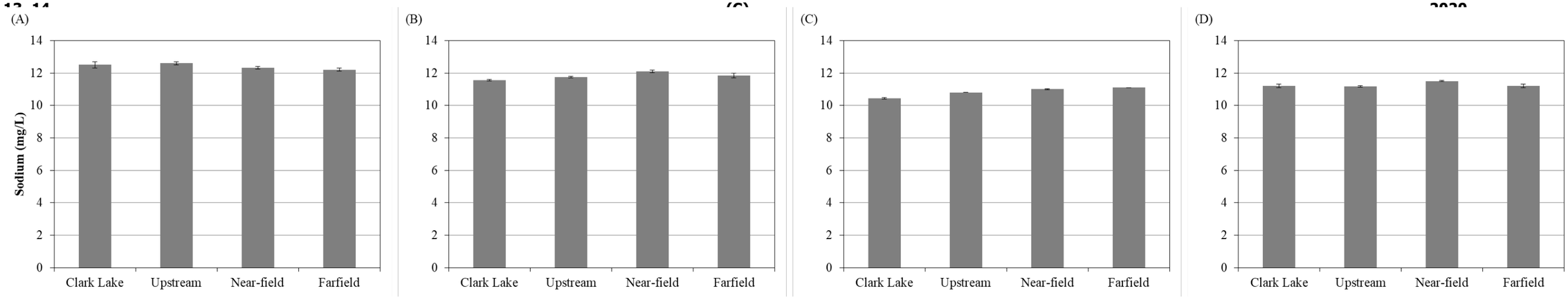


Figure 74: **Mean (± SE) sodium concentrations measured in Clark Lake, and the upstream, near-field, and far-field areas of the Nelson River near the Keeyask GS construction site on June 20 (A), July 22 (B), August 18 (C), and September 12–17 (D), 2020.**

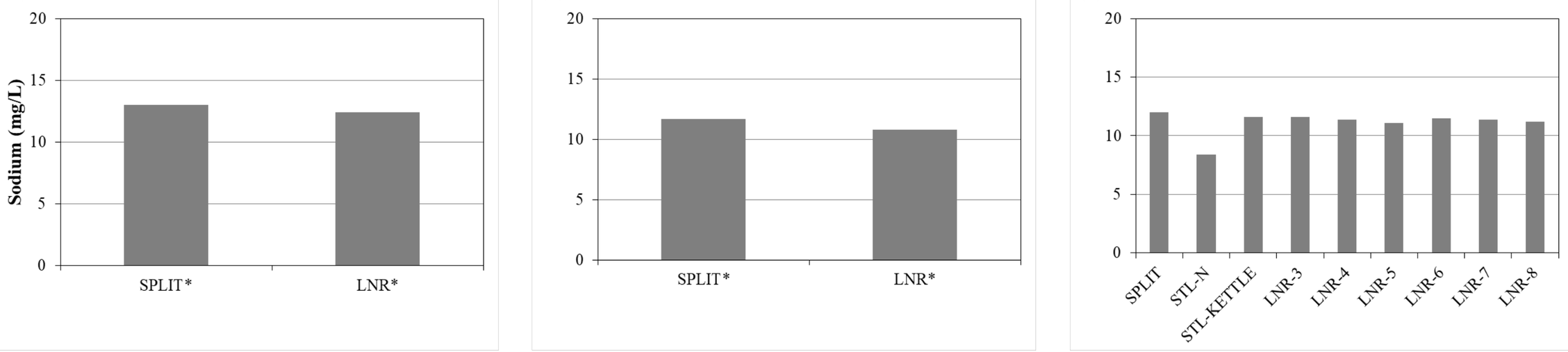


Figure 75: **Sodium concentrations measured in the Keeyask regional study area under CAMP (denoted with asterisk, source: CAMP 2020) or Keeyask on June 19–22 (A), July 29–August 4 (B), and September 13–14 (C), 2020.**

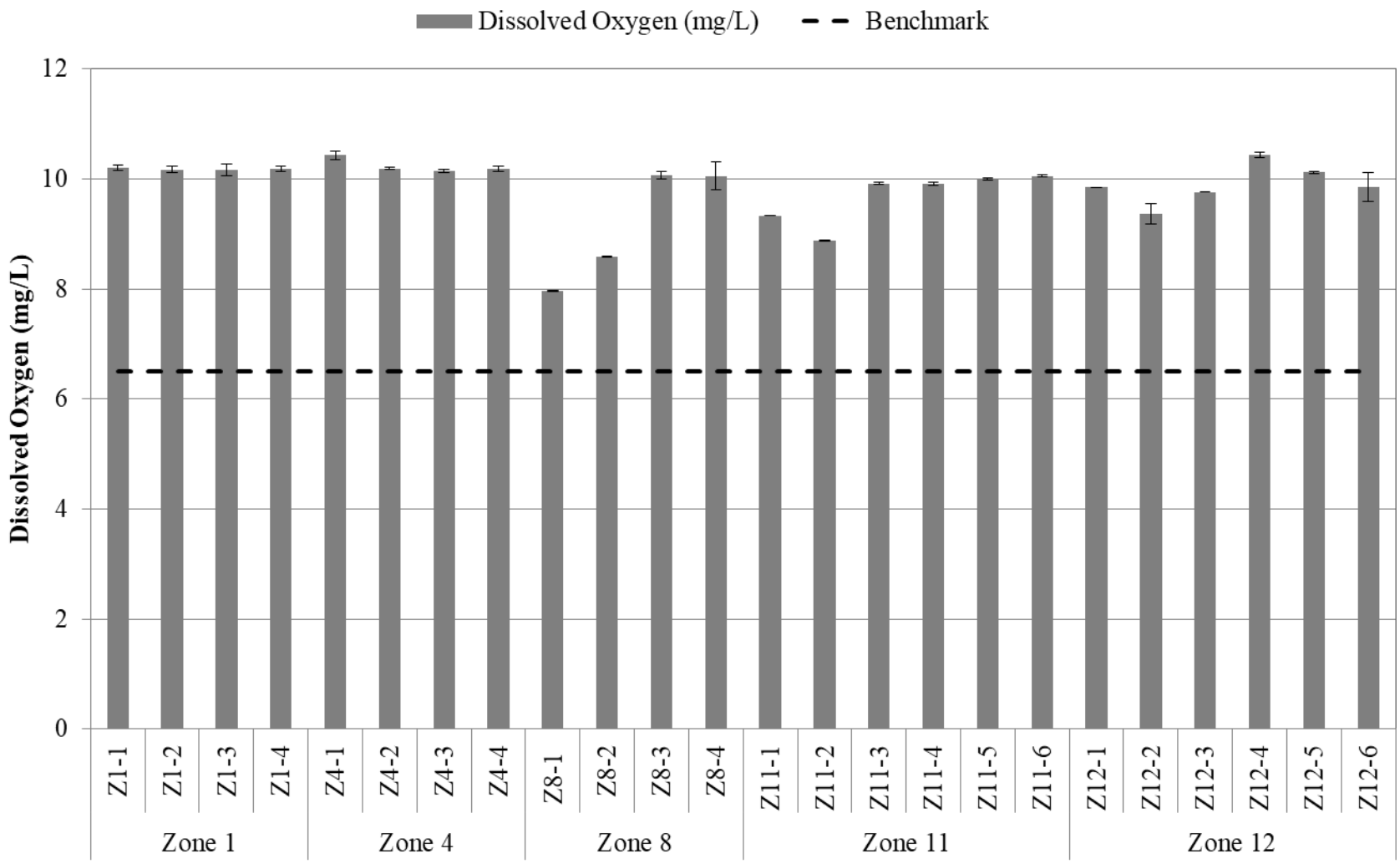
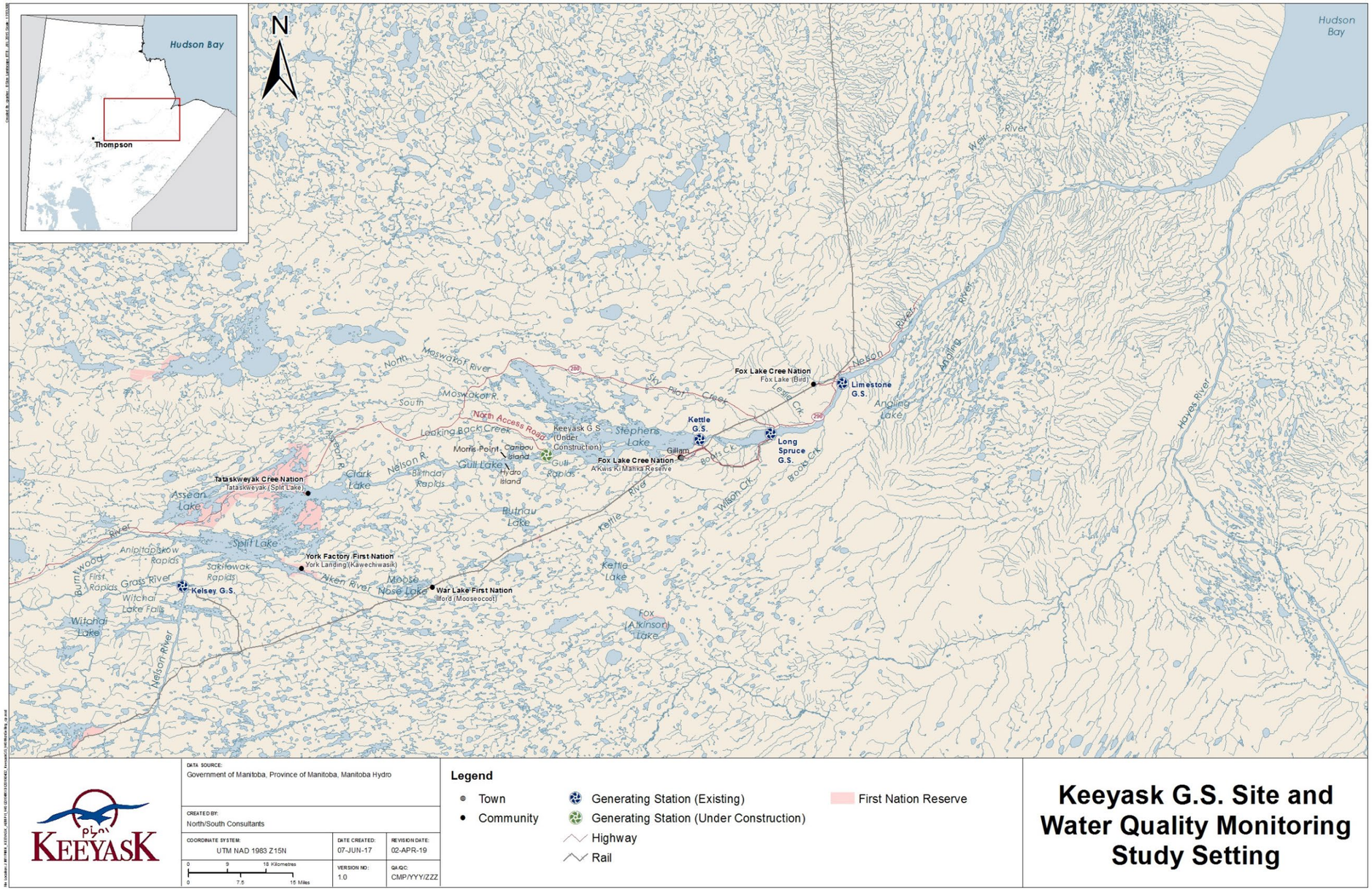
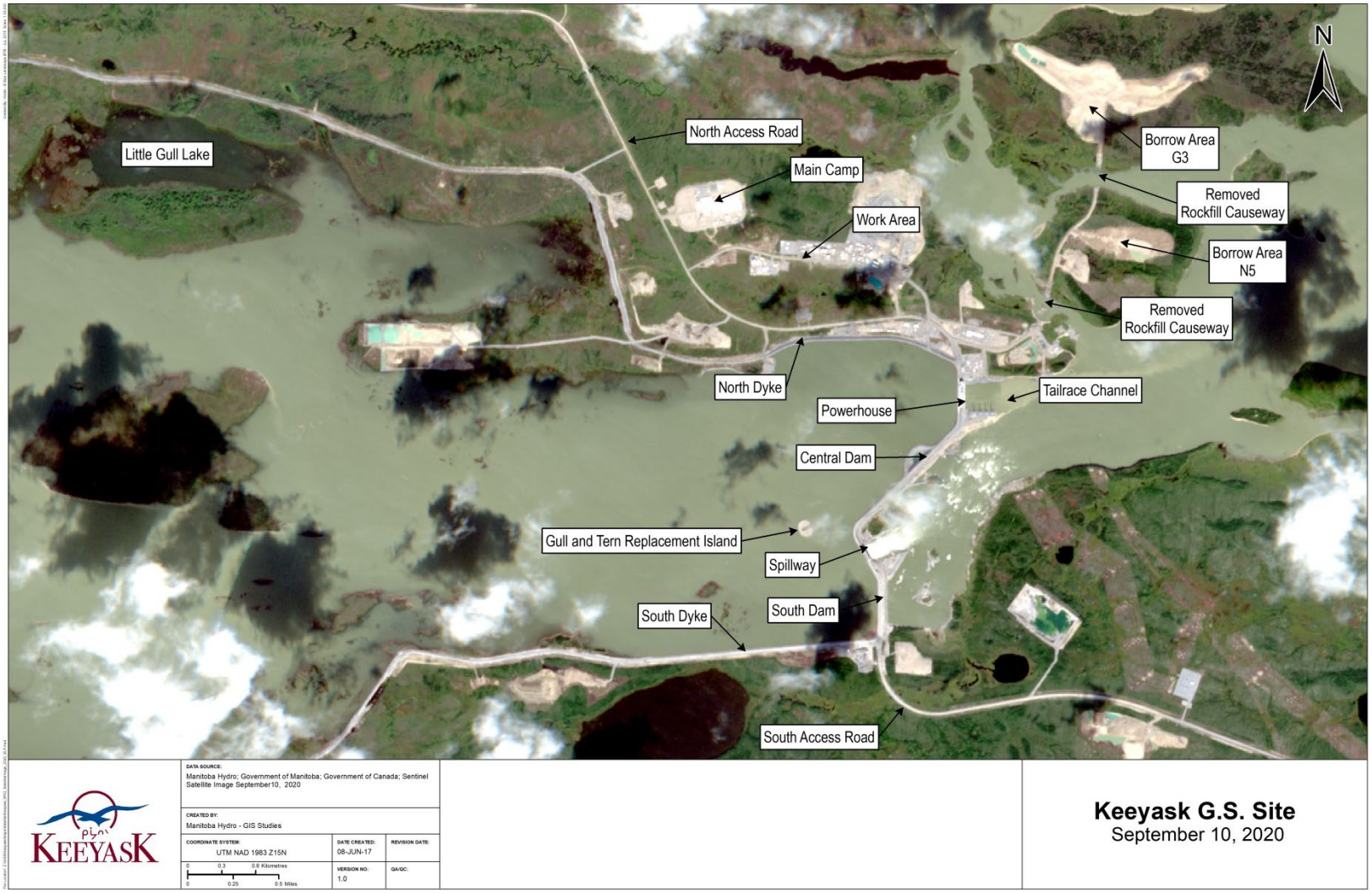


Figure 76: Dissolved oxygen concentrations measured in the Keeyask reservoir during post-impoundment surveys on September 22–23, 2020.

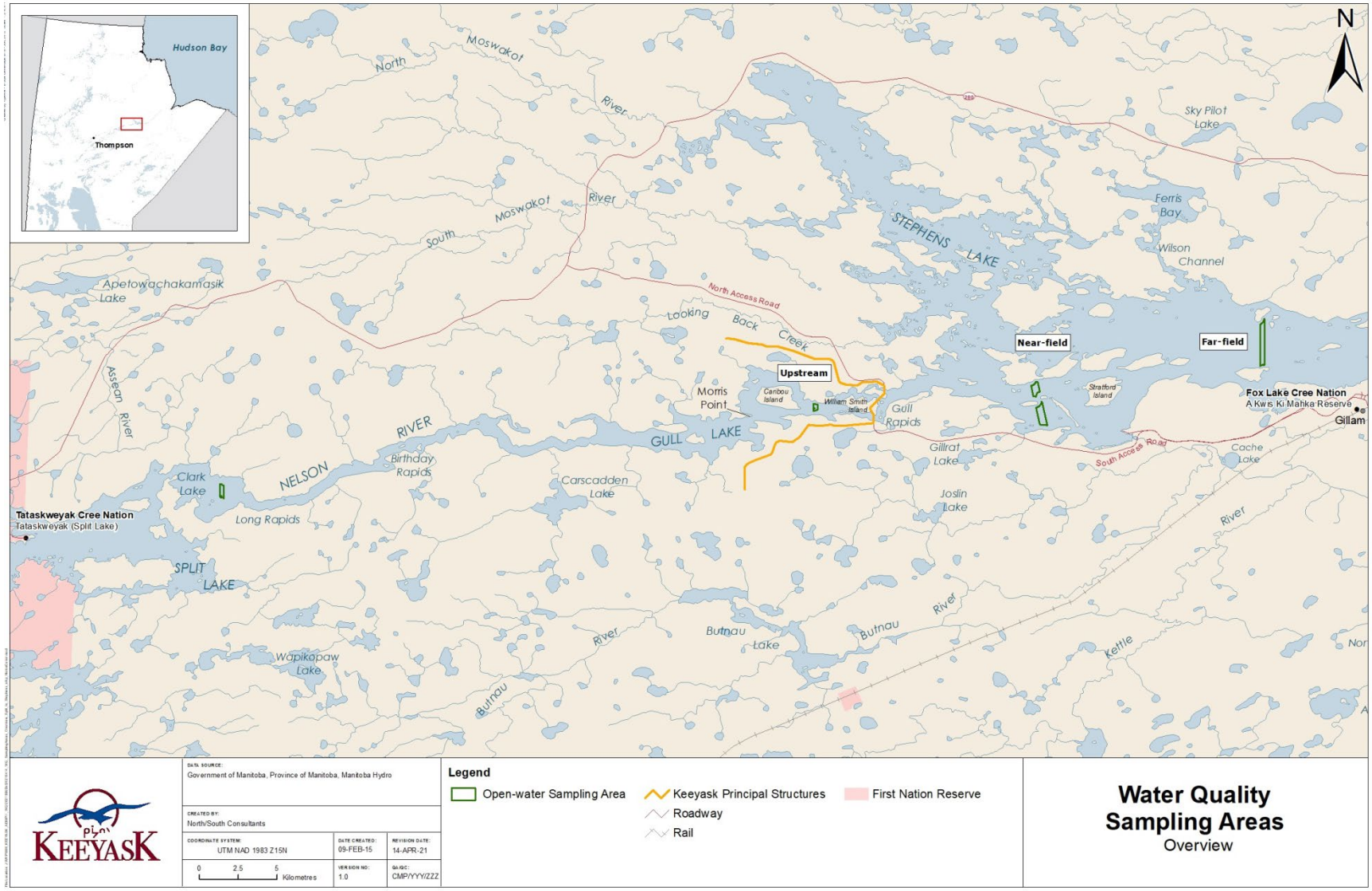
MAPS



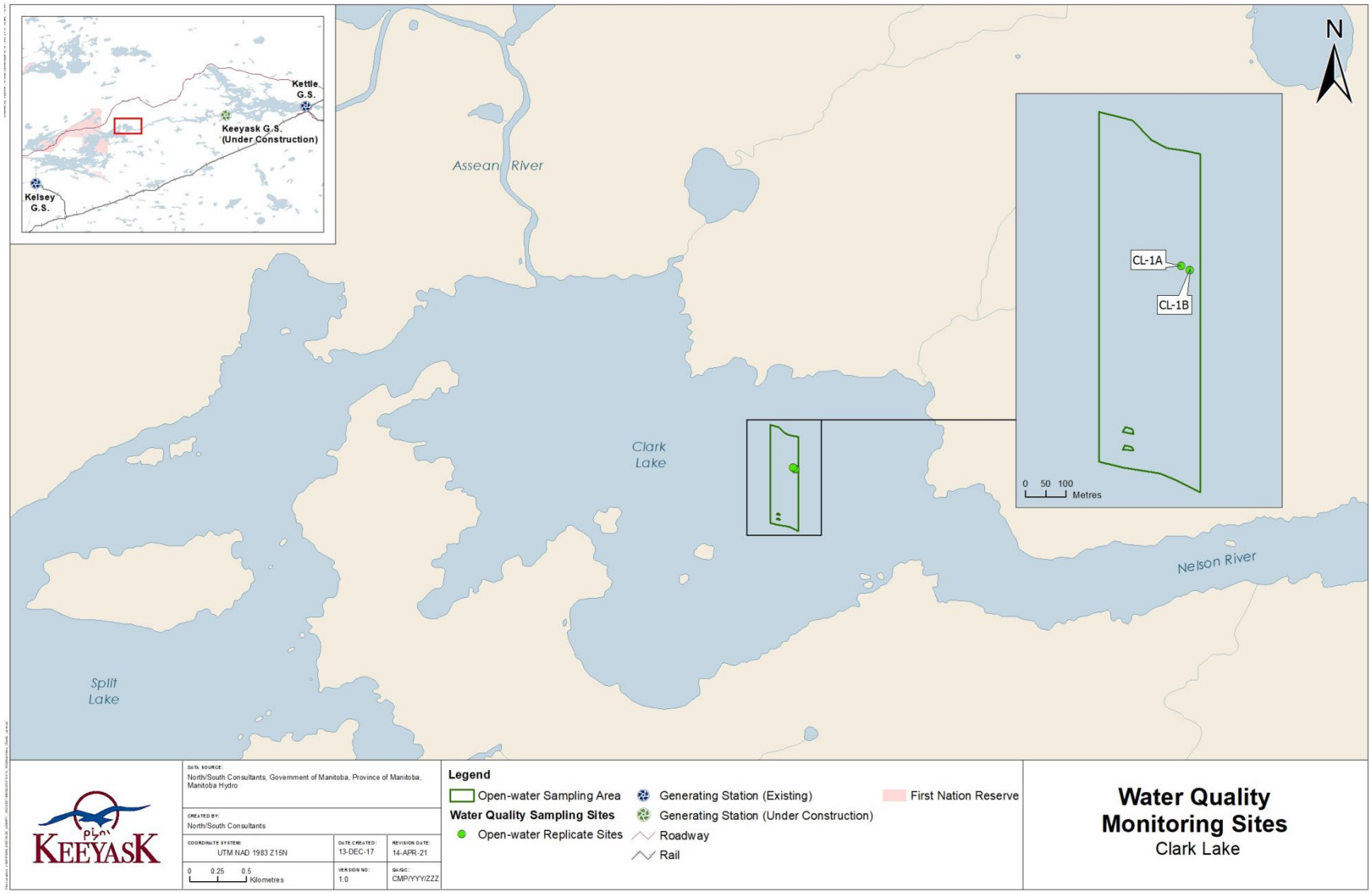
Map 1: Map of the Nelson River showing the site of the Keeyask Generating Station and the water quality monitoring study setting.



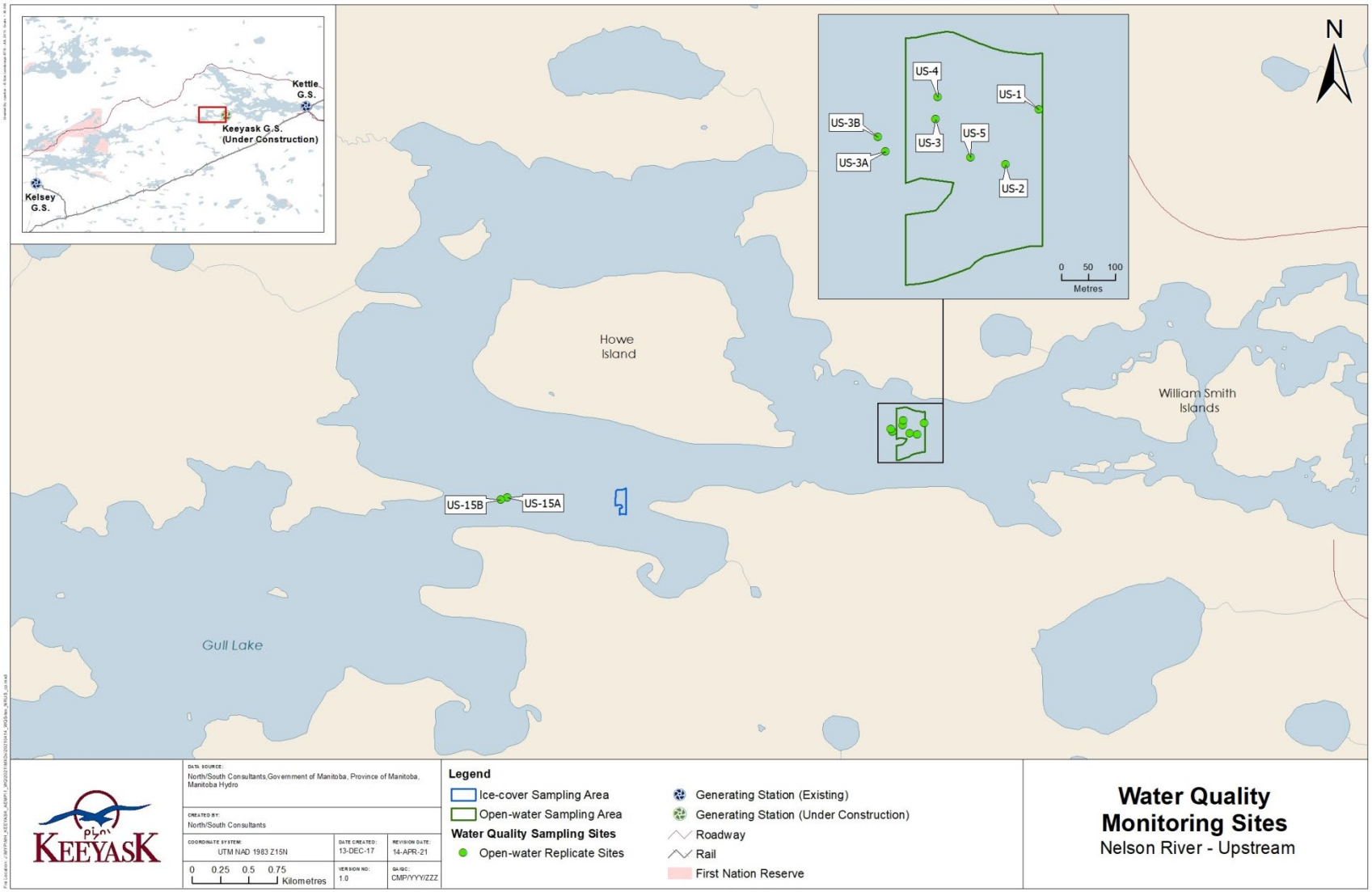
Map 2: Map illustrating instream structures at the Keeyask Generating Station site after reservoir flooding, September 2020.



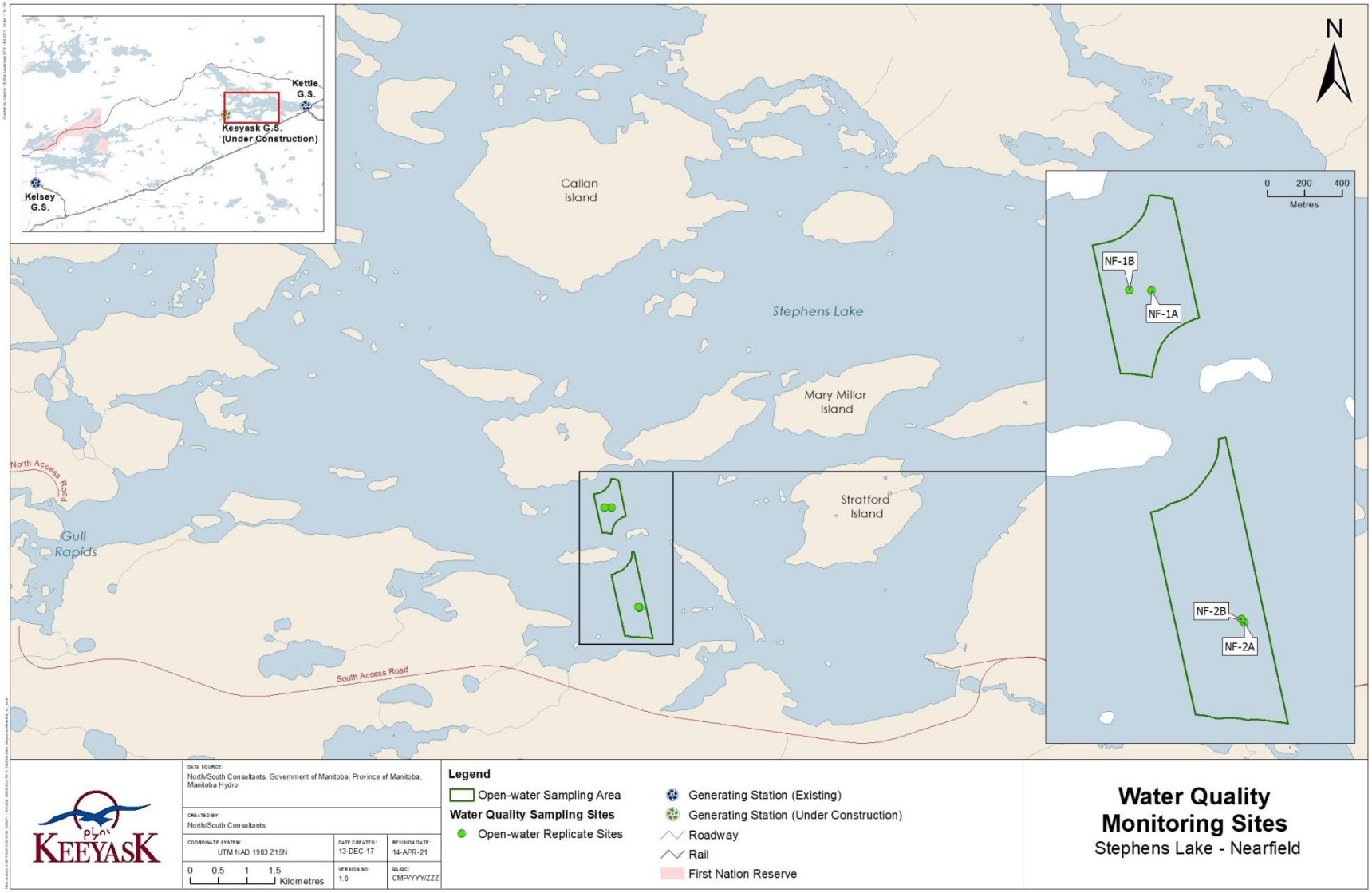
Map 3: Overview of water quality monitoring areas in the Keeyask local study area during open-water 2020.



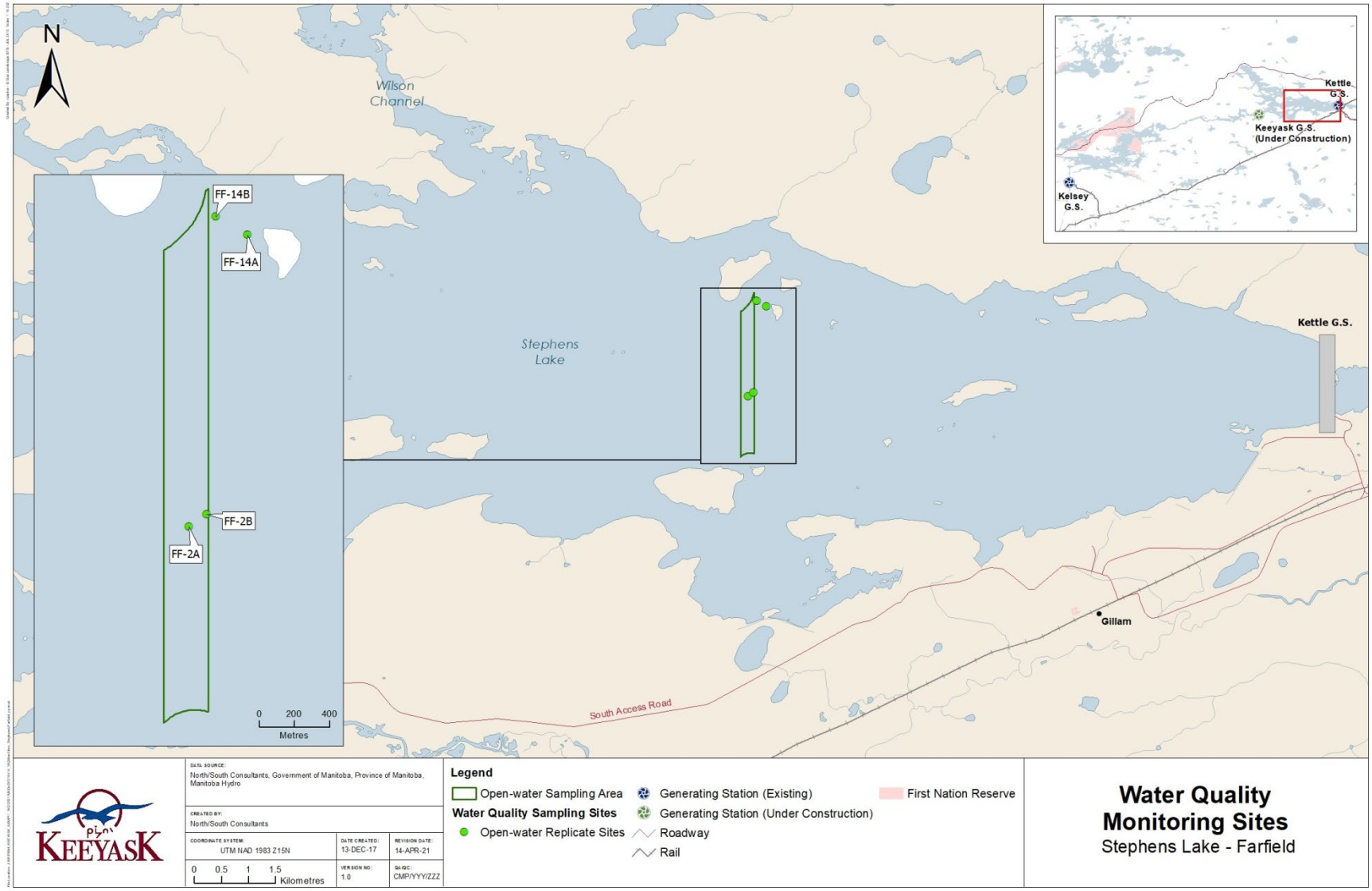
Map 4: Water quality sampling locations in Clark Lake during open-water 2020.



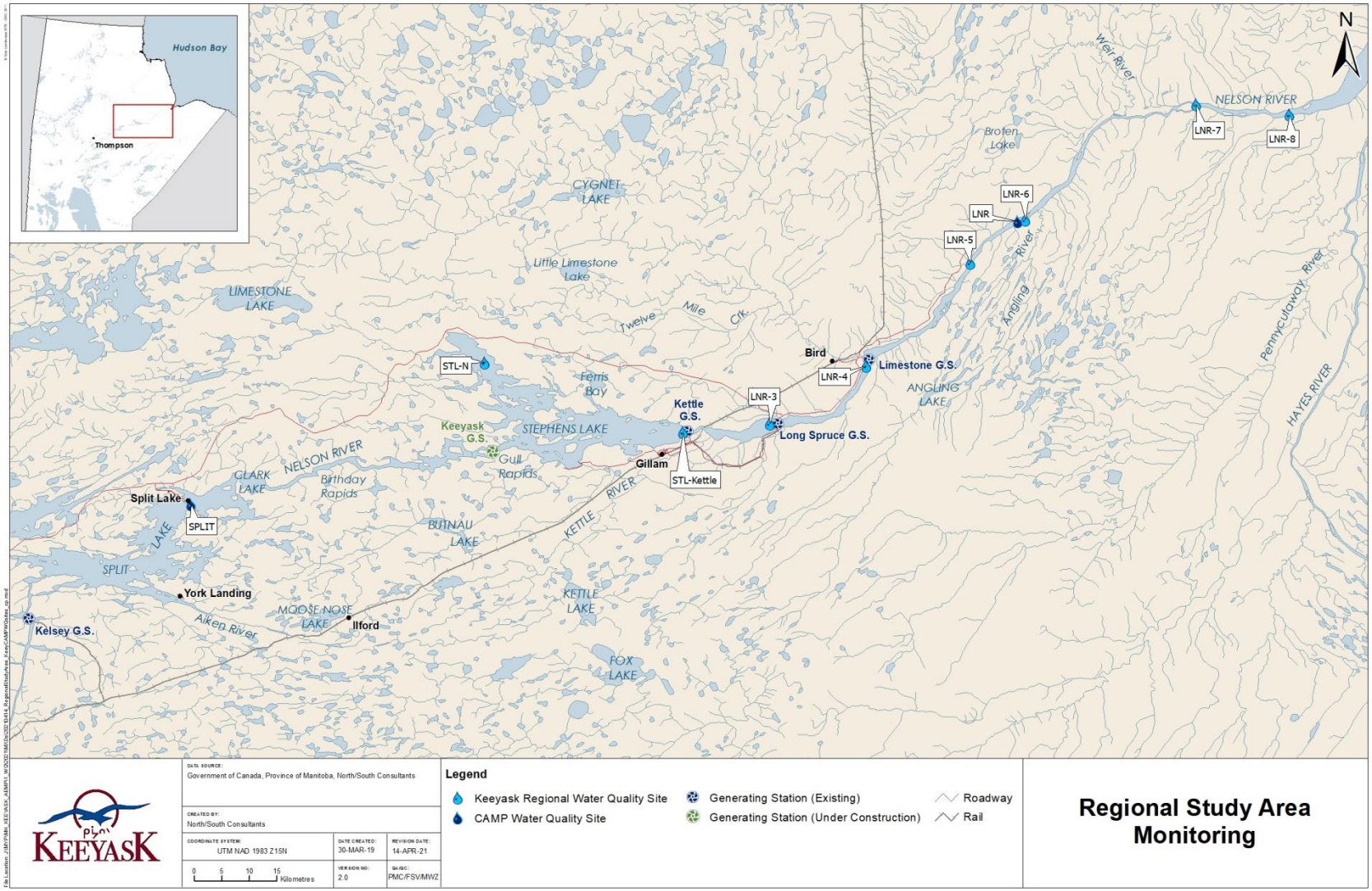
Map 5: Water quality sampling locations in the Nelson River upstream of the Keeyask GS during open-water 2020.



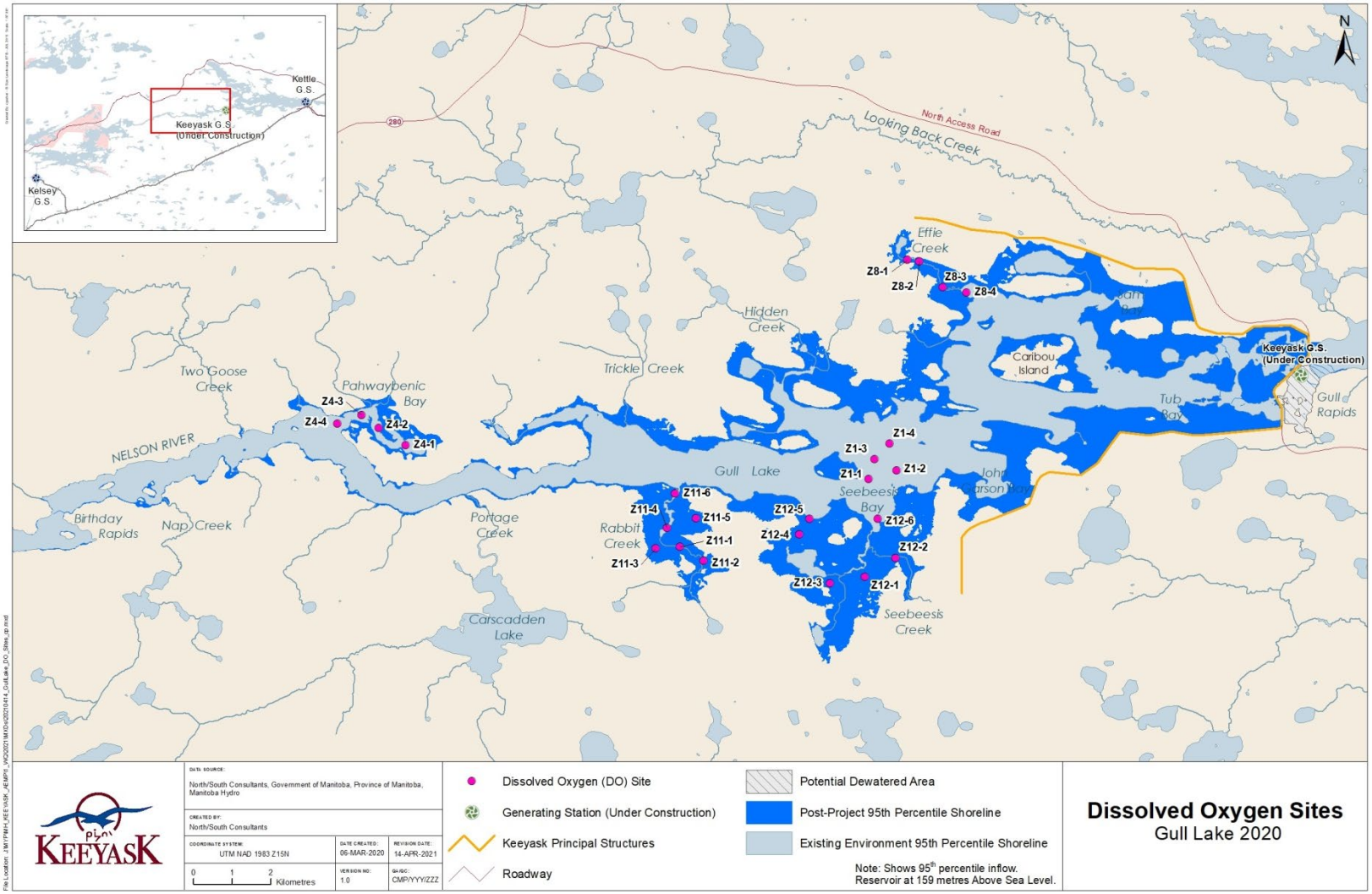
Map 6: Water quality sampling locations in the near-field sampling area of Stephens Lake during open-water 2020.



Map 7: Water quality sampling locations in the far-field sampling area of Stephens Lake during open-water 2020.



Map 8: Water quality sampling locations monitored in the regional study area under CAMP (source: CAMP 2020) and Keeyask.



Map 9: Locations sampled in the Keeyask reservoir during a post-impoundment DO monitoring survey, September 2020. Dark blue shading represents estimated flooded area of the reservoir.

APPENDICES

APPENDIX 1:
RESULTS OF WATER QUALITY MONITORING, 2020

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect.

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth (m)	Sample Depth (m)	Temperature (°C)	pH (pH units)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Specific Conductance (µS/cm)	Turbidity (NTU)	Secchi Depth (m)
Clark Lake #1	CL-1A	20-Jun-20	13:00	11.0	0.3	11.25	7.93	10.57	96.5	246.6	18.58	0.55
					1.0	11.29	7.98	10.55	96.3	254.7	19.12	
					2.0	11.28	7.96	10.54	96.3	254.9	19.32	
					3.0	11.28	7.94	10.53	96.1	255.2	19.11	
					4.0	11.27	7.89	10.51	96.0	252.0	19.37	
					5.0	11.27	7.85	10.50	95.9	255.4	19.01	
					6.0	11.27	7.85	10.50	95.9	255.4	18.97	
					7.0	11.26	7.85	10.48	95.7	255.6	19.30	
					8.0	11.26	7.80	10.47	95.6	255.6	20.20	
Nelson River Upstream #15A	US-15A	20-Jun-20	17:10	11.3	0.3	11.20	7.74	10.61	96.7	251.3	18.39	
					1.0	11.15	7.73	10.62	96.7	251.1	18.83	
					2.0	11.13	7.74	10.60	96.5	251.2	18.65	
					3.0	11.13	7.74	10.59	96.4	251.1	19.28	
					4.0	11.13	7.75	10.59	96.3	251.1	18.84	
					5.0	11.13	7.74	10.58	96.3	251.1	18.46	
					6.0	11.12	7.75	10.58	96.2	250.8	18.64	
					7.0	11.12	7.77	10.57	96.0	250.8	18.23	
					8.0	11.11	7.77	10.56	96.1	250.7	18.92	
					9.0	11.11	7.76	10.55	96.0	250.8	18.83	
					10.0	11.11	7.78	10.54	95.9	250.8	18.43	
Stephens Lake - Near-field #1A	NF-1A	20-Jun-20	14:30	20.1	0.3	11.19	7.63	11.87	108.2	248.5	20.33	0.53
					1.0	11.22	7.71	11.88	108.3	248.5	20.03	
					2.0	11.14	7.74	11.87	108.1	248.4	20.57	
					3.0	11.18	7.75	11.85	108.0	248.4	20.94	
					4.0	11.07	7.72	11.85	107.7	248.6	20.30	
					5.0	11.14	7.70	11.84	107.8	248.5	19.65	
					6.0	11.06	7.74	11.84	107.6	248.5	20.53	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth (m)	Sample Depth (m)	Temperature (°C)	pH (pH units)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Specific Conductance (µS/cm)	Turbidity (NTU)	Secchi Depth (m)
Stephens Lake - Near-field #1A	NF-1A	20-Jun-20	14:30	20.1	7.0	11.09	7.74	11.82	107.4	248.6	20.40	
					8.0	11.05	7.75	11.82	107.3	248.7	19.97	
					9.0	11.04	7.75	11.81	107.2	248.6	20.23	
					10.0	11.05	7.75	11.80	107.2	248.6	20.28	
					11.0	11.04	7.76	11.79	107.0	248.9	20.10	
					12.0	11.04	7.75	11.78	107.0	248.9	20.66	
					13.0	11.04	7.74	11.76	106.9	248.8	20.77	
					14.0	11.04	7.75	11.75	106.7	248.9	21.38	
					15.0	11.04	7.75	11.74	106.6	248.9	20.11	
					16.0	11.04	7.74	11.73	106.5	248.9	21.55	
					17.0	11.04	7.75	11.72	106.4	248.9	21.15	
Stephens Lake - Near-field #2A	NF-2A	20-Jun-20	15:15	12.2	0.3	11.25	7.75	11.60	105.9	249.0	21.18	0.475
					1.0	11.25	7.77	11.60	105.8	249.1	21.15	
					2.0	11.22	7.72	11.62	106.0	249.1	21.01	
					3.0	11.20	7.72	11.62	105.9	249.1	20.47	
					4.0	11.17	7.74	11.59	105.6	249.1	21.61	
					5.0	11.14	7.75	11.58	105.4	249.1	21.25	
					6.0	11.13	7.74	11.56	105.2	249.1	22.10	
					7.0	11.13	7.74	11.55	105.1	249.0	22.25	
					8.0	11.13	7.75	11.55	105.1	249.1	21.15	
					9.0	11.13	7.76	11.53	104.9	249.1	22.19	
					10.0	11.12	7.75	11.51	104.8	249.1	22.02	
					11.0	11.12	7.73	11.51	104.7	249.1	25.16	
Stephens Lake - Far-field #2A	FF-2A	20-Jun-20	16:00	17.5	0.3	11.84	7.78	11.10	102.7	251.3	17.99	0.55
					1.0	11.76	7.82	11.09	102.4	251.3	18.30	
					2.0	11.75	7.82	11.06	102.0	251.3	18.23	
					3.0	11.48	7.82	11.01	100.9	251.4	18.59	
					4.0	11.40	7.82	10.96	100.4	251.4	18.57	
					5.0	11.38	7.79	10.94	100.2	251.3	19.00	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Stephens Lake - Far-field #2A	FF-2A	20-Jun-20	16:00	17.5	6.0	11.37	7.78	10.94	100.1	251.2	18.50	
					7.0	11.34	7.78	10.93	100.0	251.2	18.73	
					8.0	11.33	7.78	10.92	99.8	251.2	19.56	
					9.0	11.31	7.75	10.91	99.7	251.0	19.53	
					10.0	11.30	7.74	10.90	99.6	251.1	19.49	
					11.0	11.28	7.75	10.89	99.5	251.1	18.02	
					12.0	11.28	7.79	10.88	99.3	251.0	18.39	
					13.0	11.28	7.75	10.88	99.4	251.0	18.07	
					14.0	11.27	7.78	10.86	99.2	251.1	19.20	
Clark Lake #1	CL-1A	22-Jul-20	8:10	9.5	0.3	19.92	6.88	8.94	98.2	241.3	26.26	0.425
					1.0	19.90	6.90	8.93	98.0	240.1	26.55	
					2.0	19.90	6.91	8.92	98.0	239.8	26.71	
					3.0	19.90	7.24	8.91	97.8	243.3	26.40	
					4.0	19.91	7.24	8.90	97.8	243.1	27.16	
					5.0	19.90	7.22	8.89	97.6	242.3	26.16	
					6.0	19.90	7.21	8.88	97.5	242.5	26.94	
					7.0	19.90	7.13	8.87	97.4	241.6	28.27	
					8.0	19.90	7.13	8.86	97.3	240.6	27.73	
					9.0	19.90	7.13	8.86	97.1	240.2	26.89	
Nelson River Upstream #3A	US-3A	22-Jul-20	9:35	11.0	0.3	19.93	6.45	8.81	96.8	243.1	25.43	0.425
					1.0	19.93	6.44	8.79	96.6	243.2	25.91	
					2.0	19.92	6.46	8.78	96.5	243.2	27.65	
					3.0	19.92	6.46	8.78	96.4	243.2	25.41	
					4.0	19.92	6.51	8.76	96.2	242.7	26.46	
					5.0	19.92	6.52	8.75	96.2	242.7	26.41	
					6.0	19.92	6.53	8.74	96.0	242.6	25.03	
					7.0	19.92	6.65	8.73	95.9	242.7	26.41	
					8.0	19.91	6.66	8.72	95.8	242.7	26.68	
					9.0	19.91	6.66	8.71	95.7	242.6	25.73	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Nelson River Upstream #3A	US-3A	22-Jul-20	9:35	11.0	10.0	19.91	6.64	8.70	95.6	242.8	26.11	
					11.0	19.91	6.76	8.69	95.4	242.6	27.10	
Stephens Lake - Near-field #1A	NF-1A	22-Jul-20	10:30	20.1	0.3	19.93	6.46	9.79	107.6	245.9	24.46	0.375
					1.0	19.92	6.46	9.78	107.4	245.9	24.49	
					2.0	19.92	6.47	9.76	107.2	246.0	24.62	
					3.0	19.91	6.68	9.75	107.1	246.1	25.51	
					4.0	19.91	6.70	9.74	106.9	246.2	22.74	
					5.0	19.91	6.70	9.73	106.8	246.2	24.39	
					6.0	19.88	6.72	9.70	106.5	246.2	24.02	
					7.0	19.88	6.72	9.60	106.4	246.1	24.51	
					8.0	19.87	6.72	9.67	106.2	246.1	24.49	
					9.0	19.87	6.74	9.67	106.1	246.1	24.12	
					10.0	19.86	6.74	9.66	106.0	246.0	25.42	
					11.0	19.85	6.76	9.65	105.9	245.9	24.35	
					12.0	19.83	6.79	9.64	105.7	245.8	24.07	
					13.0	19.84	6.78	9.63	105.7	245.7	23.97	
					14.0	19.84	6.77	9.62	105.5	245.8	23.74	
					15.0	19.82	6.77	9.59	105.2	246.0	24.49	
					16.0	19.82	6.78	9.59	105.2	246.0	25.91	
					17.0	18.83	6.78	9.60	105.2	245.9	24.26	
					18.0	18.81	7.19	9.54	105.5	246.2	25.58	
					19.0	19.78	7.22	9.47	103.8	246.4	25.78	
Stephens Lake - Near-field #2A	NF-2A	22-Jul-20	11:20	18.3	0.3	20.13	7.44	9.81	108.1	246.7	23.11	0.425
					1.0	19.89	7.41	9.73	106.9	246.9	26.11	
					2.0	19.87	7.38	9.71	106.5	247.1	26.36	
					3.0	19.87	7.35	9.70	106.4	247.1	24.31	
					4.0	19.85	7.42	9.68	106.2	247.3	23.50	
					5.0	19.85	7.41	9.67	106.1	247.1	23.90	
					6.0	19.86	7.40	9.66	106.0	247.1	23.81	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Stephens Lake - Near-field #2A	NF-2A	22-Jul-20	11:20	18.3	7.0	19.82	7.56	9.65	105.7	247.1	23.31	
					8.0	19.77	7.56	9.63	105.5	247.1	23.79	
					9.0	19.72	7.51	9.63	105.5	246.9	23.26	
					10.0	19.69	7.46	9.61	105.1	247.0	21.84	
					11.0	19.62	7.44	9.58	104.6	247.0	22.90	
					12.0	19.61	7.44	9.56	104.4	247.1	23.19	
					13.0	19.61	7.46	9.56	104.3	247.0	22.53	
					14.0	19.59	7.53	9.42	102.7	247.4	25.39	
					15.0	19.30	7.47	9.28	100.9	247.5	36.24	
Stephens Lake - Far-field #2A	FF-2A	22-Jul-20	12:15	14.5	0.3	20.40	8.04	10.08	111.9	245.5	22.29	0.425
					1.0	19.90	7.93	9.83	107.7	245.5	23.19	
					2.0	19.69	7.86	9.73	106.5	245.5	23.49	
					3.0	19.57	7.82	9.65	105.1	245.3	20.68	
					4.0	19.51	7.76	9.61	104.7	245.5	21.60	
					5.0	19.49	7.72	9.59	104.5	245.4	21.89	
					6.0	19.49	7.70	9.58	104.4	245.6	21.67	
					7.0	19.51	7.71	9.58	104.4	245.6	21.23	
					8.0	19.49	7.67	9.57	104.3	245.5	21.44	
					9.0	19.52	7.67	9.56	104.2	245.6	21.79	
					10.0	19.51	7.64	9.55	104.1	245.6	21.64	
					11.0	19.51	7.60	9.55	104.0	245.5	21.31	
					12.0	19.50	7.52	9.53	103.9	245.6	22.54	
					13.0	19.52	7.49	9.53	103.9	245.6	23.21	
					14.0	19.52	7.47	9.52	103.5	245.6	22.00	
Clark Lake #1	CL-1A	18-Aug-20	8:50	10.1	0.3	19.23	7.63	8.71	94.4	231.5	24.86	0.45
					1.0	19.25	7.62	8.69	94.2	231.2	24.85	
					2.0	19.25	7.61	8.68	94.1	231.3	24.51	
					3.0	19.26	7.60	8.67	94.0	233.0	24.58	
					4.0	19.27	7.59	8.65	93.8	234.7	24.62	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Clark Lake #1	CL-1A	18-Aug-20	8:50	10.1	5.0	19.26	7.58	8.65	93.8	234.6	24.82	
					6.0	19.27	7.58	8.63	93.6	234.6	24.22	
					7.0	19.27	7.57	8.63	93.5	235.1	24.88	
					8.0	19.24	7.57	8.61	93.4	235.1	24.72	
					9.0	19.27	7.56	8.61	93.3	235.0	28.24	
Nelson River Upstream #3A	US-3A	18-Aug-20	10:25	11.2	0.3	19.23	7.71	8.65	93.7	237.0	23.77	0.45
					1.0	19.23	7.71	8.64	93.6	237.1	24.77	
					2.0	19.24	7.72	8.63	93.5	237.1	24.20	
					2.9	19.24	7.71	8.61	93.3	237.0	24.75	
					4.0	19.24	7.69	8.60	93.2	237.1	27.59	
					5.0	19.24	7.70	8.59	93.1	236.9	25.54	
					6.0	19.24	7.70	8.58	93.0	236.9	27.54	
					7.0	19.24	7.66	8.57	92.9	237.1	25.01	
					8.0	19.24	7.73	8.56	92.8	237.1	25.09	
					8.9	19.24	7.73	8.56	92.7	236.9	25.03	
					10.0	19.24	7.73	8.55	92.6	237.0	24.41	
Stephens Lake - Near-field #1A	NF-1A	18-Aug-20	11:28	18.2	0.3	19.80	7.82	9.83	107.6	238.8	24.12	0.45
					1.0	19.46	7.83	9.81	106.8	238.7	24.15	
					2.0	19.40	-	9.78	106.3	238.8	24.62	
					3.0	19.40	7.79	9.77	106.2	238.7	23.61	
					4.0	19.40	7.78	9.76	106.1	238.6	25.09	
					5.0	19.40	7.77	9.75	106.0	238.7	24.85	
					6.0	19.40	7.77	9.74	105.9	238.7	24.18	
					7.0	19.40	7.77	9.73	105.8	238.9	27.74	
					8.0	19.39	7.77	9.72	105.7	239.0	26.05	
					9.0	19.38	7.78	9.69	105.3	239.0	24.15	
					10.0	19.38	7.74	9.67	105.1	239.1	25.41	
					11.0	19.38	7.76	9.66	105.0	239.0	24.99	
					12.0	19.38	7.76	9.64	104.7	239.3	25.09	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Stephens Lake - Near-field #1A	NF-1A	18-Aug-20	11:28	18.2	13.0	19.38	7.75	9.64	104.7	239.0	27.51	
					14.0	19.38	7.74	9.63	104.7	239.0	28.62	
					15.0	19.38	7.72	9.62	104.6	239.0	24.98	
					16.0	19.37	7.72	9.60	104.3	239.2	24.98	
					17.0	19.38	7.75	9.58	104.1	239.3	25.58	
Stephens Lake - Near-field #2A	NF-2A	18-Aug-20	12:17	11.1	0.3	19.91	7.86	9.76	107.0	240.9	23.61	0.45
					1.0	19.45	7.83	9.72	105.9	240.4	23.99	
					2.0	19.43	7.77	9.70	105.6	240.4	23.13	
					3.0	19.43	7.81	9.69	105.4	240.4	25.43	
					4.0	19.43	-	9.68	105.3	240.4	23.35	
					5.0	19.43	7.78	9.67	105.2	240.4	24.41	
					6.0	19.43	7.77	9.66	105.1	240.6	23.78	
					7.0	19.43	7.80	9.65	105.0	240.5	23.50	
Stephens Lake - Far-field #2A	FF-2A	18-Aug-20	13:25	17.6	0.3	20.54	7.94	9.58	106.5	241.3	21.75	0.45
					1.0	20.39	7.95	9.51	105.4	241.6	20.90	
					2.0	19.60	7.92	9.16	100.0	241.7	22.29	
					3.0	19.58	7.88	9.13	99.7	241.4	22.22	
					4.0	19.58	7.81	9.10	99.3	241.5	21.95	
					5.0	19.58	7.79	9.09	99.2	241.5	23.23	
					6.0	19.58	7.78	9.07	99.0	241.5	22.86	
					7.0	19.58	7.78	9.07	98.9	241.5	23.34	
					8.0	19.58	7.78	9.06	98.9	241.5	21.98	
					9.0	19.57	7.80	9.04	98.6	241.7	22.85	
					10.0	19.57	7.79	9.03	98.5	241.7	21.17	
					11.0	19.55	7.80	9.01	98.3	241.7	22.35	
					12.0	19.55	7.79	9.00	98.2	241.7	22.55	
					13.0	19.55	7.75	9.00	98.2	241.6	21.91	
					14.0	19.55	7.79	8.99	98.0	241.6	21.78	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Clark Lake #1	CL-1A	14-Sep-20	12:05	12.6	0.3	11.71	8.43	10.37	95.6	243.0	18.5	0.60
					1.0	11.70	8.43	10.36	95.6	243.0	19.3	
					2.0	11.71	8.42	10.35	95.5	242.0	21.2	
					3.0	11.71	8.40	10.34	95.4	242.0	19.0	
					4.0	11.71	8.41	10.33	95.3	242.0	20.1	
					5.0	11.71	8.41	10.32	95.2	240.0	18.7	
					6.0	11.71	8.41	10.32	95.2	241.0	21.0	
					7.0	11.71	8.40	10.30	95.0	240.0	20.4	
					8.0	11.71	8.40	10.30	95.0	241.0	19.1	
					9.0	11.71	8.40	10.29	94.9	240.0	21.2	
					10.0	11.71	8.40	10.28	94.9	240.0	19.1	
					11.0	11.71	8.40	10.27	94.8	240.0	22.1	
Nelson River Upstream #1	US-1	17-Sep-20	9:27	25.7	0.3	9.81	8.30	10.76	95.0	238.9	*38.67*	0.35
					1.0	9.82	8.38	10.75	94.8	239.1	*38.79*	
					2.0	9.82	8.39	10.74	94.8	238.9	*38.94*	
					3.0	9.82	8.39	10.72	94.7	239.0	*39.74*	
					4.0	9.82	8.39	10.72	94.6	239.1	*39.08*	
					5.0	9.82	8.38	10.70	94.5	239.2	*39.44*	
					6.0	9.83	8.38	10.69	94.4	239.1	*39.77*	
					7.0	9.83	8.38	10.68	94.3	239.2	*39.70*	
					8.0	9.84	8.38	10.68	94.3	239.2	*40.17*	
					9.0	9.84	8.37	10.66	94.1	239.2	*40.45*	
					10.0	9.84	8.37	10.65	94.0	239.2	*39.74*	
					11.0	9.83	8.37	10.64	94.0	239.3	*40.95*	
					12.0	9.84	8.36	10.62	93.8	239.3	*43.46*	
					13.0	9.84	8.36	10.62	93.8	239.1	*41.70*	
					14.0	9.84	8.36	10.61	93.7	239.3	*42.01*	
					15.0	9.84	8.35	10.60	93.6	239.2	*41.53*	
					16.0	9.84	8.35	10.59	93.5	239.3	*41.91*	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Nelson River Upstream #1	US-1	17-Sep-20	9:27	25.7	17.0	9.84	8.35	10.57	93.4	239.2	*41.52*	
					18.0	9.84	8.36	10.57	93.4	239.3	*32.22*	
					19.0	9.84	8.36	10.57	93.4	239.3	*32.26*	
Nelson River Upstream #2	US-2	17-Sep-20	10:35	13.1	0.3	9.86	8.39	10.77	95.2	239.2	*29.81*	0.35
					1.0	9.87	8.38	10.77	95.2	239.1	*36.07*	
					2.0	9.87	8.39	10.76	95.1	239.2	*36.65*	
					3.0	9.89	8.39	10.76	95.1	239.2	*37.04*	
					4.0	9.88	8.38	10.75	95.0	239.1	*36.58*	
					5.0	9.89	8.39	10.75	95.0	239.2	*37.38*	
					6.0	9.89	8.39	10.73	94.9	239.2	*40.35*	
					7.0	9.89	8.39	10.73	94.8	239.2	*37.53*	
					8.0	9.89	8.39	10.72	94.8	239.2	*37.71*	
					9.0	9.90	8.39	10.79	94.7	239.2	*37.71*	
					10.0	9.89	8.37	10.69	94.6	239.2	*36.73*	
					11.0	9.89	8.38	10.68	94.5	239.3	*36.04*	
					12.0	9.89	8.37	10.68	94.4	239.4	*36.17*	
Nelson River Upstream #3	US-3	17-Sep-20	11:12	14.4	0.3	9.90	8.36	10.78	95.4	240.2	*34.07*	0.35
					1.0	9.89	8.35	10.77	95.2	240.0	*36.48*	
					2.0	9.88	8.35	10.76	95.1	240.1	*36.71*	
					3.0	9.89	8.34	10.74	95.0	240.3	*36.47*	
					4.0	9.89	8.33	10.73	94.8	240.2	*36.51*	
					5.0	9.87	8.33	10.72	94.8	240.0	*36.45*	
					6.0	9.88	8.33	10.71	94.7	240.1	*36.52*	
					7.0	9.87	8.33	10.70	94.5	239.0	*36.35*	
					8.0	9.86	8.33	10.69	94.5	239.9	*36.30*	
					9.0	9.85	8.33	10.68	94.3	239.9	*36.67*	
					10.0	9.84	8.32	10.67	94.3	239.9	*36.06*	
					11.0	9.84	8.32	10.66	94.2	239.8	*36.30*	
					12.0	9.85	8.31	10.65	94.1	239.8	*36.26*	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Nelson River Upstream #4	US-4	17-Sep-20	11:58	16.6	0.3	9.82	8.36	10.79	95.3	239.2	*31.25*	0.35
					1.0	9.83	8.36	10.78	95.2	239.4	*31.98*	
					2.0	9.83	8.35	10.77	95.0	239.5	*31.79*	
					3.0	9.81	8.35	10.76	95.0	239.4	*32.20*	
					4.0	9.81	8.33	10.75	94.9	239.3	*32.22*	
					5.0	9.81	8.32	10.74	94.8	239.3	*31.88*	
					6.0	9.79	8.32	10.73	94.7	239.1	*32.23*	
					7.0	9.79	8.29	10.81	96.5	238.9	*36.78*	
					8.0	9.80	8.29	10.72	94.6	239.2	*36.73*	
					9.0	9.80	8.29	10.71	94.5	239.2	*36.95*	
					10.0	9.79	8.28	10.69	94.3	239.2	*37.09*	
					11.0	9.79	8.28	10.68	94.3	239.3	*37.21*	
					12.0	9.48	8.27	10.67	94.1	239.2	*37.21*	
					13.0	9.78	8.27	10.67	94.1	239.1	*37.16*	
					14.0	9.79	8.28	10.66	94.0	239.2	*37.10*	
					15.0	9.79	8.27	10.65	94.0	239.2	*37.14*	
Nelson River Upstream #5	US-5	17-Sep-20	12:22	15.4	0.3	9.84	8.33	10.80	95.4	238.9	*29.28*	0.35
					1.0	9.88	8.33	10.80	95.5	238.5	*29.69*	
					2.0	9.88	8.34	10.79	95.4	238.4	*29.11*	
					3.0	9.89	8.35	10.78	95.3	238.4	*29.07*	
					4.0	9.87	8.34	10.77	95.2	238.5	*29.16*	
					5.0	9.89	8.35	10.76	95.1	238.3	*30.01*	
					6.0	9.89	8.35	10.75	95.0	238.4	*30.68*	
					7.0	9.89	8.35	10.74	95.0	238.3	*31.20*	
					8.0	9.88	8.35	10.73	94.9	238.4	*31.52*	
					9.0	9.87	8.35	10.72	94.8	238.5	*31.63*	
					10.0	9.88	8.35	10.71	94.7	238.5	*31.95*	
					11.0	9.88	8.34	10.70	94.6	238.5	*31.84*	
					12.0	9.88	8.34	10.69	94.5	238.4	*31.57*	

Table A1-1: *In situ* parameters measured in the Keeyask local study area during open-water 2020. Values in blue italics are considered suspect (continued).

Sample Location	Site ID	Sample Date	Sample Time	Total Water Depth	Sample Depth	Temperature	pH	Dissolved Oxygen		Specific Conductance	Turbidity	Secchi Depth
				(m)	(m)	(°C)	(pH units)	(mg/L)	(% Saturation)	(µS/cm)	(NTU)	(m)
Stephens Lake - Near-field #1A	NF-1A	12-Sep-20	12:35	18.3	0.3	12.01	7.97	11.75	109.2	241.0	17.78	0.55
					1.0	12.01	7.98	11.68	108.3	240.9	18.75	
					2.0	12.06	7.96	11.72	108.9	241.0	18.12	
					3.0	12.01	8.00	11.73	108.9	241.1	18.48	
					4.0	12.02	8.01	11.73	109.0	241.1	18.46	
					5.0	12.01	8.03	11.71	108.7	241.1	18.00	
					6.0	12.00	8.04	11.69	108.6	241.3	18.35	
					7.0	12.00	8.04	11.68	108.4	241.3	18.63	
					8.0	12.00	8.04	11.62	107.9	241.0	18.34	
					9.0	12.00	8.11	11.66	108.3	241.2	18.21	
Stephens Lake - Near-field #2A	NF-2A	12-Sep-20	13:25	9.8	0.3	11.94	8.11	11.32	105.0	241.1	18.26	0.55
					1.0	11.94	8.11	11.34	105.1	241.3	18.14	
					2.0	11.95	8.10	11.34	105.1	241.3	18.69	
					3.0	11.95	8.10	11.34	105.1	241.4	18.08	
					4.0	11.94	8.09	11.33	105.0	241.3	18.11	
					5.0	11.94	8.09	11.31	104.9	241.4	18.01	
					6.0	11.93	8.08	11.28	104.5	241.1	17.86	
					7.0	11.93	8.08	11.26	104.4	241.1	18.14	
					8.0	11.92	8.08	11.22	104.0	241.0	18.23	
Stephens Lake - Far-field #14A	FF-14A	14-Sep-20	10:55	7.7	0.3	11.22	8.37	10.91	99.5	242.0	18.59	0.45
					1.0	11.22	8.37	10.91	99.6	242.0	18.84	
					2.0	11.23	8.38	10.90	99.5	242.0	19.01	
					3.0	11.23	8.38	10.90	99.4	242.0	18.60	

Table A1-2: Routine water chemistry parameters measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020.

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Alkalinity				Nitrogen						Phosphorus	
					Total (CaCO3) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Hydroxide (OH) (mg/L)	Ammonia (mg/L N)	Nitrate/ nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total N[1] (mg/L)	Dissolved P (mg/L)	Total P (mg/L)
Detection Limit 2020					**1.0**	**1.2**	**0.60**	**0.34**	**0.010**	**0.0051**	**0.0050**	**0.0010**	**0.20**		**0.0010**	**0.0010**
Clark Lake #1A	CL-1A	L2463816-1	20-Jun-20	13:00	91.8	112	<0.60	<0.34	0.120	0.0064	0.0064	<0.0010	0.47	0.48	0.0167	0.0371
Clark Lake #1B	CL-1B	L2463816-2	20-Jun-20	13:15	93.6	114	<0.60	<0.34	0.105	<0.0051	<0.0050	<0.0010	0.4	0.40	0.0136	0.0358
Nelson River Upstream #15A	US-3A	L2463816-3	20-Jun-20	17:10	92.8	113	<0.60	<0.34	0.029	<0.0051	<0.0050	<0.0010	0.39	0.39	0.0147	0.0359
Nelson River Upstream #15B	US-3B	L2463816-4	20-Jun-20	17:20	91.8	112	<0.60	<0.34	0.070	<0.0051	<0.0050	<0.0010	0.42	0.42	0.0235*	0.0354
Stephens Lake - Near-field #1A	NF-1A	L2463816-5	20-Jun-20	14:30	92.2	112	<0.60	<0.34	0.133*	0.0085	0.0085	<0.0010	0.47	0.48	0.0141	0.0354
Stephens Lake - Near-field #1B	NF-1B	L2463816-6	20-Jun-20	14:45	91.8	112	<0.60	<0.34	0.019*	0.0059	0.0059	<0.0010	0.42	0.43	0.0137	0.0347
Stephens Lake - Near-field #2A	NF-2A	L2463816-7	20-Jun-20	15:15	91.6	112	<0.60	<0.34	0.042	0.0184	0.0184	<0.0010	0.32	0.34	0.0165	0.0362
Stephens Lake - Near-field #2A	NF-2B	L2463816-8	20-Jun-20	15:30	91.1	111	<0.60	<0.34	0.101	<0.0051	<0.0050	<0.0010	0.49	0.49	0.0136	0.0350
Stephens Lake - Far-field #2A	FF-2A	L2463816-9	20-Jun-20	16:00	93.5	114	<0.60	<0.34	0.060	<0.0051	<0.0050	<0.0010	0.42	0.42	0.013	0.0321
Stephens Lake - Far-field #2B	FF-2B	L2463816-10	20-Jun-20	16:10	93.1	114	<0.60	<0.34	0.043	0.0077	0.0077	<0.0010	0.39	0.40	0.0134	0.0307
Clark Lake #1A	CL-1A	L2478617-1	22-Jul-20	8:10	90.6	111	<0.60	<0.34	<0.010	0.0217	0.0217	<0.0010	0.47	0.49	0.0248	0.0503
Clark Lake #1B	CL-1B	L2478617-2	22-Jul-20	8:20	90.1	110	<0.60	<0.34	0.022	0.0270	0.0270	<0.0010	0.44	0.47	0.0249	0.0502
Nelson River Upstream #3A	US-3A	L2478617-3	22-Jul-20	9:35	90.9	111	<0.60	<0.34	0.026	0.0260	0.0260	<0.0010	0.45	0.48	0.0255	0.0502
Nelson River Upstream #3B	US-3B	L2478617-4	22-Jul-20	9:45	91.3	111	<0.60	<0.34	0.072	0.0237	0.0237	<0.0010	0.6	0.62	0.0251	0.0454
Stephens Lake - Near-field #1A	NF-1A	L2478617-5	22-Jul-20	10:30	90.7	111	<0.60	<0.34	0.171*	0.0220	0.0220	<0.0010	0.66	0.68	0.0238	0.0532
Stephens Lake - Near-field #1B	NF-1B	L2478617-6	22-Jul-20	10:49	92.0	112	<0.60	<0.34	0.112*	0.0238	0.0227	0.0011	0.59	0.61	0.0253	0.0448
Stephens Lake - Near-field #2A	NF-2A	L2478617-7	22-Jul-20	11:20	91.5	112	<0.60	<0.34	0.040	0.0219	0.0219	<0.0010	0.49	0.51	0.0245	0.0482
Stephens Lake - Near-field #2A	NF-2B	L2478617-8	22-Jul-20	11:30	91.6	112	<0.60	<0.34	0.017	0.0217	0.0217	<0.0010	0.46	0.48	0.0218	0.0465
Stephens Lake - Far-field #2A	FF-2A	L2478617-9	22-Jul-20	12:15	92.9	113	<0.60	<0.34	0.015	0.0097	0.0097	<0.0010	0.6	0.61	0.0218	0.0480
Stephens Lake - Far-field #2B	FF-2B	L2478617-10	22-Jul-20	12:25	93.1	114	<0.60	<0.34	0.044	0.0107	0.0107	<0.0010	0.55	0.56	0.0212	0.0507
Clark Lake #1A	CL-1A	L2490762-1	18-Aug-20	8:50	86.1	105	<0.60	<0.34	0.046	0.0619	0.0551	0.0068	0.55	0.61	0.0356	0.0566
Clark Lake #1B	CL-1B	L2490762-2	18-Aug-20	9:00	86.4	105	<0.60	<0.34	0.022	0.0628	0.0553	0.0075	0.51	0.57	0.0386	0.0560
Nelson River Upstream #3A	US-3A	L2490762-3	18-Aug-20	10:25	86.9	106	<0.60	<0.34	0.040	0.0679	0.0606	0.0073	0.63	0.69	0.0387	0.0583
Nelson River Upstream #3B	US-3B	L2490762-4	18-Aug-20	10:35	87.9	107	<0.60	<0.34	0.053	0.0688	0.0613	0.0076	0.57	0.63	0.0345	0.0586
Stephens Lake - Near-field #1A	NF-1A	L2490762-5	18-Aug-20	11:28	88.0	107	<0.60	<0.34	0.025	0.0680	0.0615	0.0065	0.59	0.65	0.039	0.0585
Stephens Lake - Near-field #1B	NF-1B	L2490762-6	18-Aug-20	11:38	87.9	107	<0.60	<0.34	0.015	0.0644	0.0576	0.0068	0.5	0.56	0.0346	0.0596
Stephens Lake - Near-field #2A	NF-2A	L2490762-7	18-Aug-20	12:17	87.5	107	<0.60	<0.34	0.064	0.0909[2]	0.0846[2]	0.0063	0.55	0.63	0.0358	0.0586
Stephens Lake - Near-field #2A	NF-2B	L2490762-8	18-Aug-20	12:27	88.3	108	<0.60	<0.34	0.036	0.0652[2]	0.0590[2]	0.0063	0.56	0.62	0.0369	0.0580
Stephens Lake - Far-field #2A	FF-2A	L2490762-9	18-Aug-20	13:25	88.2	108	<0.60	<0.34	0.012	0.0416	0.0377	0.0039	0.55	0.59	0.0385	0.0590
Stephens Lake - Far-field #2B	FF-2B	L2490762-10	18-Aug-20	13:35	87.9	107	<0.60	<0.34	0.038	0.0498	0.0453	0.0044	0.56	0.61	0.0362	0.0552

Table A1-2: Routine water chemistry parameters measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020 (continued).

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Alkalinity				Nitrogen						Phosphorus	
					Total (CaCO3) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Hydroxide (OH) (mg/L)	Ammonia (mg/L N)	Nitrate/ nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total N[1] (mg/L)	Dissolved P (mg/L)	Total P (mg/L)
Detection Limit 2020					**1.0**	**1.2**	**0.60**	**0.34**	**0.010**	**0.0051**	**0.0050**	**0.0010**	**0.20**		**0.0010**	**0.0010**
Clark Lake #1A	CL-1A	L2502898-1	14-Sep-20	12:05	90.9	111	<0.60	<0.34	0.018	0.0999	0.0955	0.0043	0.48	0.58	0.0276	0.0446
Clark Lake #1B	CL-1B	L2502898-2	14-Sep-20	12:15	90.0	110	<0.60	<0.34	0.029	0.1000	0.0951	0.0052	0.44	0.54	0.0285	0.0445
Nelson River Upstream #1	US-1	L2505309-1	17-Sep-20	9:27	91.4	112	<0.60	<0.34	0.011	0.0897	0.0870	0.0028	0.43	0.52	0.0268	0.0447
Nelson River Upstream #2	US-2	L2505309-2	17-Sep-20	10:35	92.6	113	<0.60	<0.34	0.015	0.0910	0.0877	0.0033	0.34	0.43	0.0276	0.0487
Nelson River Upstream #3	US-3, US-3B, US-3C	L2505309-3,-6,-7	17-Sep-20	11:12	92.4	113	<0.60	<0.34	0.012	0.0923	0.0892	0.0032	0.49	0.58	0.0275	0.0445
Nelson River Upstream #4	US-4	L2505309-4	17-Sep-20	11:58	92.2	112	<0.60	<0.34	0.010	0.0914	0.0882	0.0033	0.45	0.54	0.0268	0.0445
Nelson River Upstream #5	US-5	L2505309-5	17-Sep-20	12:22	92.9	113	<0.60	<0.34	0.011	0.0893	0.0861	0.0032	0.52	0.61	0.0268	0.0458
Stephens Lake - Near-field #1A	NF-1A	L2502461-1	12-Sep-20	12:35	87.9	107	<0.60	<0.34	0.017	0.1110	0.1060	0.0051	0.4	0.51	0.0278	0.0451
Stephens Lake - Near-field #1B	NF-1B	L2502461-2	12-Sep-20	12:45	89.1	109	<0.60	<0.34	0.015	0.1090	0.1040	0.0050	0.38	0.48	0.0275	0.0447
Stephens Lake - Near-field #2A	NF-2A	L2502461-3	12-Sep-20	13:25	88.4	108	<0.60	<0.34	0.014	0.1120	0.1070	0.0051	0.41	0.52	0.0287	0.0452
Stephens Lake - Near-field #2A	NF-2B	L2502461-4	12-Sep-20	13:35	88.5	108	<0.60	<0.34	0.015	0.1110	0.1060	0.0054	0.46	0.57	0.0284	0.0456
Stephens Lake - Far-field #14A	FF-2A	L2502898-3	14-Sep-20	10:55	91.7	112	<0.60	<0.34	<0.010	0.1080	0.1020	0.0059	0.44	0.54	0.0293	0.0450
Stephens Lake - Far-field #14B	FF-2B	L2502898-4	14-Sep-20	11:05	91.5	112	<0.60	<0.34	<0.010	0.1060	0.1010	0.0050	0.45	0.55	0.0278	0.0447

Table A1-2: Routine water chemistry parameters measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020 (continued).

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Carbon		Water Clarity			Lab pH	Laboratory Conductivity	Total Dissolved Solids	Productivity	
					Total Organic C	Dissolved Organic C	Total Suspended Solids	Turbidity	True Colour				Chlorophyll *a*	Phaeophytin *a*
					(mg/L)	(mg/L)	(mg/L)	(NTU)	(CU)		(µmhos/cm)	(mg/L)	(µg/L)	(µg/L)
Detection Limit 2020					**0.50**	**0.50**	**1.0**	**0.10**	**5.0**	**0.10**	**1.0**	**4.0**	**0.10**	**0.10**
Clark Lake #1A	CL-1A	L2463816-1	20-Jun-20	13:00	9.63	9.62	12.0	20.4	22.4	8.15	251	181	5.69	2.18
Clark Lake #1B	CL-1B	L2463816-2	20-Jun-20	13:15	9.46	9.93	11.4	20.2	21.4	8.13	257	173	5.39	2.20
Nelson River Upstream #15A	US-3A	L2463816-3	20-Jun-20	17:10	9.57	9.71	12.0	20.2	23.1	8.12	253	168	5.49	2.20
Nelson River Upstream #15B	US-3B	L2463816-4	20-Jun-20	17:20	9.53	9.57	11.9	20.5	23.3	8.12	253	174	5.97	2.42
Stephens Lake - Near-field #1A	NF-1A	L2463816-5	20-Jun-20	14:30	9.69	9.77	13.0	21.2	24.1	8.13	249	175	5.15	2.38
Stephens Lake - Near-field #1B	NF-1B	L2463816-6	20-Jun-20	14:45	9.43	9.82	13.1	22.0	24.5	8.12	250	176	5.42	3.50
Stephens Lake - Near-field #2A	NF-2A	L2463816-7	20-Jun-20	15:15	9.39	9.83	12.9	24.4	25.2	8.12	251	183	5.88	4.66
Stephens Lake - Near-field #2A	NF-2B	L2463816-8	20-Jun-20	15:30	9.57	9.75	12.0	22.6	26.6	8.13	252	176	5.66	4.82
Stephens Lake - Far-field #2A	FF-2A	L2463816-9	20-Jun-20	16:00	9.78	9.63	9.2	17.7	25.4	8.14	255	166	6.32	5.28
Stephens Lake - Far-field #2B	FF-2B	L2463816-10	20-Jun-20	16:10	9.53	9.77	9.4	19.6	22.3	8.10	255	169	6.43	5.61
Clark Lake #1A	CL-1A	L2478617-1	22-Jul-20	8:10	10.10	10.30	12.2	26.5	30.5	8.12	239	172	4.68	2.27
Clark Lake #1B	CL-1B	L2478617-2	22-Jul-20	8:20	9.84	10.70	12.7	25.0	24.1	8.07	244	170	4.58	2.43
Nelson River Upstream #3A	US-3A	L2478617-3	22-Jul-20	9:35	9.72	10.60	11.6	24.4	26.9	8.04	244	175	4.78	2.51
Nelson River Upstream #3B	US-3B	L2478617-4	22-Jul-20	9:45	9.92	11.00	11.0	24.7	27.8	8.07	244	179	3.74	1.55
Stephens Lake - Near-field #1A	NF-1A	L2478617-5	22-Jul-20	10:30	10.00	10.40	10.3	23.2	25.7	8.08	247	176	5.71	2.32
Stephens Lake - Near-field #1B	NF-1B	L2478617-6	22-Jul-20	10:49	9.86	11.00	9.7	20.8	26.9	8.11	247	175	5.61	2.28
Stephens Lake - Near-field #2A	NF-2A	L2478617-7	22-Jul-20	11:20	9.74	10.40	9.1	20.9	36.8[2]	8.10	245	166	6.80	2.32
Stephens Lake - Near-field #2A	NF-2B	L2478617-8	22-Jul-20	11:30	10.10	11.60	9.1	20.0	26.6[2]	8.09	246	177	6.95	2.46
Stephens Lake - Far-field #2A	FF-2A	L2478617-9	22-Jul-20	12:15	9.40	10.40	7.7	18.7	30.7	8.10	244	172	9.84	2.91
Stephens Lake - Far-field #2B	FF-2B	L2478617-10	22-Jul-20	12:25	9.73	10.50	8.0	19.3	27.1	8.10	243	171	10.20	2.52
Clark Lake #1A	CL-1A	L2490762-1	18-Aug-20	8:50	10.30	10.80	11.0	24.7	24.0	8.09	232	161	2.88	1.93
Clark Lake #1B	CL-1B	L2490762-2	18-Aug-20	9:00	10.40	10.80	11.1	26.0	24.0	8.12	234	164	2.64	1.82
Nelson River Upstream #3A	US-3A	L2490762-3	18-Aug-20	10:25	10.10	10.30	11.4	24.9	24.2	8.12	237	157	2.93	2.06
Nelson River Upstream #3B	US-3B	L2490762-4	18-Aug-20	10:35	10.10	10.40	11.2	25.3	29.1	8.12	238	164	2.97	2.05
Stephens Lake - Near-field #1A	NF-1A	L2490762-5	18-Aug-20	11:28	10.80	10.70	9.2	24.0	26.8	8.13	240	160	3.85	2.01
Stephens Lake - Near-field #1B	NF-1B	L2490762-6	18-Aug-20	11:38	10.40	10.40	8.3	23.1	25.3	8.13	239	164	4.13	2.00
Stephens Lake - Near-field #2A	NF-2A	L2490762-7	18-Aug-20	12:17	10.00	11.80	8.3	22.6	24.1	8.13	242	161	3.93	1.95
Stephens Lake - Near-field #2A	NF-2B	L2490762-8	18-Aug-20	12:27	10.30	10.30	8.0	22.5	25.5	8.13	241	162	3.83	1.87
Stephens Lake - Far-field #2A	FF-2A	L2490762-9	18-Aug-20	13:25	10.10	10.80	6.5	20.4	25.9	8.15	242	162	9.84	2.38
Stephens Lake - Far-field #2B	FF-2B	L2490762-10	18-Aug-20	13:35	10.30	10.40	6.7	19.5	26.7	8.15	243	163	9.68	2.03

Table A1-2: Routine water chemistry parameters measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020 (continued).

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Carbon		Water Clarity			Lab pH	Laboratory Conductivity	Total Dissolved Solids	Productivity	
					Total Organic C	Dissolved Organic C	Total Suspended Solids	Turbidity	True Colour				Chlorophyll *a*	Phaeophytin *a*
					(mg/L)	(mg/L)	(mg/L)	(NTU)	(CU)		(µmhos/cm)	(mg/L)	(µg/L)	(µg/L)
Detection Limit 2020					**0.50**	**0.50**	**1.0**	**0.10**	**5.0**	**0.10**	**1.0**	**4.0**	**0.10**	**0.10**
Clark Lake #1A	CL-1A	L2502898-1	14-Sep-20	12:05	9.11	9.20	8.7	18.6	24.5	8.11	241	167	2.51	1.77
Clark Lake #1B	CL-1B	L2502898-2	14-Sep-20	12:15	9.07	9.70	8.8	18.7	25.6	8.14	240	174	2.54	1.75
Nelson River Upstream #1	US-1	L2505309-1	17-Sep-20	9:27	9.83	9.92	8.7	18.0	25.4	8.14	238	135	2.45	1.74
Nelson River Upstream #2	US-2	L2505309-2	17-Sep-20	10:35	9.93	10.10	9.6	15.5	22.4	8.11	241	164	2.43	1.78
Nelson River Upstream #3	US-3, US-3B, US-3C	L2505309-3,-6,-7	17-Sep-20	11:12	9.58	9.75	9.3	15.8	22.7	8.14	239	155	2.41	1.56
Nelson River Upstream #4	US-4	L2505309-4	17-Sep-20	11:58	9.72	9.78	9.3	16.9	22.2	8.14	240	155	2.53	1.68
Nelson River Upstream #5	US-5	L2505309-5	17-Sep-20	12:22	9.47	10.20	9.2	16.2	22.7	8.13	237	152	2.60	1.77
Stephens Lake - Near-field #1A	NF-1A	L2502461-1	12-Sep-20	12:35	9.52	9.87	8.2	16.7	20.3	8.05	238	155	2.74	1.70
Stephens Lake - Near-field #1B	NF-1B	L2502461-2	12-Sep-20	12:45	9.22	9.58	8.5	17.0	23.8	8.05	236	141	2.58	1.78
Stephens Lake - Near-field #2A	NF-2A	L2502461-3	12-Sep-20	13:25	9.64	9.60	8.1	16.8	21.9	8.05	236	150	2.85	1.71
Stephens Lake - Near-field #2A	NF-2B	L2502461-4	12-Sep-20	13:35	9.46	9.73	7.7	17.0	22.3	8.06	236	153	2.57	1.46
Stephens Lake - Far-field #14A	FF-2A	L2502898-3	14-Sep-20	10:55	9.06	9.94	7.1	18.5	26.1	8.16	241	167	3.47	1.66
Stephens Lake - Far-field #14B	FF-2B	L2502898-4	14-Sep-20	11:05	9.26	9.27	7.7	18.5	22.8	8.16	240	171	3.13	1.57

* Result confirmed through laboratory reanalysis.

1. Total nitrogen calculated as the sum of total Kjeldahl nitrogen and nitrate/nitrite.
2. High relative percent mean difference between samples. Results checked past hold time and could not be rerun at the lab.

Table A1-3: Metals and major ions measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020.

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Strontium (mg/L)	Sulfate (mg/L)	Sulfur (mg/L)	Tellurium (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Tungsten (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)	Zirconium (mg/L)
Detection Limit 2020					**0.00020**	**0.30**	**0.50**	**0.00020**	**0.000010**	**0.00010**	**0.00010**	**0.00030**	**0.00010**	**0.000010**	**0.00050**	**0.0030**	**0.00020**
Clark Lake #1A	CL-1A	L2463816-1	20-Jun-20	13:00	0.0885	26.1	8.31	<0.00020	<0.000010	0.00018	<0.00010	0.0283	<0.00010	0.000519	0.00200	<0.0030	0.00060
Clark Lake #1B	CL-1B	L2463816-2	20-Jun-20	13:15	0.0789	27.0	8.47	<0.00020	<0.000010	0.00016	<0.00010	0.0288	<0.00010	0.000438	0.00209	<0.0030	0.00051
Nelson River Upstream #15A	US-3A	L2463816-3	20-Jun-20	17:10	0.0909	25.9	8.56	<0.00020	<0.000010	0.00019	<0.00010	0.0276	<0.00010	0.000537	0.00197	<0.0030	0.00067
Nelson River Upstream #15B	US-3B	L2463816-4	20-Jun-20	17:20	0.0733	26.5	8.31	<0.00020	<0.000010	0.00016	<0.00010	0.0286	<0.00010	0.000432	0.00204	<0.0030	0.00051
Stephens Lake - Near-field #1A	NF-1A	L2463816-5	20-Jun-20	14:30	0.0740	25.8	8.17	<0.00020	<0.000010	0.00018	<0.00010	0.0294	<0.00010	0.000439	0.00202	0.0030	0.00053
Stephens Lake - Near-field #1B	NF-1B	L2463816-6	20-Jun-20	14:45	0.0874	25.8	8.15	<0.00020	<0.000010	0.00019	<0.00010	0.0306	<0.00010	0.000517	0.00207	<0.0030	0.00069
Stephens Lake - Near-field #2A	NF-2A	L2463816-7	20-Jun-20	15:15	0.0877	25.9	8.30	<0.00020	<0.000010	0.00021	<0.00010	0.0283	<0.00010	0.000516	0.00200	<0.0030	0.00062
Stephens Lake - Near-field #2A	NF-2B	L2463816-8	20-Jun-20	15:30	0.0864	25.7	8.01	<0.00020	<0.000010	0.00018	<0.00010	0.0287	<0.00010	0.000522	0.00199	<0.0030	0.00060
Stephens Lake - Far-field #2A	FF-2A	L2463816-9	20-Jun-20	16:00	0.0962	25.9	8.32	<0.00020	0.000011	0.00021	<0.00010	0.0263	<0.00010	0.000573	0.00174	<0.0030	0.00062
Stephens Lake - Far-field #2B	FF-2B	L2463816-10	20-Jun-20	16:10	0.0967	25.9	8.11	<0.00020	<0.000010	0.00023	<0.00010	0.0238	<0.00010	0.000573	0.00165	<0.0030	0.00068
Clark Lake #1A	CL-1A	L2478617-1	22-Jul-20	8:10	0.0819	22.1	7.79	<0.00020	0.000013	0.00025	<0.00010	0.0377	<0.00010	0.000451	0.00267	0.0039	0.00075
Clark Lake #1B	CL-1B	L2478617-2	22-Jul-20	8:20	0.0808	22.9	7.72	<0.00020	0.000014	0.00027	<0.00010	0.0403	<0.00010	0.000460	0.00279	0.0048	0.00073
Nelson River Upstream #3A	US-3A	L2478617-3	22-Jul-20	9:35	0.0815	22.7	7.87	<0.00020	0.000013	0.00026	<0.00010	0.0401	<0.00010	0.000435	0.00277	0.0038	0.00073
Nelson River Upstream #3B	US-3B	L2478617-4	22-Jul-20	9:45	0.0831	22.5	7.74	<0.00020	0.000015	0.00025	<0.00010	0.0395	<0.00010	0.000451	0.00275	0.0037	0.00071
Stephens Lake - Near-field #1A	NF-1A	L2478617-5	22-Jul-20	10:30	0.0818	22.1	7.83	<0.00020	0.000011	0.00020	<0.00010	0.0308	<0.00010	0.000448	0.00247	0.0031	0.00066
Stephens Lake - Near-field #1B	NF-1B	L2478617-6	22-Jul-20	10:49	0.0812	22.7	7.93	<0.00020	0.000015	0.00025	<0.00010	0.0363	<0.00010	0.000460	0.00263	0.0036	0.00073
Stephens Lake - Near-field #2A	NF-2A	L2478617-7	22-Jul-20	11:20	0.0830	23.1	7.70	<0.00020	0.000011	0.00021	<0.00010	0.0327	<0.00010	0.000445	0.00243	0.0034	0.00066
Stephens Lake - Near-field #2A	NF-2B	L2478617-8	22-Jul-20	11:30	0.0823	22.8	8.10	<0.00020	0.000012	0.00023	<0.00010	0.0356	<0.00010	0.000457	0.00254	0.0032	0.00066
Stephens Lake - Far-field #2A	FF-2A	L2478617-9	22-Jul-20	12:15	0.0825	22.5	7.78	<0.00020	<0.000010	0.00020	<0.00010	0.0300	<0.00010	0.000449	0.00232	0.0037	0.00063
Stephens Lake - Far-field #2B	FF-2B	L2478617-10	22-Jul-20	12:25	0.0832	22.8	7.85	<0.00020	0.000012	0.00020	<0.00010	0.0314	<0.00010	0.000437	0.00236	0.0032	0.00069
Clark Lake #1A	CL-1A	L2490762-1	18-Aug-20	8:50	0.0748	24.0	8.23	0.00035	0.000014	0.00024	<0.00010	0.0391	<0.00010	0.000488	0.00296	0.0052	0.00079
Clark Lake #1B	CL-1B	L2490762-2	18-Aug-20	9:00	0.0735	24.6	8.31	0.00046	0.000014	0.00024	<0.00010	0.0381	<0.00010	0.000498	0.00300	0.0047	0.00077
Nelson River Upstream #3A	US-3A	L2490762-3	18-Aug-20	10:25	0.0759	25.2	8.35	0.00035	0.000013	0.00022	<0.00010	0.0372	<0.00010	0.000505	0.00301	0.0040	0.00071
Nelson River Upstream #3B	US-3B	L2490762-4	18-Aug-20	10:35	0.0765	25.2	8.21	0.00037	0.000013	0.00025	<0.00010	0.0392	<0.00010	0.000517	0.00303	0.0044	0.00080
Stephens Lake - Near-field #1A	NF-1A	L2490762-5	18-Aug-20	11:28	0.0768	25.4	8.57	0.00042	0.000014	0.00024	<0.00010	0.0373	<0.00010	0.000526	0.00293	0.0038	0.00083
Stephens Lake - Near-field #1B	NF-1B	L2490762-6	18-Aug-20	11:38	0.0764	25.5	8.52	0.00044	0.000014	0.00022	<0.00010	0.0348	<0.00010	0.000512	0.00287	0.0040	0.00075
Stephens Lake - Near-field #2A	NF-2A	L2490762-7	18-Aug-20	12:17	0.0767	25.9	8.46	0.00037	0.000012	0.00021	<0.00010	0.0319	<0.00010	0.000518	0.00279	0.0031	0.00073
Stephens Lake - Near-field #2A	NF-2B	L2490762-8	18-Aug-20	12:27	0.0774	25.8	8.51	0.00031	0.000012	0.00021	<0.00010	0.0347	<0.00010	0.000523	0.00288	0.0036	0.00073
Stephens Lake - Far-field #2A	FF-2A	L2490762-9	18-Aug-20	13:25	0.0785	25.7	8.38	0.00043	0.000011	0.00020	<0.00010	0.0304	<0.00010	0.000509	0.00274	0.0035	0.00069
Stephens Lake - Far-field #2B	FF-2B	L2490762-10	18-Aug-20	13:35	0.0781	25.7	8.36	0.00038	0.000011	0.00020	<0.00010	0.0305	<0.00010	0.000506	0.00269	0.0037	0.00068

Table A1-3: Metals and major ions measured in the laboratory for sites monitored in the Keeyask local study area during open-water 2020. Results in blue italics are considered suspect.

Sample Location	Site ID	ALS Sample ID	Sample Date	Sample Time	Strontium (mg/L)	Sulfate (mg/L)	Sulfur (mg/L)	Tellurium (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Tungsten (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)	Zirconium (mg/L)
Detection Limit 2020					**0.00020**	**0.30**	**0.50**	**0.00020**	**0.000010**	**0.00010**	**0.00010**	**0.00030**	**0.00010**	**0.000010**	**0.00050**	**0.0030**	**0.00020**
Clark Lake #1A	CL-1A	L2502898-1	14-Sep-20	12:05	0.0827	23.8	7.44	<0.00020	0.000011	0.00019	<0.00010	0.0271	<0.00010	0.000467	0.00231	<0.0030	0.00065
Clark Lake #1B	CL-1B	L2502898-2	14-Sep-20	12:15	0.0807	23.6	7.47	<0.00020	0.000010	0.00020	<0.00010	0.0298	<0.00010	0.000481	0.00239	<0.0030	0.00069
Nelson River Upstream #1	US-1	L2505309-1	17-Sep-20	9:27	0.0778	21.6	7.90	<0.00020	0.000011	0.00020	<0.00010	0.0310	<0.00010	0.000493	0.00229	<0.0030	0.00066
Nelson River Upstream #2	US-2	L2505309-2	17-Sep-20	10:35	0.0781	21.8	7.83	<0.00020	<0.000010	0.00021	<0.00010	0.0322	<0.00010	0.000486	0.00237	<0.0030	0.00067
Nelson River Upstream #3	US-3, US-3B, US-3C	L2505309-3,-6,-7	17-Sep-20	11:12	0.0793	21.9	8.11	<0.00020	<0.000010	0.00022	<0.00010	0.0313	<0.00010	0.000484	0.00231	<0.0030	0.00085
Nelson River Upstream #4	US-4	L2505309-4	17-Sep-20	11:58	0.0770	21.9	7.93	<0.00020	0.000010	0.00021	<0.00010	0.0307	<0.00010	0.000484	0.00225	<0.0030	0.00065
Nelson River Upstream #5	US-5	L2505309-5	17-Sep-20	12:22	0.0786	21.7	7.98	<0.00020	0.000010	0.00020	<0.00010	0.0314	<0.00010	0.000479	0.00235	<0.0030	0.00077
Stephens Lake - Near-field #1A	NF-1A	L2502461-1	12-Sep-20	12:35	0.0800	24.1	7.79	<0.00020	<0.000010	0.00020	<0.00010	0.0287	<0.00010	0.000470	0.00234	<0.0030	0.00068
Stephens Lake - Near-field #1B	NF-1B	L2502461-2	12-Sep-20	12:45	0.0798	24.1	7.77	<0.00020	<0.000010	0.00021	<0.00010	0.0307	<0.00010	0.000486	0.00230	<0.0030	0.00066
Stephens Lake - Near-field #2A	NF-2A	L2502461-3	12-Sep-20	13:25	0.0786	24.3	7.77	<0.00020	0.000011	0.00020	<0.00010	0.0287	<0.00010	0.000489	0.00232	<0.0030	0.00064
Stephens Lake - Near-field #2A	NF-2B	L2502461-4	12-Sep-20	13:35	0.0798	24.1	7.70	<0.00020	0.000010	0.00020	<0.00010	0.0303	<0.00010	0.000484	0.00237	<0.0030	0.00067
Stephens Lake - Far-field #14A	FF-2A	L2502898-3	14-Sep-20	10:55	0.0803	23.9	7.46	<0.00020	<0.000010	0.00018	<0.00010	0.0285	<0.00010	0.000472	0.00229	<0.0030	0.00066
Stephens Lake - Far-field #14B	FF-2B	L2502898-4	14-Sep-20	11:05	0.0816	24.0	7.56	<0.00020	<0.000010	0.00019	<0.00010	0.0269	<0.00010	0.000483	0.00229	<0.0030	0.00078

APPENDIX 2: RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL SAMPLES, 2020

Table A2-1: Quality assurance/quality control results for routine water chemistry variables measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL).

					Alkalinity				Nitrogen						Phosphorus	
Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Total (CaCO3) (mg/L)	Bicarbonate (HCO_3) (mg/L)	Carbonate (CO_3) (mg/L)	Hydroxide (OH) (mg/L)	Ammonia (mg/L N)	Nitrate/ nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total N^3 (mg/L)	Dissolved P (mg/L)	Total P (mg/L)
Detection Limit 2020					**1.0**	**1.2**	**0.60**	**0.34**	**0.010**	**0.0051**	**0.0050**	**0.0010**	**0.20**	**-**	**0.0010**	**0.0010**
Replicates																
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	11:12	92.4	113	<0.60	<0.34	0.013	0.0913	0.0884	0.003	0.39	0.48	0.0272	0.0441
	US-3B	L2505309-6	17-Sep-20	11:12	92.9	113	<0.60	<0.34	0.011	0.0953	0.0918	0.0036	0.69	0.79	0.0281	0.0452
	US-3C	L2505309-7	17-Sep-20	11:12	91.8	112	<0.60	<0.34	0.013	0.0903	0.0873	0.003	0.40	0.49	0.0273	0.0443
				Mean	92	113	<0.60	<0.34	0.012	0.0923	0.0892	0.0032	0.49	0.59	0.0275	0.0445
				SD	0.6	0.6	-	-	0.0012	0.00265	0.00235	0.00035	0.170	0.17	0.00049	0.00059
				PRSD	1	1	-	-	-	3	3	-	-		2	1
Field Blanks																
Field Blank	TF-2	L2463816-12	20-Jun-20		<1.0	<1.2	<0.60	<0.34	0.028	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	0.001
Field Blank	TF-2	L2478617-12	22-Jul-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	0.001
Field Blank	TF-2	L2490762-12	18-Aug-20		<1.0	<1.2	<0.60	<0.34	0.020	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	0.001
Field Blank	TF-2	L2502461-6	13-Sep-20		1.0	1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	0.001
Field Blank	TF-4	L2505309-9	17-Sep-20		1.0	1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	0.001
Trip Blanks																
Trip Blank	TF-1	L2463816-11	20-Jun-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0030
Trip Blank	TF-1	L2478617-11	22-Jul-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010
Trip Blank	TF-1	L2490762-11	18-Aug-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010
Trip Blank	TF-1	L2502461-5	13-Sep-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010
Trip Blank	TF-3	L2505309-8	17-Sep-20		<1.0	<1.2	<0.60	<0.34	<0.010	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010

Table A2-1: Quality assurance/quality control results for routine water chemistry variables measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL) (continued).

					Carbon		Water Clarity						Productivity	
Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Total Organic C (mg/L)	Dissolved Organic C (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	True Colour (CU)	Lab pH	Laboratory Conductivity (µmhos/cm)	Total Dissolved Solids (mg/L)	Chlorophyll *a* (µg/L)	Phaeophytin *a* (µg/L)
Detection Limit 2020					**0.50**	**0.50**	**1.0**	**0.10**	**5.0**	**0.10**	**1.0**	**4.0**	**0.10**	**0.10**
Replicates														
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	11:12	9.64	9.80	8.8	15.8	20.7	8.13	240	160	2.48	1.59
	US-3B	L2505309-6	17-Sep-20	11:12	9.59	9.76	9.5	15.8	24.3	8.14	238	150	2.35	1.55
	US-3C	L2505309-7	17-Sep-20	11:12	9.50	9.70	9.6	15.8	23.1	8.14	238	155	2.41	1.54
				Mean	9.58	9.75	9.3	15.8	22.7	8.14	239	155	2.41	1.56
				SD	0.071	0.050	0.44	0.00	1.83	0.006	1.2	5.0	0.065	0.026
				PRSD	1	1	5	0	-	0	0	3	3	2
Field Blanks														
Field Blank	TF-2	L2463816-12	20-Jun-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.49	<1.0	<4.0	<0.10	<0.10
Field Blank	TF-2	L2478617-12	22-Jul-20		<0.50	<0.50	<1.0	0.16	<5.0	5.41	<1.0	<4.0	<0.10	<0.10
Field Blank	TF-2	L2490762-12	18-Aug-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.34	<1.0	<4.0	<0.10	<0.10
Field Blank	TF-2	L2502461-6	13-Sep-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.33	1.0	<4.0	<0.10	<0.10
Field Blank	TF-2	L2505309-9	17-Sep-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.81	1.0	<4.0	<0.10	<0.10
Trip Blanks														
Trip Blank	TF-1	L2463816-11	20-Jun-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.53	1.1	<4.0	<0.10	<0.10
Trip Blank	TF-1	L2478617-11	22-Jul-20		<0.50	0.54	<1.0	0.21	<5.0	5.51	<1.0	<4.0	<0.10	<0.10
Trip Blank	TF-1	L2490762-11	18-Aug-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.43	<1.0	<4.0	<0.10	<0.10
Trip Blank	TF-1	L2502461-5	13-Sep-20		<0.50	<0.50	<1.0	<0.10	<5.0	5.35	1.2	<4.0	<0.10	<0.10
Trip Blank	TF-3	L2505309-8	17-Sep-20		<0.50	<0.50	<1.0	0.41	<5.0	5.59	<1.0	<4.0	<0.10	<0.10

Table A2-2: Quality assurance/quality control results for metals and major ions measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL).

Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Hardness (as $CaCO_3$) (mg/L)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Cesium (mg/L)
Detection Limit 2020					**0.20**	**0.0030**	**0.00010**	**0.00010**	**0.00010**	**0.00010**	**0.000050**	**0.010**	**0.0000050**	**0.050**	**0.000010**
Replicates															
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	11:12	105	0.795	<0.00010	0.00149	0.0296	<0.00010	<0.000050	0.020	0.0000098	23.800	0.000087
	US-3B	L2505309-6	17-Sep-20	11:12	105	0.812	<0.00010	0.00149	0.0296	<0.00010	<0.000050	0.020	0.0000081	24.400	0.000081
	US-3C	L2505309-7	17-Sep-20	11:12	104	0.785	<0.00010	0.00147	0.0289	<0.00010	<0.000050	0.020	0.0000084	23.800	0.00008
				Mean	105	0.797	<0.00010	0.00148	0.0294	<0.00010	<0.000050	0.020	0.0000088	24.000	0.000083
				SD	0.6	0.0137	-	0.000012	0.00040	-	-	0.0000	0.00000091	0.346	0.0000038
				PRSD	1	2	-	1	1	-	-	-	-	1	-
Field Blanks															
Field Blank	TF-2	L2463816-12	20-Jun-20		<0.20	<0.0030	0.00023	0.00021	<0.00010	<0.00010	0.000206	<0.010	0.00002	<0.050	<0.000010
Field Blank	TF-2	L2478617-12	22-Jul-20		<0.20	<0.0030	<0.00010	0.00013	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Field Blank	TF-2	L2490762-12	18-Aug-20		<0.20	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Field Blank	TF-2	L2502461-6	13-Sep-20		<0.20	0.0065	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Field Blank	TF-4	L2505309-9	17-Sep-20		<0.20	<0.0030	<0.00010	<0.00010	0.00013	<0.00010	<0.000050	<0.010	<0.0000050	0.069	<0.000010
Trip Blanks															
Trip Blank	TF-1	L2463816-11	20-Jun-20		<0.20	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Trip Blank	TF-1	L2478617-11	22-Jul-20		<0.20	<0.0030	<0.00010	0.00012	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Trip Blank	TF-1	L2490762-11	18-Aug-20		<0.20	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Trip Blank	TF-1	L2502461-5	13-Sep-20		<0.20	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010
Trip Blank	TF-3	L2505309-8	17-Sep-20		<0.20	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010

Table A2-2: Quality assurance/quality control results for metals and major ions measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL) (continued).

Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)
Detection Limit 2020					**0.10**	**0.00010**	**0.00010**	**0.00050**	**0.010**	**0.000050**	**0.0010**	**0.0050**	**0.00010**	**0.00000050**	**0.000050**
Replicates															
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	11:12	9.95	0.00132	0.00035	0.00182	0.757	0.000341	0.0081	11	0.0167	0.00000084	0.000454
	US-3B	L2505309-6	17-Sep-20	11:12	9.95	0.00133	0.00034	0.00187	0.776	0.000348	0.0081	10.8	0.0172	0.00000068	0.000445
	US-3C	L2505309-7	17-Sep-20	11:12	9.97	0.00129	0.00033	0.00181	0.733	0.000334	0.0082	10.8	0.0167	0.00000083	0.000483
				Mean	9.96	0.00131	0.00034	0.00183	0.755	0.000341	0.0081	10.9	0.0169	0.00000078	0.000461
				SD	0.012	0.000021	0.000010	0.000032	0.0215	0.0000070	0.00006	0.12	0.00029	0.000000090	0.0000199
				PRSD	0	2	-	-	3	2	1	1	2	-	4
Field Blanks															
Field Blank	TF-2	L2463816-12	20-Jun-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	0.000109	<0.0010	0.0182	<0.00010	<0.00000050	0.00017
Field Blank	TF-2	L2478617-12	22-Jul-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Field Blank	TF-2	L2490762-12	18-Aug-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Field Blank	TF-2	L2502461-6	13-Sep-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Field Blank	TF-4	L2505309-9	17-Sep-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Trip Blanks															
Trip Blank	TF-1	L2463816-11	20-Jun-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Trip Blank	TF-1	L2478617-11	22-Jul-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Trip Blank	TF-1	L2490762-11	18-Aug-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Trip Blank	TF-1	L2502461-5	13-Sep-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050
Trip Blank	TF-3	L2505309-8	17-Sep-20		<0.10	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.00000050	<0.000050

Table A2-2: Quality assurance/quality control results for metals and major ions measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL) (continued).

Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Rubidium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	Sulfur (mg/L)
Detection Limit 2020					**0.00050**	**0.030**	**0.05**	**0.00020**	**0.000050**	**0.10**	**0.000010**	**0.050**	**0.00020**	**0.30**	**0.50**
Replicates															
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	10:15	0.00174	0.047	2.25	0.00274	0.000091	3.85	<0.000010	11.100	0.07820	21.80	8.16
	US-3B	L2505309-6	17-Sep-20	10:20	0.00174	0.05	2.25	0.00276	0.000107	3.83	<0.000010	11.200	0.08100	21.90	8.01
	US-3C	L2505309-7	17-Sep-20	10:25	0.00172	0.061	2.23	0.00256	0.000096	3.95	<0.000010	11.100	0.07880	21.90	8.17
				Mean	0.00173	0.053	2.24	0.00269	0.000098	3.88	<0.000010	11.133	0.07933	21.87	8.11
				SD	0.000012	0.0074	0.012	0.000110	0.0000082	0.064	-	0.0577	0.001474	0.058	0.090
				PRSD	-	-	1	4	-	2	-	1	2	0	1
Field Blanks															
Field Blank	TF-2	L2463816-12	20-Jun-20		<0.00050	<0.030	<0.050	<0.00020	0.000195	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Field Blank	TF-2	L2478617-12	22-Jul-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Field Blank	TF-2	L2490762-12	18-Aug-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Field Blank	TF-2	L2502461-6	13-Sep-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Field Blank	TF-4	L2505309-9	17-Sep-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	0.084	<0.00020	<0.30	<0.50
Trip Blanks															
Trip Blank	TF-1	L2463816-11	20-Jun-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Trip Blank	TF-1	L2478617-11	22-Jul-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Trip Blank	TF-1	L2490762-11	18-Aug-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Trip Blank	TF-1	L2502461-5	13-Sep-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50
Trip Blank	TF-3	L2505309-8	17-Sep-20		<0.00050	<0.030	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.30	<0.50

Table A2-2: Quality assurance/quality control results for metals and major ions measured in the laboratory during open-water 2020. Percent relative standard deviations (PRSD) were calculated for triplicate samples where all results exceeded five times the detection limit (DL) (continued).

Sample Location	Sample ID	ALS Sample ID	Sample Date	Sample Time	Tellurium (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Tungsten (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)	Zirconium (mg/L)
Detection Limit 2020					**0.00020**	**0.000010**	**0.00010**	**0.00010**	**0.00030**	**0.00010**	**0.000010**	**0.00050**	**0.0030**	**0.00020**
Replicates														
Nelson River Upstream #3	US-3	L2505309-3	17-Sep-20	10:15	<0.00020	0.000010	0.00021	<0.00010	0.0307	<0.00010	0.000477	0.00232	<0.0030	0.00064
	US-3B	L2505309-6	17-Sep-20	10:20	<0.00020	0.000010	0.00023	<0.00010	0.0319	<0.00010	0.000492	0.00232	<0.0030	0.00123
	US-3C	L2505309-7	17-Sep-20	10:25	<0.00020	<0.000010	0.00022	<0.00010	0.0313	<0.00010	0.000482	0.00229	<0.0030	0.00068
				Mean	<0.00020	<0.000010	0.00022	<0.00010	0.0313	<0.00010	0.000484	0.00231	<0.0030	0.00085
				SD	-	-	0.000010	-	0.00060	-	0.0000076	0.000017	-	0.000330
				PRSD	-	-	-	-	2	-	2	-	-	-
Field Blanks														
Field Blank	TF-2	L2463816-12	20-Jun-20		<0.00020	<0.000010	<0.00010	0.00011	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Field Blank	TF-2	L2478617-12	22-Jul-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Field Blank	TF-2	L2490762-12	18-Aug-20		0.00033	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Field Blank	TF-2	L2502461-6	13-Sep-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Field Blank	TF-4	L2505309-9	17-Sep-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Trip Blanks														
Trip Blank	TF-1	L2463816-11	20-Jun-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Trip Blank	TF-1	L2478617-11	22-Jul-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Trip Blank	TF-1	L2490762-11	18-Aug-20		0.00036	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Trip Blank	TF-1	L2502461-5	13-Sep-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020
Trip Blank	TF-3	L2505309-8	17-Sep-20		<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.00020