



Keeyask Generation Project Aquatic Effects Monitoring Plan

Walleye Movement Monitoring Report AEMP-2022-04



KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING PLAN

REPORT #AEMP-2022-04

WALLEYE MOVEMENT MONITORING IN THE NELSON RIVER BETWEEN CLARK LAKE AND THE LIMESTONE GENERATING STATION, SEPTEMBER 2020 TO OCTOBER 2021: YEAR 8 CONSTRUCTION

Prepared for

Manitoba Hydro

By

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SUMMARY

Background

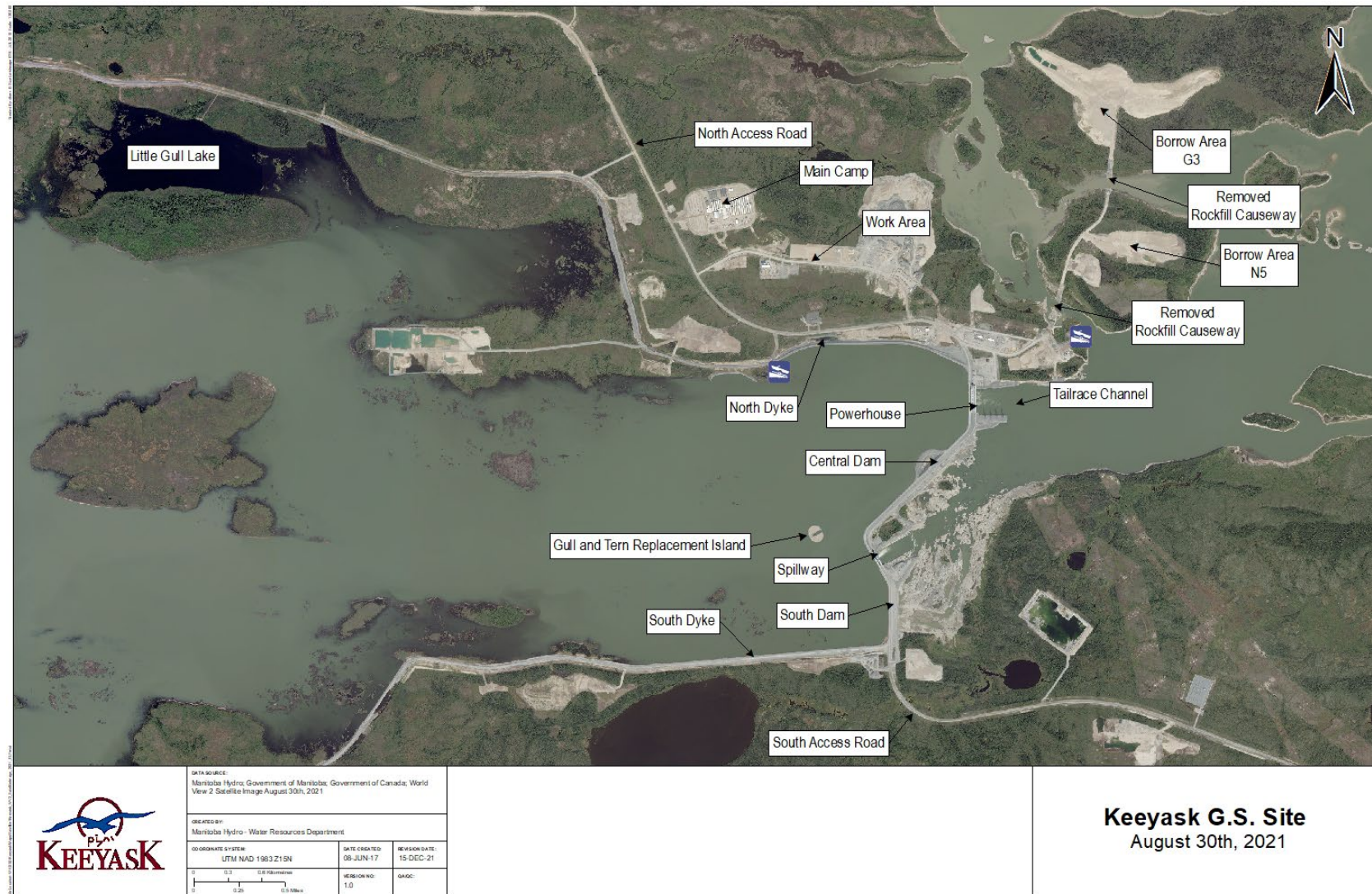
The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the Keeyask Generating Station (GS) on the environment. Besides measuring the accuracy of the predictions made and actual effects of the GS on the environment, monitoring 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 and instream work was completed in 2020. The reservoir was impounded with water levels being raised to full supply level between August 31 and September 5, 2020. Commissioning of the powerhouse turbines was initiated after impoundment and five of seven units were in-service by fall 2021. During commissioning and as units came into service, substantial flows continued through the spillway until the summer of 2021 when more flow was going through the powerhouse than spillway. By mid-September the spillway was closed and barely used in the fall.

Movements of Walleye in relation to Birthday Rapids and Gull Rapids were monitored prior to the start of the construction monitoring program in 2013, but because different methods were used to collect data under the Aquatic Effects Monitoring Plan (AEMP), the results are not directly comparable. While earlier studies did not record detailed fish movement patterns between Clark Lake and Stephens Lake, data indicated that the majority of Walleye continued to live in the waterbody where they had been tagged and some moved over Birthday and Gull rapids. A small number of Walleye also moved downstream through the Kettle and Long Spruce generating stations.

This report presents results of Walleye movement monitoring from September 2020 to October 2021, during the period immediately after reservoir impoundment. It provides a summary of data collected since the monitoring program was initiated in June 2013. Tags were initially implanted into Walleye in 2013 and these tags expired in 2016. To continue the study, additional transmitters were applied to Walleye in 2014 (expired in 2017), 2016 (expired in 2021), 2018 (expire in 2023), 2019 (expire in 2023), and 2021 (expire in 2025). Monitoring these tags will continue through commissioning and operation of the Keeyask GS.

Monitoring fish movements is an important component of the overall plan to monitor the impacts of construction and operation of the Keeyask GS on fish. Walleye was identified as one of the key species to monitor because it is: of commercial and domestic importance; abundant in the Keeyask area; known to pass through Gull Rapids in either direction prior to the start of construction; and resilient enough to survive the acoustic tagging procedure.



Map illustrating instream structures at the Keeyask Generating Station site, August 2021.

Why is the study being done?

Monitoring during the end of construction of the GS and the first year after the reservoir was flooded is being done to answer four questions:

Are there Walleye close to the construction site, particularly during spawning?

If Walleye are in the river close to the construction area, they could be harmed by high amounts of mud in the water or they could be trapped in an area that becomes dry. If construction negatively affects spawning sites or directly harms the fish, the total number of Walleye could decrease.

How many Walleye are moving through and/or away from the Keeyask GS during construction and how far are they going?

Movement studies tell us how many Walleye are moving down through the Keeyask GS, how far they travel up or downstream away from the site, whether they are leaving the Keeyask area completely, and when they are making these movements. The distance they travel is monitored as far upstream as the inlet to Clark Lake and downstream as far as the Limestone Reservoir.

If Walleye move through a GS, they cannot move back, and may be injured or killed during passage. This could decrease the number of fish living upstream of the GS.

How many Walleye move upstream past Birthday and/or Long rapids?

Walleye travelling upstream past these rapids tells us they have left their original habitat in the Keeyask reservoir. Tracking these fish can tell us whether they return to the reservoir, move back and forth, or permanently leave the Keeyask area.

Did Walleye change where they live after the reservoir was flooded?

Flooding of Gull Lake will cause changes to available habitat in the area. This may cause Walleye to move away or to use different areas of the river.

What was done?

Movements of Walleye were tracked using acoustic telemetry. This is a technique in which a tag is surgically implanted inside a fish. Each tag sends out a sound signal (called a “ping”) that is picked up by receivers that were placed along the Nelson River between Clark Lake and the Limestone Generating Station (see study area map below). Each fish is given a battery powered transmitter that sends out a unique ping, and pings can be detected up to 1 kilometre (km) away from a receiver. By looking at detections recorded by different receivers, the movement of each fish can be tracked.

Eighty Walleye were tagged in 2013, 40 upstream and 40 downstream of Gull Rapids (now called the Keeyask GS). In 2014, another 11 Walleye were tagged, nine upstream and two downstream. Because the batteries in these transmitters expired in 2016, an additional 80 transmitters were applied to Walleye in June 2016: 40 upstream and 40 downstream of Gull Rapids. Because eight

of the fish tagged in 2016 moved downstream through Gull Rapids shortly after being tagged, an additional eight tags were applied upstream of Gull Rapids in fall 2016. By October 2017, more fish were considered missing or had moved downstream. To replace these, 24 more tags were applied in spring 2018: 17 upstream of the Keeyask GS, and seven in Stephens Lake. The batteries in tags applied to Walleye in 2016 will expire in winter 2021, and those applied in 2018 will expire in winter 2023. An additional 56 transmitters were applied to Walleye (27 upstream and 29 downstream) in spring 2019 and 60 (30 upstream and 30 downstream) in spring 2021. These tags will expire in 2023 and 2025, respectively. Movements of these fish will continue to be monitored through commissioning and operation of the Keeyask GS.



Measuring a Walleye before surgery (left), surgery (middle), and release (right).

What was found?

Walleye tagged upstream of the Keeyask GS have consistently showed the same four general movement patterns since monitoring began in 2013. These fish either: remain in Gull Lake, move between Birthday Rapids and Gull Lake, move between Clark Lake and Gull Lake, or remain in the riverine area downstream of Birthday Rapids. Some fish also move downstream through the Keeyask GS. Walleye tagged in Stephens Lake have been consistently split into two groups: those that remain exclusively within the upper portion (within 13.4 rkm of the Keeyask GS) of the lake; and those that move extensively throughout the lake. Most fish continued to display these same movement patterns in the first year after reservoir impoundment, but some (31%) moved farther than in previous years.

Since tagging began in 2013, 39 fish have moved downstream through Gull Rapids or the Keeyask GS. Thirteen of these movements likely happened because of tagging stress or mortality, while 26 movements occurred for another reason. Most of the latter happened in 2017 (18%) and 2019 (13%). The highest numbers of fish also moved downstream through the Kettle GS in the same years. In all other monitoring years, the percentage of fish that have moved downstream through Gull Rapids or the Keeyask GS has ranged from 0% (in 2013) to 10% (in 2015). Two Walleye (5%) moved downstream through the Keeyask GS nearly nine months after reservoir impoundment, during the open-water period in 2021. Both fish crossed the GS independent of tagging, and movements within Stephens Lake indicate they survived passage.

Before the start of construction in 2014, seven of 49 tagged Walleye (14%) moved upstream into Clark Lake. During the construction period, 24 of 132 tagged Walleye (18%) moved upstream. No Walleye moved upstream out of the newly formed reservoir immediately following impoundment.

During the first open-water period after impoundment, 18 tagged Walleye moved upstream (31%), which represents a larger proportion of tagged fish than seen in past years. Despite the increase, most of the fish (56%) returned downstream to the reservoir before the end of the 2021 open-water period. Six remained in Clark Lake, and one likely moved upstream out of the study area.

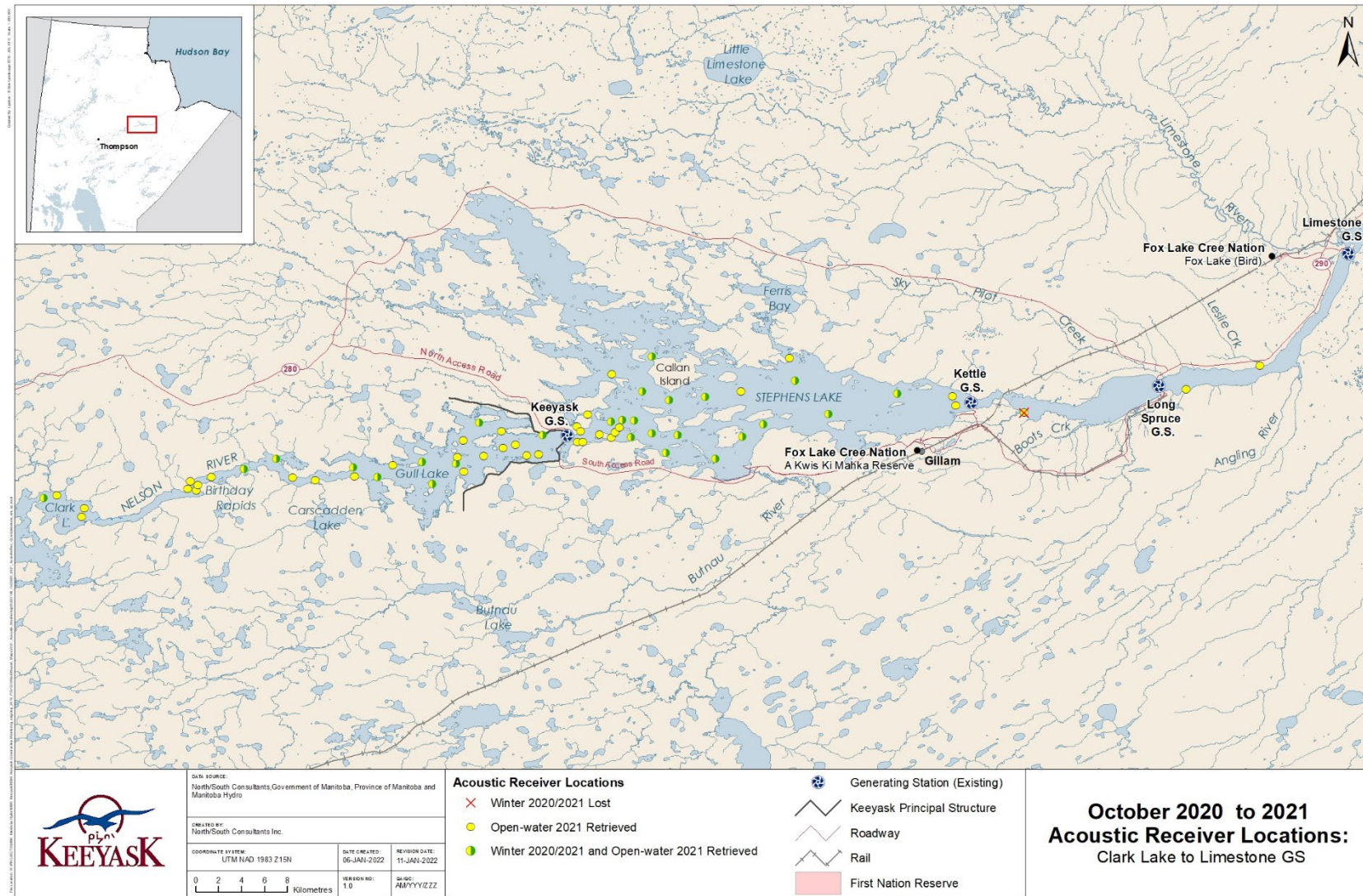
Walleye in Stephens Lake regularly use habitat directly downstream of the construction site. It has been one full year of monitoring since the first unit of the powerhouse was commissioned, causing flow alterations downstream of the GS. Despite this, Walleye have been detected near Gull Rapids or the Keeyask GS during the spring in all study years and have likely continued to spawn in this area throughout construction and during the initial operation period.

What does it mean?

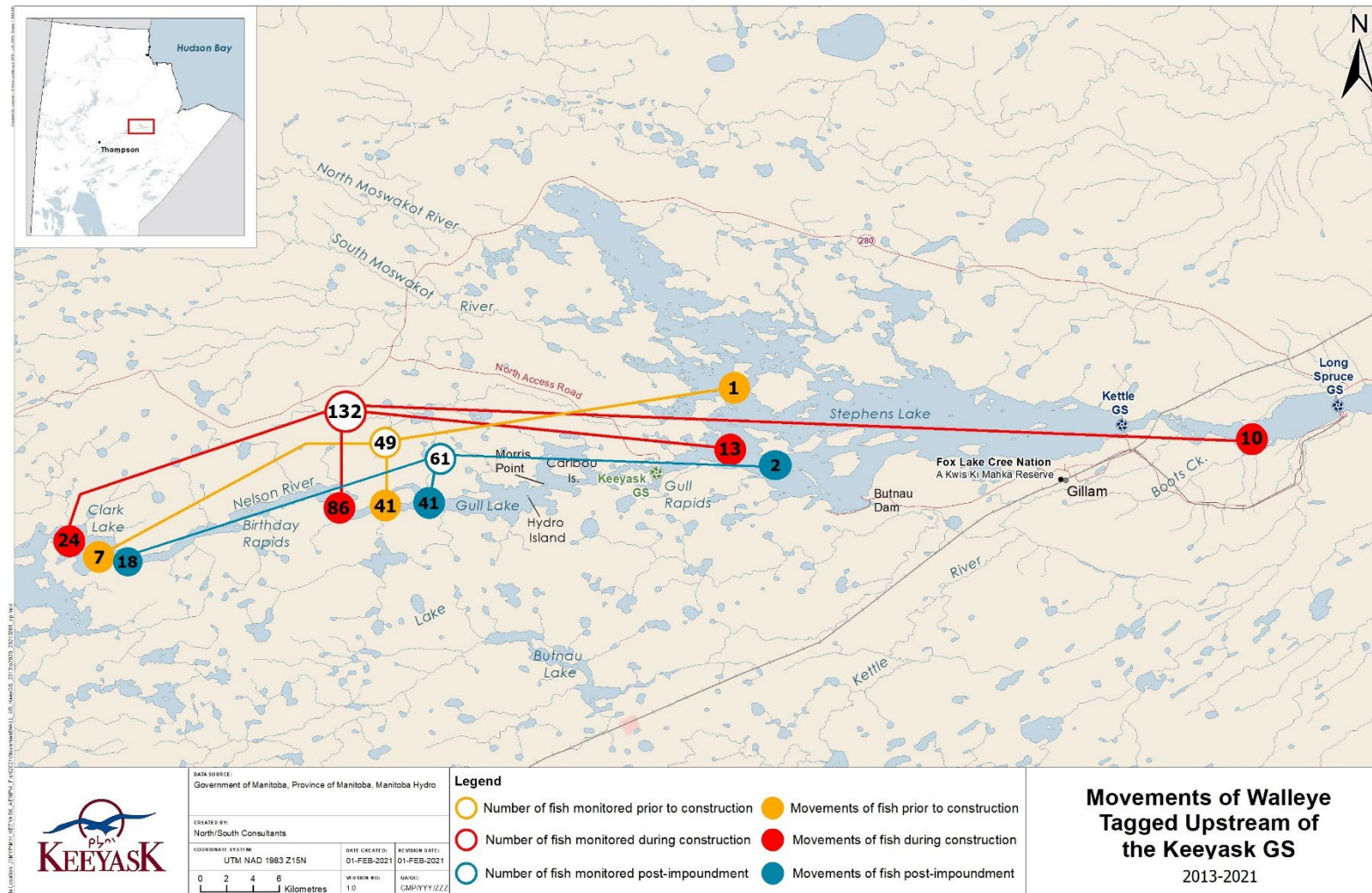
The study continues to show that Walleye use habitat immediately downstream of the construction site, in Stephens Lake, including during the spawning period. After impounding the reservoir, most of the Walleye tagged upstream from the GS showed the same, general movement patterns that were seen prior to impoundment. However, approximately one third of the Walleye tagged upstream moved up into Clarke Lake (half of those moved back into the reservoir afterwards), which is farther than most have been observed to travel historically. In 2021, there was no indication that the number of Walleye moving downstream into Stephens Lake has increased more than they have in the past.

What will be done next?

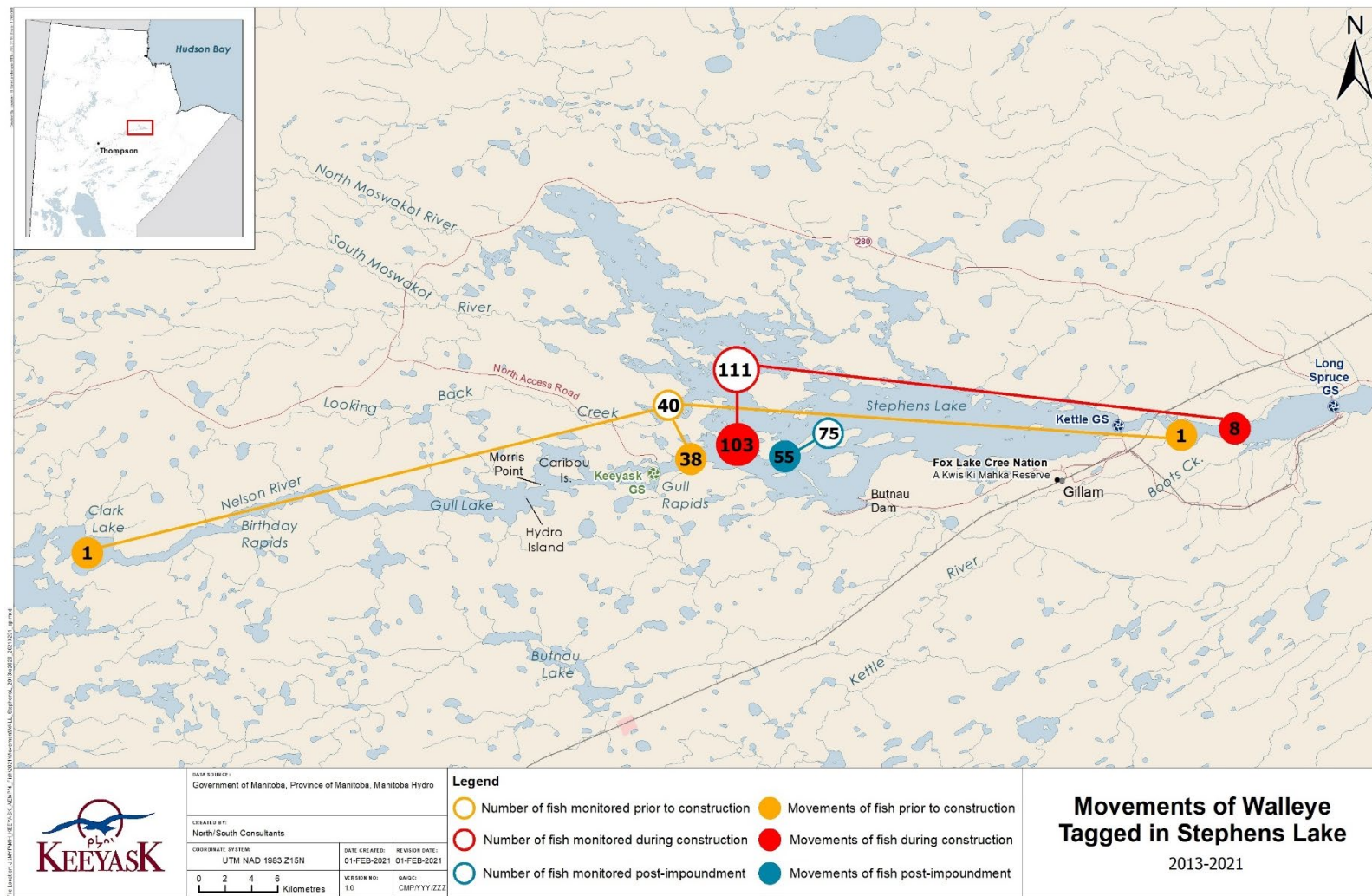
Fish that were tagged in 2018/2019 and 2021 will continue to be tracked in 2022. Ongoing tracking of fish through post-impoundment and initial operation of the GS, will indicate if the project changed their general movements, which can provide information about what kinds of habitats these fish need to use over several years, when and where they are spawning, where they are feeding, and whether they leaving the Keeyask area.



Map showing the study area (pre-flooding shoreline). The dots represent the locations of receivers in the river. The different colours represent receivers that were in the river at different times of the year.



Map showing how many Walleye tagged upstream of the Keeyask GS moved upstream out of Gull Lake, stayed in Gull Lake, and moved into Stephens Lake before construction (yellow), during construction (red) and after reservoir impoundment (blue). Movements of fish due to tagging stress or mortality were not included. Numbers of fish monitored (hollow circles) represent the number of fish tagged while the number of fish movements (solid circles) represent the number of fish detected.



Map showing how many Walleye tagged downstream of the Keeyask GS moved upstream through Gull Rapids, stayed in Stephens Lake, and moved downstream through the Kettle GS before construction (yellow), during construction (red) and after reservoir impoundment (blue). Movements due to tagging stress and mortality were not included. Numbers of fish monitored (hollow circles) represent the number of fish tagged while the number of fish movements (solid circles) represent the number of fish detected.

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The collection of biological samples described in this report was authorized by Manitoba Conservation and Water Stewardship, Fisheries Branch, under terms of the Scientific Collection Permit #08-2021.

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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, Walleye (*Sander vitreus*) movement, for the construction and operation phases of the Project.

Pre-construction (baseline) movements of Walleye were monitored using radio telemetry from 2001 to 2005 (Barth *et al.* 2003; Murray *et al.* 2005; Murray and Barth 2007). Radio telemetry studies focused specifically on detecting the upstream and downstream movements of fish over rapids in the study area (Birthday Rapids and Gull Rapids). Pre-construction movement data revealed that the majority of Walleye did not move upstream or downstream over rapids into adjacent study reaches; instead, they remained within the reach where they had been tagged. Those few fish that moved over one or more sets of rapids did so in the summer or fall, suggesting that these movements were not associated with a life history event such as spawning. A small number of Walleye also moved downstream through the generating stations/spillways along the lower Nelson River. Additional information on long distance movements was obtained from mark-recapture studies. These results are not directly comparable to the movement data being collected under the AEMP.

In 2013, 80 Walleye were tagged with acoustic transmitters to assess the frequency of movement through Gull Rapids and to monitor the potential impact that construction of the Keeyask GS may have on movement (Hrenchuk and Barth 2014). Movements of these Walleye from the tagging date until October 2014 are provided in Murray *et al.* (2015); October 2014 to October 2015 are presented in Burnett *et al.* (2016); and October 2015 to October 2016 are presented in Hrenchuk and Lacho (2017).

As the transmitters applied in 2013 reached the end of their battery life in 2016, additional transmitters were applied to Walleye in 2016 to continue the movement study until 2021. Results from June to October 2016 are presented in Hrenchuk and Lacho (2017), October 2016 to October 2017 in Hrenchuk and Lacho (2018), October 2017 to October 2018 in Hrenchuk and Lacho (2019), October 2018 to October 2019 in Hrenchuk (2020), and October 2019 to

September 2020 in Hrenchuk (2021). An additional 60 tags were applied in 2021 to continue to track movements post-impoundment and during early operation. This report provides results of Walleye movement monitoring from September 2020 to October 2021 and summarizes what has been observed since the program began in 2013.

Impoundment of the Keeyask reservoir was completed on September 5, 2020. Sampling in the Keeyask reservoir in 2021 represented the first year of sampling under operating conditions (water levels and flows). Monitoring in Stephens Lake, however, represented a transition between construction and operation as a considerable portion of the flow was still being passed through the spillway in spring and early summer when only a few units were in-service. Later in the summer and early fall as additional units became operational all the entire flow of the river was going through the powerhouse. Due to Keeyask reservoir impoundment, several key questions identified in the AEMP that have not been previously discussed are addressed.

- What is the frequency of downstream movement through the Keeyask GS and when are the movements occurring?
- Are Walleye utilizing habitat in the vicinity of construction activities (particularly during spawning)?
- What types of habitat are Walleye utilizing in the Keeyask reservoir (i.e., are fish using the upper, middle, or lower end of the reservoir)?
- What proportion of the fish population moves from the Keeyask reservoir upstream past Birthday and/or Long rapids?

This report provides results from September 2020 to October 2021, which is the first winter and full open-water period following reservoir impoundment.

2.0 STUDY SETTING

The study area encompasses an approximately 110 km long reach of the Nelson River from Clark Lake to the upstream end of the Limestone Reservoir (Map 1). This section of river offers a diversity of physical habitat conditions, including a variety of substrate types, and variable water depths (range 0–30 m) and velocities. Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of the Keeyask GS (formerly Gull Rapids) (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. The area between Clark Lake and the Keeyask GS is considered the Keeyask reservoir.

Birthday Rapids is located approximately 10 km downstream of Clark Lake and 30 km upstream of Gull Rapids/the Keeyask GS (Maps 1 and 2) and marks the upstream end of major water level changes as a result of impoundment by the Keeyask GS. The drop in elevation from the upstream to downstream side of Birthday Rapids was approximately 2 m prior to impoundment but is now a nearly level, albeit fast-flowing section of river. The 14 km reach of the Nelson River between Birthday Rapids and Gull Lake was characterized as a large and somewhat uniform channel with medium to high water velocities and a few large bays. This area is now within the Keeyask reservoir, though flooding was limited to mainly shoreline areas.

Prior to impoundment, Gull Lake was a widening of the Nelson River, with moderate to low water velocity beginning approximately 20 km upstream of Gull Rapids/the Keeyask GS. Water levels on Gull Lake increased by several metres following impoundment and flooding along the shoreline and small tributaries entering this reach was extensive. Although this area is now a portion of the Keeyask reservoir, it is referred to herein as Gull Lake.

Just below the Keeyask GS, the Nelson River enters Stephens Lake. Stephens Lake was formed in 1971 by construction of the Kettle GS. Construction of the Keeyask GS has altered the flow distribution immediately downstream of the station.

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.

The 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 (Maps 1 and 6).

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 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.

2.1 FLOWS, WATER LEVELS, AND KEEYASK OPERATIONS

From October 2020 to mid-June 2021 the calculated Split Lake outflow varied about the median flow of about 3,300 m³/s, ranging between about 3,000 m³/s and 3,900 m³/s. From mid-June to mid-August, the flows steadily decreased from about 3,700 m³/s to about 2,000 m³/s, which is approximately the 5th percentile low flow. Low flow conditions persisted from summer into winter, with flows dropping to a low of about 1,800 m³/s at the end of November 2021. These are the lowest flows that have occurred during Keeyask construction. It is not since 2005 that flows this low have occurred on the Nelson River.

Water levels on Gull Lake have been held steady between about 158.8-159 m since reservoir impoundment in September 2020. Upstream of Gull Lake at gauges below and above Birthday Rapids the levels were about 0.5 m and 2 m higher than on Gull Lake, a smaller difference than would have occurred prior to the project. Upstream levels increased about 3-4 m at these sites in winter due to ice effects as in previous years. Due to low flows in summer 2021 the water surface was relatively flat from Gull Lake to the gauge just upstream of Birthday Rapids, with a difference of only about 0.8-0.9 m between the two.

Keeyask is transitioning from a construction project to an operating station (Map 2). In 2021, the work at site has been focused on bringing units into service. By the end of April 2021, prior to the start of aquatic monitoring, Unit 1 and Unit 2 were in service. Throughout the open water period more units were being tested and brought into service one at a time. As units came into service, the distribution of flow between the spillway and powerhouse has gradually shifted, as summarized below. By the end of October 2021 five units were fully in service.

Discharges from the spillway and powerhouse are not measured but have been estimated based on performance design curves. For reference it is noted that the design discharge capacity of the powerhouse is 4,000 m³/s, giving each turbine unit a discharge capacity of approximately 570 m³/s.

Table below outlines Keeyask GS operation, including powerhouse and spillway flows, in 2021.

Dates	Powerhouse Units	Spillway Gate Operation	Powerhouse	Spillway	Keeyask Total
			Discharge (m ³ /s)		
End Apr. - end June 2021	Unit 2 online; Unit 3 testing	Gates 1, 2, 3, 5, 7 in use until mid-June. Gates 1, 3, 5, 7 primarily mid- to end-June	Steady at about 1,100 varying down to 600 on a few intermittent days and up to 1,650 during two weeks of Unit 3 testing.	Generally, 2,200-2,800 except during Unit 3 testing it varied from about 1,400-2,400.	Generally, 3,400-3,900 except during Unit 3 testing it varied from 2,600-3,600.
End June – mid-Sept. 2021	Unit 3 online; Unit 5 testing	Generally, Gates 1, 3, 5, 7 until mid-July. Gates 3, 5, 7 until end of July. Various gates used in Aug. Gates 1 and 7 used in Sept. until closure of all gates on Sept. 11.	About 1,650, but reduced to 1,100 for two weeks with a unit shut down and varying up to 2,100 during two weeks of Unit 5 testing.	From end of June to mid Aug. Nelson R inflow declined from about 3,600 to about 1,800-2,200 and has remained steady around 2,000-2,200 since then – corresponding spillway discharge gradually declined from about 2,400 to 0 by mid-Sept. when Unit 5 came into service, although daily variations of +/- 200-400 or more in a few instances occurred during this time.	Total Keeyask discharge declined from about 3,600 to an average of about 2,000-2,200 corresponding to the decrease in Nelson R inflow, and daily variation of about +/- 200-400 depending on spillway and powerhouse operations.
Mid-Sept. – end Oct. 2021	Unit 5 online; Unit 4 testing; Unit 4 online Oct. 25	Various gates used very sporadically. First reopening on Sept. 28.	Average discharge about 2,000-2,200 with typical daily variation from 1,600-2,200 and a maximum variation between 1,000-2,800 depending on unit operations and Unit 4 testing.	No spillway flow except for a few intermittent days of up to 1,000.	Same as powerhouse.

3.0 METHODS

3.1 ACOUSTIC TELEMETRY

Acoustic telemetry involves tracking movements of fish surgically implanted with internal acoustic transmitters (tags). Each transmitter emits a unique signal, recognizable by stationary receivers. When tagged fish come into the detection range of a receiver (generally within 500 m to 1 km, depending on conditions), the transmitter code number, as well as the date and time, are stored in the receiver.

3.1.1 ACOUSTIC TRANSMITTER APPLICATION

Acoustic transmitters (VEMCO V13-1x) were first applied to Walleye in 2013 (40 upstream and 40 downstream of Gull Rapids) and 2014 (nine upstream and two downstream) (Murray *et al.* 2015). These transmitters expired during the 2016 open-water period. To continue Walleye movement monitoring with a similar sample size, 80 acoustic transmitters (VEMCO V13-1x¹) were applied to Walleye between May 27 and June 7, 2016: 40 upstream, and 40 downstream of Gull Rapids (now referred to as the Keeyask GS) (Table 1). Shortly after tagging (i.e., within 22 days), eight fish moved downstream into Stephens Lake. To return the number of tagged fish upstream of Gull Rapids to the original sample size, eight additional transmitters were applied on September 24, 2016 (Hrenchuk and Lacho 2017).

In October 2017, monitoring results indicated that several additional fish had either moved downstream out of Gull and Stephens lakes, or had gone missing (see Sections 4.1.1 and 4.1.2). Therefore, to maintain a similar sample size of tagged fish, additional transmitters (VEMCO V13-1x) were applied to Walleye upstream of the Keeyask GS and in Stephens Lake in spring 2018. Seventeen fish were tagged upstream of the Keeyask GS between May 27 and June 5, and seven fish were tagged in Stephens Lake between June 6 and 9 (Table 1).

Additional transmitters were applied to Walleye in 2019 (VEMCO V13-1x) to maintain the sample size during GS operation, while obtaining one full year of tracking prior to GS commissioning. Twenty-seven fish were tagged upstream of the Keeyask GS between May 23 and June 7, and 27 were tagged in Stephens Lake between May 30 and June 3. An additional two fish were tagged in Stephens Lake on September 16. As these tags are nearing the end of their expected battery life, an additional 40 tags (VEMCO V13-1x) were applied to Walleye in May and June 2021; 31 upstream and 30 downstream of the Keeyask GS (Appendix 6).

¹ Battery life for tags implanted in 2013 was estimated at 1,480 days; tags implanted in 2016 and 2018 had an estimated battery life of 1,735 days; tags implanted in 2019 had an estimated battery life of 1,492 days; and tags implanted in 2021 had an estimated battery life of 1,460 days.

3.1.2 ACOUSTIC RECEIVERS

Since 2013, stationary acoustic receivers (VEMCO model VR2W) have been used to continuously monitor tagged Walleye in the Nelson River between Clark Lake and the Long Spruce GS. In spring 2016, the receiver array was extended to the upper Limestone reservoir, with the placement of two receivers downstream of the Long Spruce GS. The intent of adding these receivers was to determine whether fish that had moved into the Long Spruce reservoir had continued to move downstream.

During the six years of the construction phase of the Project (beginning in July 2014), receivers were deployed at the same sites as those established during the pre-construction phase (2011–2013). During the open-water period, receivers were deployed in calm water with a flat bottom free of large debris to maximize detection range, and spaced along the main river channel throughout the study area to maximize spatial coverage. In Stephens Lake, receivers were placed at locations within pre-flood river channels, based on the observation that sturgeon tend to stay within river channels, even in flooded environments. At constrictions within the river channel, a series of receivers were deployed to create “gates” with the intent of recording all fish that passed by the river cross-section (described in Section 3.1.2.2).

The retrieval of receivers deployed during winter has proven challenging and several were lost in previous winters, likely moved by ice (Hrenchuk and Barth 2013). Because it appears that receivers will only remain safe from ice if deployed in calm areas at depths greater than 10 m, the number of possible receiver locations during winter is limited, especially in areas upstream of the Keeyask GS.

3.1.2.1 WINTER 2020/2021

The stationary acoustic receiver array for the winter 2020/2021 (September 24, 2020, to April 30, 2021) period consisted of 28 receivers. Although additional receivers were not set until May, the end of the winter period is defined as April 30 to provide consistency between years. Ten were set upstream of the Keeyask GS, 17 throughout Stephens Lake, and one in the Long Spruce forebay (Maps 3 and 4). Forebay impoundment in fall 2020 allowed for additional receivers to be set in the reservoir, due to the increase in deep off-current areas. An additional five receivers were set including one in the riverine portion of the reservoir between Birthday Rapids and Gull Lake (#114230; rkm -26.4), one at the inlet of Gull Lake (#122779; rkm -19.5), one at the mouth of the flooded backbay at Rabbit Creek (#114226; rkm -17.4), one north of Caribou Island (#129182; rkm -7.9), and one immediately upstream of the powerhouse (#127100; rkm -2.2). One additional receiver was set in Stephens Lake, closer to the GS (#125557; rkm 3.9).

3.1.2.2 OPEN-WATER 2021

An array of 64 acoustic receivers was used during the 2021 open-water period (defined as May 1 to October 10, 2021). Although additional receivers were not set until later in May, the start of

the open-water period is defined as May 1 to provide consistency between years. Thirty-one were set both upstream of the Keeyask GS and in Stephens Lake (Maps 5 and 6). The 2021 open-water array differed slightly from the array used in 2020. Three additional receivers were set upstream of the GS: one in the reservoir upstream of Gull Lake (#114235; rkm -22.6), one south of Caribou Island (#114232; rkm -7.7), and one upstream of the Keeyask GS spillway (#129192; rkm -2.5) (Map 5).

Water levels downstream of the Keeyask GS in spring and summer 2021 were lower than in previous years, preventing access to the receiver set downstream of the Kettle GS. Several attempts were made to access the site throughout the open-water period. A boat was successfully launched downstream of the Kettle GS in October 2021, however, the single receiver set during winter 2020/2021 could not be retrieved. Despite this, two receivers were set downstream of the Long Spruce GS for the duration of the 2021 open-water period (Map 7).

Similar to previous years, receiver “gates” were established in several key areas selected by river morphology (channel restrictions) and habitat characteristics (areas with low velocity adjacent to the main flow of the river). Receiver “gates” consisted of two or more acoustic receivers set parallel to flow to provide complete (or nearly complete) signal coverage of a river cross-section. Areas between the “gates” were referred to as river zones. Receiver gates provide confidence that movements past key points are being detected, which allows for extrapolation of coarse-scale positions (i.e., which zone) during periods when fish remain undetected. When analyzing data, fish detected within a zone that subsequently go undetected for a period of time without passing through a gate, are assumed to be within the zone in which they were last detected.

Four gates were established between Clark Lake and the Keeyask GS (44.0, 34.0, 19.0, and 10.0 rkms upstream of the GS), and two were established in Stephens Lake (4.5 and 40.0 rkms downstream of the GS) (Maps 5 and 6). The location of the “gates” has remained consistent since 2013.

To describe fish movements for reporting purposes, the study area was divided into nine different zones. The area upstream of the Keeyask GS was divided into five zones (Map 5; Zones 1–5), while Stephens Lake was divided into two zones (Map 6; Zones 6 and 7). The Long Spruce reservoir is referred to as Zone 8 and the Limestone reservoir as Zone 9.

Water temperature within the Nelson River mainstem was recorded with a HOBO Water Temperature Pro data logger from September 24, 2020, to October 3, 2021. Walleye generally spawn in the spring when water temperature ranges from 4–9°C (Scott and Crossman 1998; Stewart and Watkinson 2004). Thus, data collected during this temperature range was considered as “spawning period”.

By October 11, 2021, most receivers were removed, and a subset (n = 27) were redeployed to monitor movements during winter 2021/2022.

3.1.3 DATA ANALYSIS

False detections can arise on acoustic telemetry receivers due to code collisions and/or environmental noise (Pincock 2012). To filter out false detections, a fish was required to be detected at least two times within a 30-minute interval at a given stationary receiver. Single detections were filtered and not used in most analyses; however, in instances when fish went undetected for lengthy periods, and/or rapid movements were suspected, raw data were also explored. In no instance did examination of raw data suggest that consideration of a single detection would result in a different behaviour or movement pattern compared with the result when single detections were removed.

Movements were analysed in terms of rkm distance, with the base of the Keeyask GS representing a distance of 0 rkm. The area located downstream of the Keeyask GS (i.e., Stephens Lake) was given a positive (+) distance value from the GS, while the area located upstream (i.e., Gull and Clark lakes) was given negative (-) distance values (Figures 1 and 2). The average rkm distance from the GS was calculated over a 4-hour interval and plotted versus time for each fish. Total detection ranges were calculated by subtracting the farthest downstream detection location from the location of the farthest upstream detection. The proportion of time that all fish spent within each river zone was calculated and plotted.

Rapid downstream movements observed within two weeks of tagging were classified as caused by tagging mortality or stress. If the fish made a rapid downstream movement within two weeks of tagging followed by upstream and downstream movements, it was classified as tagging stress. If a fish made a rapid downstream movement within two weeks of tagging and was not detected again or did not display upstream movements, it was classified as a tagging mortality. If a fish was not detected for more than one year, it was classified as missing.

4.0 RESULTS

Section 4.1 provides a movement summary for fish tagged between 2018 and 2020 prior to winter 2020/2021. Numbers of fish tagged upstream of the Keeyask GS and in Stephens Lake, by year, are provided in Table 1. Table 2 summarizes the proportional distribution of tagged fish upstream and downstream of the construction site (2013–2021). Table 3 summarizes Walleye movements through Gull Rapids (or the Keeyask GS) and the Kettle GS between 2013 and 2021. Figures 4 to 12 provide movement range, relative detection frequency, and proportional distribution of fish both upstream and downstream of the construction site by season tagged in 2018/2019. Figures 13 to 16 provide movement range, proportional distributions, and relative detection frequency for fish tagged in 2021. Appendix A1 provides farthest upstream and downstream detection locations by river kilometer for each tagged fish (2018–2021) while appendices A2 to A5 provide movement summaries, by river kilometre, for each Walleye tagged between 2018 and 2021. Biological information associated with each tagged fish is provided in Appendix A6.

4.1 2017-2020 RESULTS SUMMARY

4.1.1 UPSTREAM OF THE KEEYASK GS

A total of 17 transmitters were applied to Walleye between May 27 and June 5, 2018, and an additional 27 tags were applied between May 23 and June 7, 2019, bringing the total number of fish tagged to 44.

Six fish were only detected briefly in Gull Lake (between 0 and 18 days) after being tagged, and are considered missing due to tagging stress or mortality:

- #20155 was tagged on June 6, 2019 at the inlet of Gull Lake. It was last located farther downstream in Gull Lake (rkm -9.9) on June 14 (Appendix A2-25).
- #20164 was tagged on June 6, 2019 at the inlet of Gull Lake. It was last located farther downstream in Gull Lake (rkm -15) on the same day (Appendix A2-34).
- #20168 was tagged on June 7, 2019 at the inlet of Gull Lake. It was never detected and likely represents a tag malfunction.
- #20169 was tagged on June 7, 2019 at the inlet of Gull Lake. It was last located farther downstream in Gull Lake (rkm -12.9) on June 16 (Appendix A2-35).
- #25743 was tagged on June 5, 2018. It moved downstream immediately and was last detected in lower Gull Lake on June 12, 2018 (Appendix A2-4).
- #25745 was tagged on June 5, 2018 in upper Gull Lake. It was located here until June 6, 2018 (Appendix A2-6).

An additional five fish are considered missing (i.e., have not been detected for more than a year).

- #25742 was last detected on June 6, 2019 in Gull Lake (rkm -12.9) (Appendix A2-3).
- #25750 was last detected on September 9, 2019 in Clark Lake (rkm -44.5). It is likely that this fish continued to move upstream out of the receiver array (Appendix A2-11).
- #25756 was last detected on July 3, 2019 in Clark Lake (rkm -46.9). It is likely that this fish continued to move upstream out of the receiver array (Appendix A2-17).
- #20153 was last detected on June 26, 2019 in Gull Lake at rkm -10.2 (Appendix A2-23).
- #20175 was last detected on October 5, 2019 in the riverine portion of the Nelson River between Birthday Rapids and Gull Lake (rkm -26.5) (Appendix A2-37).

The 11 fish described above were not included in data analyses and are not discussed in the remainder of the report.

Prior to winter 2019/2020, 16 tagged Walleye moved downstream through Gull Rapids or the Keeyask GS into Stephens Lake:

- Three moved into Stephens Lake and made multiple upstream and downstream movements. Based on a lack of detections, all three fish are now considered missing.
 - #20182 was tagged on May 25, 2019a at the inlet of Gull Lake. It moved downstream through the Keeyask GS spillway on June 13 (Appendix A2-40).
 - #20186 was tagged on May 29, 2019 in upper Gull Lake. It moved throughout Gull Lake, as far upstream as the inlet and as far downstream as lower Gull Lake until August 10 when it moved downstream through the Keeyask GS spillway (Appendix A2-41).
 - #25739 was tagged on June 5, 2018 in lower Gull Lake and moved downstream through the Keeyask GS spillway between October and November. It was last detected in Stephens Lake (rkm 13.9) on November 20, 2018 and is now considered missing (Appendix A2-1).
- Five moved downstream through Gull Rapids or the Keeyask GS into Stephens Lake, and then continued to move downstream into the Long Spruce Reservoir.
 - #20147 was tagged on June 5, 2019. It moved throughout upper Gull Lake until July 24, when it moved downstream through the Keeyask GS spillway. It continued to move downstream in Stephens Lake and was detected within the Long Spruce forebay on August 1, 2019 (Appendix A2-18).
 - #20187 was tagged on May 23, 2019 at the inlet of Gull Lake and moved downstream through the Keeyask GS spillway on June 19. It continued to move downstream through Stephens Lake and was detected within the Long Spruce forebay on July 22, 2019 (Appendix A2-42).
 - #25740 was tagged on June 5, 2018. It moved throughout lower Gull Lake until June 14 and was detected in Stephens Lake on June 15. It moved between rkm

- 3.8 and 7.9 until June 18, after which it continued to move downstream. It was detected within the Long Spruce forebay on July 31, 2018 (Appendix A2-2).
- #25753 was tagged on May 27, 2018 at the inlet of Gull Lake. It then moved as far upstream as Birthday Rapids. It moved downstream through Gull Rapids on July 25 and through the Kettle GS on August 12, 2018 (Appendix A2-14).
 - #25755 was tagged on June 1, 2018, at the inlet of Gull Lake. It moved downstream through Gull Rapids between June 11 and 12, 2018. It was last detected in Stephens Lake on June 17, 2018 and detected in the Long Spruce forebay on August 6 (Appendix A2-16).
 - Four moved downstream through Gull Rapids immediately after tagging and were detected briefly (for one to 15 days) in Stephens Lake with no upstream movements. These fish are considered tagging mortalities or movements induced by stress resulting from the tagging procedure and are not discussed in the remainder of the report.
 - #20158 was tagged on June 6 at the inlet of Gull Lake. It moved downstream through the Keeyask GS spillway on June 16. It was last detected on June 21 (Appendix A2-28).
 - #20160 was tagged on June 7 at the inlet of Gull Lake. It remained at this location until June 13 when it began to move downstream, moving through the Keeyask GS Spillway on June 17. It was located in upper Stephens Lake until the end of the study period (Appendix A2-30).
 - #25748 was tagged on May 28, 2018, in the riverine area upstream of Gull Lake and moved downstream through Gull Rapids on June 12. It moved through the Kettle GS between June 14 and 18, 2018 (Appendix A2-9).
 - #25752 was tagged on May 27, 2018, at the inlet of Gull Lake and moved downstream through Gull Rapids on June 8. It moved downstream through the Kettle GS on June 23, 2018 (Appendix A2-13).
 - Four were last detected immediately upstream of the Kettle GS and likely moved downstream into the Long Spruce reservoir.
 - #20148 was tagged on June 6, 2019 in upper Gull Lake. It moved downstream through the Keeyask GS in winter 2019/2020 and continued to move downstream within Stephens Lake. It was last detected immediately upstream of the Kettle GS on July 5, 2020 (Appendix A2-19).
 - #20149 was tagged on June 5, 2019 in upper Gull Lake. It moved downstream through the Keeyask GS spillway on June 21 and continued to move downstream within Stephens Lake. It was last detected immediately upstream of the Kettle GS on July 2, 2019 (Appendix A2-20).
 - #20150 was tagged on June 5, 2019 in upper Gull Lake. It moved downstream within Gull Lake and was last detected at rkm -4.8 on June 21. It moved through the Keeyask GS Spillway on the same day. It was last detected immediately upstream of the Kettle GS on July 2 (Appendix A2-21).

- #20163 was tagged on June 6, 2019 at the inlet to Gull Lake. It was located here until June 22 when it moved upstream. It was located in the riverine area of the Nelson River between Birthday Rapids and Gull Lake until July 31 when it returned to Gull Lake. It moved downstream through the Keeyask GS spillway on August 9 and was last detected in lower Stephens Lake immediately upstream of the Kettle GS on August 16 (Appendix A2-33).

To summarize, 44 Walleye were tagged upstream of Gull Rapids in 2018 and 2019. Eleven are considered missing and 16 moved downstream into Stephens Lake. Therefore, 17 fish were available to be detected upstream of the Keeyask GS during winter 2020/2021.

4.1.2 STEPHENS LAKE

Seven transmitters were applied between June 6 and 9, 2018, and an additional 31 were applied between May and September, 2019 bringing the total number of tagged fish to 38.

One fish was only detected briefly after being tagged, and is considered missing due to tagging stress or mortality:

- #25734 was tagged on June 7, 2018. It moved downstream and was last detected at rkm 21.6 on June 13 (Appendix A3-2).

Eleven tagged Walleye were detected for more than 14 days but have not been located for over two years and are considered missing:

- #20129 was last detected on September 30, 2019 in upper Stephens Lake at rkm 4.2 (Appendix A3-8).
- #20133 was last detected on October 2, 2019 in upper Stephens Lake at rkm 4.2 (Appendix A3-12).
- #20134 was last detected on July 6, 2019 in upper Stephens Lake at rkm 1.2 (Appendix A3-13).
- #20136 was last detected on July 24, 2019 in lower Stephens Lake at rkm 24.7 (Appendix A3-15).
- #20137 was last detected on April 4, 2020 in lower Stephens Lake at rkm 21.6 (Appendix A3-16).
- #20145 was last detected on July 6, 2019 in upper Stephens Lake at rkm 1.2 (Appendix A3-24).
- #20152 was last detected on July 19, 2019 in upper Stephens Lake at rkm 6.5 (Appendix A3-25).
- #20171 was last detected on June 15, 2019 in upper Stephens Lake at rkm 7.4 (Appendix A3-28).

- #20178 was last detected on June 27, 2019 immediately downstream of the Keeyask GS spillway at rkm 0.6 (Appendix A3-34).
- #20180 was last detected on August 3, 2019 in lower Stephens Lake at rkm 24.7 (Appendix A3-36).
- #25736 was tagged on June 7, 2018, immediately downstream of the Keeyask GS. It was detected in upper Stephens Lake (rkm 1.2 to 10.3) until June 26 (Appendix A3-4).

These 12 fish are not discussed in the remainder of this report.

Prior to winter 2020/2021, four Walleye moved downstream through the Kettle GS into the Long Spruce reservoir.

- #20141 was tagged on May 31, 2019, immediately downstream of the Keeyask GS. It moved between rkm 0.6 and 9.4 in upper Stephens Lake until June 14 when it moved rapidly downstream. It moved through the Kettle GS on June 15, 2019 (Appendix A3-20).
- #20142 was detected moving between upper and lower Stephens Lake (rkm 5.2 to 18.8) until July 31, 2021. It was first detected downstream of the Kettle GS on August 16, 2020 (Appendix A3-21).
- #25732 was tagged on June 9, 2018, immediately downstream of the Keeyask GS. It remained at this location until June 15, after which it began to move downstream. It moved through the Kettle GS on June 13, 2018 (Appendix A3-1).
- #25738 was tagged on June 7, 2018, immediately downstream of the Keeyask GS. It moved downstream and was last located in lower Stephens Lake at rkm 36.1 on July 6. It was first located in the Long Spruce forebay on June 19, 2018 (Appendix A3-6).

One additional fish likely moved downstream through the Kettle GS, however, its movements could not be confirmed.

- #20167 was tagged on September 16, 2019 at rkm 5.5 in upper Stephens Lake. It moved downstream on September 20 and was last located immediately upstream of the Kettle GS (rkm 40.9) on September 27. Due to the short amount of time between tagging and this downstream movement (four days), it likely represents a movement caused by tagging stress or by mortality (Appendix A3-27).

To summarize, 38 Walleye were tagged in Stephens Lake in 2018 and 2019. Twelve fish are considered missing and five moved downstream through the Kettle GS (four confirmed and one suspected). No fish that moved downstream through the Keeyask GS were available to be detected. Therefore, 21 fish were available to be detected in Stephens Lake during winter 2020/2021.

4.2 WINTER 2020/2021

4.2.1 UPSTREAM OF THE KEEYASK GS

All ten receivers deployed between Clark Lake and the Keeyask GS during the 2020/2021 winter period were retrieved (Figure 1; Map 3). Seven of the 17 fish (41%) available to be detected were located a total of 68,128 times (range: 26–49,906 detections per individual) (Appendix A1-1). On average, fish were detected for 53 days of the 219-day winter period (24%) (range: 4–189 days). All seven fish were located exclusively in the Gull Lake portion of the reservoir, as far upstream as rkm -19.5 and as far downstream as rkm -7.9. The average overall movement range was 1.6 rkm (StDev = 1.8 rkm; range 0.0-5.0 rkm) (Figure 4; Table A1-1). Most detections (n = 54,637; 80%) were logged in the middle of Gull Lake at rkm -12.9 by three fish (Figure 5). One fish previously considered missing (#53790) was located by a single receiver set for the first time during winter at the mouth of the flooded backbay at Rabbit Creek (#114226; rkm -17.4).

4.2.2 STEPHENS LAKE

All of the 17 receivers deployed in Stephens Lake during the 2020/2021 winter period were retrieved (Figure 1; Map 4). Seven of 21 fish (33%) were located a total of 189,283 times (range: 26–77,327 detections per individual) (Appendix A1-2). On average, fish were detected for 64 days of the 219-day winter period (29%) (range: 4–206 days). Four (57%) were located as far upstream as rkm 3.9, while one (14%) was located as far downstream as rkm 32.0 (Figure 6). The average overall movement range was 4.4 rkm (StDev = 4.3 rkm; range 0.0–12.4 rkm) (Figure 6; Appendix A1-2). Most detections (n = 101,863; 54%) were logged in the Southern portion of Stephens Lake at rkm 8.7 by two fish (Figure 7).

4.3 OPEN-WATER 2021

4.3.1 ACOUSTIC RECEIVER RETRIEVAL

All stationary acoustic receivers deployed upstream of the Keeyask GS (n = 31), in Stephens Lake (n = 31), and the Limestone reservoir (n = 2) during the 2021 open-water period were successfully retrieved (Maps 5 and 6).

4.3.2 UPSTREAM OF THE KEEYASK GS

Seventeen Walleye were available to be detected upstream of the Keeyask GS during the 2021 open-water period (Section 4.1.1). Thirteen (76%) were detected between 2 and 107,836 times for 1–144 days of the 162-day open-water period (1–89% of the time; Appendix A1-3). The average total movement range was 16.0 rkm (StDev = 17.8 rkm; range: 0.0–38.3 rkm) (Figure 8; Appendix A1-3). The farthest upstream detections occurred at the inlet to Clark Lake at rkm -48.2 (by five fish; 38%). Only one fish was detected as far downstream as rkm -7.7 (Figures 8 and 9; Appendix A1-3). No fish moved downstream through the Keeyask GS spillway into Stephens Lake.

Of the four fish that were not detected during open-water 2021:

- Two (#25747 and #20157) were detected for the majority of the 2020 open-water period, moving throughout Gull Lake.
- Two (#25754 and #20176) were detected for less than 20 days of the 2020 open-water period and may remain largely outside the receiver array.

4.3.2.1 PROPORTIONAL DISTRIBUTION

Walleye continued to spend a similar proportion of time in each river zone in 2021 as in previous years, using the Gull Lake portion of the reservoir (zones 4 and 5) most often (Table 2; Figure 10):

- Zone 1 for 9% of the time (StDev = 19%; range: 0–63%);
- Zone 2 for 2% of the time (StDev = 6%; range: 0–18%);
- Zone 3 for 9% of the time (StDev = 20%; range: 0–70%);
- Zone 4 for 55% of the time (StDev = 49%; range: 0–100%); and
- Zone 5 for 25% of the time (StDev = 45%; range: 0–100%).

4.3.2.2 MOVEMENT PATTERNS

During the 2021 open-water period, most detections were logged at the inlet to Gull Lake at rkms -19.4 and -19.5 ($n = 116,072$; 71%) (Figure 9).

Most fish (69%) displayed the same movement patterns as in previous years.

- Seven remained exclusively in the Gull Lake portion of the reservoir.
 - Three remained in lower Gull Lake. All of these fish were located by a single receiver: #20159 at rkm -7.7 (receiver #114232), #25744 at rkm -7.9 (receiver #122862), and #25749 at rkm -8.9 (receiver #108010).

- Two (#20154 and #20156) remained near the Gull Lake inlet at rkms -19.4 and -19.5.
- Two (#20162 and #25746) remained in upper Gull Lake (between rkms -17.4 and -12.9).
- #20170 moved upstream into Clark Lake on June 3, 2021, likely moving upstream past the receiver array. Although this fish was not detected again during the 2021 open-water period, it displayed the same movement pattern in 2019.
- #20188 first moved upstream into Clark Lake during open-water 2020, moving past the receiver array. It was detected at the inlet to Clark Lake (rkm -48.2) near the beginning of the 2021 open-water period. It moved downstream to the Gull Lake inlet (rkm -19.5) on June 21, 2021, before returning to Clark Lake inlet where it was last detected on August 15, 2021.

Four Walleye displayed increased movement ranges and moved long distances (spanning four zones) within the study area:

- Three (#20151, #20181, and #25751) made upstream movements to the Clark Lake inlet (rkm -48.2) in spring before returning downstream to the reservoir.
- #20161 was detected in the Gull Lake portion of the reservoir for the majority of the study period. It moved upstream in fall and was last detected at the inlet to Clark Lake (rkm -48.2) on September 29, 2021.

4.3.3 STEPHENS LAKE

Twenty-one Walleye were available to be detected in Stephens Lake during the 2021 open-water period (Section 4.1.2). Sixteen (76%) were detected between 20 and 67,306 times for 7–130 days of the 162-day open-water period (5–80% of the time; Appendix A1-4). The average total movement range was 7.9 rkm (StDev = 10.3 rkm; range: 0.0–40.1 rkm) (Figure 11; Appendix A1-4). The farthest upstream detections occurred near the Keeyask GS spillway at rkm 0.8 (by six fish; 38%) while the farthest downstream occurred at rkm 40.9 just upstream of the Kettle GS (by one fish; 6%) (Figure 12; Appendix A1-4).

Of the five fish not detected during open-water 2021:

- Two (#20140 and #20177) were detected for the majority of the 2020 open-water period, moving throughout Stephens Lake.
- Three (#20172, #20183, and #20184) were detected for less than 20 days of the 2020 open-water period and may remain largely outside the receiver array.

4.3.3.1 PROPORTIONAL DISTRIBUTION

Unlike the majority of previous study years, individual Walleye spent the greatest proportion of the open-water period in Zone 6 (closer to the Keeyask GS), spending an average of 56% (StDev = 39%, range: 0–100%) of the study period in this area. Zone 7 (farther from the GS) was used an average of 44% (StDev = 39%, range: 0–98%) of the time (Table 2; Figure 10).

4.3.3.2 MOVEMENTS

During the 2021 open-water period, most detections were logged near the tailrace of the Keeyask GS at rkm 1.2 (n = 75,417; 42%) (Figure 12). General movement patterns were as follows.

- Twelve (75%) remained in upper Stephens Lake, moving no farther downstream than rkm 13.4:
 - Eight (#25737, #20130, #20131, #20138, #20139, #20144, #20179, and #20185) were located in the northern portion of Stephens Lake for part of the open-water period.
 - Four (#25741, #20132, #20135, and #20174) remained in the immediate vicinity of the Keeyask GS, travelling no farther downstream than rkm 1.3.
- Two moved farther downstream into Stephens Lake:
 - #20143 spent the beginning of the open-water period near the GS, but made a downstream movement to rkm 18.8 in early July.
 - #20173 made upstream and downstream movements within Stephens Lake, moving as far downstream as rkm 16.1.
- Two were located just upstream of the Kettle GS:
 - #20165 made upstream and downstream movements throughout Stephens Lake for most of the open-water period. On September 30 and October 1, 2021, this fish was detected immediately upstream of the Kettle GS (rkm 40.9). It is unclear if this fish moved downstream through the GS.
 - #25735 was tagged downstream of the Keeyask GS in 2018. It remained in the upper portion of Stephens Lake until winter 2019 when it moved downstream to lower Stephens Lake. Since this time, it has been detected regularly at rkm 32.0 and 36.1.

4.3.4 LONG SPRUCE RESERVOIR

Due to low water levels that prevented boat access downstream of the Kettle GS throughout the majority of the open-water period, no acoustic receivers were set in the Long Spruce reservoir. No Walleye were detected within the Limestone reservoir in 2021.

4.4 2021 TAGGING

4.4.1 UPSTREAM OF THE KEEYASK GS

All 30 Walleye tagged upstream of the Keeyask reservoir GS between May 31 and June 14, 2021, were detected between 1,771 and 31,981 times for 12–124 days of the 162-day open-water period (7–77% of the time; Appendix A1-3). The average total movement range was 24.8 rkm (StDev = 13.43 rkm; range: 0.0–60.0 rkm) (Figures 13 and 14; Appendix A1-3). The farthest upstream detections occurred at the inlet to Clark Lake at rkm -48.2 by ten fish (33%). Only two fish were detected near the tailrace of the Keeyask GS at rkm -2.2, and two fish moved downstream through the GS into Stephens Lake.

4.4.1.1 PROPORTIONAL DISTRIBUTION

Unlike fish tagged in 2018 and 2019, those tagged in 2021 spent the greatest amount of time in the portion of the reservoir between Birthday Rapids and Gull Lake (Zone 3) and the upper basin of Gull Lake (Zone 4) (Table 2; Figure 10). However, this is likely a reflection of tagging location as most fish tagged in 2021 were captured in Zone 3. Each zone was used as follows:

- Zone 1 for 9% of the time (StDev = 15%; range: 0–58%);
- Zone 2 for 2% of the time (StDev = 3%; range: 0–9%);
- Zone 3 for 36% of the time (StDev = 34%; range: 0–100%);
- Zone 4 for 40% of the time (StDev = 37%; range: 0–100%); and
- Zone 5 for 14% of the time (StDev = 24%; range: 0–69%).

4.4.1.2 MOVEMENT PATTERNS

During the 2021 open-water period, most detections were logged in the riverine area slightly upstream of the Gull Lake inlet at rkm -22.6 (n = 101,070; 31%).

Fourteen fish moved out of the reservoir (briefly or permanently), moving upstream into Clark Lake or downstream into Stephens Lake.

- Twelve moved upstream into Clark Lake.
 - Five (#48258, #48266, #48314, #48320, and #48331) moved between Gull Lake and Clark Lake, returning downstream by the end of the study period.
 - Two (#48326 and #48329) moved between Clark Lake and the portion of the reservoir between Birthday Rapids and Gull Lake, returning downstream by the end of the study period.

- Five (#48244, #48270, #48322, #48321, and #48333) were last detected in Clark Lake at the end of the study period.
- Two moved downstream into Stephens Lake, both made upstream and downstream movements within the reservoir for more than two weeks prior to moving downstream. Therefore, these movements cannot be attributed to tagging mortality or stress.
 - #48323 was tagged on June 1 in the riverine portion of the reservoir at rkm -22.6. It moved downstream through the Keeyask GS on July 1 and was first detected in Stephens Lake downstream of the spillway (rkm 0.8). It made multiple upstream and downstream movements within Stephens Lake, indicating it survived passage.
 - #48330 was tagged in upper Gull Lake (rkm -17.4) on June 1, 2021. It moved downstream through the Keeyask GS on July 14. It continued to move downstream within Stephens Lake (with some upstream movements indicating it survived passage). It was last detected immediately upstream of the Kettle GS (rkm 40.5) on July 24.

Sixteen fish remained within the reservoir.

- Seven (#48259, #48260, #48261, #48263, #48267, #48313, and #48332) moved between Gull Lake and Birthday Rapids.
- Four (#48264, #48269, #48327, and #48328) moved between Gull Lake and the riverine area immediately upstream.
- Four (#48265, #48268, #48271, and #48319) remained in the riverine area between Birthday Rapids and the inlet to Gull Lake.
- #48262 remained within the Gull Lake portion of the reservoir.

4.4.2 STEPHENS LAKE

All 30 Walleye tagged in Stephens Lake between June 2 and 6, 2021, were detected between 358 and 19,665 times for 4–116 days of the 162-day open-water period (2–72% of the time; Appendix A1-4). The average total movement range was 14.2 rkm (StDev = 8.1 rkm; range: 3.1–31.0 rkm) (Figures 15 and 16; Appendix A1-4). The farthest upstream detections occurred near the Keeyask GS spillway at rkm 0.8 (by 12 fish; 40%) while the farthest downstream occurred upstream of the Kettle GS at rkm 32.0 (by one fish; 3%).

4.4.2.1 PROPORTIONAL DISTRIBUTION

Unlike the fish tagged in 2018 and 2019, individual Walleye tagged in 2021 spent the greatest proportion of the open-water period in Zone 7 (farther from the Keeyask GS), spending an average of 70% (StDev = 36%, range: 0–100%) of the study period in this area. Zone 6 (closer to the GS) was used an average of 30% (StDev = 36%, range: 0–100%) of the time (Table 2; Figure 10).

4.4.2.2 MOVEMENT PATTERNS

During the 2021 open-water period, most detections were logged near the tailrace of the Keeyask GS at rkm 1.2 (n = 36,879; 20%). All fish were detected close to the Keeyask GS (between rkms 0.8 to 2.7) at some point during this period.

Seventeen fish remained in upper Stephens Lake, travelling as far downstream as rkm 13.4.

- Three (#48238, #48240, and #48249) remained near the Keeyask GS, travelling no farther than 5.9 rkm downstream.
- Two moved into the northern portion of Stephens Lake and were last detected here in July (#48245 and #48274).
- Twelve moved between upper and lower Stephens Lake, remaining in the southern portion.

Thirteen fish moved farther downstream.

- Four moved as far downstream as rkm 18.8.
- Nine moved as far downstream and rkm 24.9.
 - Two (#48241 and #48242) made one downstream movement to rkm 24.9 and were detected there from July to the end of the open-water period.

5.0 DISCUSSION

Walleye movement monitoring was initiated in 2013 to describe movements during the pre-construction (2013), construction/commissioning (2014–2022), and operation phases of the Keeyask Project. The intent of the study was to determine if habitat changes associated with construction and operation of the GS would alter habitat use and coarse-scale movement patterns. The discussion below highlights movement patterns that have been observed and discusses the key questions (presented in the AEMP) with respect to potential impacts of construction and impoundment on Walleye and their movements.

Acoustic transmitters have been applied to Walleye upstream and downstream of the Keeyask GS (formerly Gull Rapids) in six different years since the study began (2013, 2014, 2016, 2018, 2019, and 2021). Transmitters applied in earlier years have since expired (2013–2016) and therefore regular tagging is required to maintain a sample size of 80 fish and provide overlap to record movements associated with different phases of the Project (construction, reservoir impoundment, commissioning, and operation). Walleye were tagged in both 2018 (17 upstream of the Keeyask GS and seven in Stephens Lake) and 2019 (27 upstream and 29 downstream). An additional 60 fish (30 upstream and 30 downstream) were tagged in 2021. The discussion below highlights movement patterns observed for Walleye tagged in 2018/2019 and 2021 separately, and compares to those tagged in 2013–2016.

5.1 EVALUATION OF METHODOLOGY

Fish movement monitoring, via acoustic telemetry, is a significant component of the AEMP, and is being used to assess potential impacts of Keeyask GS construction on several fish species including Lake Sturgeon (adults and juveniles), Walleye, and Lake Whitefish. Of these fish species/life stages, the methodology is most effective for monitoring movements of adult and juvenile Lake Sturgeon. Lake Sturgeon have a low natural mortality rate, occupy main channel habitats where receivers are located, and in the case of juveniles, rarely move long distances. These are all characteristics that allow for frequent detections of tagged fish. Monitoring movements of Walleye and Lake Whitefish via acoustic telemetry has been less effective relative to Lake Sturgeon. This is because: i) tagged individuals are detected less frequently due to more frequent utilization of shallow water habitats outside the detection range of receivers; ii) potential use of tributaries and off-current embayments where receivers are not located; iii) stress from the tagging procedure may cause an initial downstream movement of some individuals which complicates data interpretation; and iv) a higher natural mortality rate relative to Lake Sturgeon causes a greater proportion of tags to go missing. These characteristics reduce the frequency of detection of tagged fish and the higher proportion of missing fish further complicates data interpretation.

Despite this, acoustic telemetry continues to be an effective method for monitoring movements and habitat use patterns of Walleye in the study area. During the 2021 open-water period, the

majority of tagged fish remaining in the study area were located. Upstream of the Keeyask GS 76% of fish were detected in 2021 (compared to 47–100% in previous years) and 76% were detected in Stephens Lake (compared to 50–98% in previous years). The data collected to date provides a good understanding of Walleye movement on a coarse-scale. This has been facilitated by the extensive array of stationary acoustic receivers spread over a ~100 km length of the Nelson River between Clark Lake and the Limestone GS, and the inclusion of receiver gates which provide confidence that movements of Walleye past key points are being detected.

5.2 MOVEMENT PATTERNS

Although different Walleye have been tagged and monitored over time, similar coarse-scale movement patterns have been observed both upstream and downstream of Gull Rapids/the Keeyask GS since the study began in 2013. Each year, fish tagged upstream of the Keeyask GS have been split into four groups: those that remained in Gull Lake; those that moved between Birthday Rapids and Gull Lake; those that moved between Clark Lake and Gull Lake; and those that remain in the riverine area downstream of Birthday Rapids. Walleye upstream of the Keeyask GS have consistently spent little time in the vicinity of the GS. Similarly, Walleye tagged in Stephens Lake have been consistently split into two groups: those that remain exclusively within the upper portion (i.e., within 13.4 rkm of the Keeyask GS) of the lake; and those that move extensively throughout. In contrast to those tagged upstream of the Keeyask GS, a high proportion of the Walleye tagged in Stephens Lake have continued to use habitat in the vicinity of the construction site.

Walleye tagged in 2018/2019 continued to display the same general movement patterns both upstream and downstream of the Keeyask GS in the first open-water season post-impoundment. The majority (69%) of fish within the reservoir continued to display the same movement patterns as in previous years, while the remaining 31% (four fish) moved farther than in previous year, as far upstream as Clark Lake. A greater number of fish tagged in 2021 moved long distances with 12 (40%) moving upstream to Clark Lake, and an additional seven (23%) moving between Gull Lake and Birthday Rapids. The average total movement range was 16.0 rkm for fish tagged in 2018/2019 compared to 24.8 rkm for fish tagged in 2021.

5.3 KEY QUESTIONS

Impoundment of the Keeyask reservoir was completed on September 5, 2020 and sampling in the Keeyask reservoir in 2021 represented the first year that water levels and flows were the same as they will be during operation. Monitoring in Stephens Lake, however, represented a transition between construction and operation as a considerable portion of the flow was still being passed through the spillway, and only a few units were functioning in the powerhouse. Due to Keeyask reservoir impoundment, several key questions identified in the AEMP that have not been previously discussed are addressed below.

What is the frequency of downstream movement through the Keeyask GS, which size classes are moving downstream, and when are the movements occurring?

Since tagging began in 2013, 39 fish have moved downstream through Gull Rapids or the Keeyask GS. Thirteen of these movements likely occurred due to tagging stress or mortality, while 26 movements occurred independently of tagging. By year, the highest proportion of tagged Walleye moved downstream through the Keeyask GS construction site (independent of tagging stress) in 2017 (18%) and the Keeyask GS spillway in 2019 (13%). In all other years, the rate of downstream movement has ranged from 0% (in 2013) to 10% (in 2015). In the first full year of monitoring following reservoir impoundment in 2020, two fish (5%) moved downstream through the Keeyask GS spillway. Both fish were first detected in Stephens Lake at the beginning of June, almost nine months after reservoir impoundment. Both fish continued to display upstream and downstream movements within Stephens Lake, indicating they survived passage. Overall, there does not appear to be a clear increasing or decreasing trend in the proportion of Walleye that move downstream past the Keeyask GS.

Are Walleye using habitat in the vicinity of construction activities, particularly during spawning?

Monitoring since 2013 has shown that Walleye tagged upstream of the Keeyask GS do not spend much time in the vicinity of the construction site. Since studies began, Walleye have rarely been detected at the receiver set closest to Gull Rapids or the Keeyask GS construction site (rkm -5.8 from 2013–2017, -4.8 from 2018–2019, and -2.2 in 2020–2021). For example, only two of 30 Walleye tagged in 2021 were detected by the receiver closest to the Keeyask GS (rkm -2.2) in 2021, and no fish tagged in 2018/2019 were detected farther downstream than rkm -7.7 (one fish; 7%).

In contrast, Walleye in Stephens Lake regularly use habitat directly downstream of the construction site. It has been one full year of monitoring since the first unit of the powerhouse was commissioned, causing flow alterations downstream of the GS in Stephens Lake. Despite this, Walleye have been detected near Gull Rapids or the Keeyask GS construction site (\leq rkm 1.3) during the spring in all study years and have likely continued to spawn in this area during the construction and initial operation periods. In 2021, two fish (13%) tagged in 2018/2019 and all fish tagged in 2021 were detected within 1.3 rkm of the Keeyask GS during the spawning period (May 24 to June 4).

What types of habitat are Walleye utilizing in the Keeyask reservoir (i.e., are fish using the upper, middle, or lower end of the reservoir)?

Walleye have continued to spend the majority of the open-water period in the upper basin of Gull Lake (Zone 4) since the study began in 2013. In the open-water period of 2020, fish spent a nearly equal portion of their time in upper Gull Lake before (60%) and after (63%) reservoir impoundment. In open-water 2021, fish tagged in 2018/2019 continued to spend 55% of the time in this area. Fish tagged in spring 2021 spent more time in the riverine area between Birthday Rapids and Gull Lake (Zone 3; 36%) than those tagged in 2018/2019 (9%). This is likely a reflection of tagging location as the majority of fish tagged in 2021 were captured and tagged in Zone 3.

What proportion of the fish population moves from the Keeyask reservoir upstream past Birthday and/or Long rapids?

Before the start of construction in 2014, seven of 49 tagged Walleye (14%) moved upstream into Clark Lake. During the construction period, 24 of 132 tagged Walleye (18%) moved upstream. During the first open-water period post-impoundment, 18 tagged Walleye (six tagged in 2018/2019 and 12 tagged in 2021) moved upstream. This represents 30% of tagged fish, a larger proportion than seen previously. Despite the increase, the majority of fish (56%) returned downstream to the reservoir prior to the end of the 2021 open-water period. Six remained in Clark Lake, and one likely moved upstream out of the receiver array. Continued monitoring will determine if this trend continues.

As discussed previously, movements of Walleye were monitored for the first full winter and open-water period after reservoir impoundment. An array of acoustic receivers was deployed at the end of the open-water period in 2021 to continue monitoring movements. Continued monitoring will determine if changes in movements observed in 2021 will continue with time post-impoundment and as GS construction is completed.

6.0 SUMMARY AND CONCLUSIONS

- Acoustic transmitters were applied to Walleye upstream and downstream of the Keeyask GS construction site in 2013, 2014, 2016, 2018, 2019, and 2021. The transmitters applied in 2013, 2014, and 2016 have expired. Sixty new transmitters were applied in spring 2021 (30 upstream and 30 downstream of the Keeyask GS) and will last until open-water 2025.
- Walleye tagged upstream of the Keeyask GS have consistently displayed four general movement patterns since monitoring began in 2013. These fish either: remain in Gull Lake, move between Birthday Rapids and Gull Lake, move between Clark Lake and Gull Lake, or remain in the riverine area downstream of Birthday Rapids.
- Walleye tagged in Stephens Lake have been consistently split into two groups: those that remain exclusively within the upper portion (within 13.4 rkm of the Keeyask GS) of the lake; and those that move extensively throughout the lake.
- The key questions, as described in the AEMP, for Walleye movement monitoring during construction and impoundment of the Keeyask GS are as follows:

- *What is the frequency of downstream movement through the Keeyask GS, which size classes are moving downstream, and when are the movements occurring?*

Since tagging began in 2013, 39 fish have moved downstream through Gull Rapids or the Keeyask GS. Thirteen of these movements likely occurred due to tagging stress or mortality, while 26 movements occurred independently of tagging. By year, the highest proportion of tagged Walleye moved downstream through the Keeyask GS construction site (independent of tagging stress) in 2017 (18%) and the Keeyask GS spillway in 2019 (13%). In all other years, the rate of downstream movement has ranged from 0% (in 2013) to 10% (in 2015). In the first full year of monitoring following reservoir impoundment in 2020, two fish (5%) moved downstream through the Keeyask GS spillway. Both fish were first detected in Stephens Lake at the beginning of June, almost nine months after reservoir impoundment. Both fish continued to display upstream and downstream movements within Stephens Lake, indicating they survived passage. Overall, there does not appear to be a clear increasing or decreasing trend in the proportion of Walleye that move downstream past the Keeyask GS.

- *Are Walleye utilizing habitat in the vicinity of construction activities (particularly during spawning)?*

Monitoring since 2013 has shown that Walleye tagged upstream of the Keeyask GS that remain in Gull Lake do not spend much time in the vicinity of the construction site. In contrast, Walleye tagged in Stephens Lake, or those that have moved downstream from Gull Lake, consistently use habitat directly downstream from the construction site. In spring, Walleye are frequently detected near (\leq rkm 1.3) the Keeyask GS, likely indicating that spawning has

continued in this area throughout the construction, commissioning of the spillway, and initial operation phases of the Project.

- *What types of habitat are Walleye utilizing in the Keeyask reservoir (i.e., are fish using the upper, middle, or lower end of the reservoir)?*

Walleye have continued to spend the majority of the open-water period in the upper basin of Gull Lake since the study began in 2013. In open-water 2021, fish tagged in 2018/2019 continued to spend 55% of the time in this area. Fish tagged in spring 2021 spent more time in the riverine area between Birthday Rapids and Gull Lake (Zone 3; 36%) than those tagged in 2018/2019 (9%). This is likely a reflection of tagging location as the majority of fish tagged in 2021 were captured and tagged in Zone 3.

- *What proportion of the fish population move from the Keeyask reservoir upstream past Birthday and/or Long rapids?*

Before the start of construction in 2014, seven of 49 tagged Walleye (14%) moved upstream into Clark Lake. During the construction period, 24 of 132 tagged Walleye (18%) moved upstream. During the first open-water period post-impoundment, 18 tagged Walleye moved upstream. This represents 30% of tagged fish, a larger proportion than seen previously. Despite the increase, the majority of fish (56%) returned downstream to the reservoir prior to the end of the 2021 open-water period. Six remained in Clark Lake, and one likely moved upstream out of the receiver array.

- Movements of Walleye were monitored for the first full winter and open-water period after reservoir impoundment. An array of acoustic receivers was deployed at the end of the open-water period in 2021 to continue monitoring movements. Continued monitoring will determine if changes in movements observed in 2021 will continue with time post-impoundment and as GS construction is completed.

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TABLES

Table 1: Number of acoustic tags applied to Walleye in the Keeyask Study Area (upstream of Gull Rapids/the Keeyask GS and in Stephens Lake) between June 2013 and October 2021.

Year	Upstream GR	Stephens Lake	Total
2013*	40	40	80
2014*	9	2	11
2015*	0	0	0
2016*	48	40	88
2017*	0	0	0
2018	17	7	24
2019	27	31	58
2020	0	0	0
2021	30	30	60

*Tags no longer active during the current reporting period. Detailed information on movements (2013–2016) can be found in Hrenchuk and Barth (2014), Murray *et al.* (2015), Burnett *et al.* (2016), Hrenchuk and Lacho (2017; 2018; 2019), and Hrenchuk (2020).

Table 2: Proportion of time spent in each river zone by Walleye tagged upstream of Gull Rapids/the Keeyask GS and in Stephens Lake during a portion of the 2013 (June 4 to October 15), 2014 (June 4 to October 3), 2015 (June 4 to October 11), 2016 (June 4 to October 19), 2017 (June 7 to October 16), 2018 (June 6 to October 10), 2019 (June 2 to October 7), 2020 (July 3 to September 23), and 2021 (June 13 to October 10) open-water periods.

Tagging Year	Study Year	Upstream of Gull Rapids					Stephens Lake	
		1	2	3	4	5	6	7
2013	2013	4.0	1.3	2.0	84.0	8.7	66.0	34.0
	2014	6.9	1.2	4.8	82.7	4.3	59.0	41.0
	2015	10.4	4.2	6.5	71.8	7.1	76.5	23.5
	2016	8.5	0.1	19.9	61.0	5.9	58.2	41.8
2016/2018	2016	3.7	0.6	6.1	78.6	8.7	30.0	70.0
	2017	5.9	1.8	12.3	63.7	16.3	33.8	66.2
	2018	9.6	0.9	9.2	56.5	23.8	35.5	64.5
	2019	18.7	1.3	6.9	53.4	19.8	56.1	43.9
	2020	0.0	0.1	1.1	43.3	55.6	24.8	75.2
2019	2019	0.1	0.1	5.3	83.7	10.8	50.0	50.0
	2020	2.7	0.3	15.8	74.3	7.0	45.7	50.3
2016-2019	2019	5.3	0.5	5.7	75.2	13.4	51.7	48.3
	2020	1.5	0.2	9.2	60.3	28.8	41.5	55.3
	2021	8.6	2.5	8.8	55.1	25.0	55.9	44.1
2021	2021	8.5	1.9	35.5	40.3	13.8	30.4	69.6

Table 3: Proportion of tagged Walleye that moved downstream through Gull Rapids (now the Keeyask GS) and the Kettle GS each year since studies began in 2013.

Year	Gull Rapids/Keeyask GS									Kettle GS ¹								
	Total Movements ²			Tagging Stress/Mortality ³			Adjusted Movements ⁴			Total Movements ²			Tagging Stress/mortality ³			Adjusted Movements ⁴		
	Total Fish	Total Move	%	# Fish Tagged	Total Move	% ⁵	Total Fish	Total Move	% ⁶	Total Fish	n	%	# Fish Tagged	n	% ⁵	Total Fish	n	% ⁶
2013	40	2	5	40	2	5	40	0	0	40	-	-	40	-	-	40	-	-
2014	42	1	2	9	0	0	42	1	2	40	1	3	2	-	-	40	1	3
2015	40	4	10	0	-	-	40	4	10	43	1	2	0	-	-	43	1	2
2016	79	11	14	48	5	10	79	6	8	88	4	5	40	3	8	88	1	1
2017	28	5	18	0	-	-	28	5	18	42	8	19	0	-	-	42	8	19
2018	34	5	15	17	4	24	34	1	3	42	8	19	7	5	71	42	3	7
2019	46	8	17	27	2	7	46	6	13	55	5	9	31	1	3	55	4	7
2020	31	1	3	0	-	-	31	1	3	45	1	2	0	-	-	45	1	2
2021	47	2	4	30	-	-	47	2	4	51	-	-	30	-	-	51	-	-

1. Includes all fish tagged in Stephens Lake as well as those that moved downstream from Gull Lake.
2. Includes all downstream movements, including those that occurred due to tagging stress and mortality and those that occurred independently.
3. Includes only Walleye that moved downstream within two weeks of tagging. These movements are likely caused by tagging stress or mortality
4. Includes only Walleye that displayed downstream movements independently of tagging.
5. Proportion is calculated as a percentage of those tagged in the current year.
6. Proportion is calculated as a percentage of the total number of fish available for detection in the current year.

FIGURES

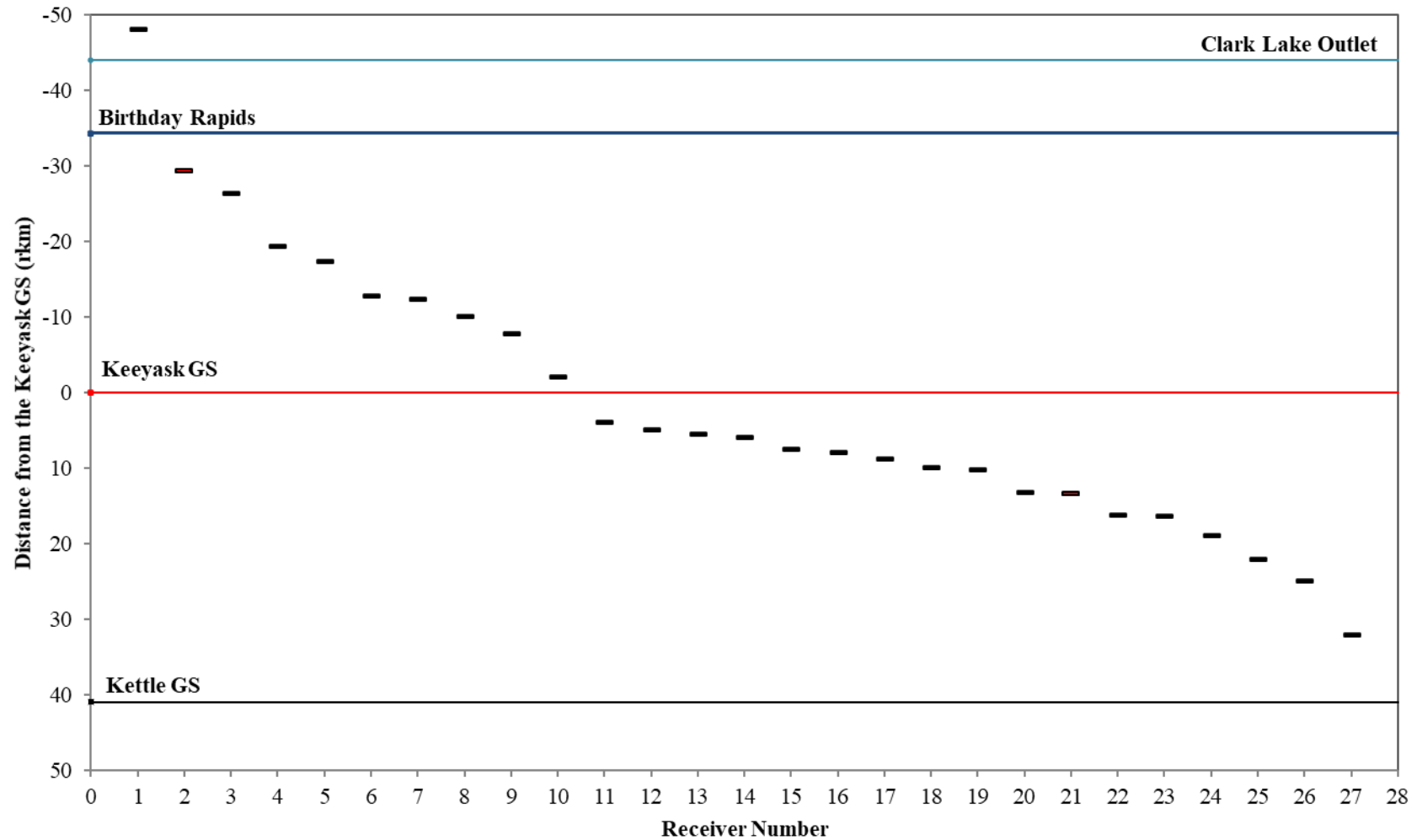


Figure 1: Locations of stationary acoustic receivers (dashes) in relation to the base of the Keeyask GS (rkm 0) and other major landmarks (lines) in the Nelson River between Clark Lake and the Limestone GS between September 2020 and May 2021. A red dash indicates a receiver that was lost.

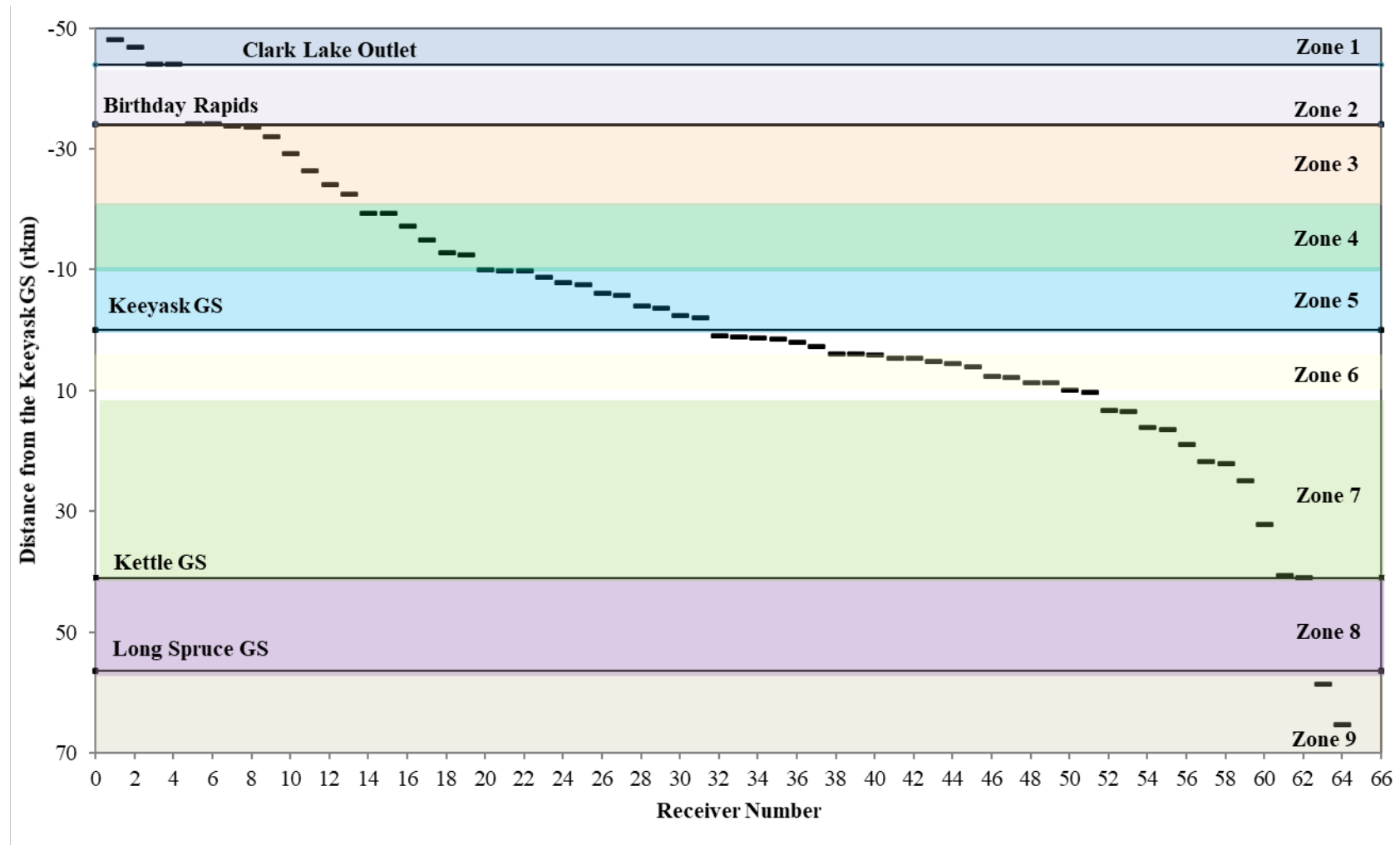


Figure 2: Locations of stationary acoustic receivers (dashes) in relation to the base of the Keeyask GS (rkm 0) and other major landmarks (lines) in the Nelson River between Clark Lake and the Limestone GS between June and October, 2021. River zones upstream and downstream of the Keeyask GS are indicated by shading.

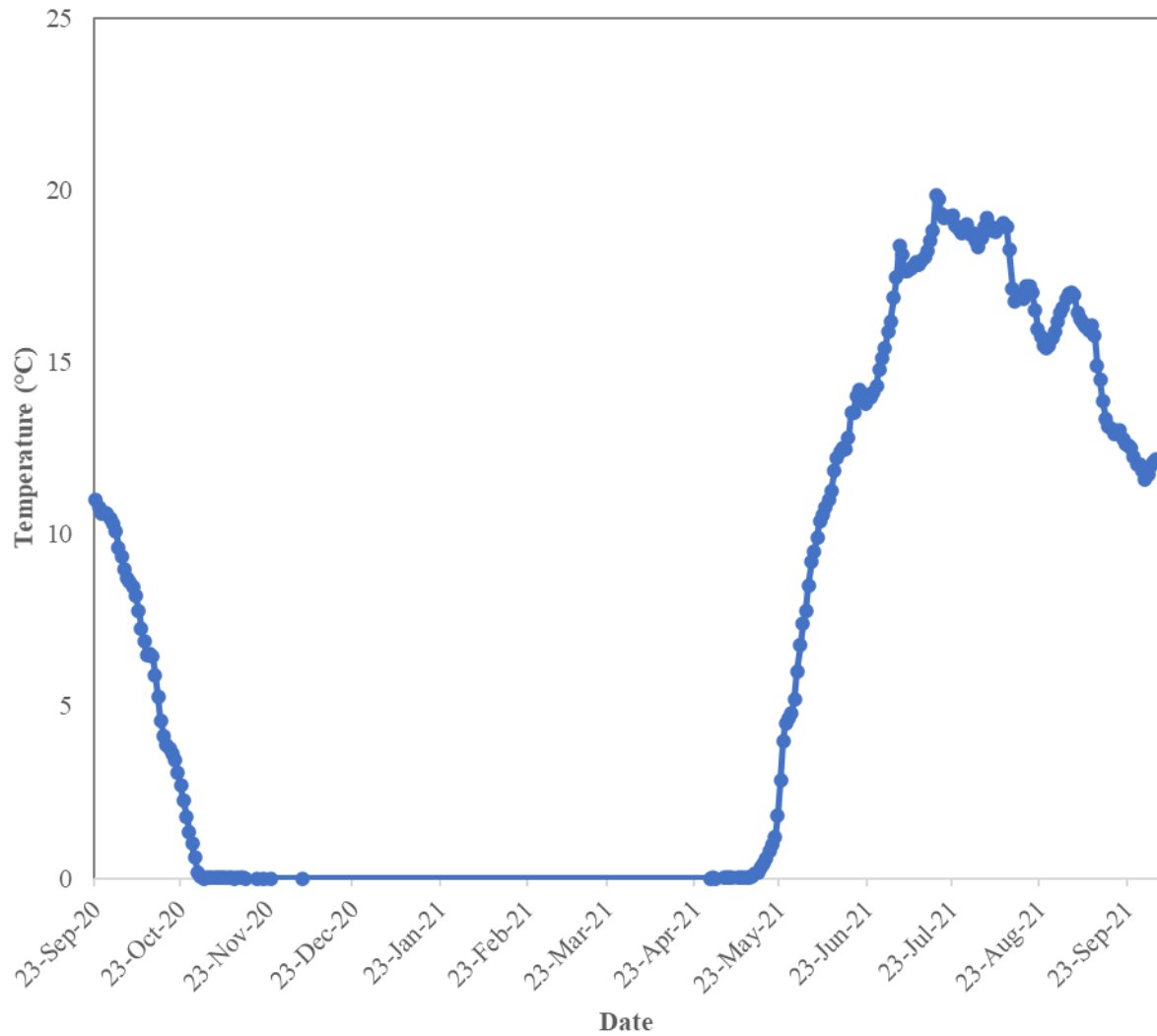


Figure 3: Water temperature in the Nelson River mainstem from September 23, 2020, to October 3, 2021.

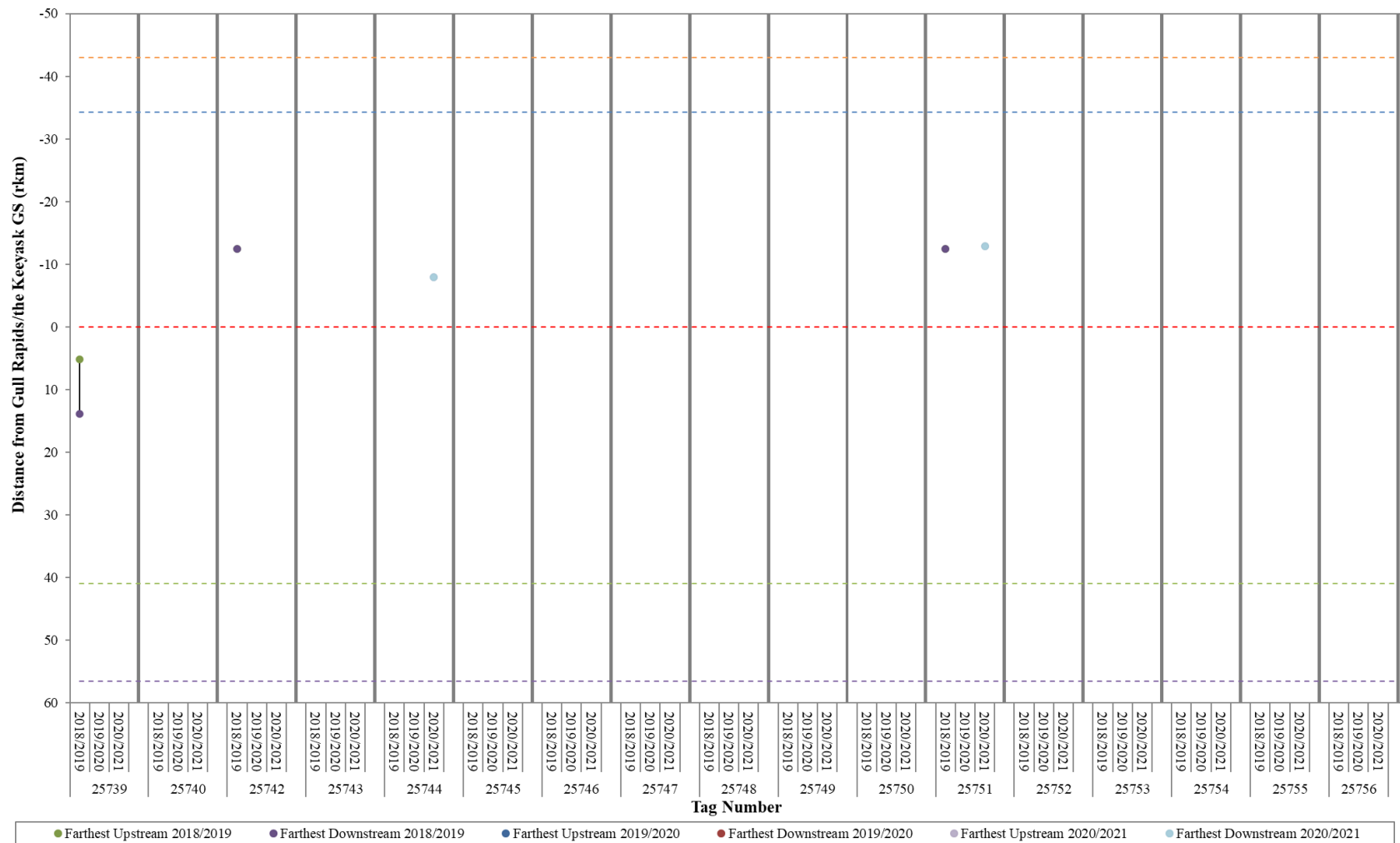


Figure 4: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of the Keeyask GS during the winter period (2018–2021). Horizontal dotted lines indicate locations of landmarks (orange = Clark Lake outlet; blue = Birthday Rapids; red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS).

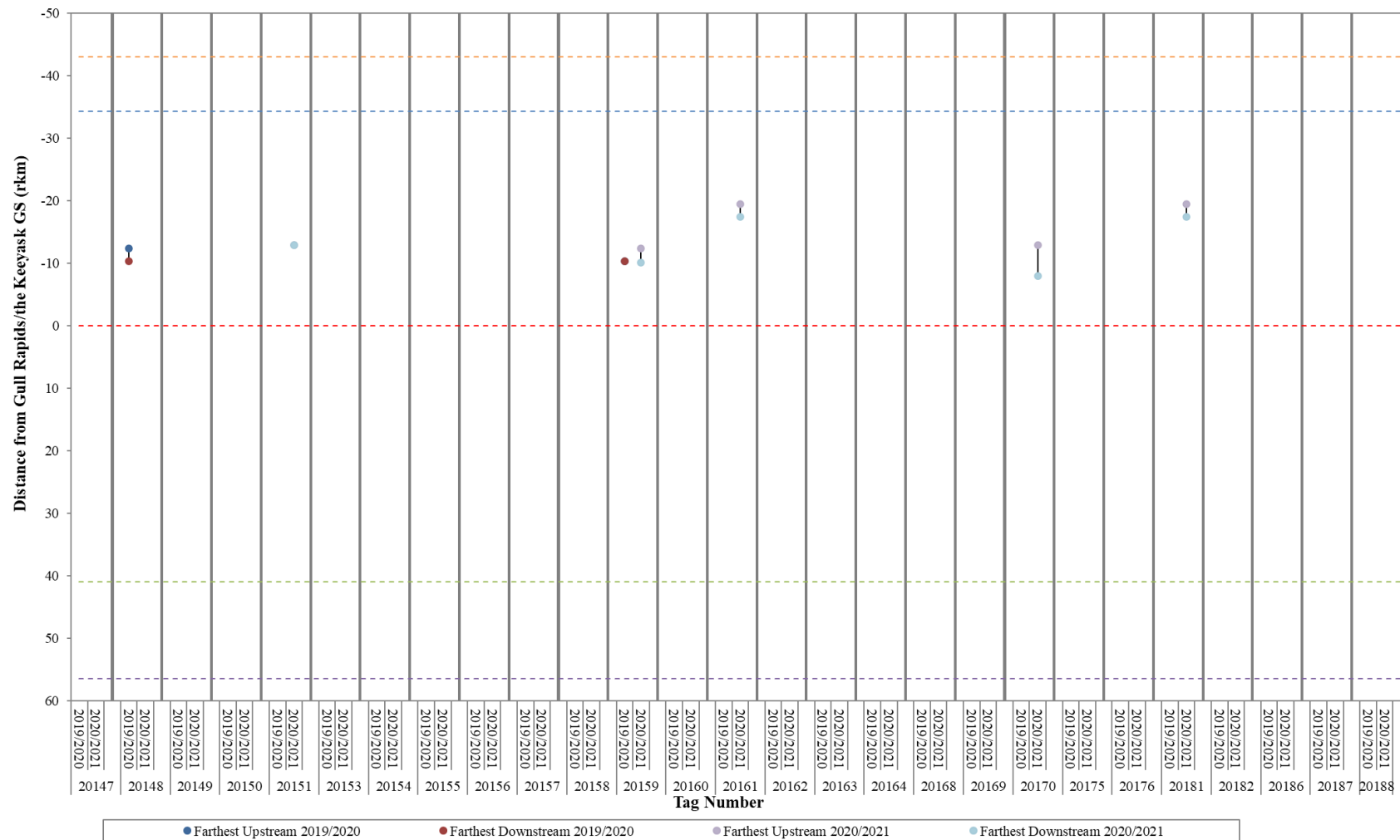


Figure 4: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of the Keeyask GS during the winter period (2018–2021). Horizontal dotted lines indicate locations of landmarks (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS) (continued).

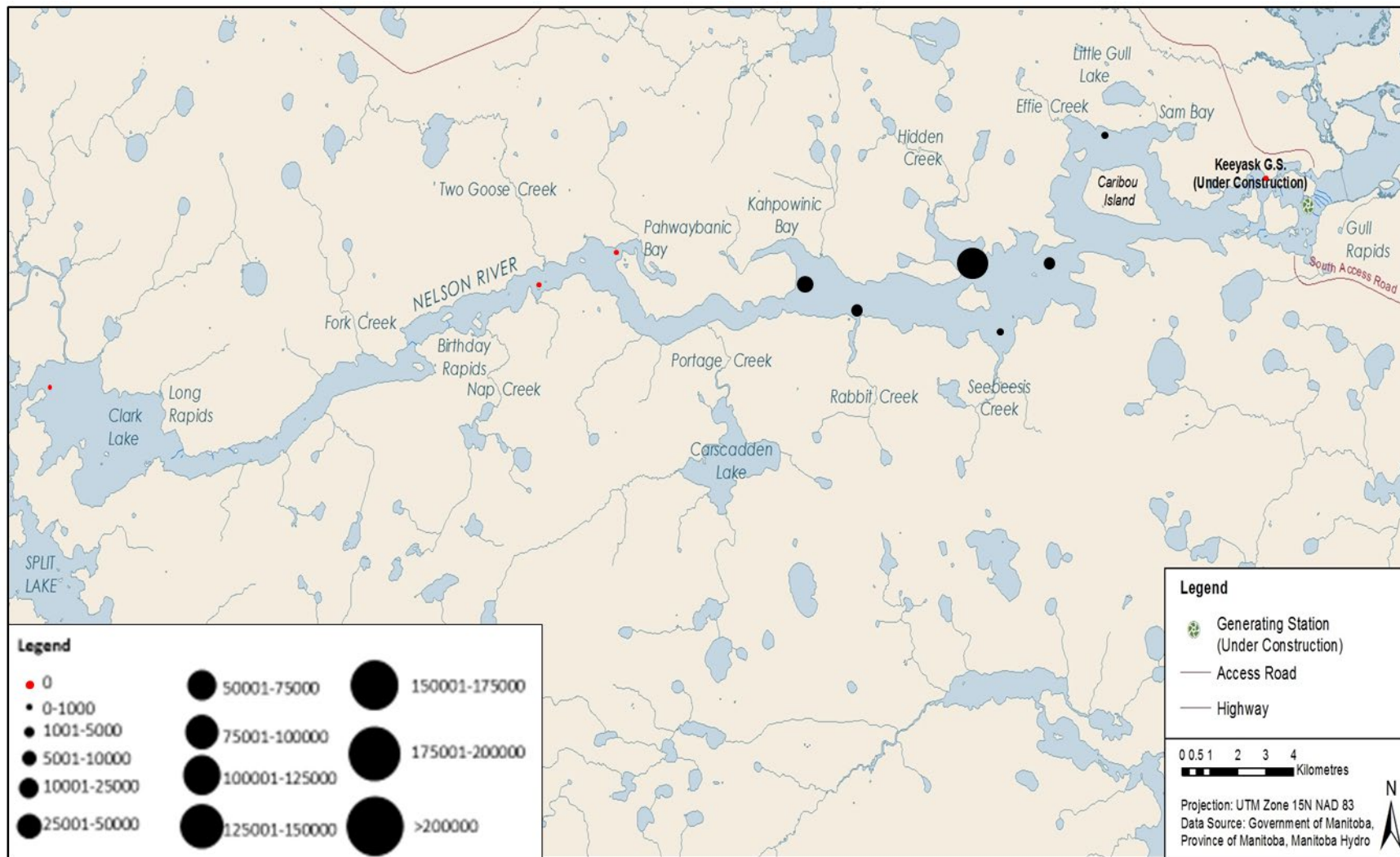


Figure 5: Relative number of detections of Walleye at each acoustic receiver set between Clark Lake and the Keeyask GS during winter 2020/2021 (September 24, 2020, to April 30, 2021). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

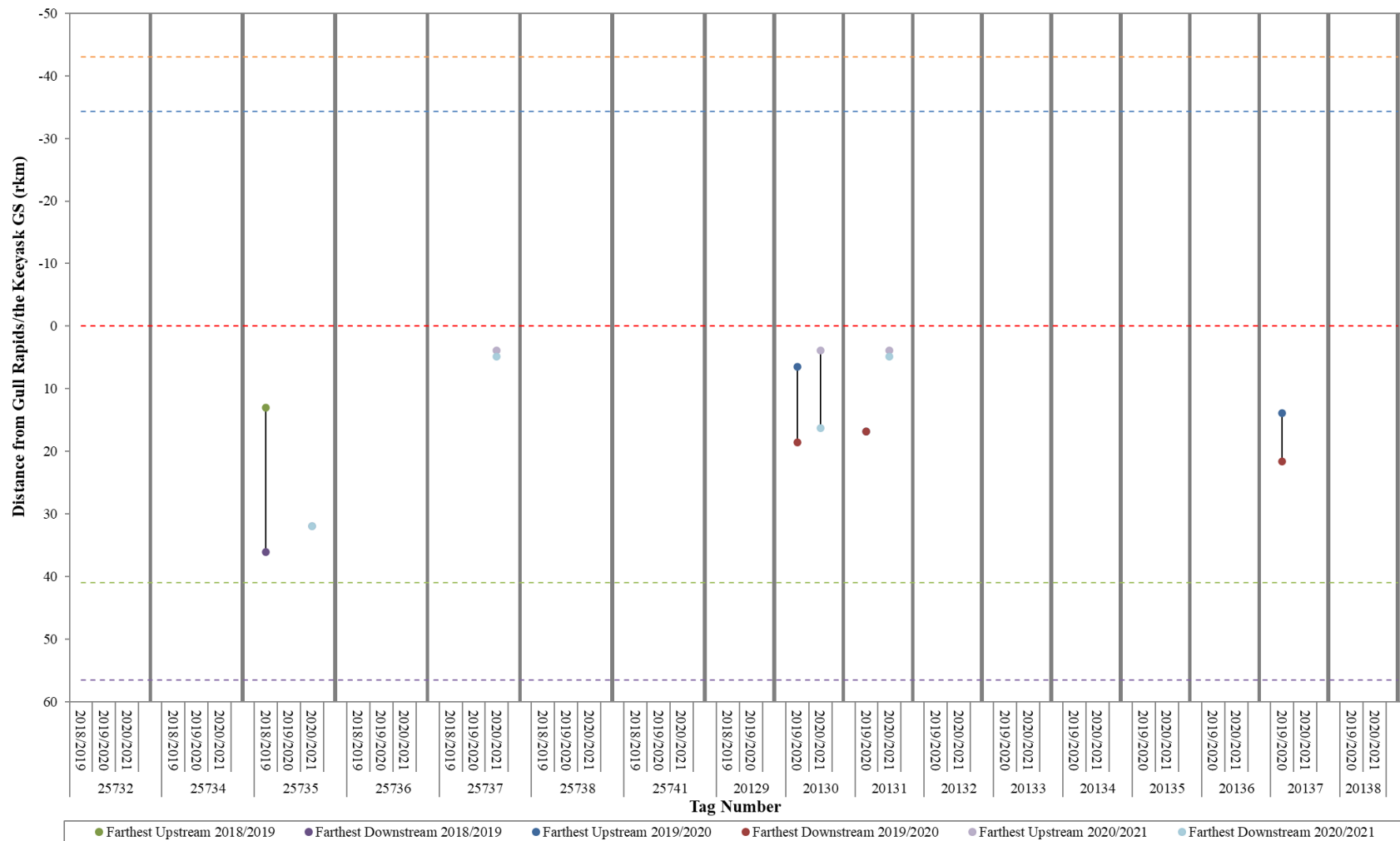


Figure 6: Detection ranges for individual Walleye tagged with acoustic transmitters in Stephens Lake during the winter period (2018–2021). Horizontal dotted lines indicate locations of landmarks (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS).

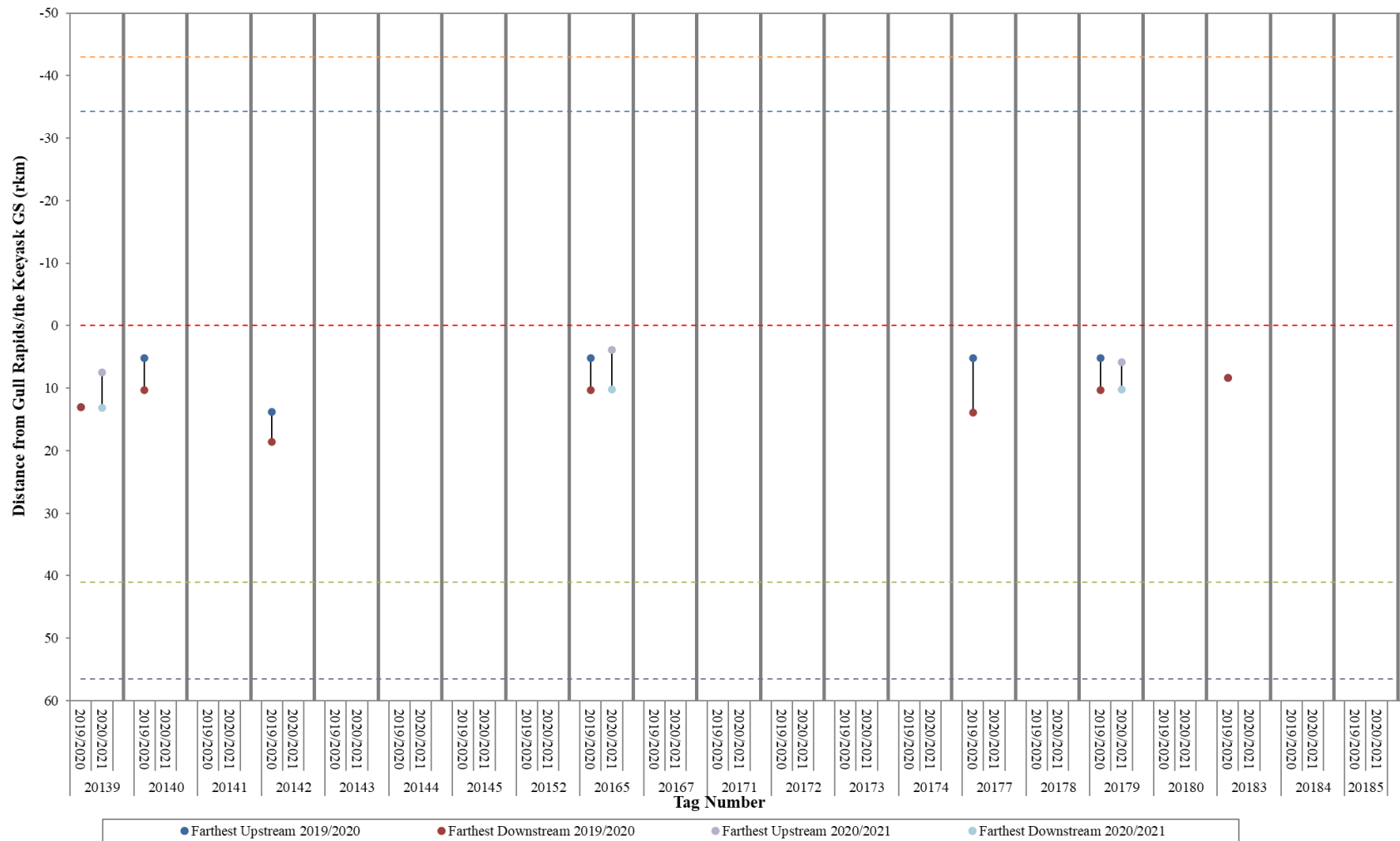


Figure 6: Detection ranges for individual Walleye tagged with acoustic transmitters in Stephens Lake during the winter period (2018–2021). Horizontal dotted lines indicate locations of landmarks (orange = Clark Lake outlet; blue = Birthday Rapids; red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS) (continued).

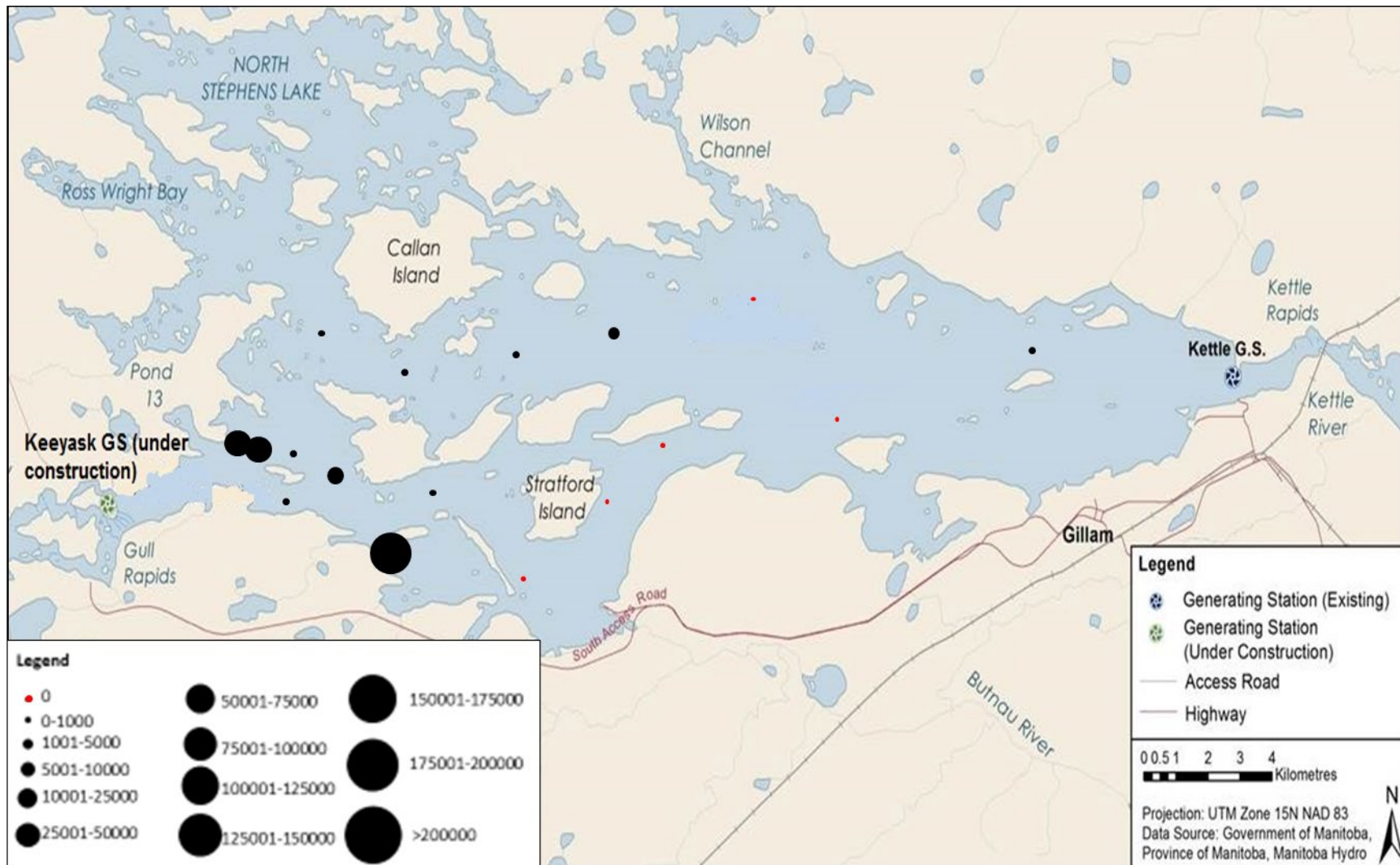


Figure 7: Relative number of detections of Walleye tagged at each acoustic receiver set in Stephens Lake during winter 2020/2021 (September 24, 2020, to April 30, 2021). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

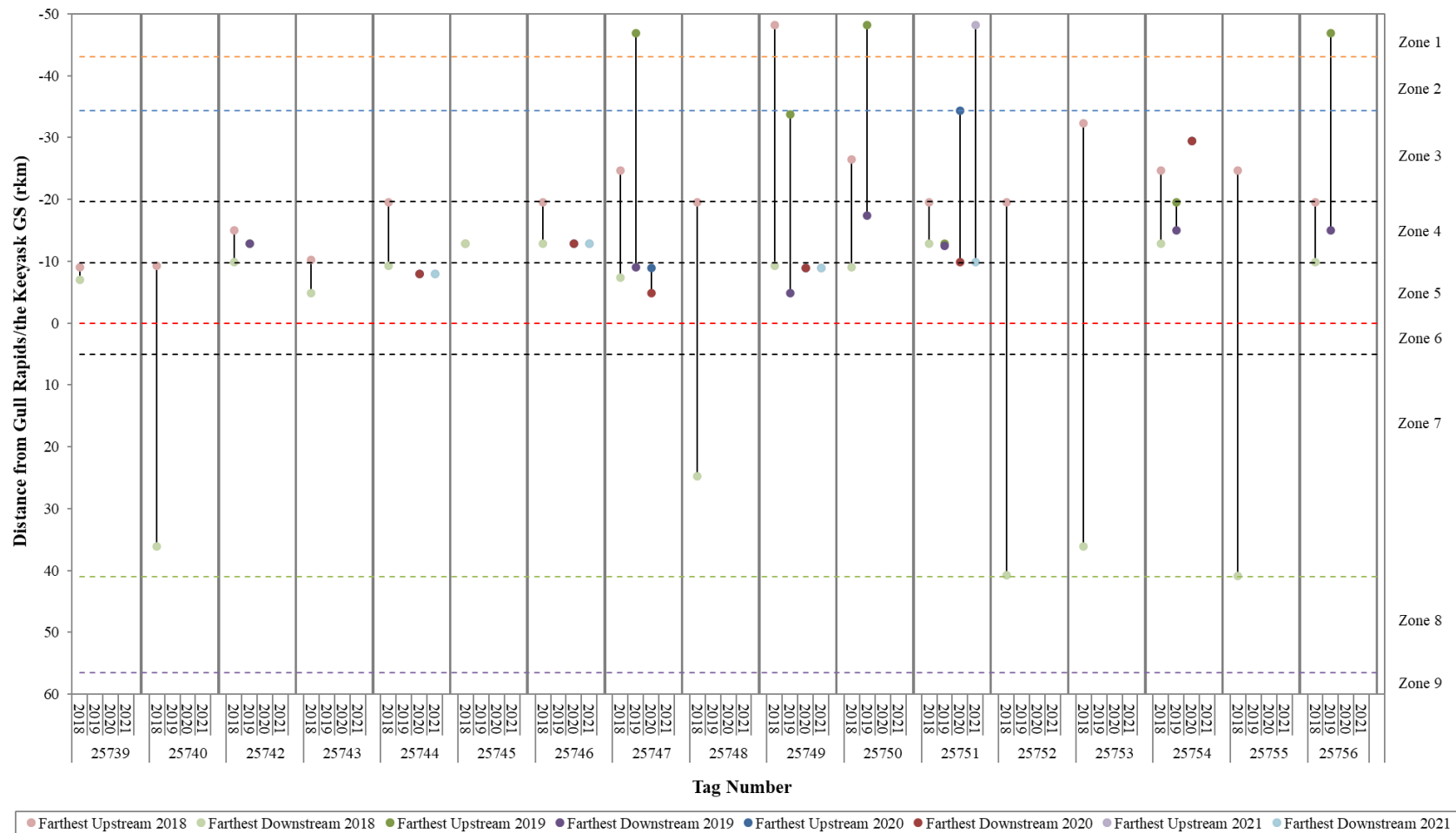


Figure 8: Detection ranges for individual Walleye tagged with acoustic transmitters in 2018/2019 upstream of the Keeyask during the open-water period (2018–2021). Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids; red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS).

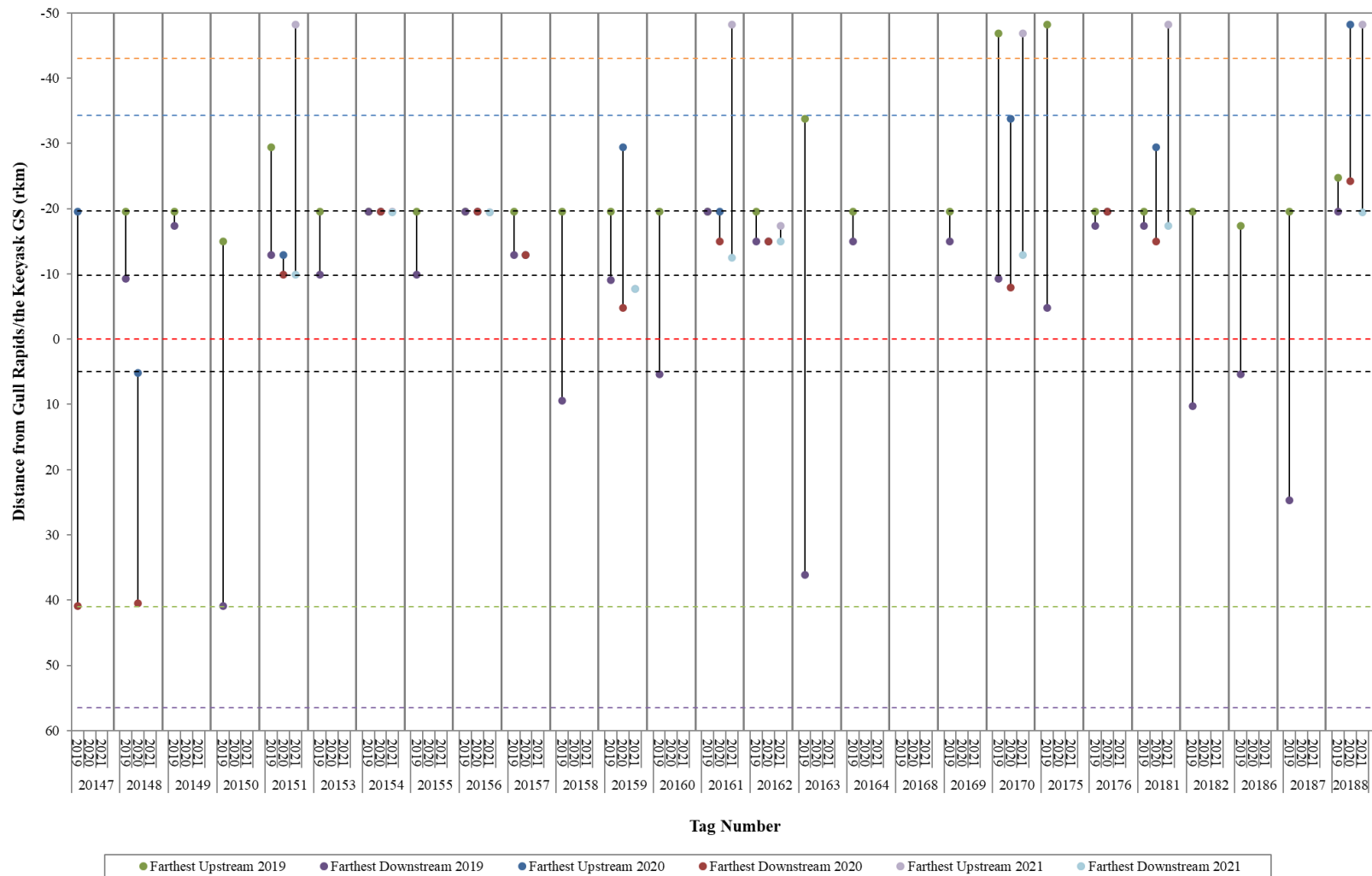


Figure 8: Detection ranges for individual Walleye tagged with acoustic transmitters in 2018/2019 upstream of the Keyyask GS during the open-water period (2018–2021). Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids; red = the Keyyask GS; green = Kettle GS; purple = Long Spruce GS) (continued).

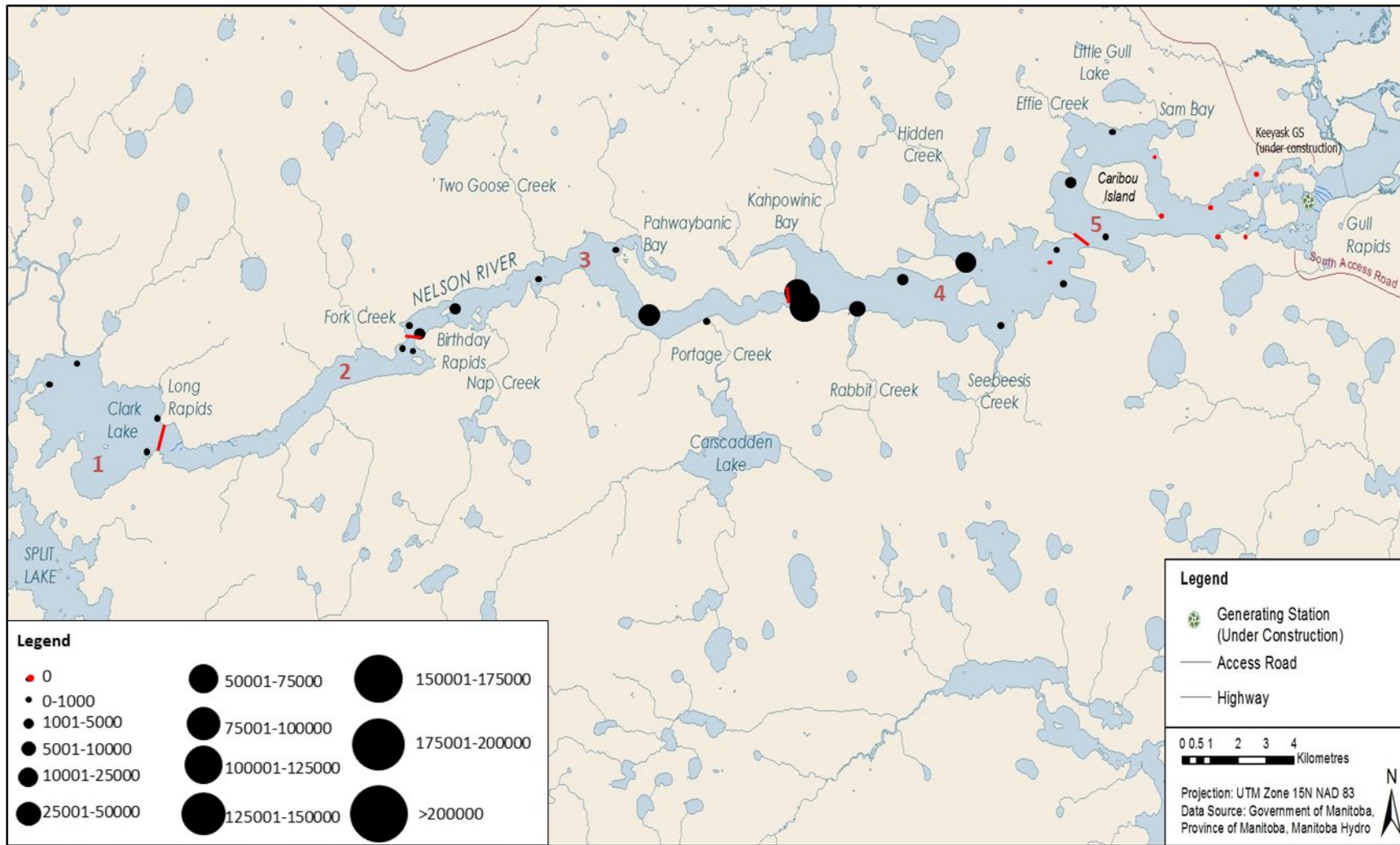


Figure 9: Relative number of detections of Walleye tagged in 2018/2019 at each acoustic receiver set between Clark Lake and the Keyyask GS during the 2021 open-water period (May 1 to October 10). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

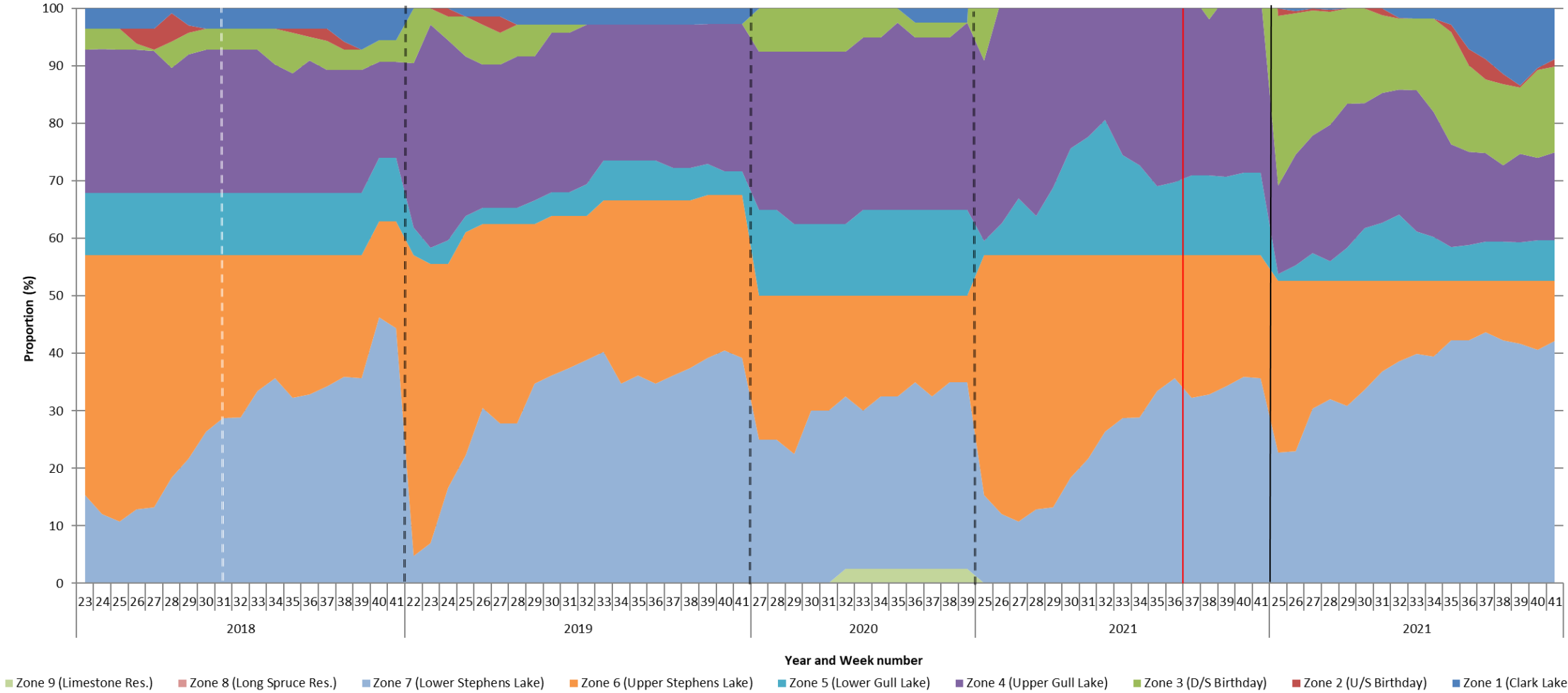


Figure 10: Proportional distribution by zone, for Walleye tagged with acoustic transmitters in the Keeyask GS Area during a portion of the 2013 (June 4 to October 15), 2014 (June 4 to October 3), 2015 (June 4 to October 11), 2016 (June 4 to October 19), 2017 (June 7 to October 16), 2018 (June 6 to October 10), 2019 (June 2 to October 7), 2020 (July 3 to September 23), and 2021 (June 13 to October 10) open-water periods. Black dashed lines indicate study years. Solid black line indicates new fish tagged. Solid white line indicates start of Keeyask construction. Red line indicates completion of Keeyask GS reservoir impoundment.

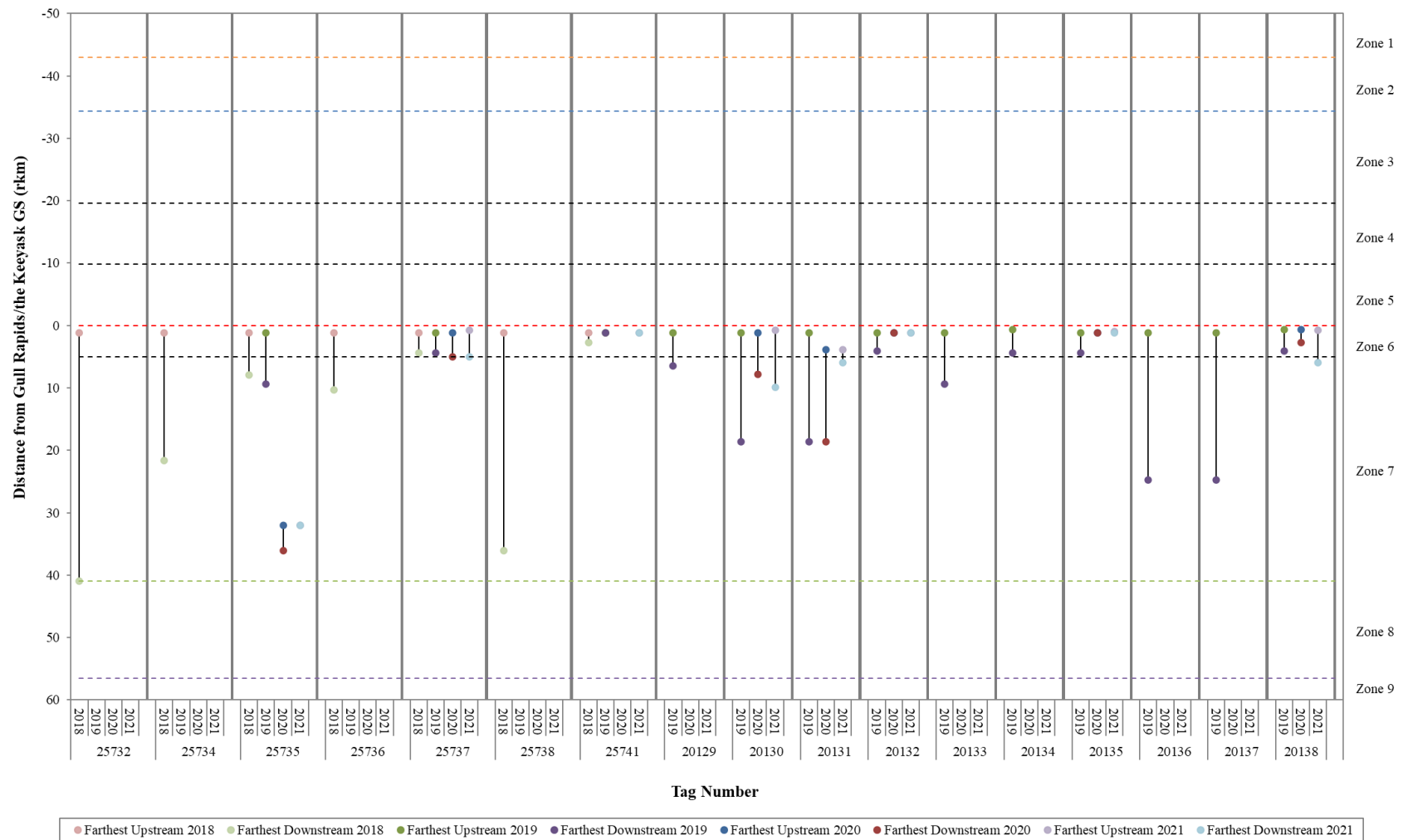


Figure 11: Detection ranges for individual Walleye tagged with acoustic transmitters in 2018/2019 in Stephens Lake during the open-water period (2018–2021). Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keyask GS; green = Kettle GS; purple = Long Spruce GS).

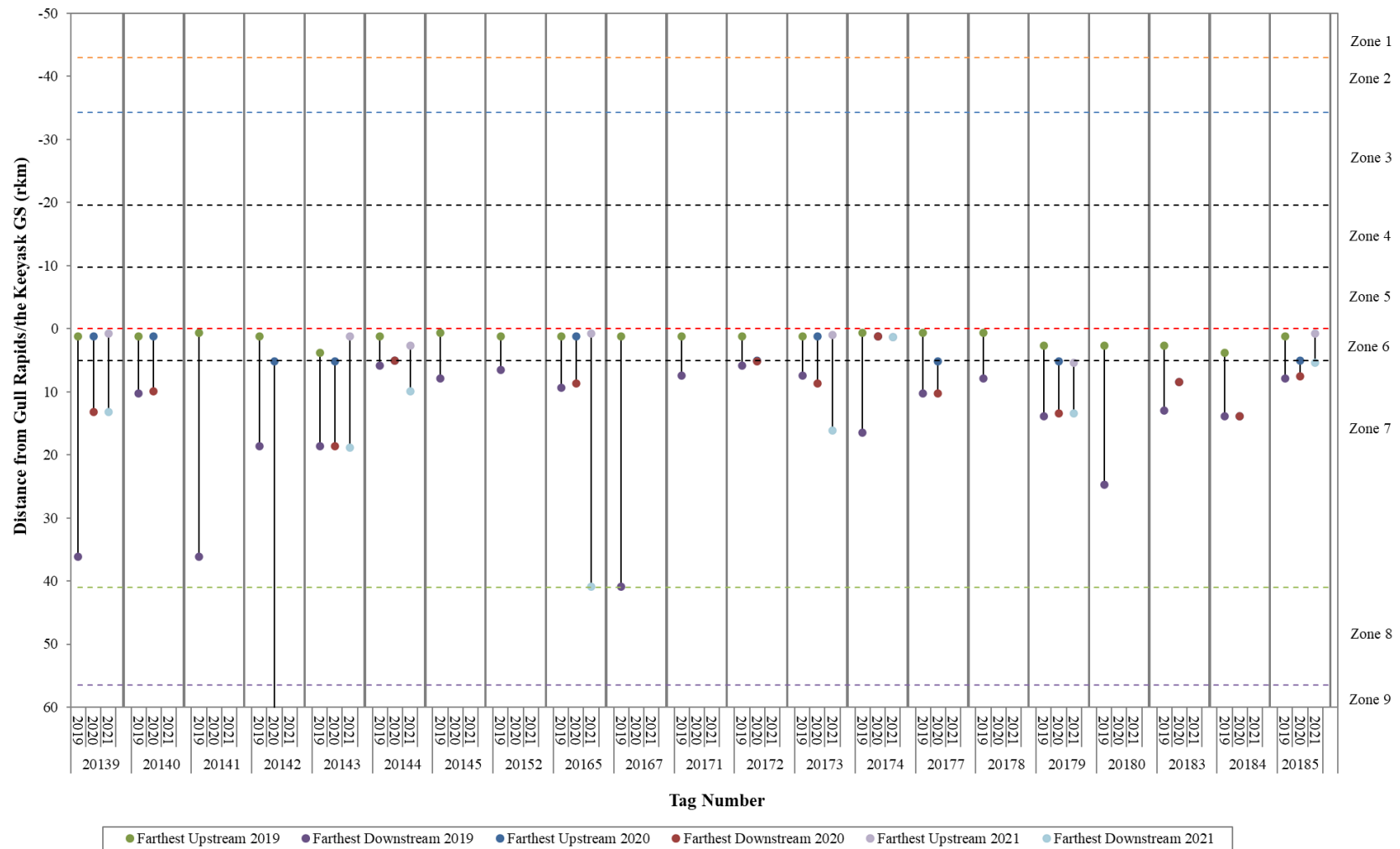


Figure 11: Detection ranges for individual Walleye tagged with acoustic transmitters in 2018/2019 in Stephens Lake during the open-water period (2018–2021). Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS). (continued).

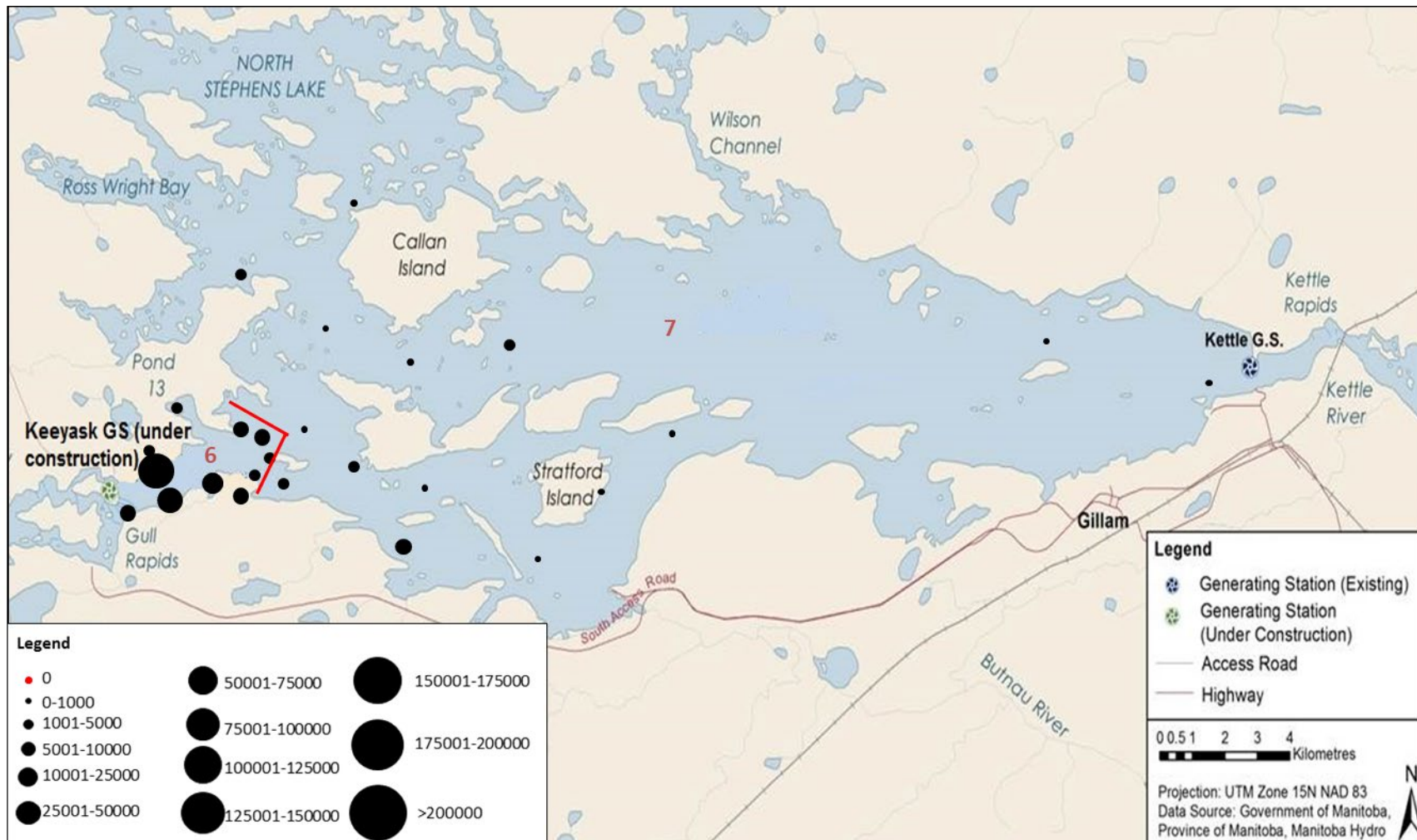


Figure 12: Relative number of detections of Walleye tagged in 2018/2019 at each acoustic receiver set in Stephens Lake during the 2021 open-water period (May 1 to October 10). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

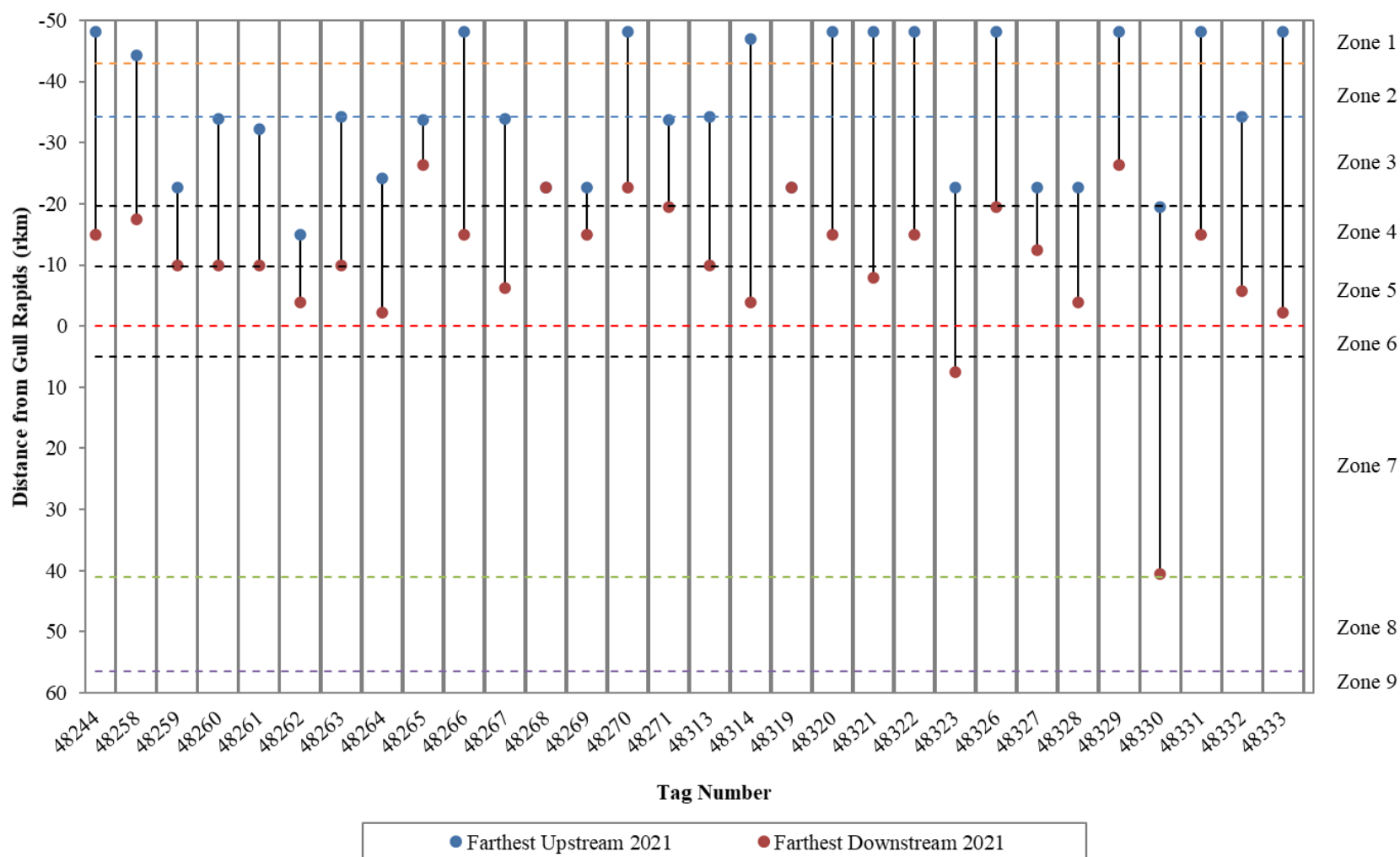


Figure 13: Detection ranges for individual Walleye tagged with acoustic transmitters in 2021 upstream of the Keeyask GS during the 2021 open-water period. Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS).

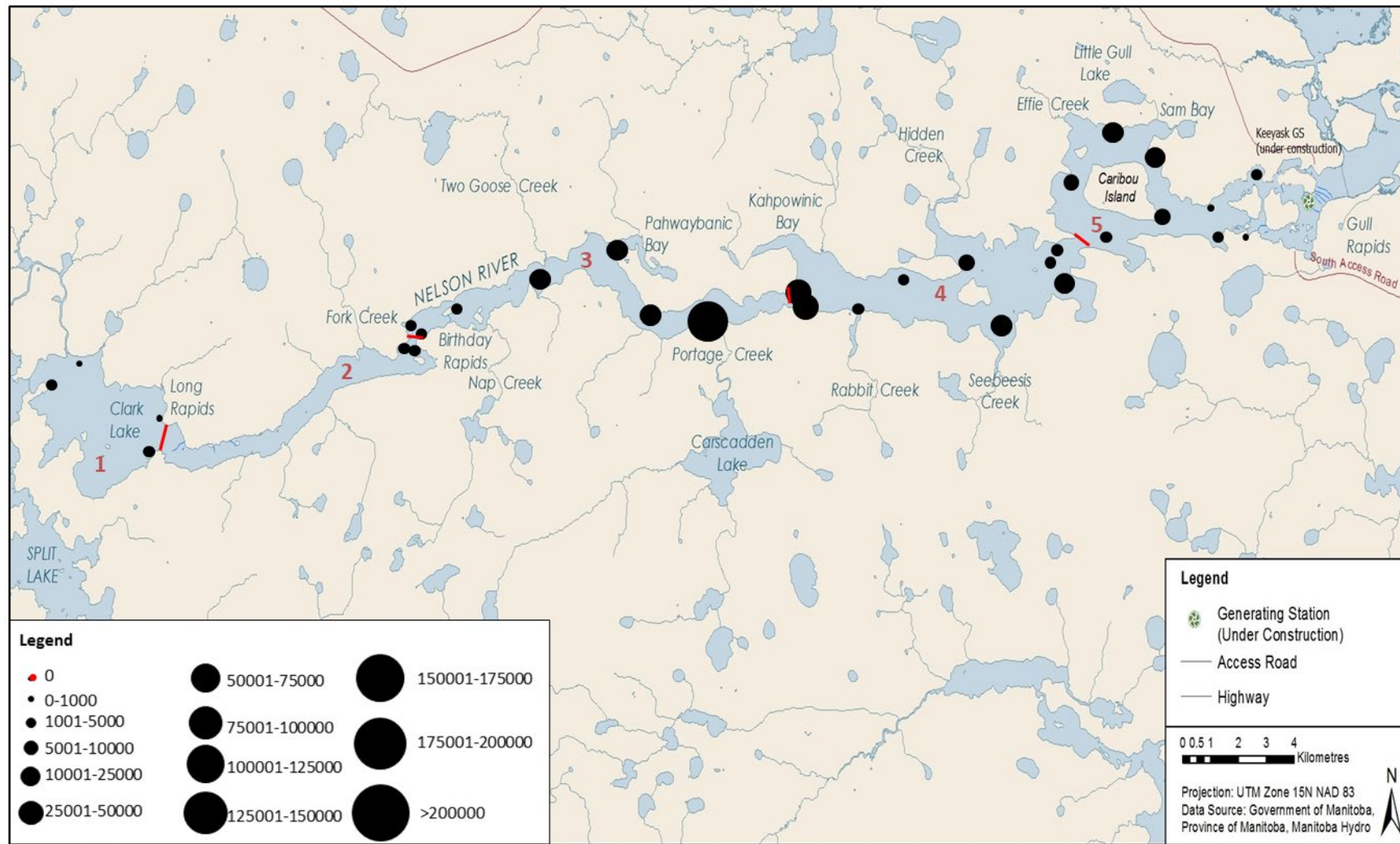


Figure 14: Relative number of detections of Walleye tagged in 2021 at each acoustic receiver set between Clark Lake and the Keeyask GS during the 2021 open-water period (May 1 to October 10). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

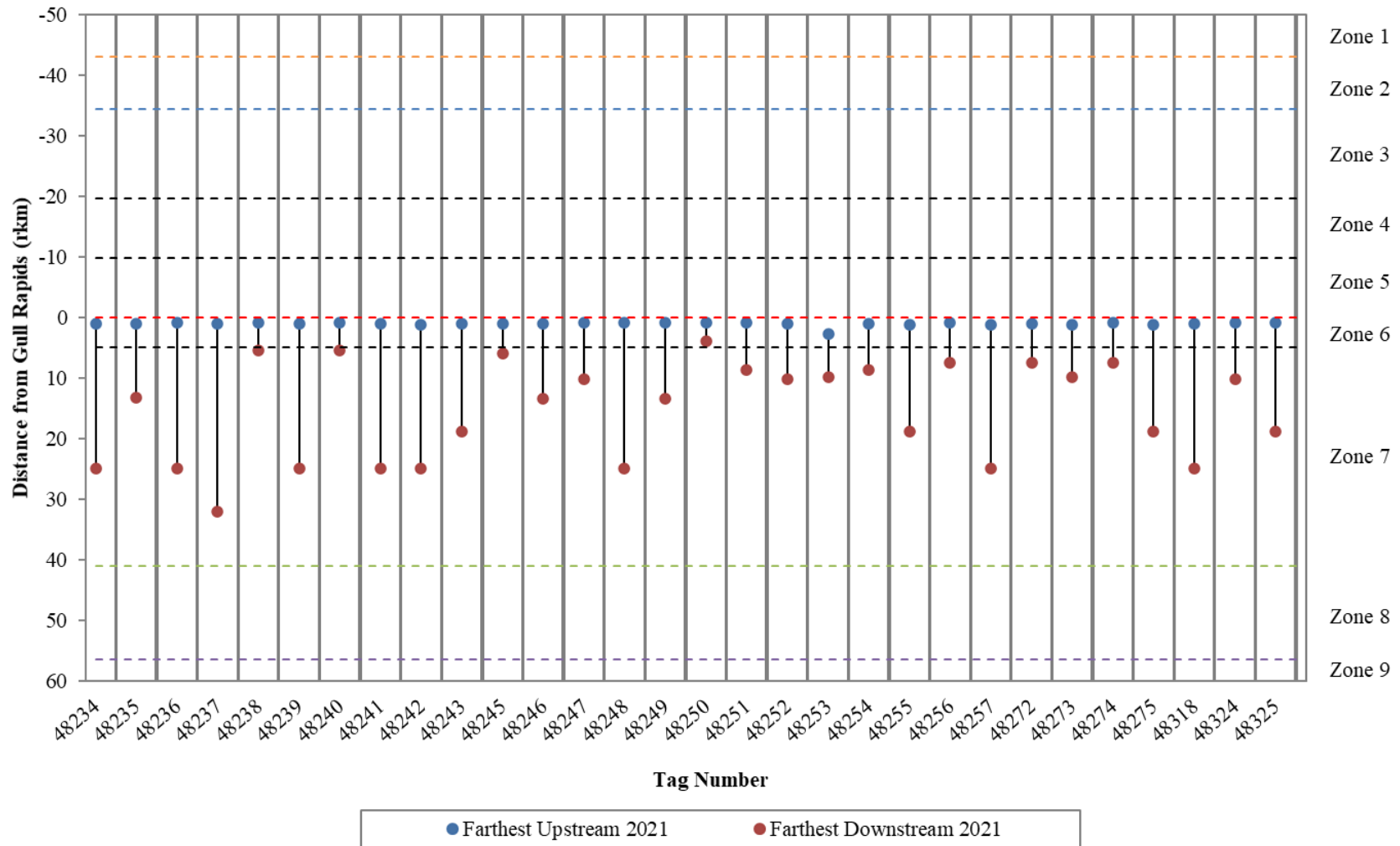


Figure 15: Detection ranges for individual Walleye tagged with acoustic transmitters in 2021 in Stephens Lake during the 2021 open-water period. Horizontal dotted lines demarcate zones (orange = Clark Lake outlet; blue = Birthday Rapids, red = the Keeyask GS; green = Kettle GS; purple = Long Spruce GS).

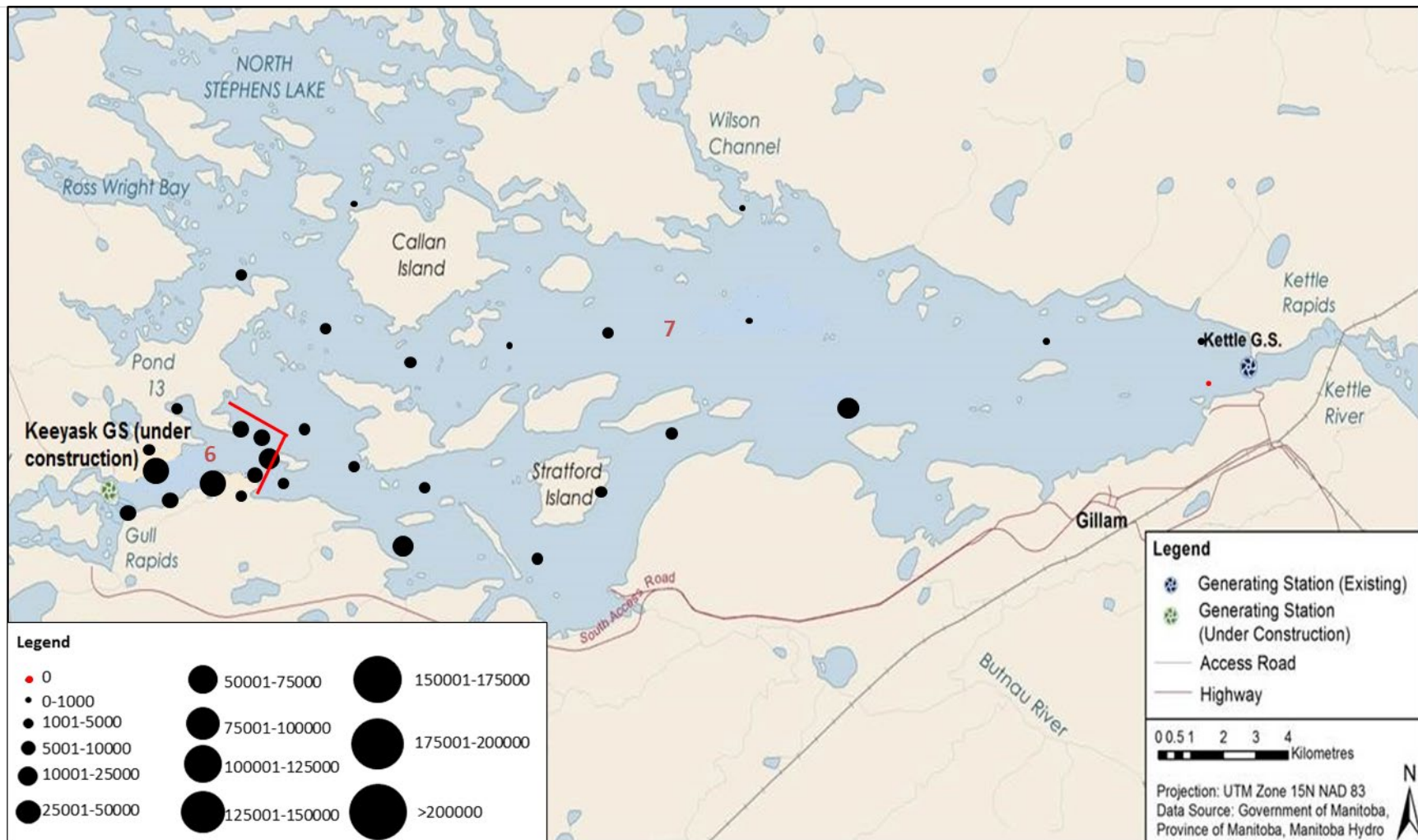


Figure 16: Relative number of detections of Walleye tagged in 2021 at each acoustic receiver set in Stephens Lake during the 2021 open-water period (May 1 to October 10). Number of detections indicated by size of bubble (defined in legend). Receivers with no detections indicated with red dot.

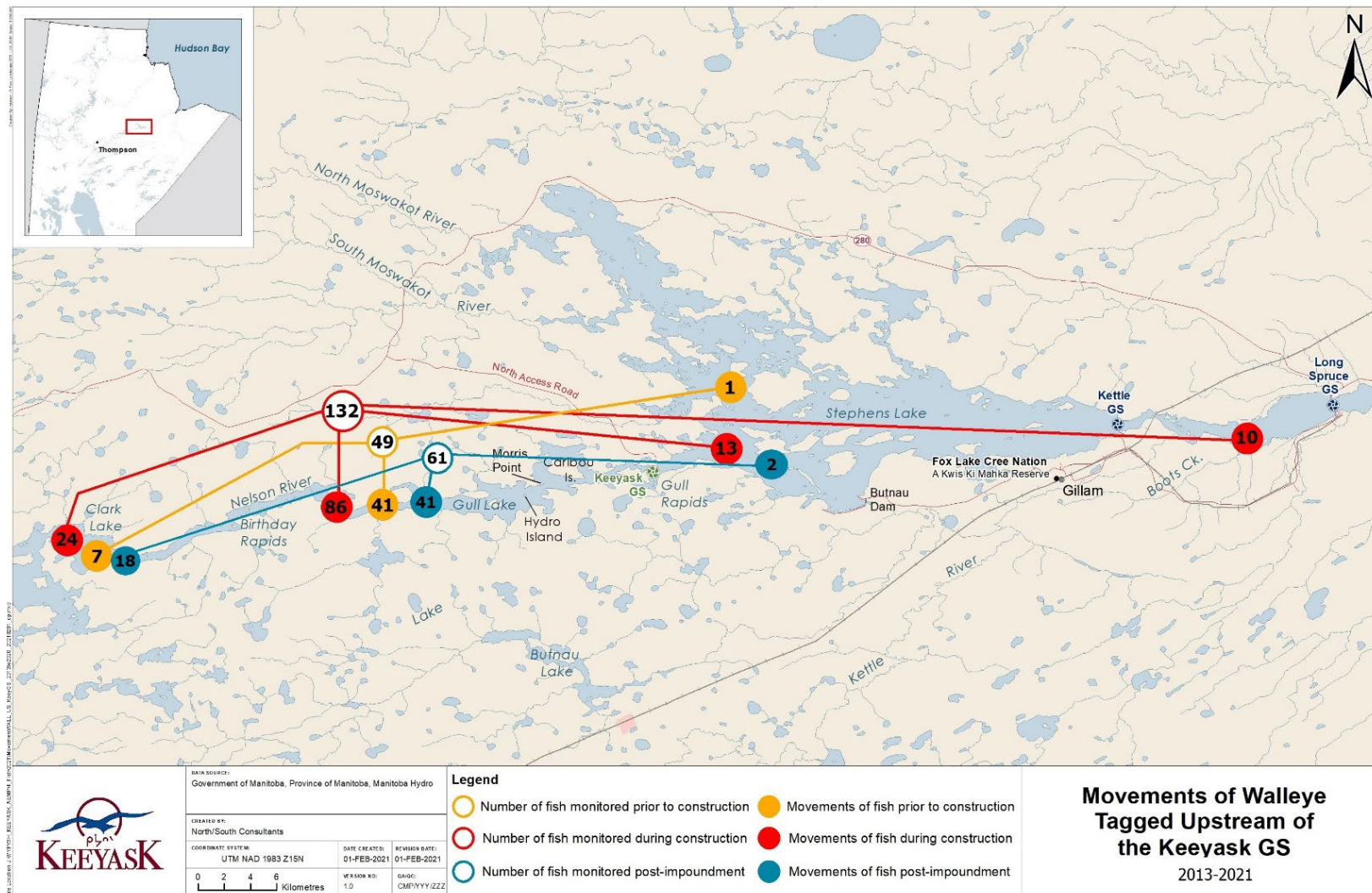


Figure 17: Map showing how many Walleye moved upstream out of Gull Lake, stayed in Gull Lake, and moved into Stephens Lake before construction (yellow), during construction (red) and after reservoir impoundment (blue). Movements of fish due to tagging stress or mortality were not included. Numbers of fish monitored (hollow circles) represent the number of fish tagged while the number of fish movements (solid circles) represent the number of fish detected.

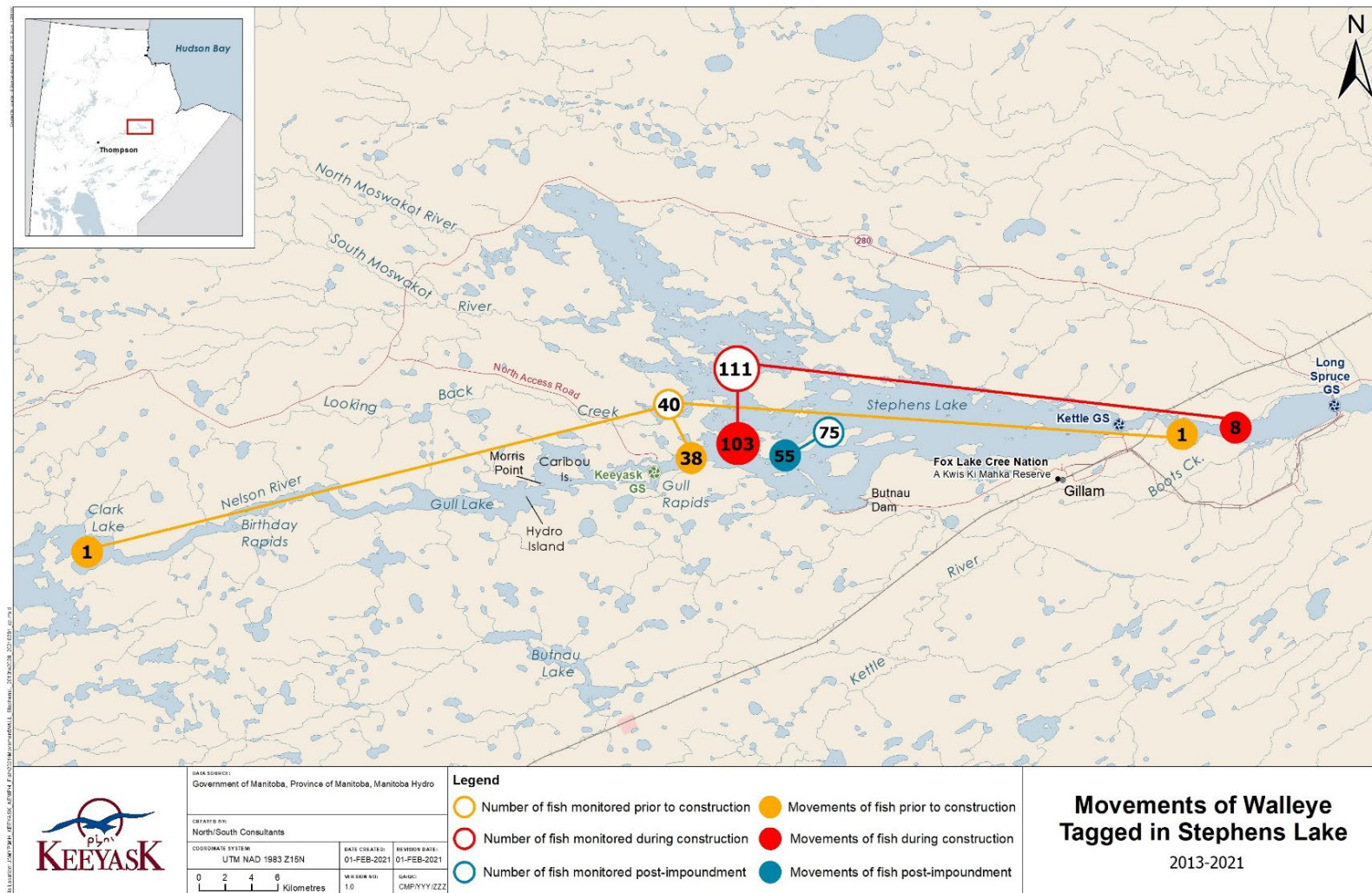
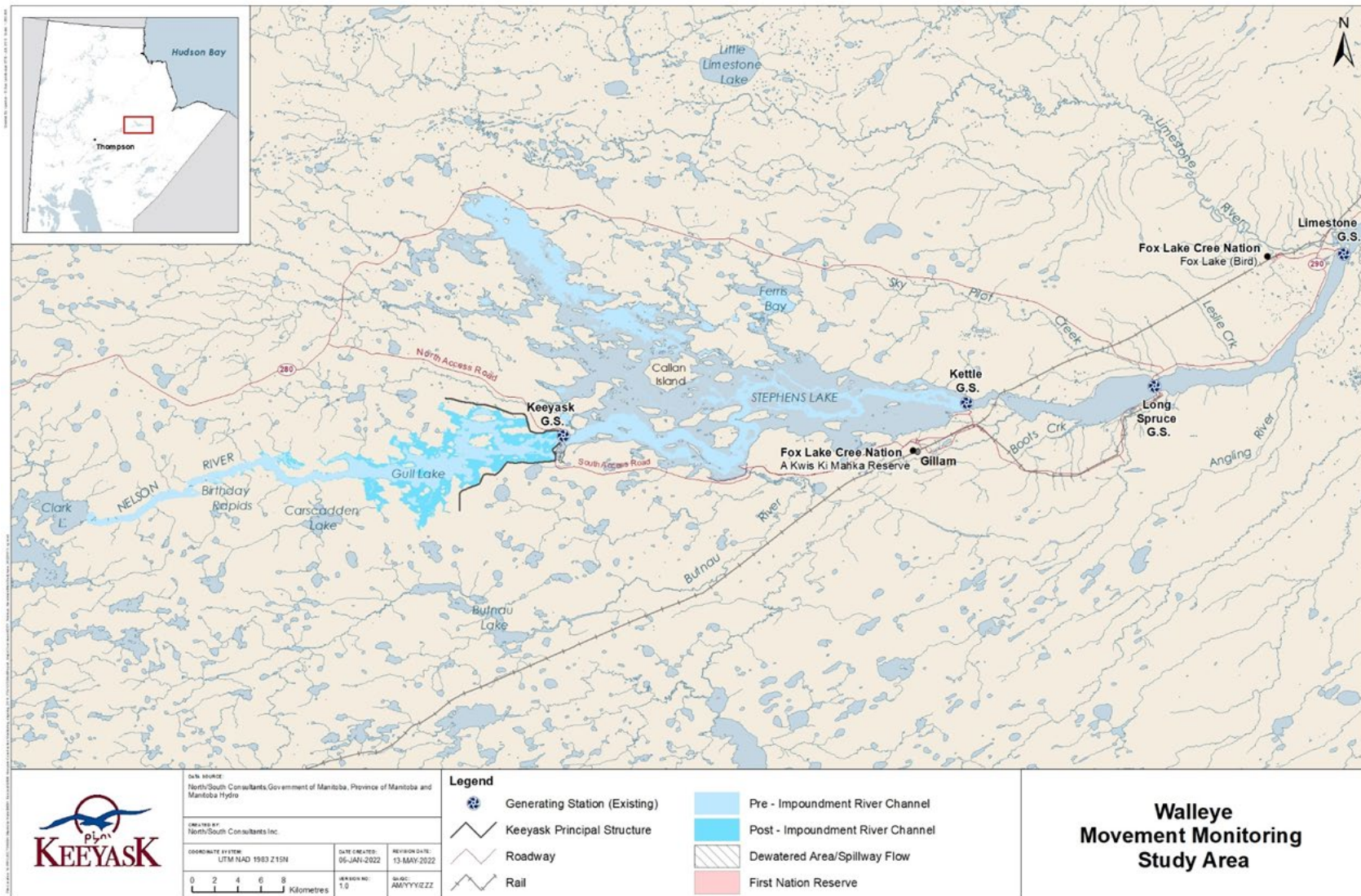
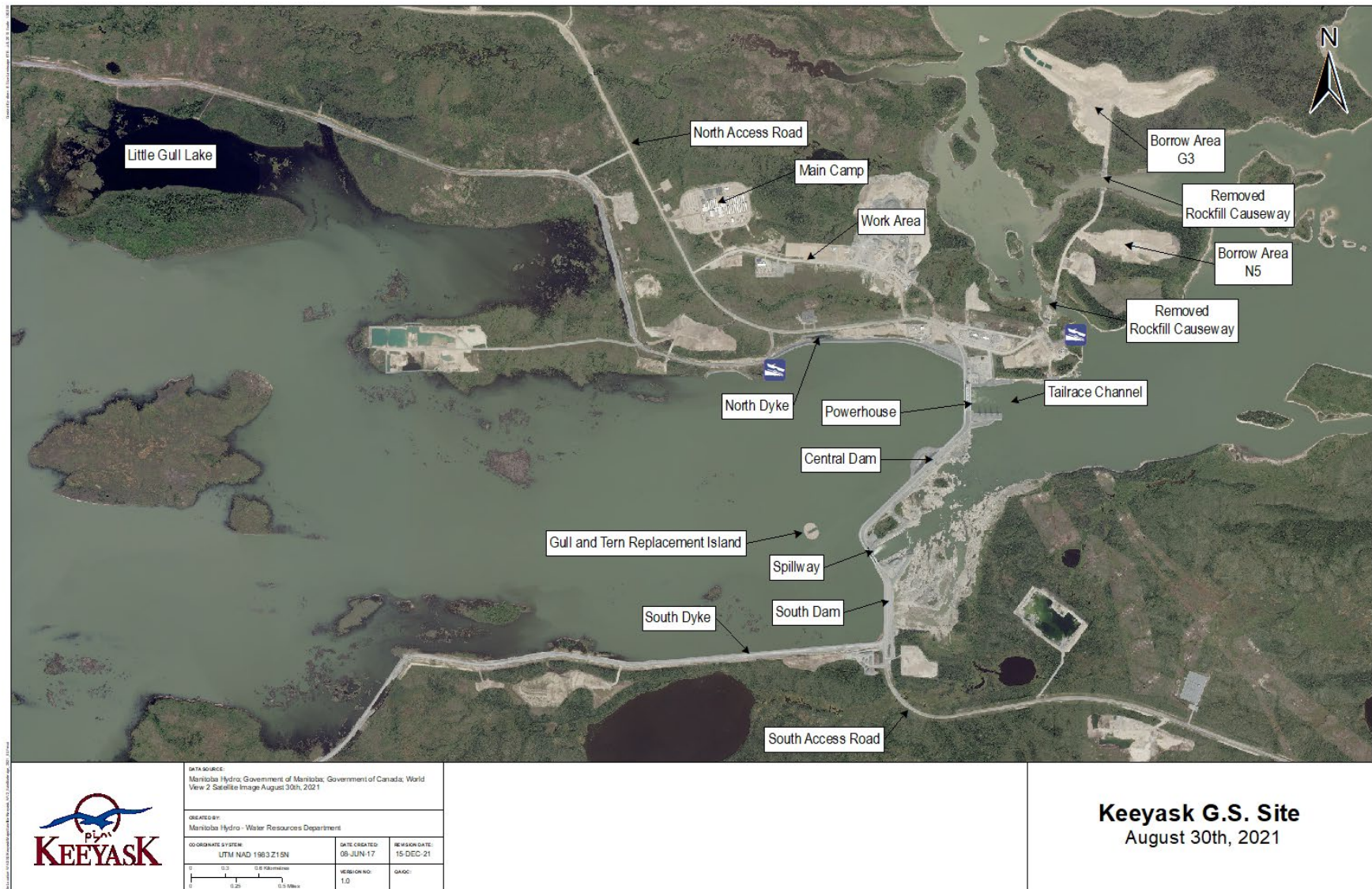


Figure 18: Map showing how many Walleye moved upstream through Gull Rapids, stayed in Stephens Lake, and moved downstream through the Kettle GS before construction (yellow), during construction (red) and after reservoir impoundment (blue). Movements due to tagging stress and mortality were not included. Numbers of fish monitored (hollow circles) represent the number of fish tagged while the number of fish movements (solid circles) represent the number of fish detected.

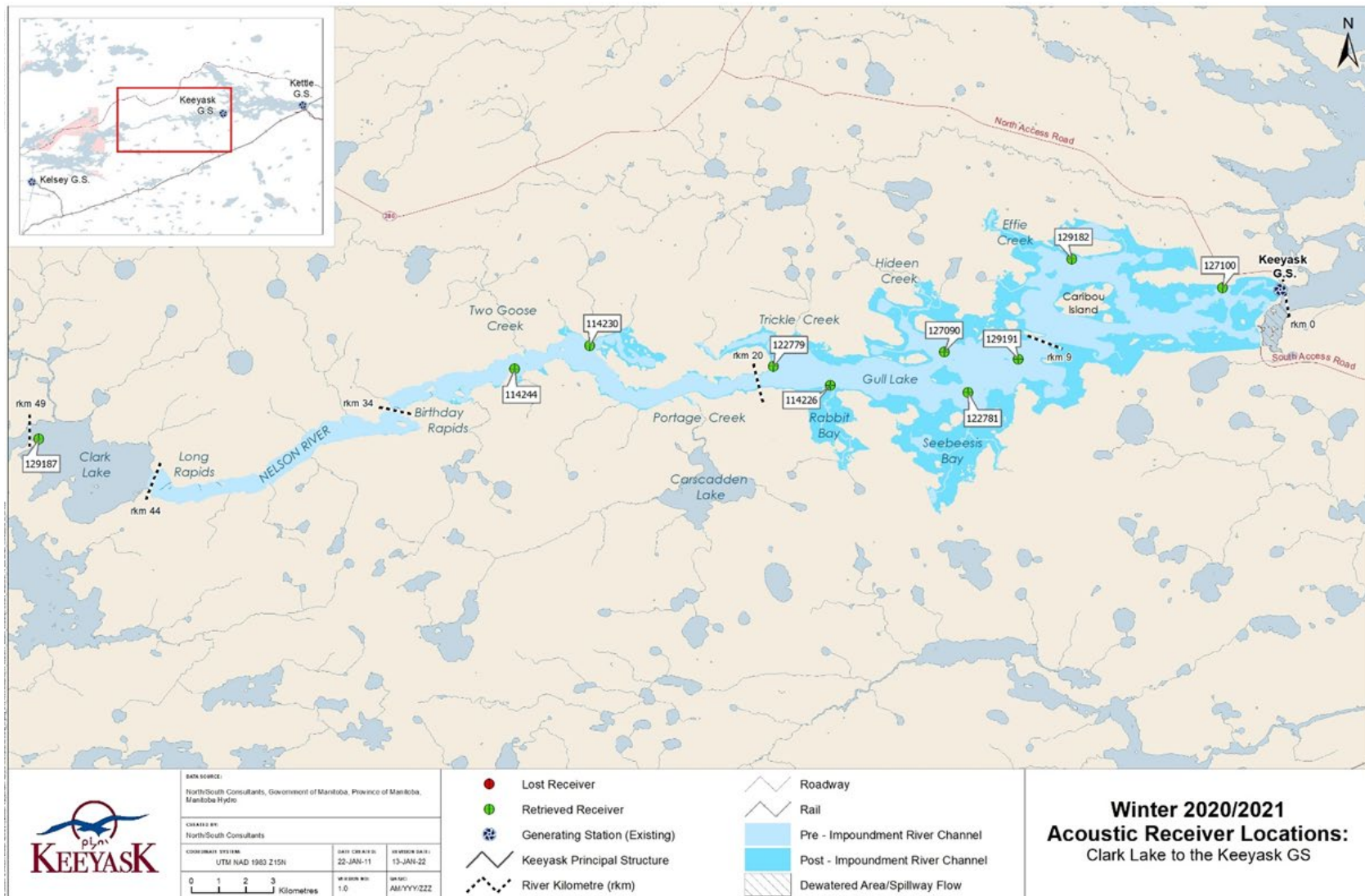
MAPS



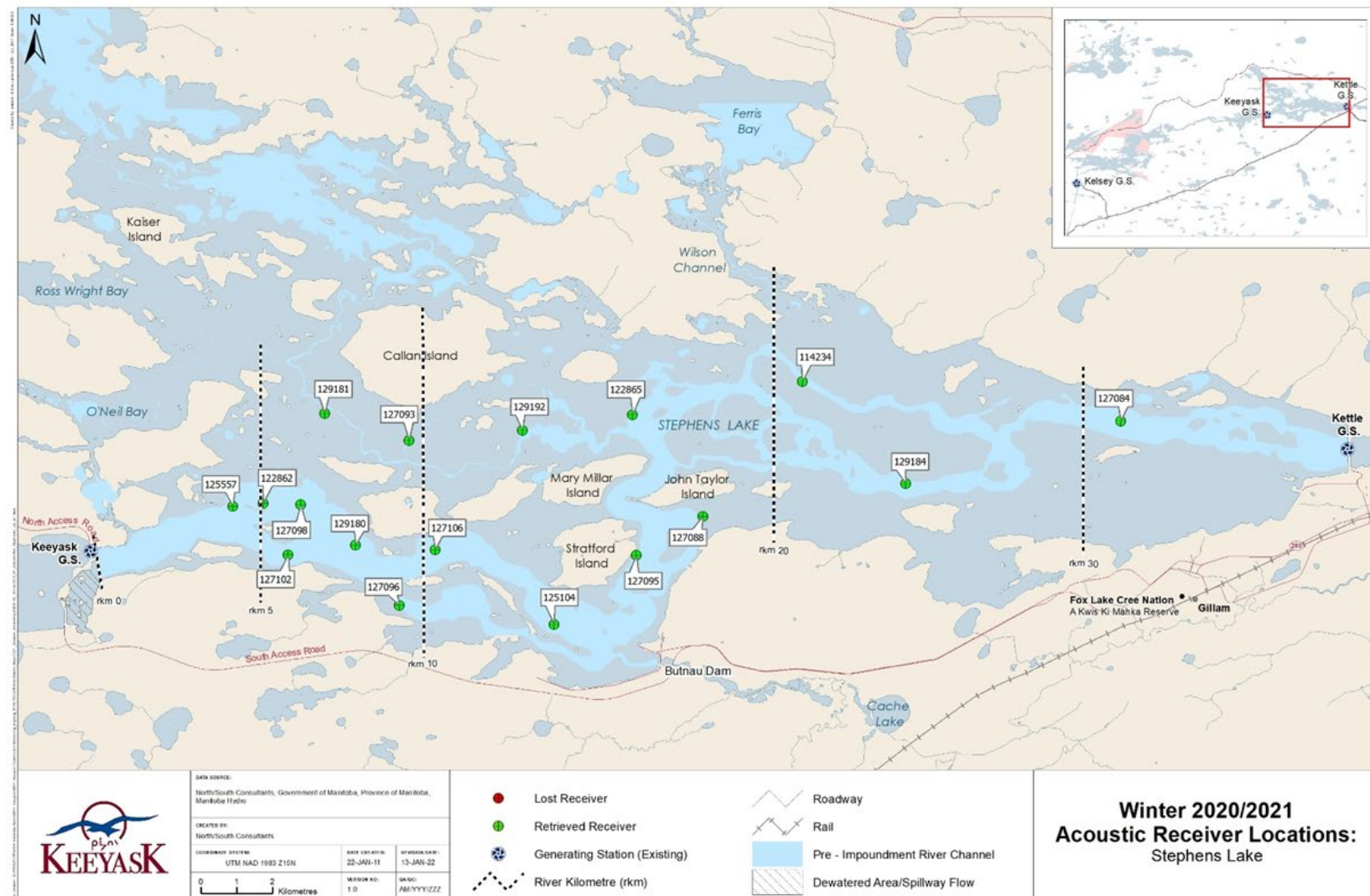
Map: Map of the lower Nelson River showing the site of the Keeyask Generating Station and the Walleye movement monitoring study setting.



Map 2: Map of instream structures at the Keeyask Generating Station site, August 2021.

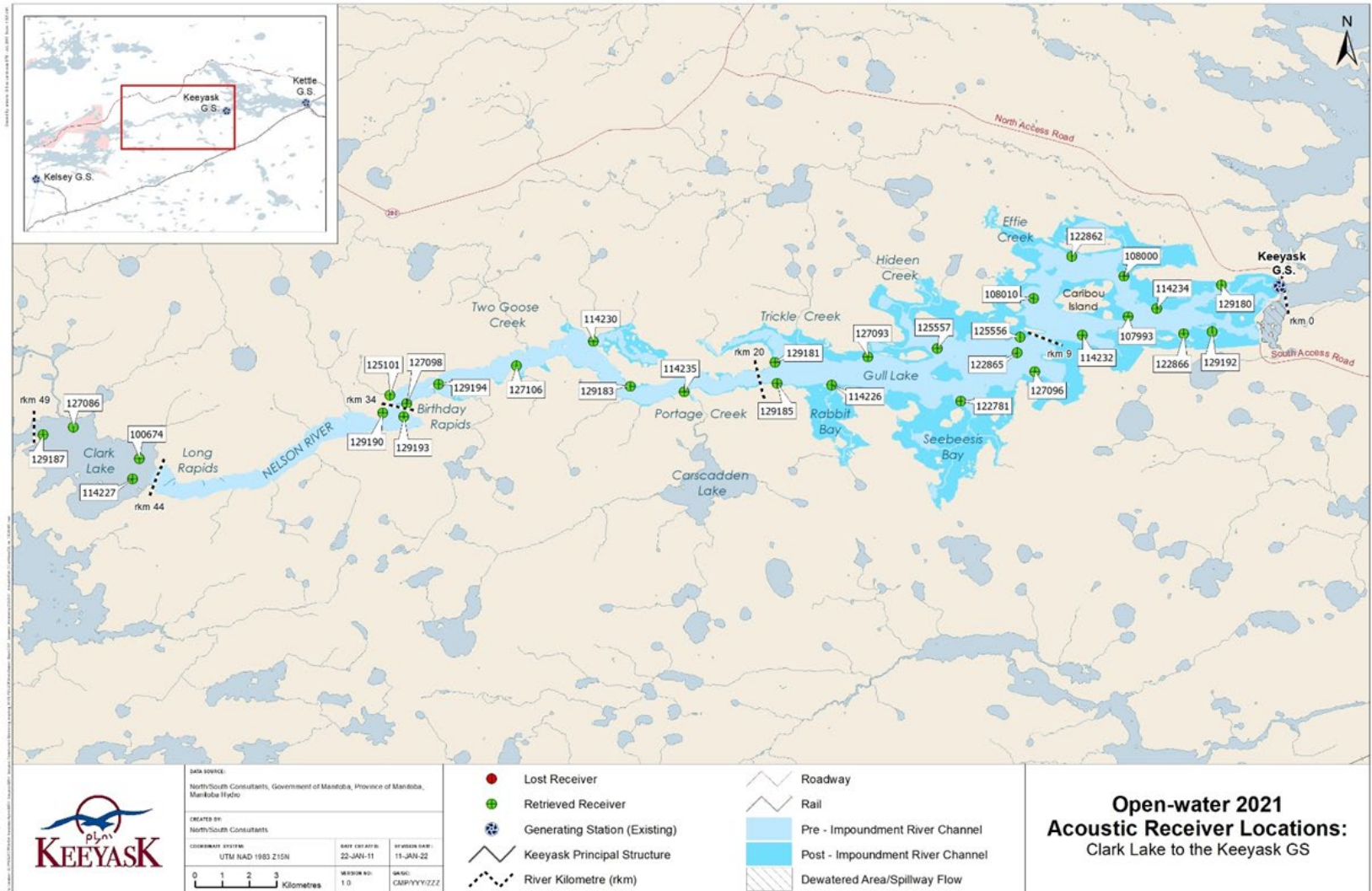


Map 3: Locations of stationary receivers set in the Nelson River from Clark Lake to the Keeyask GS between September 2020 and May 2021. River kilometer (rkm) distances are indicated with a dotted line. The former (pre-impoundment) river channel is shown in light blue.



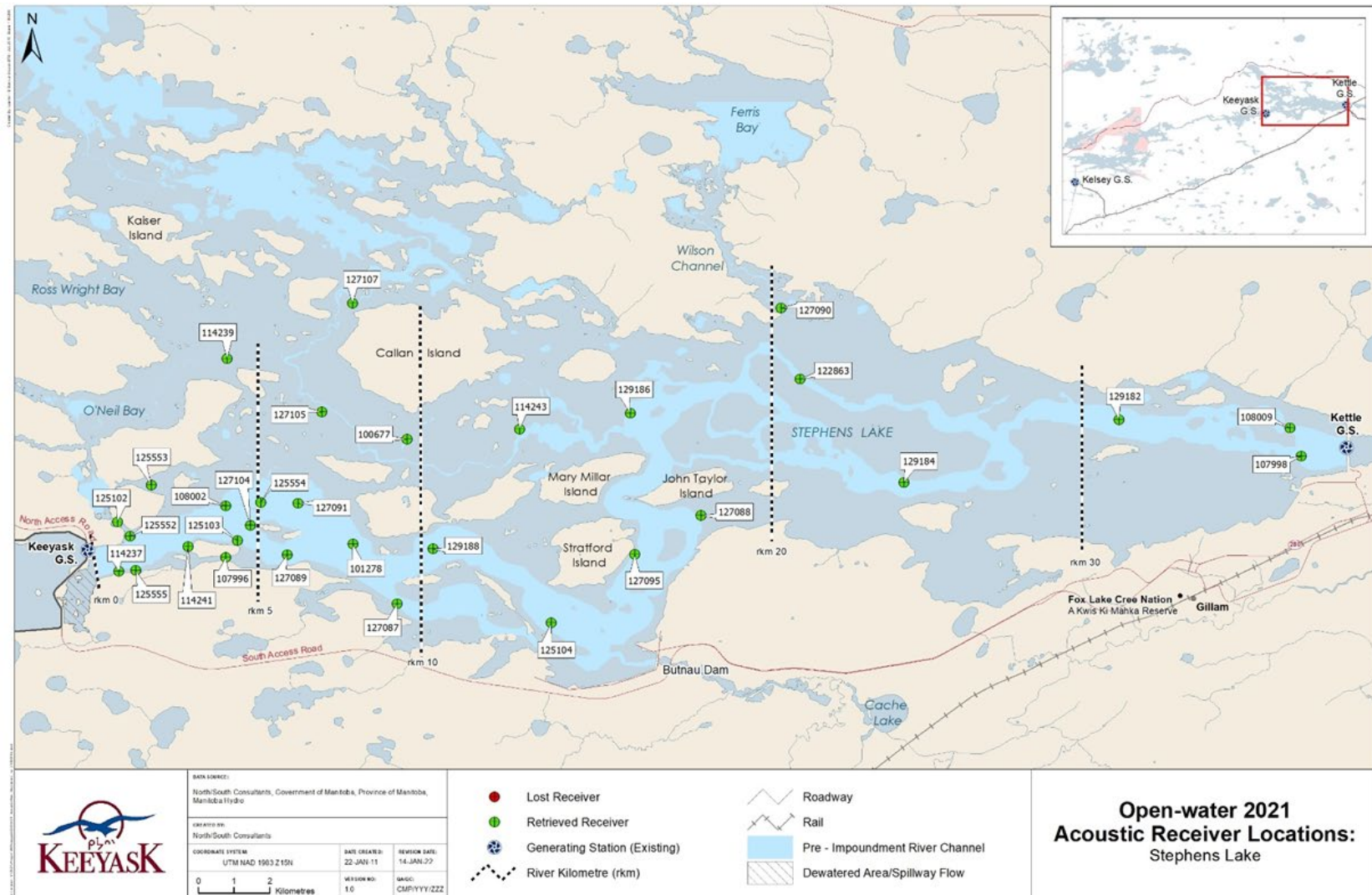
Map 4: Locations of stationary receivers set in Stephens Lake from the Keeyask GS to Kettle GS between September 2020 and May 2021. River kilometre (rkm) distances are indicated with a dotted line. The former (pre-impoundment) river

channel is shown in light blue.

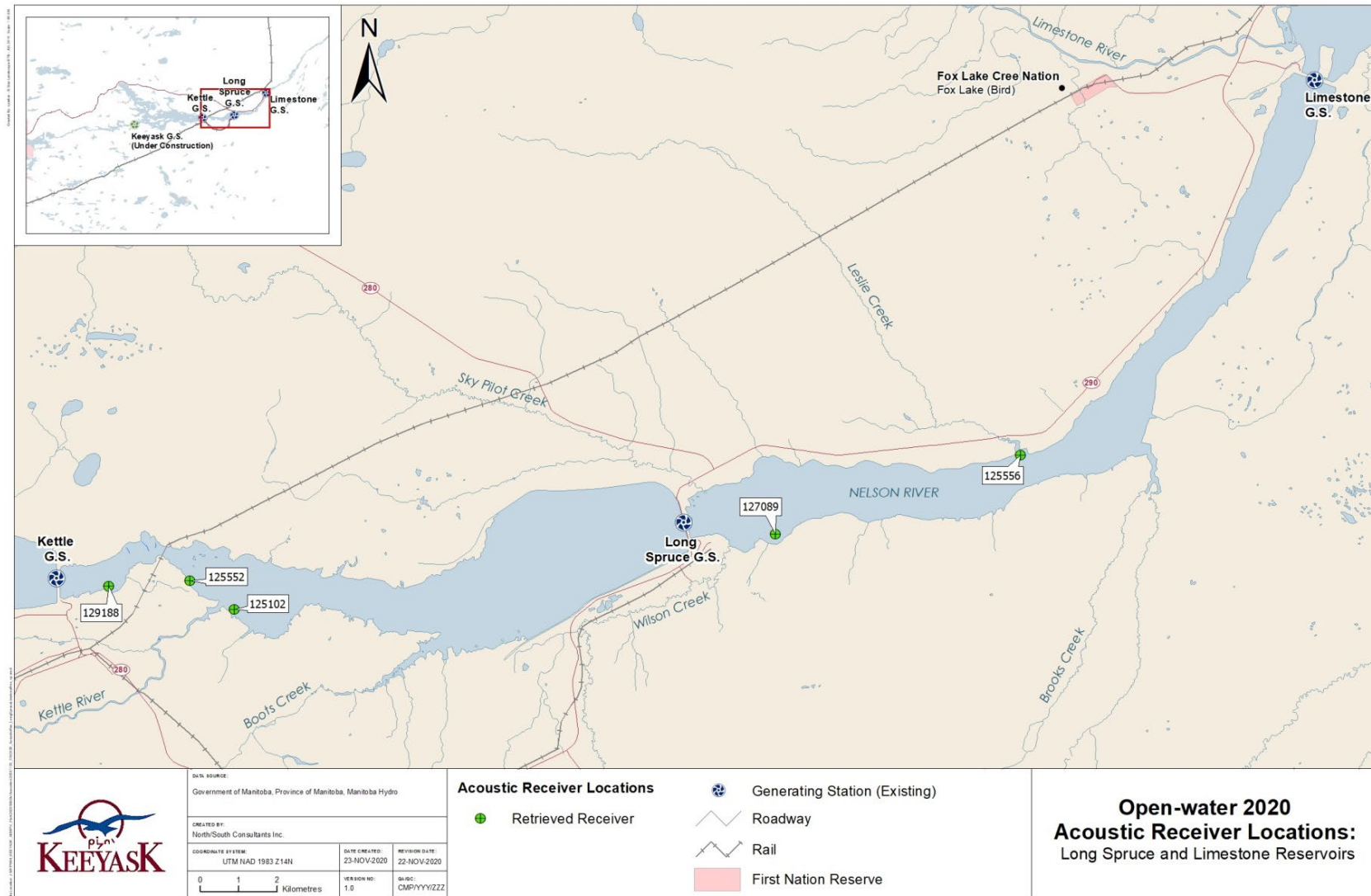


Map 5: Locations of stationary receivers set in the Nelson River from Clark Lake to the Keeyask GS between May and October 2021. The river is divided into five "zones" based on placement of receiver "gates." River kilometre (rkm)

distances at zone divisions are indicated with a dotted line. The former (pre-impoundment) river channel is shown in light blue.



Map 6: **Locations of stationary receivers set in Stephens Lake between May and October 2021. The river is divided into two "zones" based on placement of receiver "gates." River kilometer (rkm) distances are indicated with a dotted line. The pre-impoundment river channel is shown in light blue.**



Map 7: Locations of stationary receivers set between the Kettle and Limestone Generating Stations, August to September 2020.

APPENDICES

APPENDIX 1:

DETECTION SUMMARIES FOR WALLEYE TAGGED AND MONITORED IN THE KEEYASK STUDY AREA BETWEEN 2018 AND 2021

Table A1-1:	Detection summary for Walleye monitored upstream of the Keeyask GS during the winter 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30, 2021) periods.	68
Table A1-2:	Detection summary for Walleye monitored in Stephens Lake during the winter 2016/2017 (October 20, 2015 to April 30, 2017), 2017/2018 (October 17, 2017 to April 30, 2018), 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30 2021) periods.	70
Table A1-3:	Detection summary for Walleye and monitored upstream of the Keeyask GS during the open-water 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods.	72
Table A1-4:	Detection summary for Walleye monitored in Stephens Lake during the open-water 2016 (May 1 to October 19), 2017 (May 1 to October 16), 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods.	74

Table A1-1: Detection summary for Walleye monitored upstream of the Keeyask GS during the winter 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30, 2021) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted purple = moved downstream through Gull Rapids. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS.

Tag ID	Date tagged	2018/2019					2019/2020					2020/2021				
		n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)
25739	5-Jun-18	919	9	5.2	13.9		0	-	-	-	-	-	-	-	-	-
25740	5-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25742	5-Jun-18	771	10	-12.4	-12.4	0	0	-	-	-	-	-	-	-	-	-
25743	5-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25744	5-Jun-18	0	-	-	-	-	0	-	-	-	-	26	4	-7.9	-7.9	0.0
25745	5-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25746	5-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25747	28-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25748	28-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25749	28-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25750	1-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25751	5-Jun-18	37	8	-12.4	-12.4	0	0	-	-	-	-	49906	189	-12.9	-12.9	0.0
25752	27-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25753	27-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25754	27-May-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25755	1-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25756	1-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20147	5-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20148	5-Jun-19	-	-	-	-	-	2209	46	-12.4	-10.3	2.1	-	-	-	-	-
20149	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20150	5-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20151	5-Jun-19	-	-	-	-	-	0	-	-	-	-	4269	37	-12.9	-12.9	0.0
20153	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20154	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20155	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-

Table A1-1: Detection summary for Walleye monitored upstream of the Keeyask GS during the winter 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30, 2021) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted purple = moved downstream through Gull Rapids. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS (continued).

Tag ID	Date tagged	2018/2019					2019/2020					2020/2021				
		n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)
20156	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20157	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20158	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20159	7-Jun-19	-	-	-	-	-	3466	83	-10.3	-10.3	0.0	3148	53	-12.4	-10.1	2.3
20160	7-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20161	7-Jun-19	-	-	-	-	-	0	-	-	-	-	3954	35	-19.5	-17.4	2.1
20162	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20163	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20164	6-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20168	7-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20169	7-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20170	6-Jun-19	-	-	-	-	-	0	-	-	-	-	469	5	-12.9	-7.9	5.0
20175	29-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20176	29-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20181	29-May-19	-	-	-	-	-	0	-	-	-	-	6356	49	-19.5	-17.4	2.1
20182	25-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20186	29-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20187	23-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20188	23-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-

Table A1-2: Detection summary for Walleye monitored in Stephens Lake during the winter 2016/2017 (October 20, 2015 to April 30, 2017), 2017/2018 (October 17, 2017 to April 30, 2018), 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30 2021) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS.

Tag ID	Date tagged	2018/2019					2019/2020					2020/2021				
		n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)
25732	9-Jun-18	0	-	-	-	-										
25734	7-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25735	6-Jun-18	0	-	-	-	-	600	13	13	36.1	23.1	391	15	32	32	0.0
25736	7-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25737	6-Jun-18	0	-	-	-	-	0	-	-	-	-	26	3	3.9	4.9	1.0
25738	6-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
25741	6-Jun-18	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20129	3-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20130	1-Jun-19	-	-	-	-	-	1057	5	6.5	16.8	10.3	1946	16	3.9	16.3	12.4
20131	31-May-19	-	-	-	-	-	66	5	16.8	16.8	0.0	77327	206	3.9	4.9	1.0
20132	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20133	31-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20134	31-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20135	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20136	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20137	31-May-19	-	-	-	-	-	8548	48	13.9	21.6	7.7	-	-	-	-	-
20138	31-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20139	31-May-19	-	-	-	-	-	20139	4	13	13	0.0	126	6	7.5	13.2	5.7
20140	31-May-19	-	-	-	-	-	20140	14	5.2	10.3	5.1	-	-	-	-	-
20141	31-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20142	31-May-19	-	-	-	-	-	7989	75	13.9	18.6	4.7	-	-	-	-	-
20143	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-

Table A1-2: Detection summary for Walleye monitored in Stephens Lake during the winter 2016/2017 (October 20, 2015 to April 30, 2017), 2017/2018 (October 17, 2017 to April 30, 2018), 2018/2019 (October 11, 2018 to April 30, 2019), 2019/2020 (October 8, 2019 to April 30, 2020), and 2020/2021 (September 24, 2020 to April 30 2021) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS (continued).

Tag ID	Date tagged	2018/2019					2019/2020					2020/2021				
		n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)	n	# Days	Farthest U/S (rkm)	Farthest D/S (rkm)	Range (rkm)
20144	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20145	1-Jun-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20152	31-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20165	16-Sep-19	-	-	-	-	-	39683	174	5.2	10.3	5.1	52505	200	3.9	10.2	6.3
20167	16-Sep-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20171	27-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20172	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20173	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20174	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20177	30-May-19	-	-	-	-	-	10513	89	5.2	13.9	8.7	-	-	-	-	-
20178	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20179	30-May-19	-	-	-	-	-	45009	183	5.2	10.3	5.1	56962	5	5.9	10.2	4.3
20180	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20183	30-May-19	-	-	-	-	-	177	6	8.4	8.4	0.0	-	-	-	-	-
20184	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
20185	30-May-19	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-

Table A1-3: Detection summary for Walleye and monitored upstream of the Keeyask GS during the open-water 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted purple = moved downstream through Gull Rapids. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS.

Tag ID	Date tagged	2018					2019					2020					2021				
		n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)
25739	5-Jun-18	996	30	-9.3	-7.4	1.9	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25740	5-Jun-18	3587	29	-9.3	36.1	45.4	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25742	5-Jun-18	14026	101	-15.0	-9.9	5.1	586	8	-12.9	-12.9	0.0	0	-	-	-	-	0	-	-	-	-
25743	5-Jun-18	597	7	-10.2	-4.8	5.4	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25744	5-Jun-18	5128	44	-19.5	-9.3	10.2	0	-	-	-	-	2	1	-8	-7.9	0.0	38	12	-7.9	-7.9	0.0
25745	5-Jun-18	225	2	-12.8	-12.8	0.0	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25746	5-Jun-18	1946	28	-19.5	-12.8	6.7	0	-	-	-	-	423	21	-13	-12.9	0.0	2	1	-12.9	-12.9	0.0
25747	28-May-18	12012	100	-24.7	-7.4	17.3	4724	53	-46.9	-9	37.9	963	34	-8.9	-4.8	4.1	0	-	-	-	-
25748	28-May-18	625	6	-19.5	24.7	44.2						0	-	-	-	-	0	-	-	-	-
25749	28-May-18	9675	75	-48.2	-9.3	38.9	2504	64	-33.8	-4.8	29.0	8435	39	-8.9	-8.9	0.0	3139	46	-8.9	-8.9	0.0
25750	1-Jun-18	3401	49	-26.5	-9.0	17.5	6437	35	-48.2	-17.4	30.8	0	-	-	-	-	0	-	-	-	-
25751	5-Jun-18	3274	72	-19.5	-12.8	6.7	3532	83	-12.9	-12.5	0.4	6091	60	-34.3	-9.9	24.4	7861	53	-48.2	-9.9	38.3
25752	27-May-18	2272	21	-19.5	40.8	60.3	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25753	27-May-18	11695	58	-32.3	36.1	68.4	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25754	27-May-18	5119	60	-24.7	-12.9	11.8	4147	58	-19.5	-15	4.5	10	1	-29.4	-29.4	0.0	0	-	-	-	-
25755	1-Jun-18	564	11	-24.7	40.9	65.6	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25756	1-Jun-18	5983	54	-19.5	-9.9	9.6	3332	22	-46.9	-15	31.9	0	-	-	-	-	0	-	-	-	-
20147	5-Jun-19	-	-	-	-	-	11721	46	-19.5	40.9	60.4	0	-	-	-	-	0	-	-	-	-
20148	5-Jun-19	-	-	-	-	-	25306	116	-19.5	-9.3	10.2	998	8	5.2	40.5	35.3	0	-	-	-	-
20149	6-Jun-19	-	-	-	-	-	7	1	-19.5	-17.4	2.1	0	-	-	-	-	0	-	-	-	-
20150	5-Jun-19	-	-	-	-	-	1783	8	-15.0	40.9	55.9	0	-	-	-	-	0	-	-	-	-
20151	5-Jun-19	-	-	-	-	-	7125	97	-29.4	-12.9	16.5	7166	72	-12.9	-9.9	3.0	6885	89	-48.2	-9.9	38.3
20153	6-Jun-19	-	-	-	-	-	1607	9	-19.5	-9.9	9.6	0	-	-	-	-	0	-	-	-	-
20154	6-Jun-19	-	-	-	-	-	66867	115	-19.5	-19.5	0.0	31732	78	-19.5	-19.5	0.0	107836	144	-19.5	-19.4	0.1
20155	6-Jun-19	-	-	-	-	-	621	5	-19.5	-9.9	9.6	0	-	-	-	-	0	-	-	-	-
20156	6-Jun-19	-	-	-	-	-	62130	121	-19.5	-19.5	0.0	22726	56	-19.5	-19.5	0.0	951	27	-19.4	-19.4	0.0
20157	6-Jun-19	-	-	-	-	-	1174	9	-19.5	-12.9	6.6	131	12	-12.9	-12.9	0.0	0	-	-	-	-
20158	6-Jun-19	-	-	-	-	-	1697	6	-19.5	9.4	28.9	0	-	-	-	-	0	-	-	-	-
20159	7-Jun-19	-	-	-	-	-	10988	82	-19.5	-9.0	10.5	6662	71	-29.4	-4.8	24.6	126	9	-7.7	-7.7	0.0
20160	7-Jun-19	-	-	-	-	-	9846	10	-19.5	5.4	24.9	0	-	-	-	-	0	-	-	-	-
20161	7-Jun-19	-	-	-	-	-	4014	81	-19.5	-19.5	0.0	1817	37	-19.5	-15.0	4.5	8590	88	-48.2	-12.5	35.7
20162	6-Jun-19	-	-	-	-	-	537	13	-19.5	-15.0	4.5	76	8	-15.0	-15.0	0.0	5694	75	-17.4	-15.0	2.4
20163	6-Jun-19	-	-	-	-	-	6084	53	-33.8	36.1	69.9	0	-	-	-	-	0	-	-	-	-
20164	6-Jun-19	-	-	-	-	-	106	1	-19.5	-15.0	4.5	0	-	-	-	-	0	-	-	-	-
20168	7-Jun-19	-	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
20169	7-Jun-19	-	-	-	-	-	27	4	-19.5	-15.0	4.5	0	-	-	-	-	0	-	-	-	-
20170	6-Jun-19	-	-	-	-	-	6259	89	-46.9	-9.3	37.6	2464	42	-33.8	-7.9	25.9	384	7	-46.9	-12.9	34.0
20175	29-May-19	-	-	-	-	-	6127	65	-48.2	-4.8	43.4	0	-	-	-	-	0	-	-	-	-
20176	29-May-19	-	-	-	-	-	42406	118	-19.5	-17.4	2.1	1390	17	-19.5	-19.5	0.0	0	-	-	-	-
20181	29-May-19	-	-	-	-	-	6572	93	-19.5	-17.4	2.1	1604	24	-29.4	-15.0	14.4	18752	52	-48.2	-17.4	30.8

Table A1-3: Detection summary for Walleye and monitored upstream of the Keeyask GS during the open-water 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted purple = moved downstream through Gull Rapids. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS (continued).

Tag ID	Date tagged	2018					2019					2020					2021				
		n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)
20182	25-May-19	-	-	-	-	-	10080	22	-19.5	10.3	29.8	0	-	-	-	-	0	-	-	-	-
20186	29-May-19	-	-	-	-	-	10480	74	-17.4	5.4	22.8	0	-	-	-	-	0	-	-	-	-
20187	23-May-19	-	-	-	-	-	4991	35	-19.5	24.7	44.2	0	-	-	-	-	0	-	-	-	-
20188	23-May-19	-	-	-	-	-	31081	102	-24.7	-19.5	5.2	2715	27	-48.2	-24.2	24.0	3561	36	-48.2	-19.4	28.8
48244	3-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4065	55	-48.2	-15	33.2
48258	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7034	72	-44.2	-17.4	26.8
48259	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11740	103	-22.6	-9.9	12.7
48260	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1771	12	-33.9	-9.9	24.0
48261	7-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14837	109	-32.2	-9.9	22.3
48262	10-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6686	71	-15	-3.8	11.2
48263	14-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7971	78	-34.3	-9.9	24.4
48264	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31981	122	-24.2	-2.2	22.0
48265	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10385	70	-33.8	-26.4	7.4
48266	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19958	101	-48.2	-15	33.2
48267	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8532	81	-33.9	-6.2	27.7
48268	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9172	22	-22.6	-22.6	0.0
48269	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23174	99	-22.6	-15	7.6
48270	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4093	38	-48.2	-22.6	25.6
48271	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16646	104	-33.8	-19.5	14.3
48313	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6469	69	-34.3	-9.9	24.4
48314	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21586	117	-46.9	-3.8	43.1
48319	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1777	13	-22.6	-22.6	0.0
48320	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13062	113	-48.2	-15	33.2
48321	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4198	49	-48.2	-7.9	40.3
48322	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7284	55	-48.2	-15	33.2
48323	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4033	32	-22.6	7.5	30.1
48326	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20171	121	-48.2	-19.4	28.8
48327	1-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4121	17	-22.6	-12.5	10.1
48328	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28131	124	-22.6	-3.8	18.8
48329	1-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2232	34	-48.2	-26.4	21.8
48330	1-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2502	23	-19.5	40.5	60.0
48331	1-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10686	89	-48.2	-15	33.2
48332	1-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12924	103	-34.3	-5.8	28.5
48333	31-May-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7130	67	-48.2	-2.2	46.0

Table A1-4: Detection summary for Walleye monitored in Stephens Lake during the open-water 2016 (May 1 to October 19), 2017 (May 1 to October 16), 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS.

Tag ID	Date tagged	2018					2019					2020					2021				
		n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)
25732	9-Jun-18	2502	19	1.2	40.9	39.7	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25734	7-Jun-18	1429	7	1.2	21.6	20.4	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25735	6-Jun-18	1572	34	1.2	7.9	6.7	2081	33	1.2	9.4	8.2	4117	75	32.0	36.1	4.1	321	10	32.0	32.0	0.0
25736	7-Jun-18	4814	18	1.2	10.3	9.1	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25737	6-Jun-18	13243	78	1.2	4.4	3.2	11124	78	1.2	4.4	3.2	15411	64	1.2	5.0	3.8	9863	70	0.8	5.0	4.2
25738	6-Jun-18	2300	20	1.2	36.1	34.9	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
25741	6-Jun-18	45733	120	1.2	2.7	1.5	156	21	1.2	1.2	0.0	0	-	-	-	-	383	20	1.2	1.2	0.0
20129	3-Jun-19	-	-	-	-	-	2257	23	1.2	6.5	5.3	0	-	-	-	-	0	-	-	-	-
20130	1-Jun-19	-	-	-	-	-	3708	25	1.2	18.6	17.4	1753	15	1.2	7.8	6.6	4460	29	0.8	9.9	9.1
20131	31-May-19	-	-	-	-	-	11481	79	1.2	18.6	17.4	4020	63	3.9	18.6	14.7	12054	114	3.9	5.9	2.0
20132	1-Jun-19	-	-	-	-	-	20473	103	1.2	4.1	2.9	23801	82	1.2	1.2	0.0	20	7	1.2	1.2	0.0
20133	31-May-19	-	-	-	-	-	6795	44	1.2	9.4	8.2	0	-	-	-	-	0	-	-	-	-
20134	31-May-19	-	-	-	-	-	771	11	0.6	4.4	3.8	0	-	-	-	-	0	-	-	-	-
20135	1-Jun-19	-	-	-	-	-	55200	124	1.2	4.4	3.2	36772	82	1.2	1.2	0.0	67306	130	1.0	1.2	0.2
20136	1-Jun-19	-	-	-	-	-	673	18	1.2	24.7	23.5	0	-	-	-	-	0	-	-	-	-
20137	31-May-19	-	-	-	-	-	2094	29	1.2	24.7	23.5	0	-	-	-	-	0	-	-	-	-
20138	31-May-19	-	-	-	-	-	22235	95	0.6	4.1	3.5	20138	37	0.6	2.7	2.1	5014	53	0.8	5.9	5.1
20139	31-May-19	-	-	-	-	-	2457	39	1.2	36.1	34.9	20139	22	1.2	13.2	12.0	1755	28	0.8	13.2	12.4
20140	31-May-19	-	-	-	-	-	1190	50	1.2	10.3	9.1	20140	37	1.2	9.9	8.7	0	-	-	-	-
20141	31-May-19	-	-	-	-	-	2202	15	0.6	36.1	35.5	0	-	-	-	-	0	-	-	-	-
20142	31-May-19	-	-	-	-	-	9295	91	1.2	18.6	17.4	20142	30	5.2	65.3	60.1	0	-	-	-	-
20143	1-Jun-19	-	-	-	-	-	181	6	3.8	18.6	14.8	20143	7	5.2	18.6	13.4	4327	38	1.2	18.8	17.6
20144	1-Jun-19	-	-	-	-	-	5023	31	1.2	5.8	4.6	20144	3	5.0	5.0	0.0	554	9	2.7	9.9	7.2
20145	1-Jun-19	-	-	-	-	-	883	20	0.6	7.9	7.3	0	-	-	-	-	0	-	-	-	-
20152	31-May-19	-	-	-	-	-	11491	41	1.2	6.5	5.3	0	-	-	-	-	0	-	-	-	-
20165	16-Sep-19	-	-	-	-	-	5391	11	1.2	9.4	8.2	23771	89	1.2	8.7	7.5	22233	89	0.8	40.9	40.1
20167	16-Sep-19	-	-	-	-	-	1661	9	1.2	40.9	39.7	0	-	-	-	-	0	-	-	-	-
20171	27-May-19	-	-	-	-	-	1870	14	1.2	7.4	6.2	0	-	-	-	-	0	-	-	-	-
20172	30-May-19	-	-	-	-	-	5131	43	1.2	5.8	4.6	11	2	5.0	5.2	0.2	0	-	-	-	-
20173	30-May-19	-	-	-	-	-	2377	45	1.2	7.4	6.2	2394	27	1.2	8.7	7.5	8824	57	1.0	16.1	15.1
20174	30-May-19	-	-	-	-	-	20228	60	1.0	16.5	15.5	36791	82	1.2	1.2	0.0	32278	115	1.3	1.3	0.0
20177	30-May-19	-	-	-	-	-	11339	100	0.6	10.3	9.7	670	19	5.2	10.3	5.1	0	-	-	-	-
20178	30-May-19	-	-	-	-	-	4293	26	0.6	7.9	7.3	0	-	-	-	-	0	-	-	-	-
20179	30-May-19	-	-	-	-	-	2746	35	2.7	13.9	11.2	394	25	5.2	13.4	8.2	7947	44	5.4	13.4	8.0

Table A1-4: Detection summary for Walleye monitored in Stephens Lake during the open-water 2016 (May 1 to October 19), 2017 (May 1 to October 16), 2018 (May 1 to October 10), 2019 (May 1 to October 7), 2020 (May 1 to September 23), and 2021 (May 1 to October 10) periods. Tag ID highlighted yellow = lost tag. Tag ID highlighted green = moved downstream through Kettle GS. Tag ID highlighted orange = suspected to have moved downstream through Kettle GS. Tag ID highlighted red = moved downstream through Long Spruce GS (continued).

Tag ID	Date tagged	2018					2019					2020					2021				
		n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)	n	# Days	U/S (rkm)	D/S (rkm)	Range (rkm)
20180	30-May-19	-	-	-	-	-	1874	37	2.7	24.7	22.0	0	-	-	-	-	0	-	-	-	-
20183	30-May-19	-	-	-	-	-	1338	12	2.7	13.0	10.3	11	3	8.4	8.4	0.0	0	-	-	-	-
20184	30-May-19	-	-	-	-	-	2823	16	3.8	13.9	10.1	3	2	13.9	13.9	0.0	0	-	-	-	-
20185	30-May-19	-	-	-	-	-	5527	63	1.2	7.9	6.7	177	8	5.0	7.5	2.5	1469	31	0.8	5.4	4.6
48234	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1964	15	1	24.9	23.9
48235	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	736	19	1	13.2	12.2
48236	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2214	35	0.8	24.9	24.1
48237	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3101	29	1	32	31.0
48238	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6601	33	0.8	5.4	4.6
48239	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	25	1	24.9	23.9
48240	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3124	45	0.8	5.4	4.6
48241	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18349	94	1	24.9	23.9
48242	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3141	29	1.2	24.9	23.7
48243	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1389	10	1	18.8	17.8
48245	4-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	358	9	1	5.9	4.9
48246	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18039	76	1	13.4	12.4
48247	5-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3726	27	0.8	10.2	9.4
48248	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3452	19	0.8	24.9	24.1
48249	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7771	52	0.8	13.4	12.6
48250	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16010	116	0.8	3.9	3.1
48251	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	855	9	0.8	8.7	7.9
48252	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11239	92	1	10.2	9.2
48253	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	451	4	2.7	9.9	7.2
48254	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2482	46	1	8.7	7.7
48255	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2216	11	1.2	18.8	17.6
48256	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19665	105	0.8	7.5	6.7
48257	6-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3894	43	1.2	24.9	23.7
48272	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2204	43	1	7.5	6.5
48273	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3757	60	1.2	9.9	8.7
48274	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3823	60	0.8	7.5	6.7
48275	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8714	31	1.2	18.8	17.6
48318	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9581	77	1	24.9	23.9
48324	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15250	91	0.8	10.2	9.4
48325	2-Jun-21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6355	48	0.8	18.8	18.0

APPENDIX 2:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE UPSTREAM OF THE KEEYASK GS IN 2018/2019: JUNE 2018 TO OCTOBER 2021

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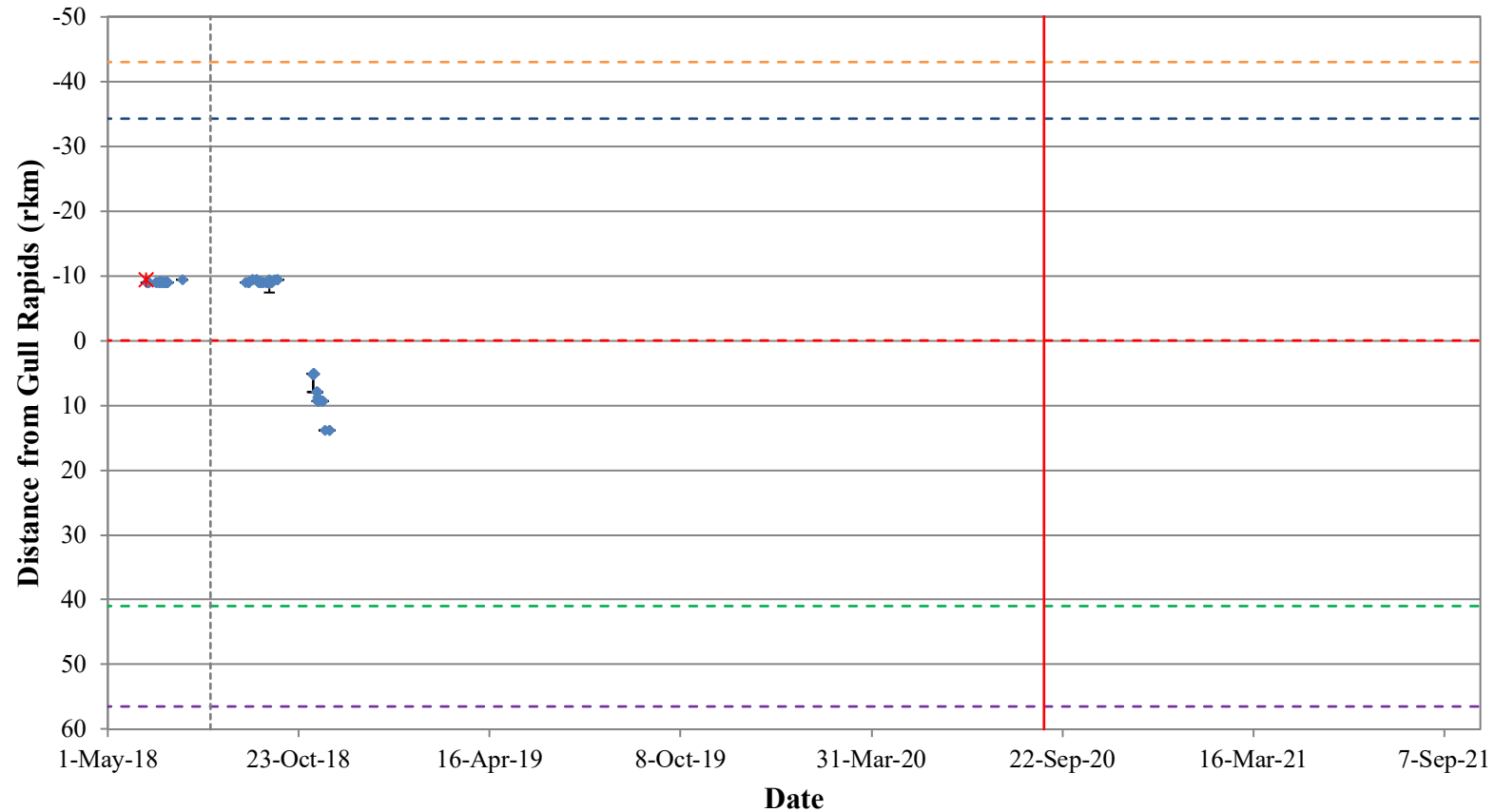


Figure A2-1: Position of a Walleye tagged with an acoustic transmitter (code #25739) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

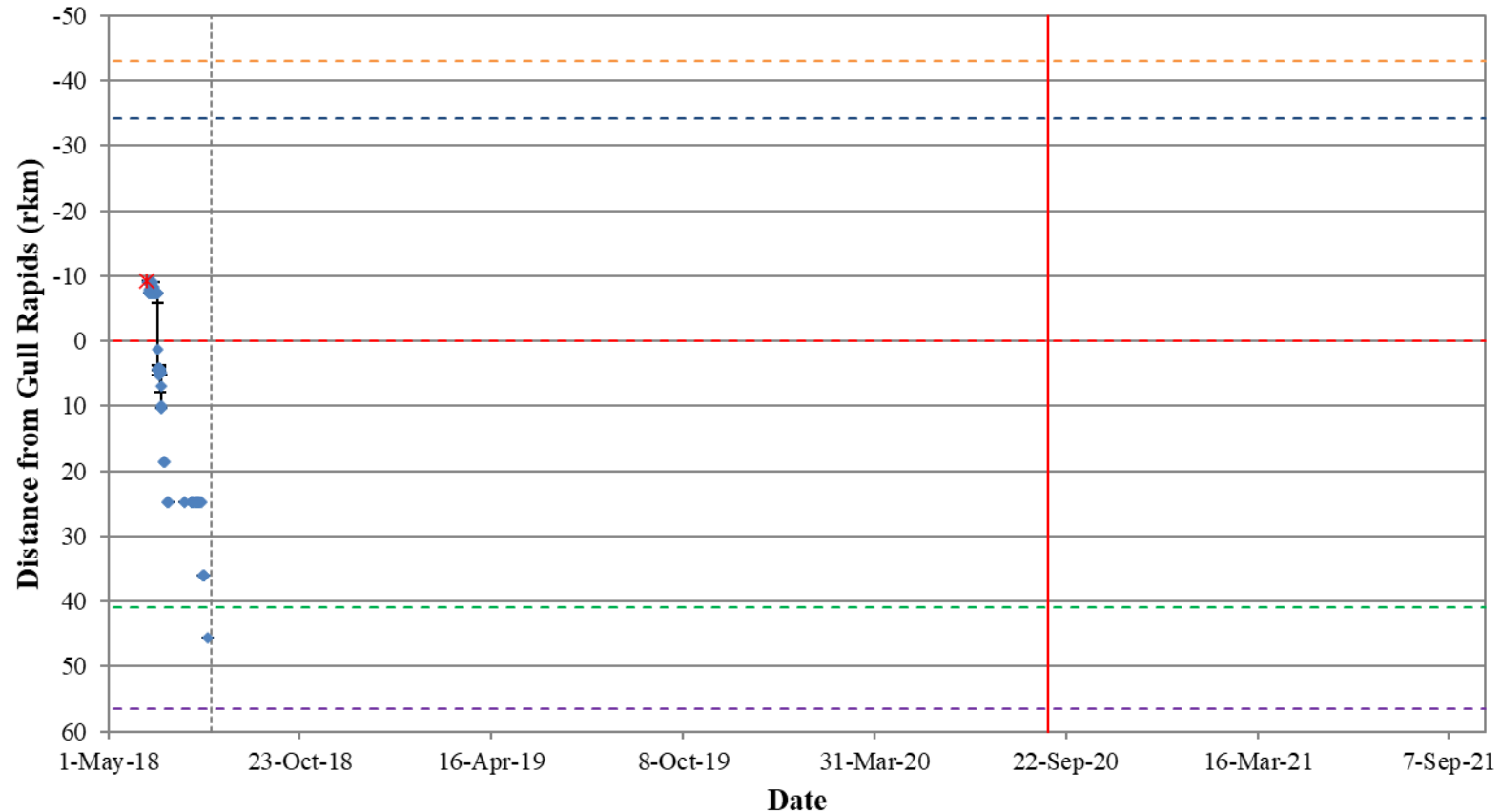


Figure A2-2: Position of a Walleye tagged with an acoustic transmitter (code #25740) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

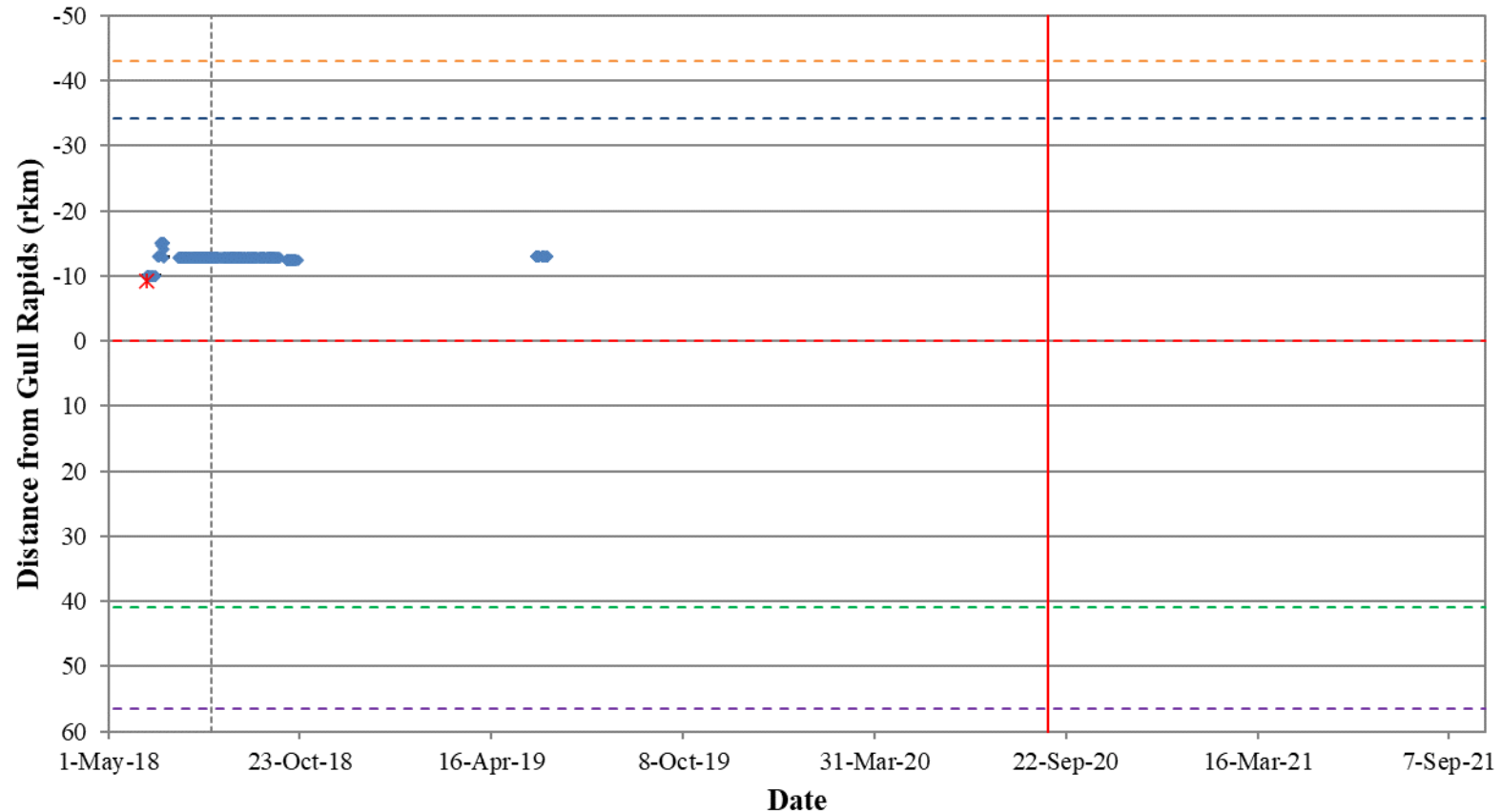


Figure A2-3: Position of a Walleye tagged with an acoustic transmitter (code #25742) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

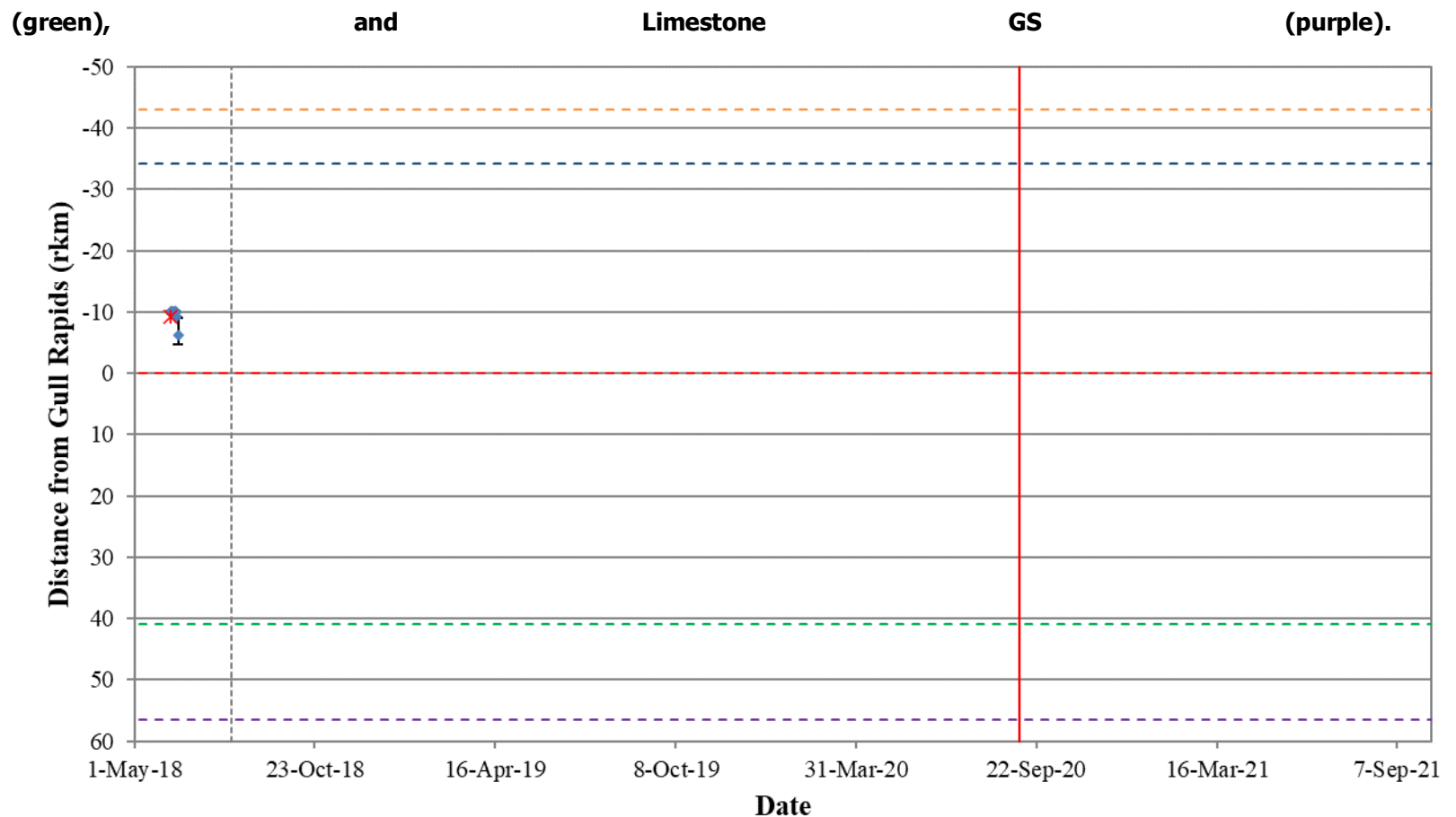


Figure A2-4: Position of a Walleye tagged with an acoustic transmitter (code #25743) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

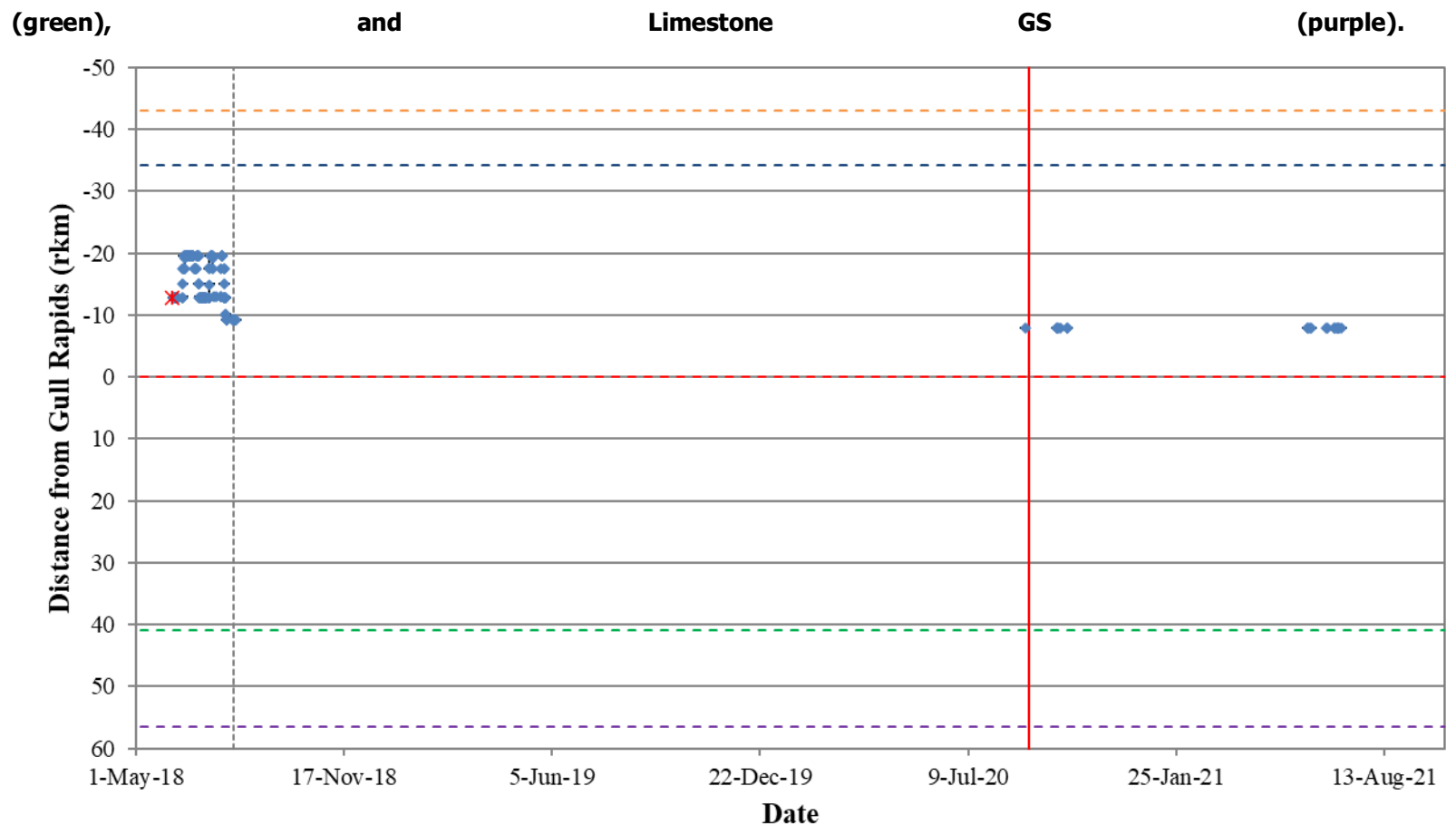


Figure A2-5: Position of a Walleye tagged with an acoustic transmitter (code #25744) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to September 23, 2020. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

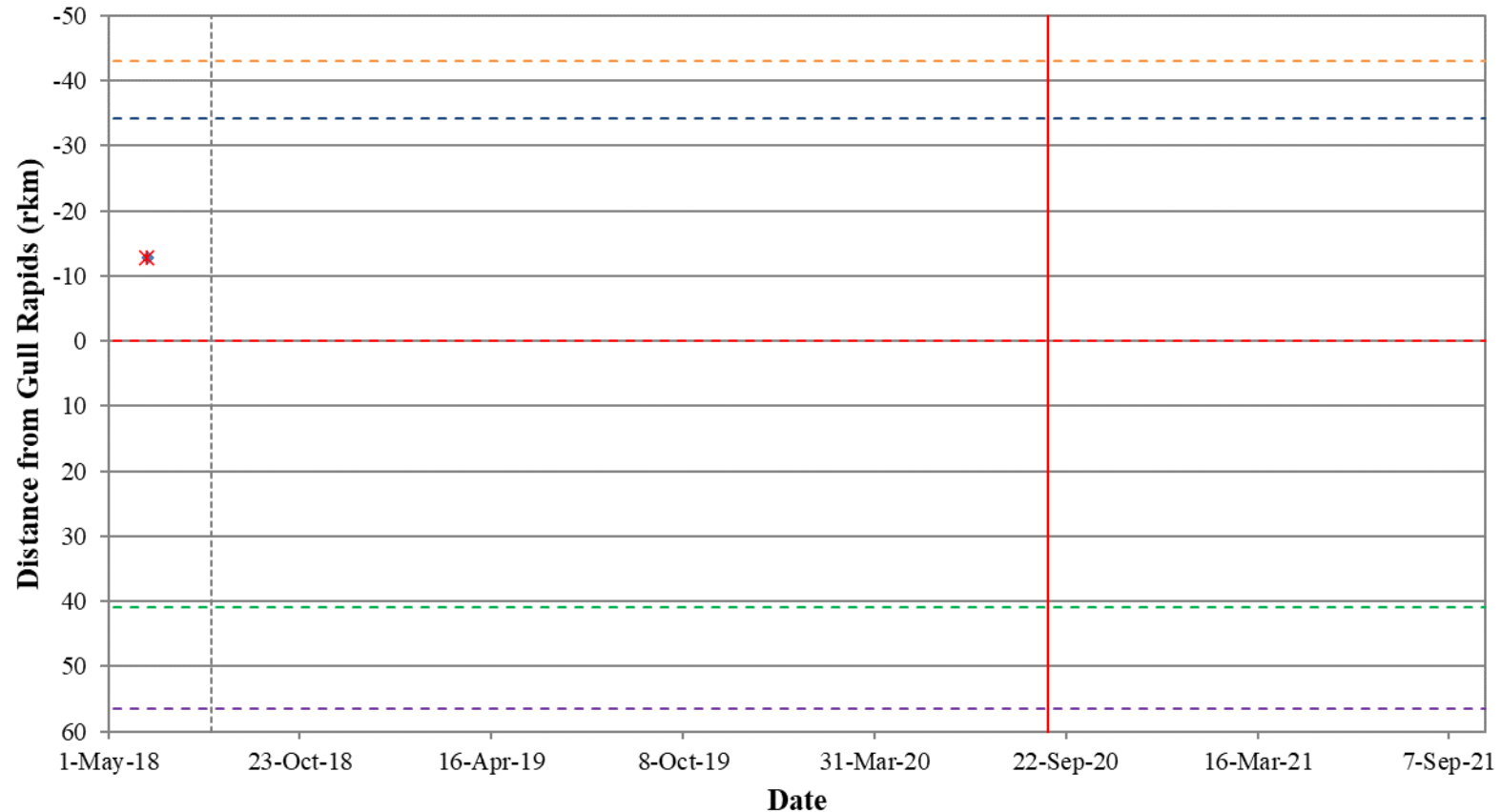


Figure A2-6: Position of a Walleye tagged with an acoustic transmitter (code #25745) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

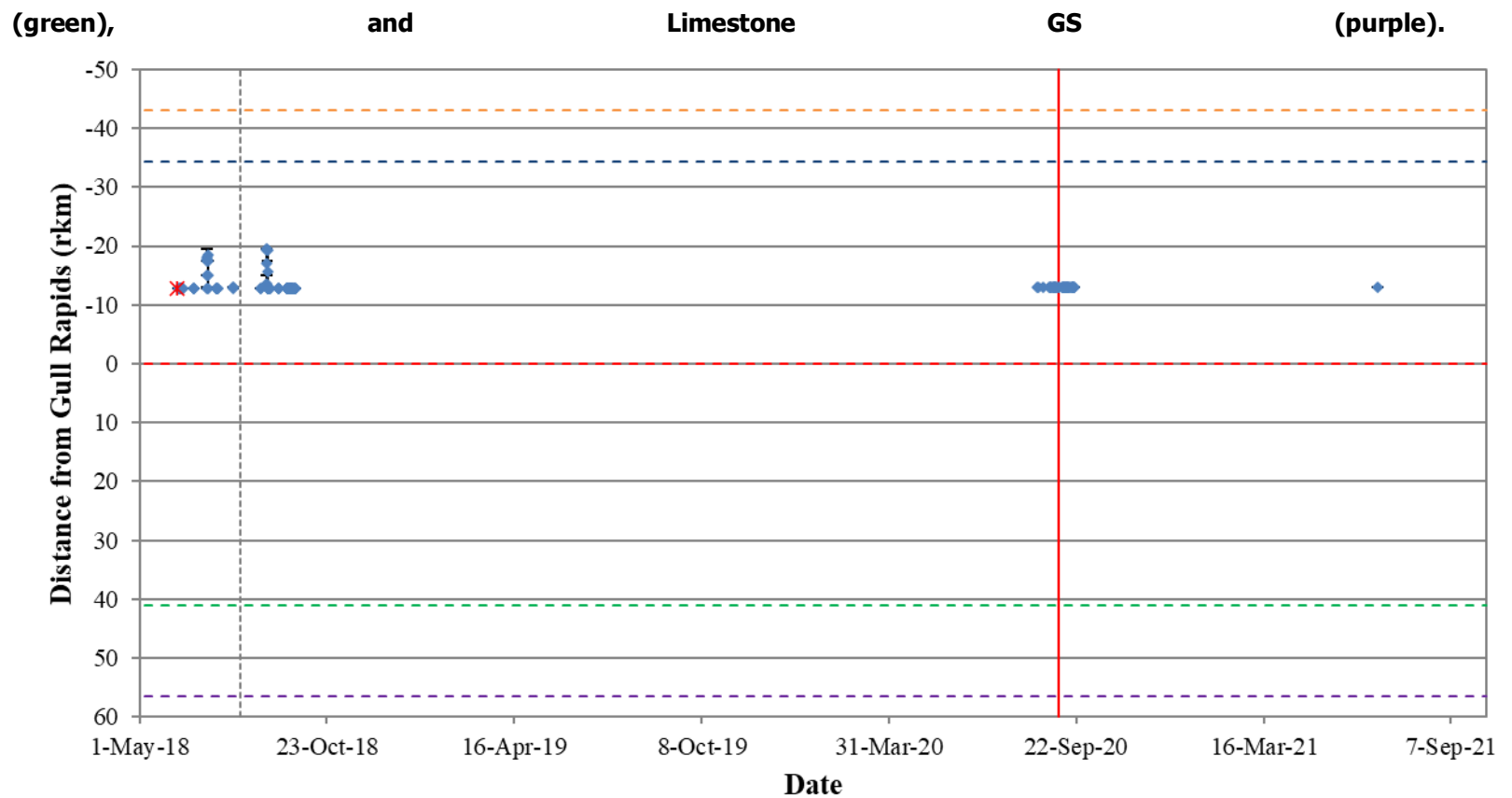


Figure A2-7: Position of a Walleye tagged with an acoustic transmitter (code #25746) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

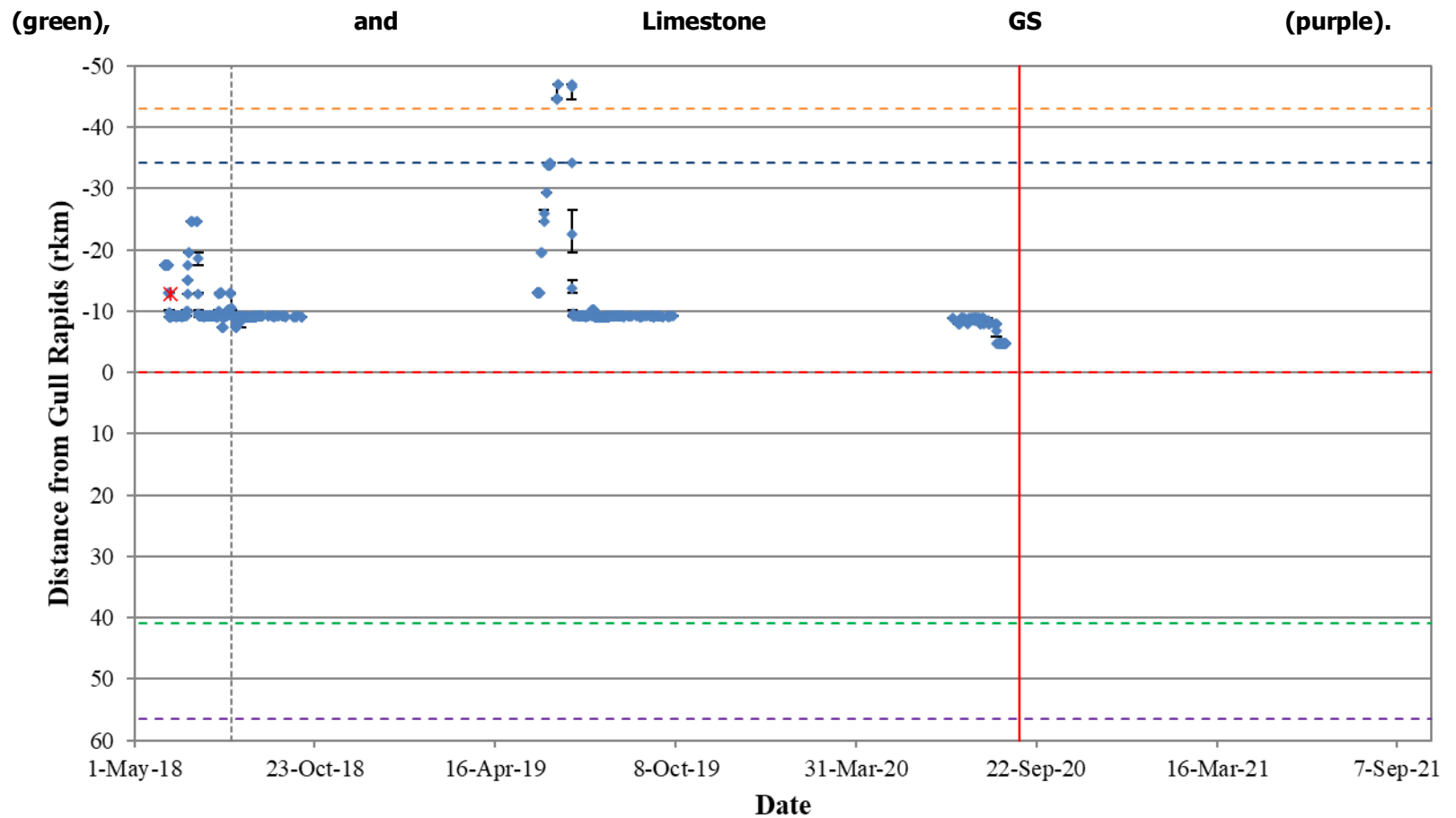


Figure A2-8: Position of a Walleye tagged with an acoustic transmitter (code #25747) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

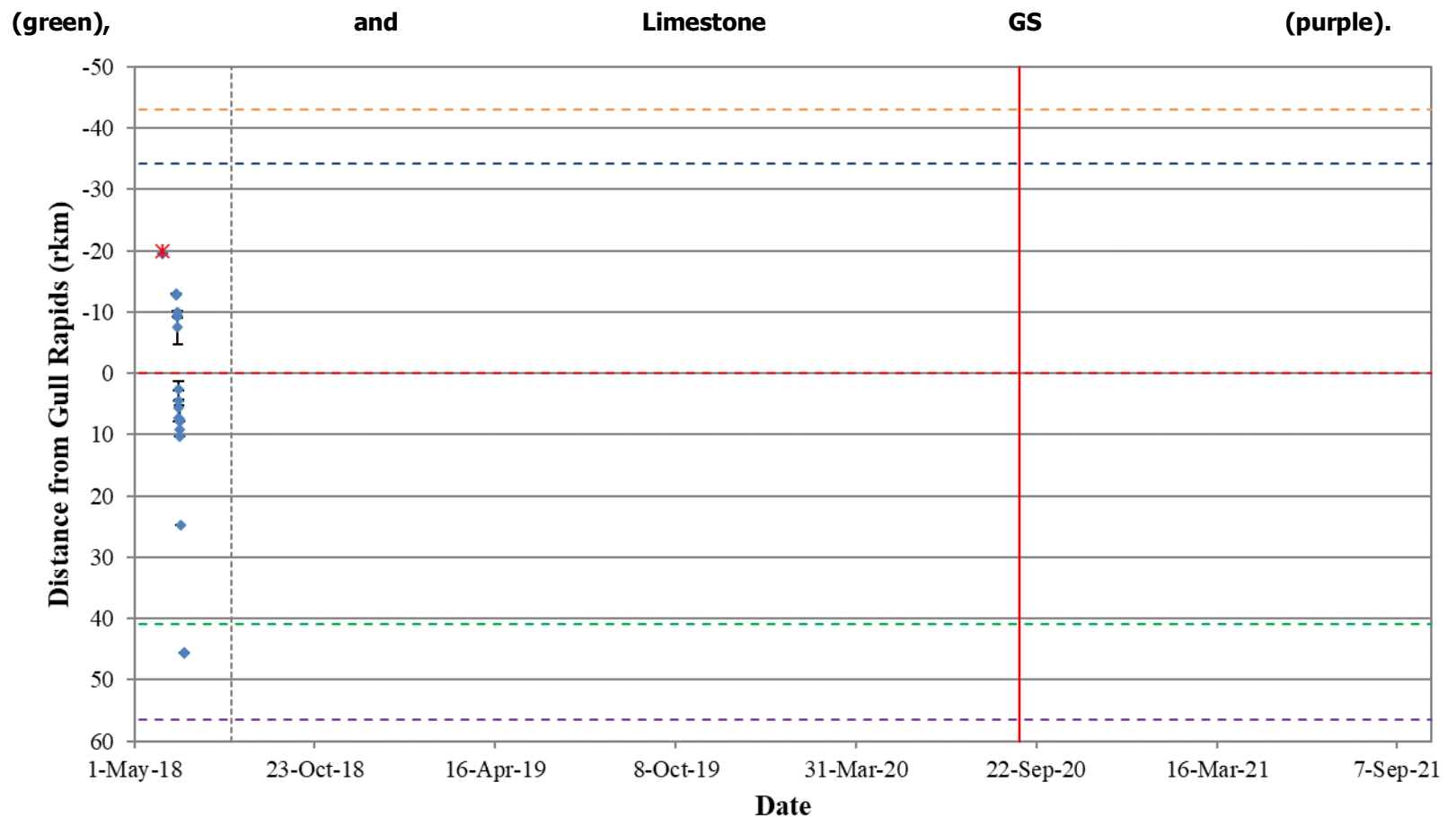


Figure A2-9: Position of a Walleye tagged with an acoustic transmitter (code #25748) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

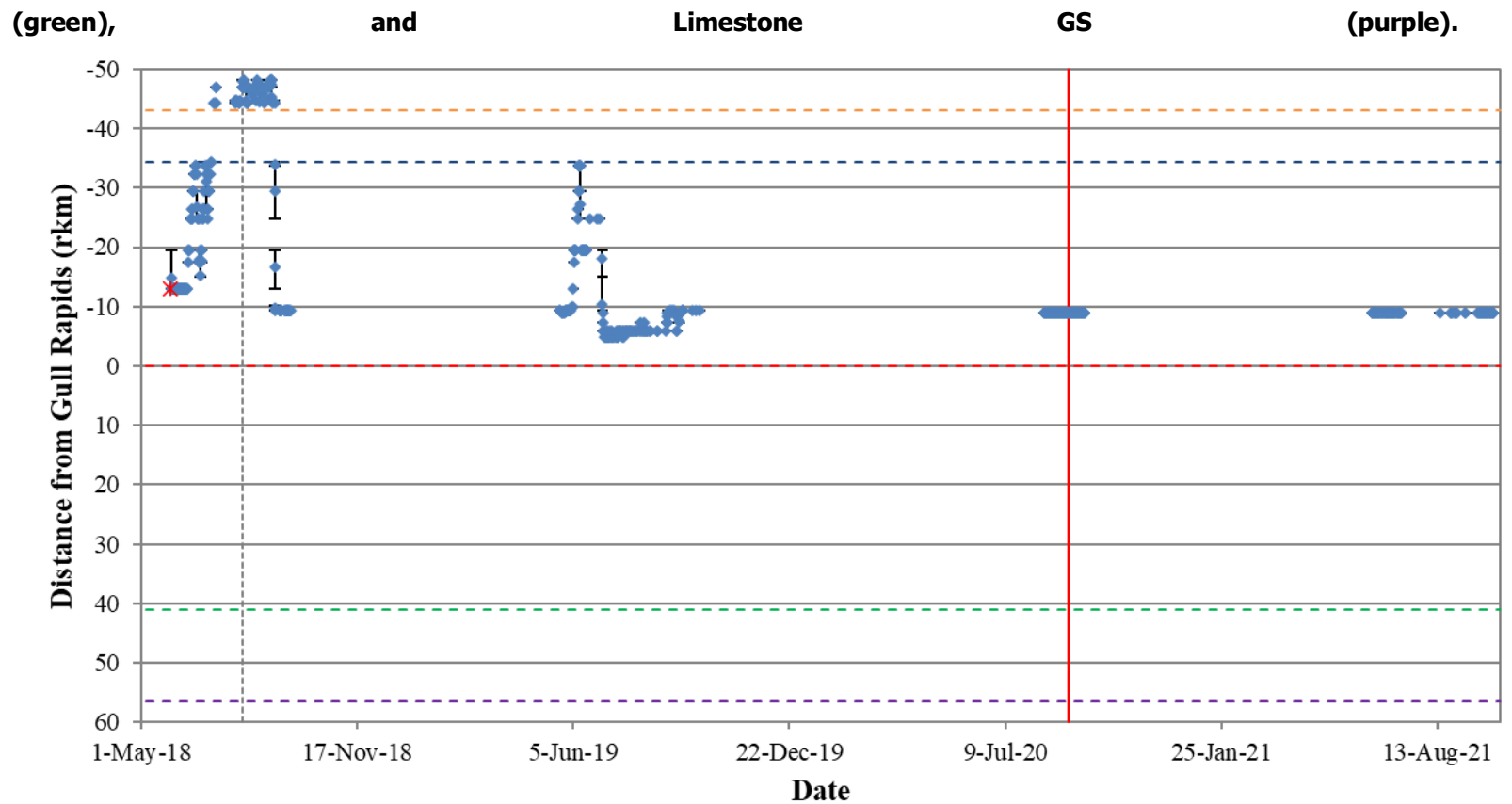


Figure A2-10: Position of a Walleye tagged with an acoustic transmitter (code #25749) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

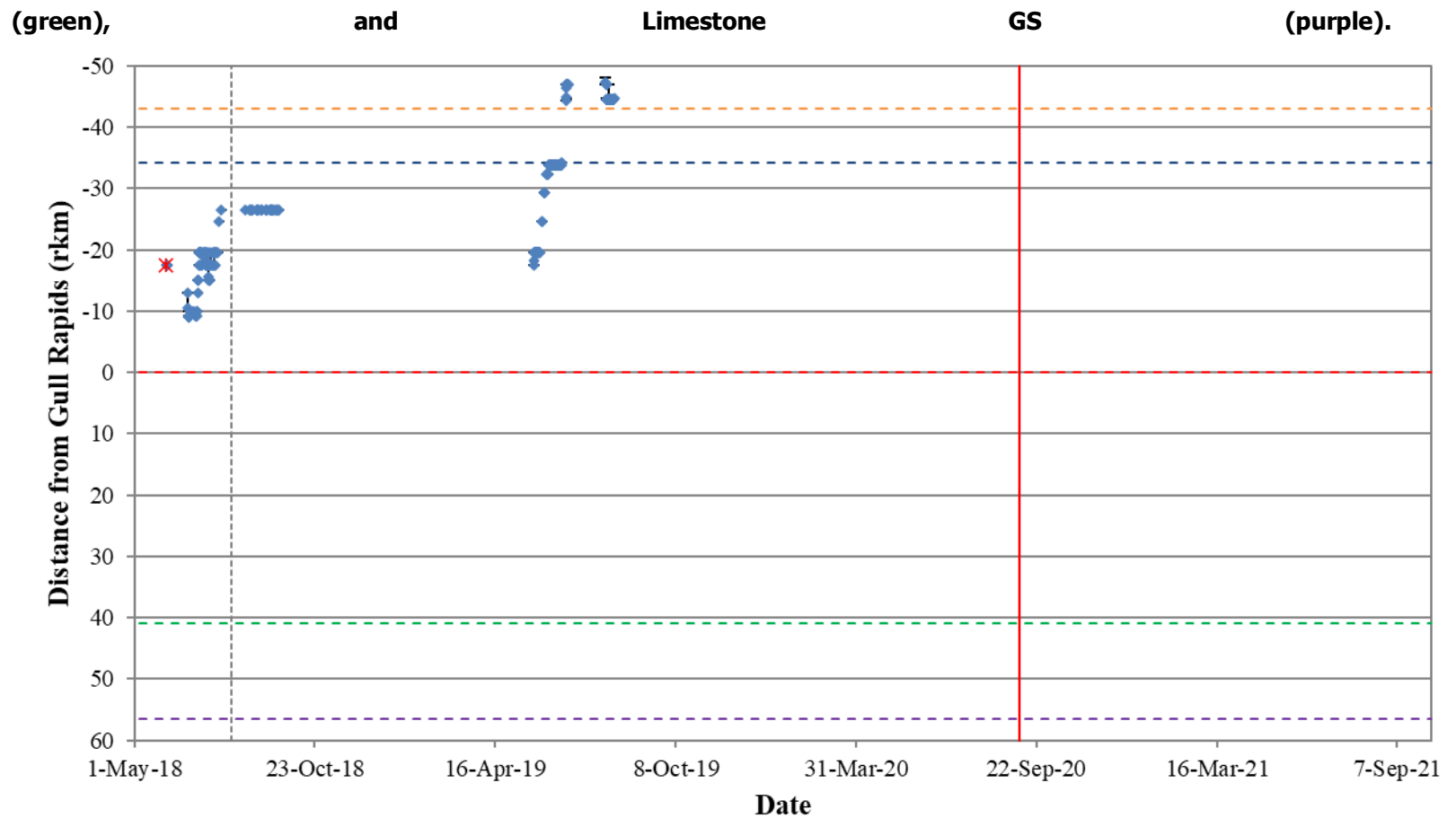


Figure A2-11: Position of a Walleye tagged with an acoustic transmitter (code #25750) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

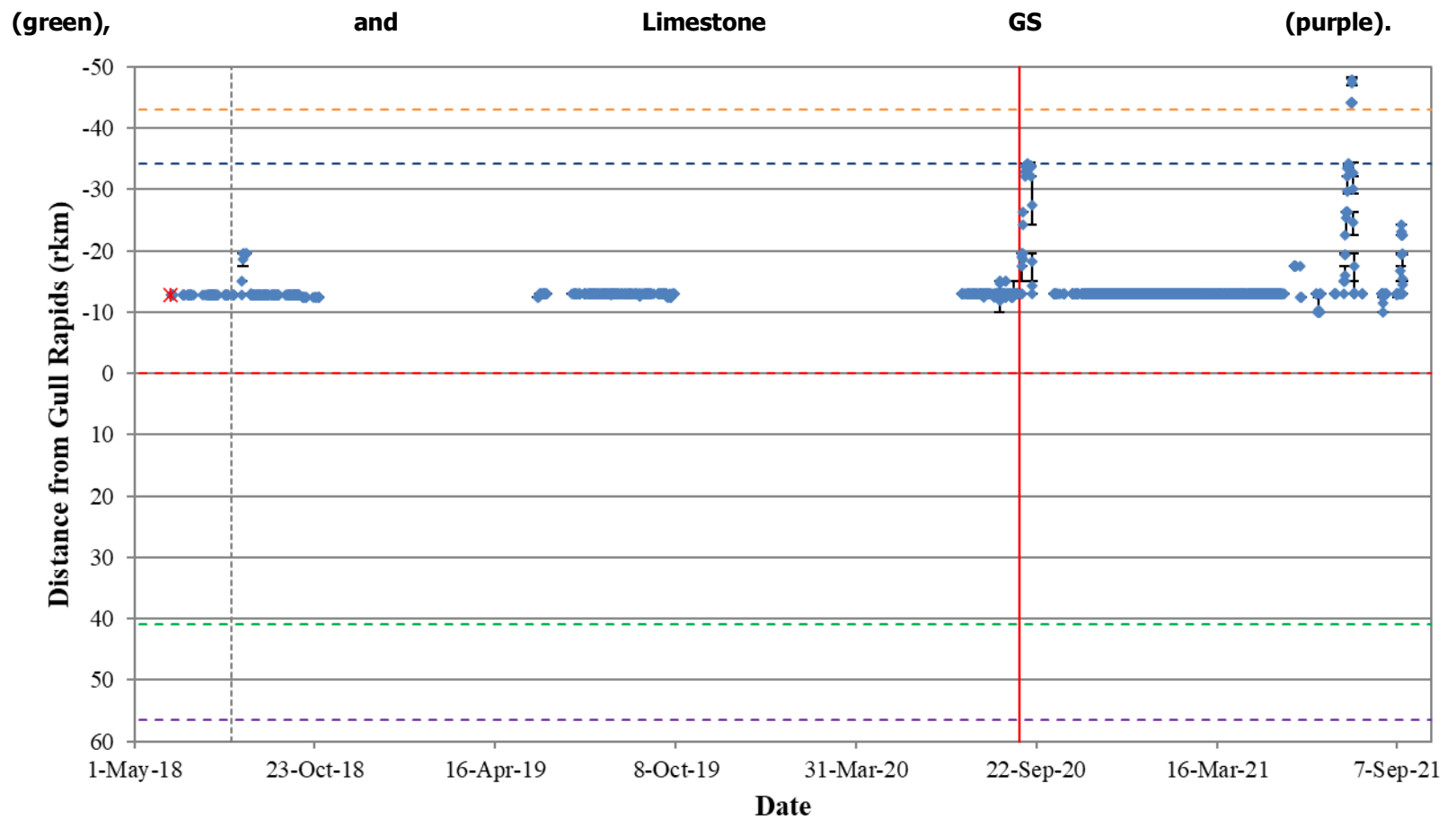


Figure A2-12: Position of a Walleye tagged with an acoustic transmitter (code #25751) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

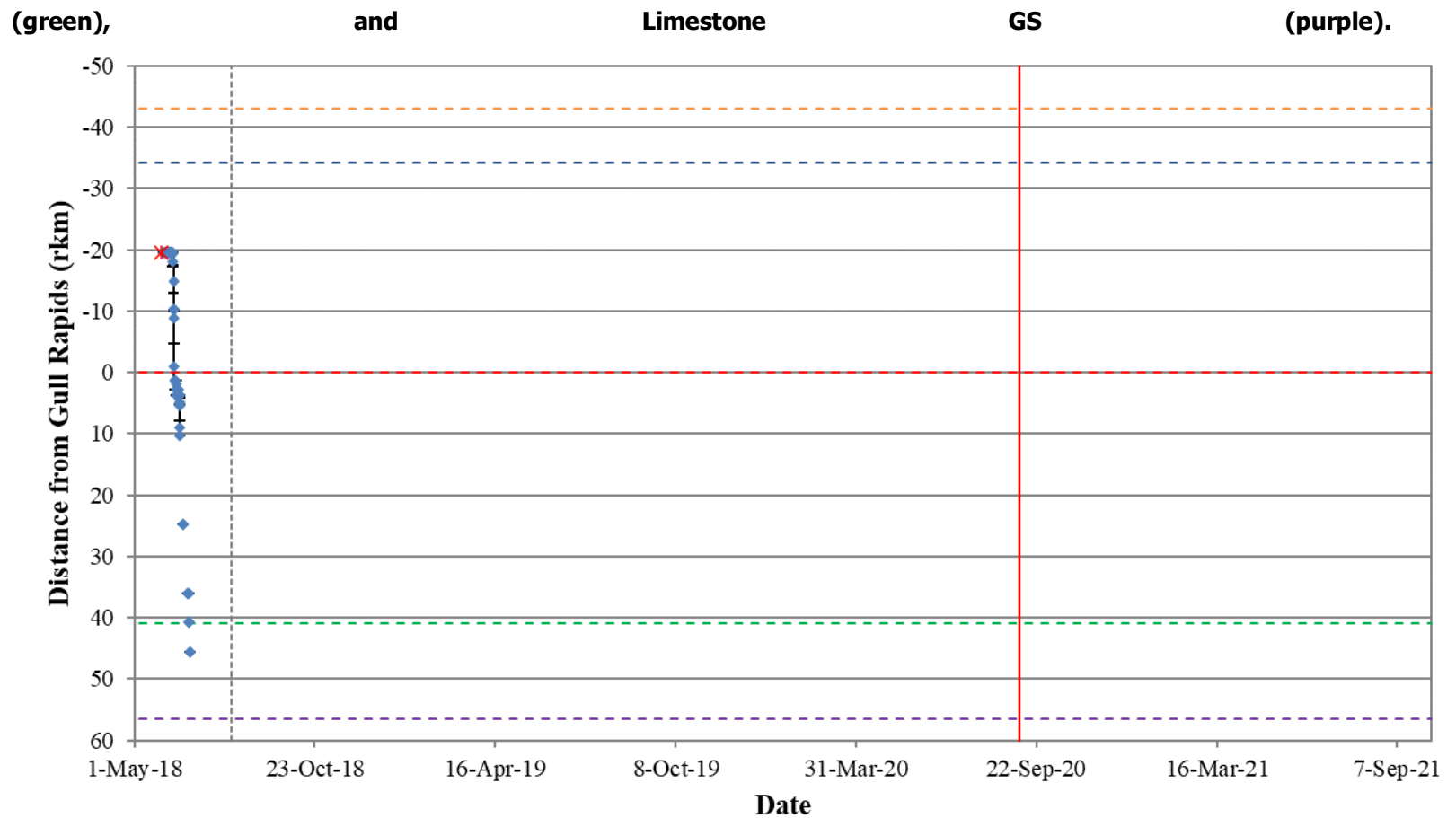


Figure A2-13: Position of a Walleye tagged with an acoustic transmitter (code #25752) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

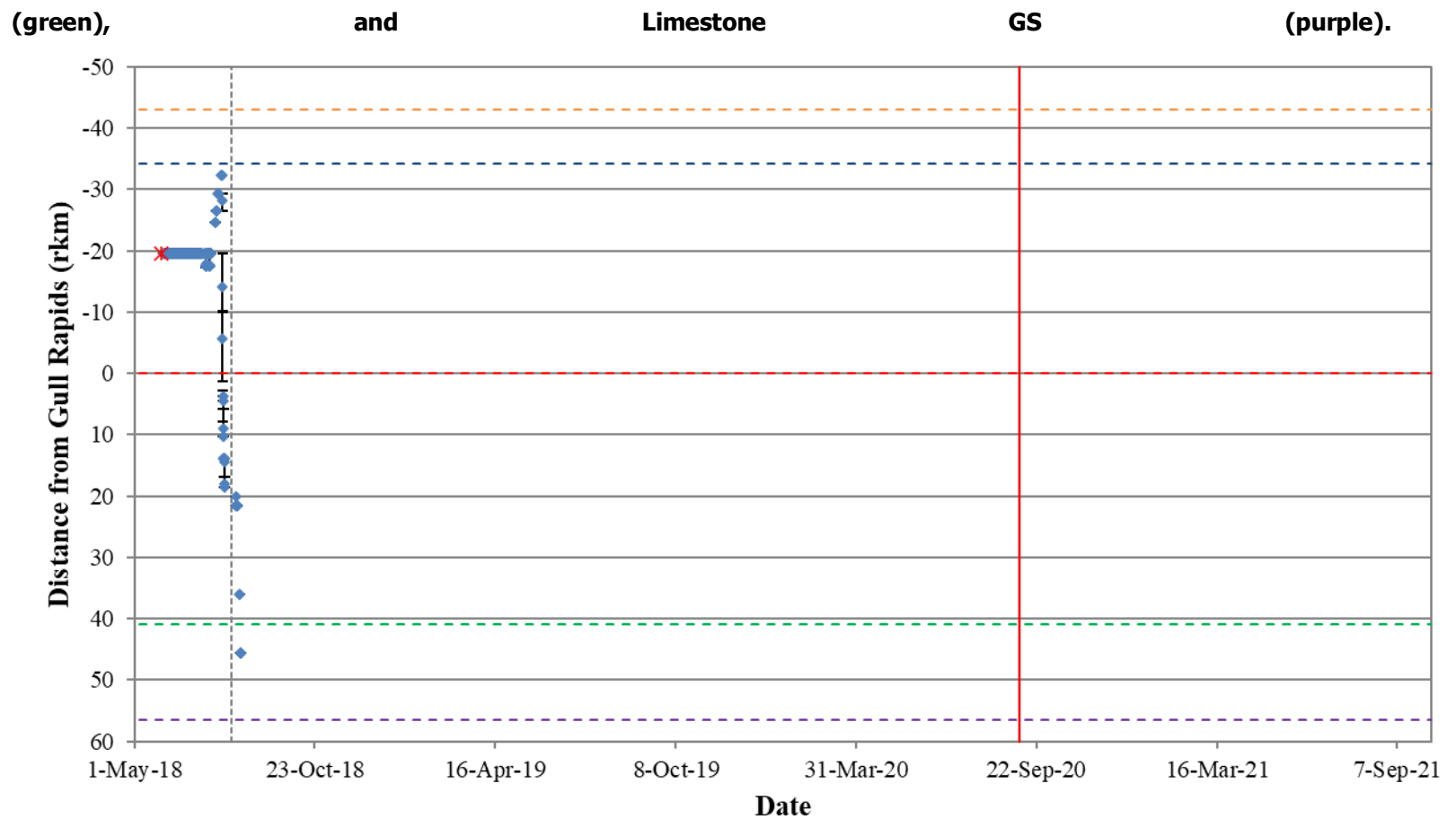


Figure A2-14: Position of a Walleye tagged with an acoustic transmitter (code #25753) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

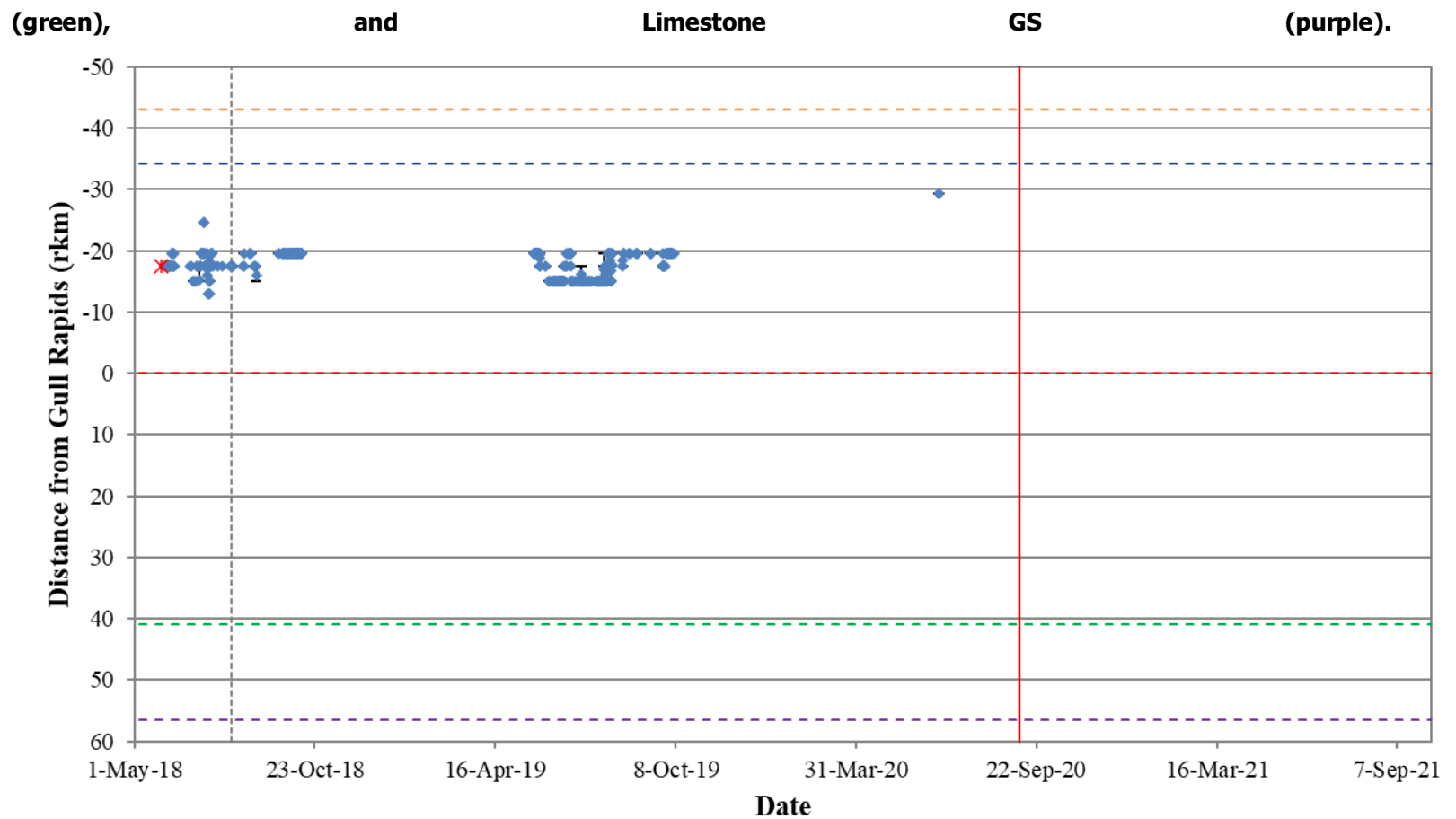


Figure A2-15: Position of a Walleye tagged with an acoustic transmitter (code #25754) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

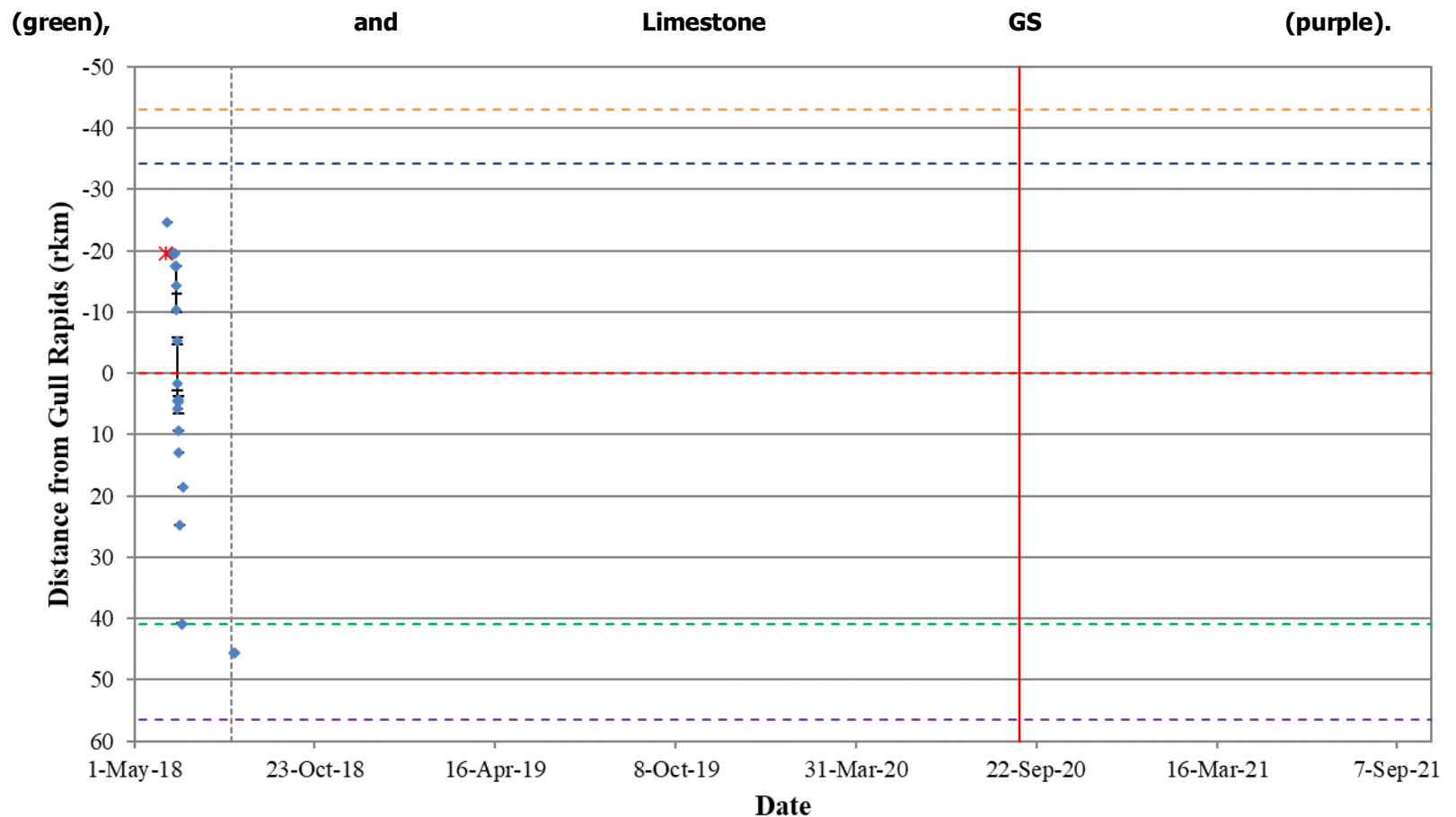


Figure A2-16: Position of a Walleye tagged with an acoustic transmitter (code #25755) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

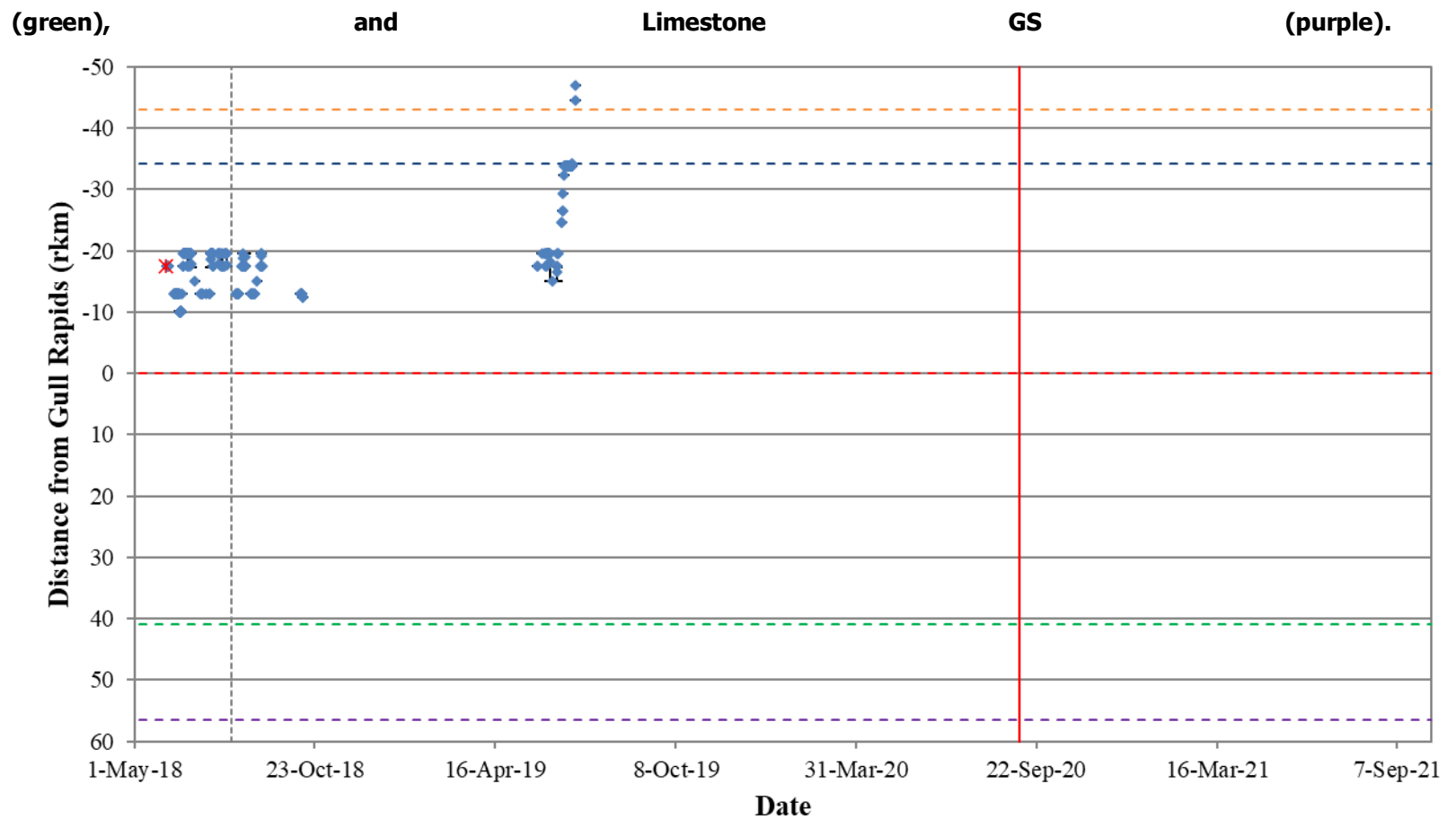


Figure A2-17: Position of a Walleye tagged with an acoustic transmitter (code #25756) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

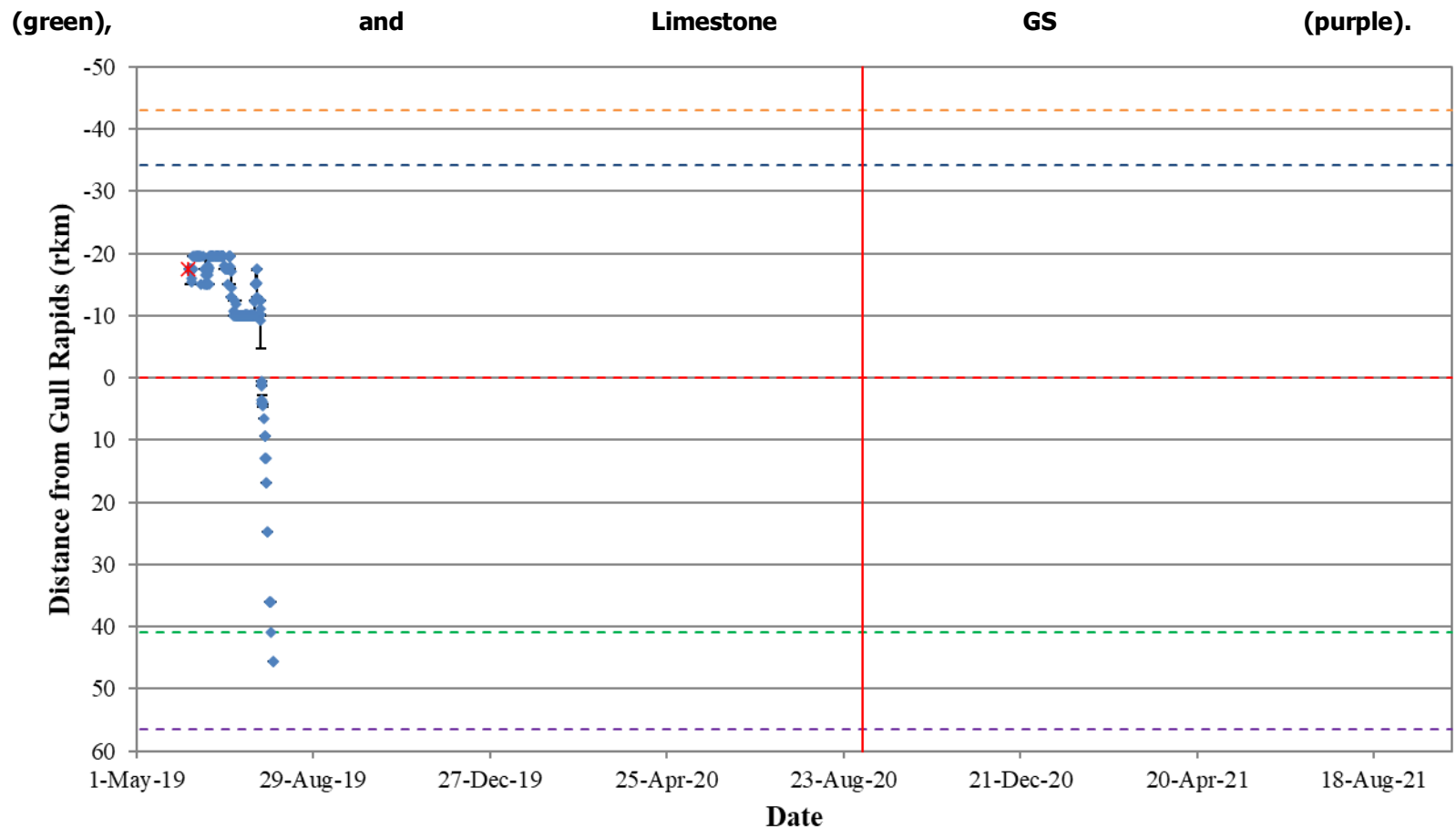


Figure A2-18: Position of a Walleye tagged with an acoustic transmitter (code #20147) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

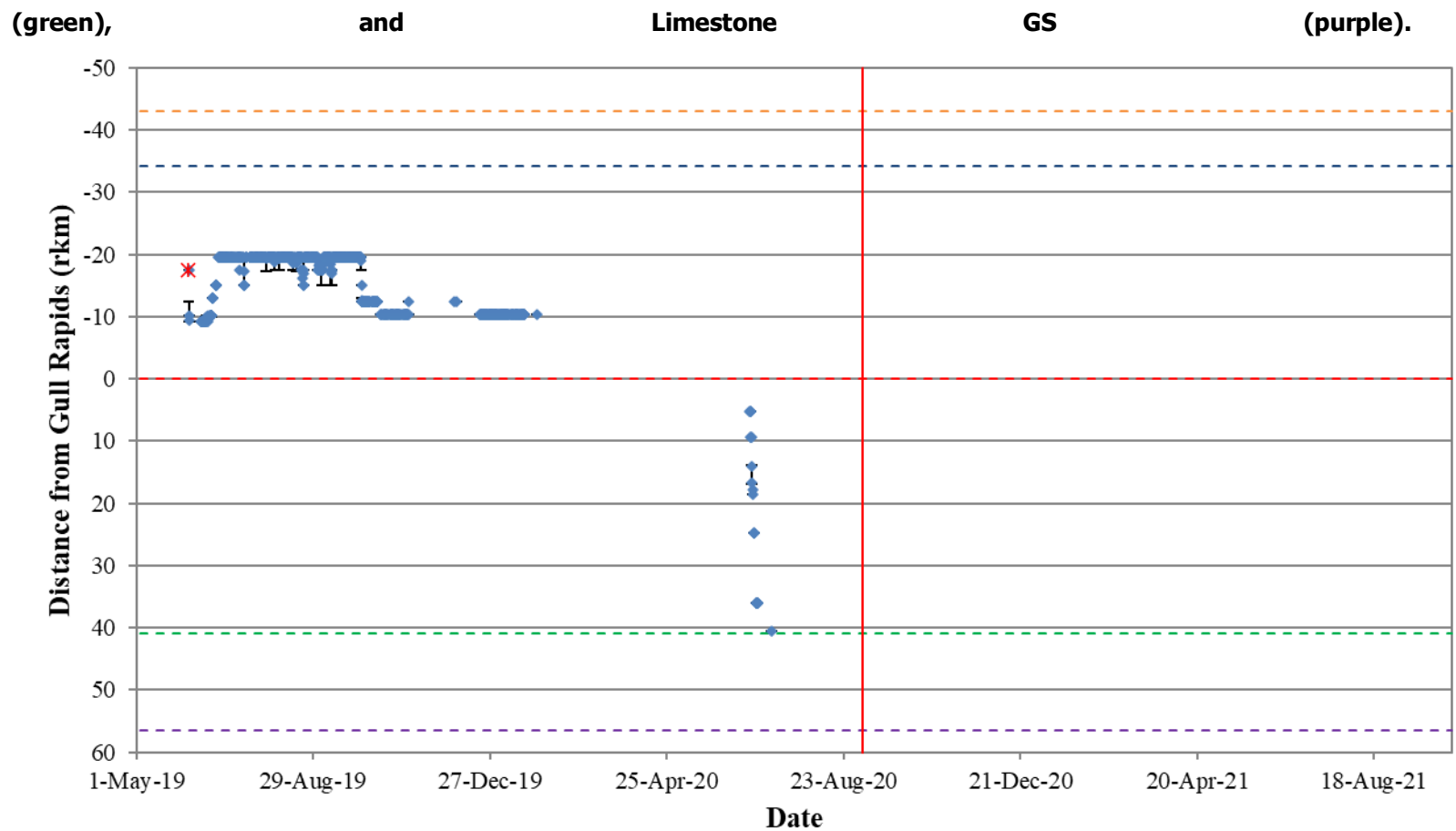


Figure A2-19: Position of a Walleye tagged with an acoustic transmitter (code #20148) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

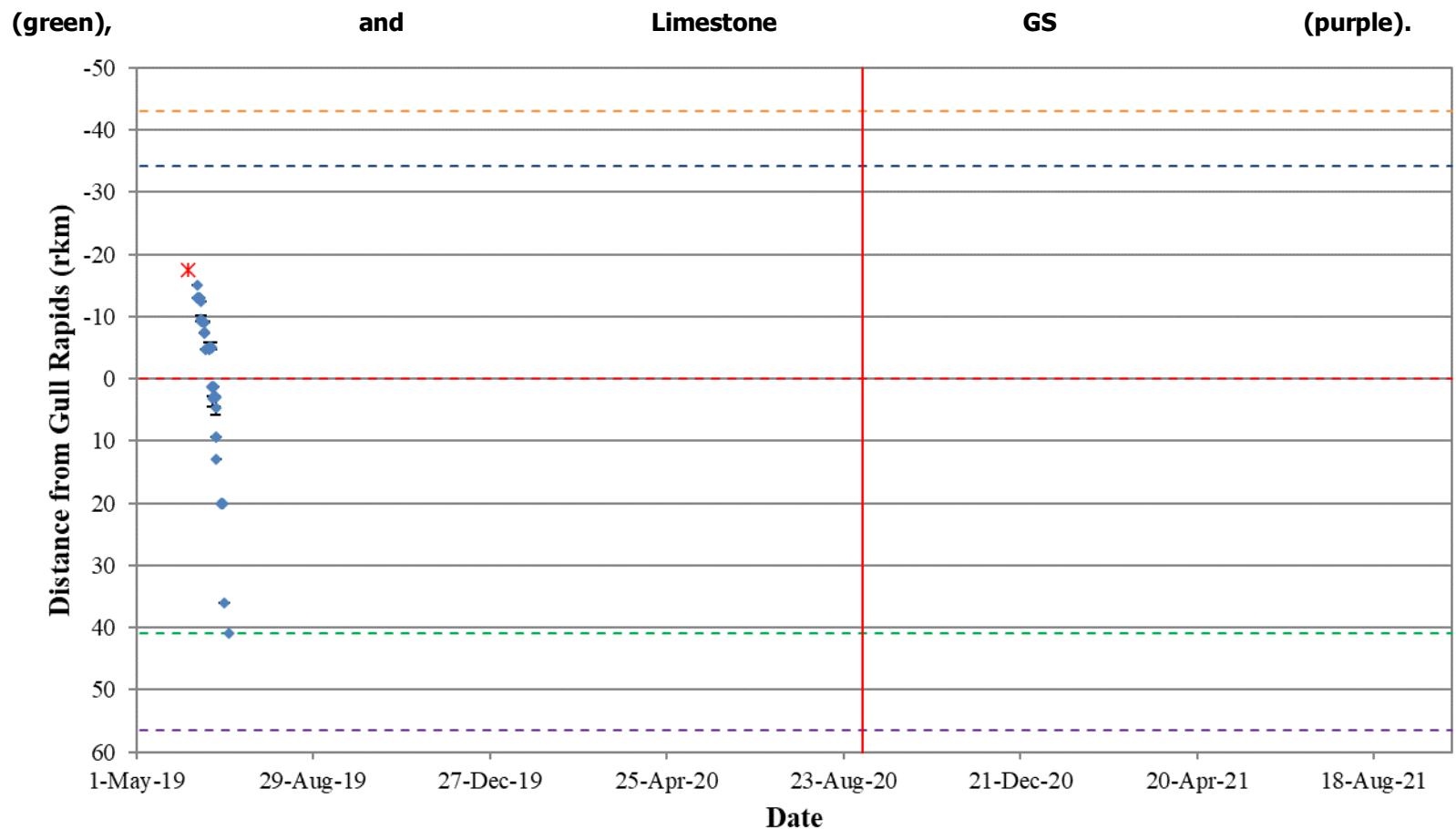


Figure A2-20: Position of a Walleye tagged with an acoustic transmitter (code #20149) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

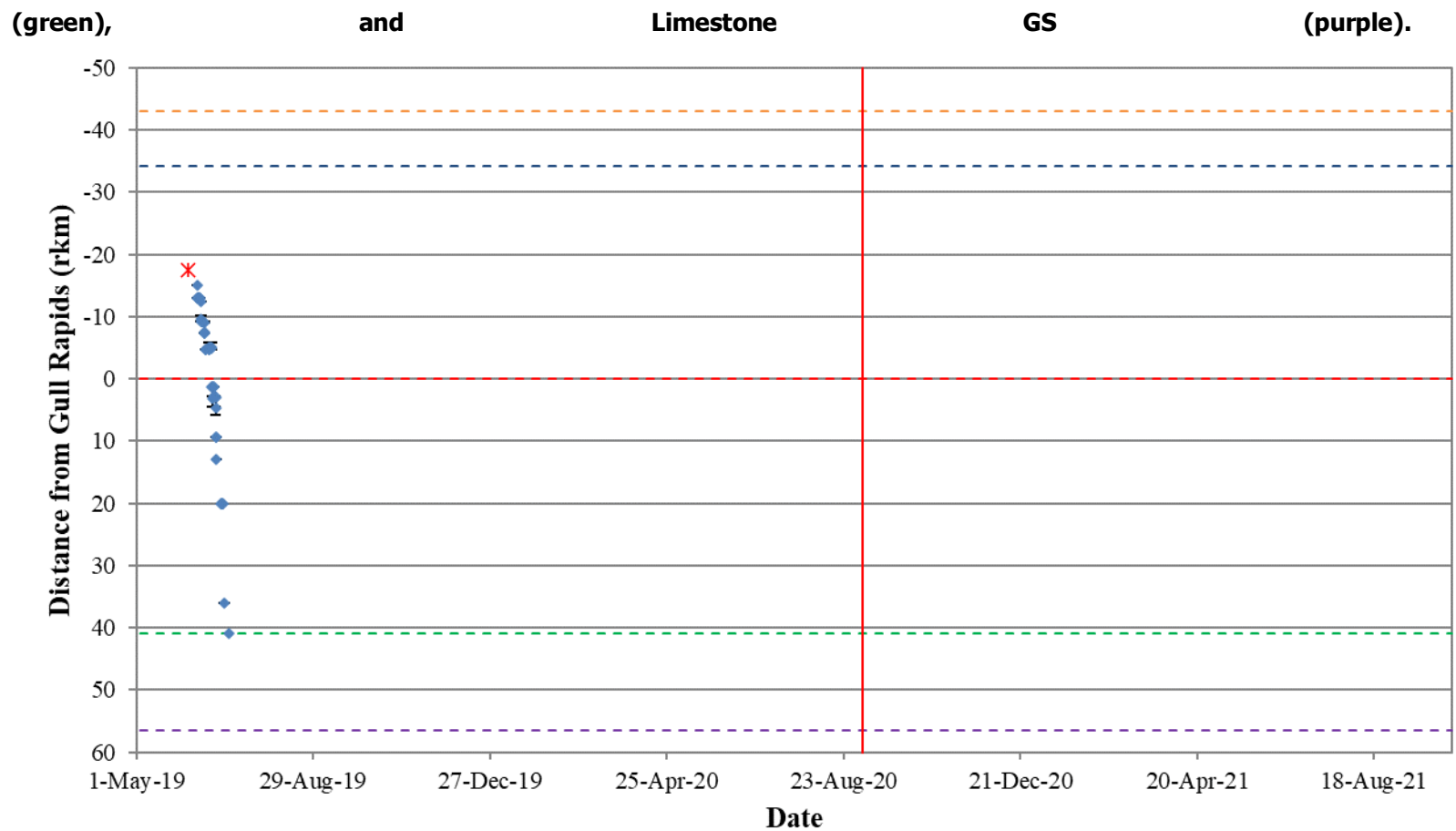


Figure A2-21: Position of a Walleye tagged with an acoustic transmitter (code #20150) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

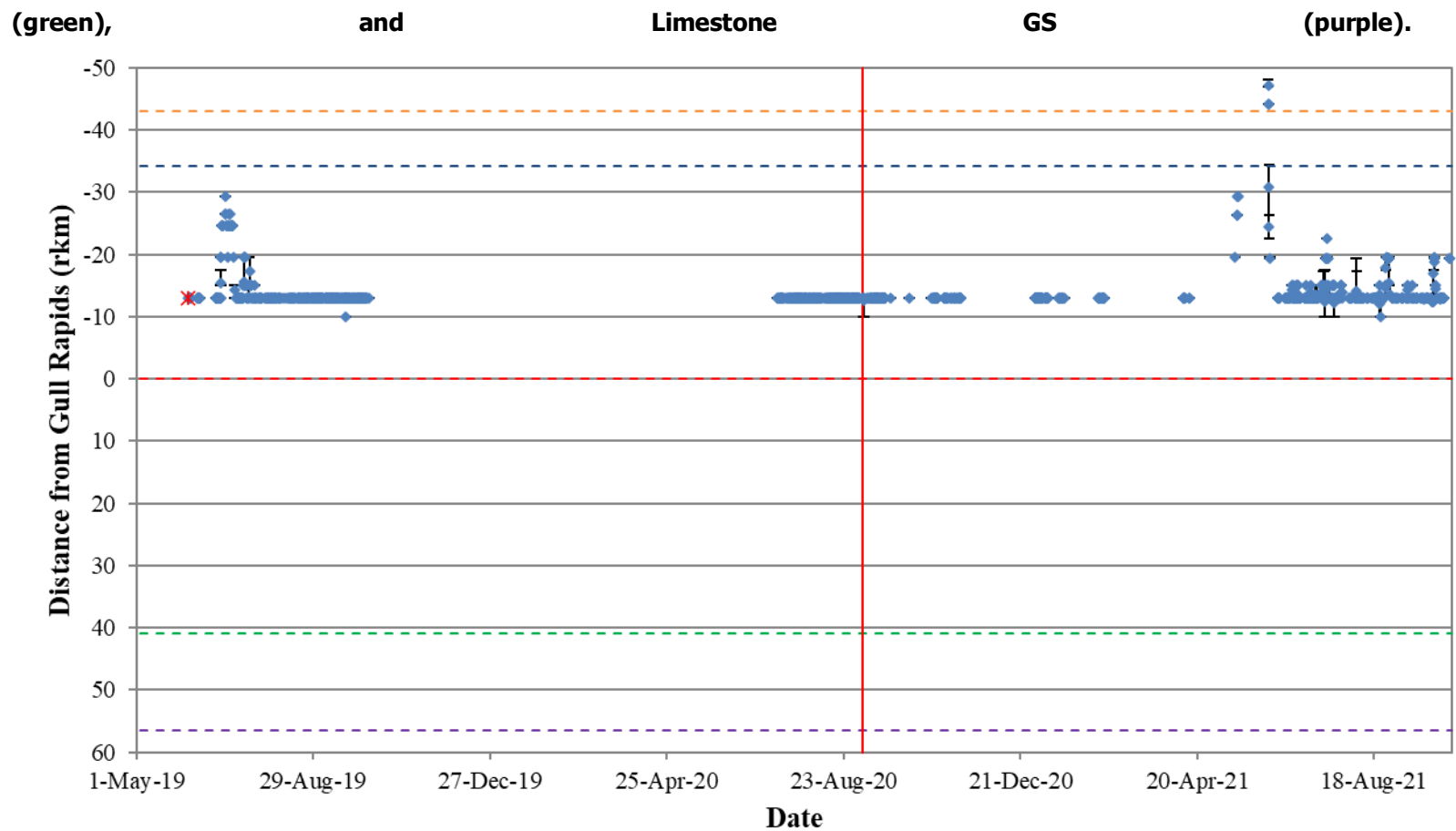


Figure A2-22: Position of a Walleye tagged with an acoustic transmitter (code #20151) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

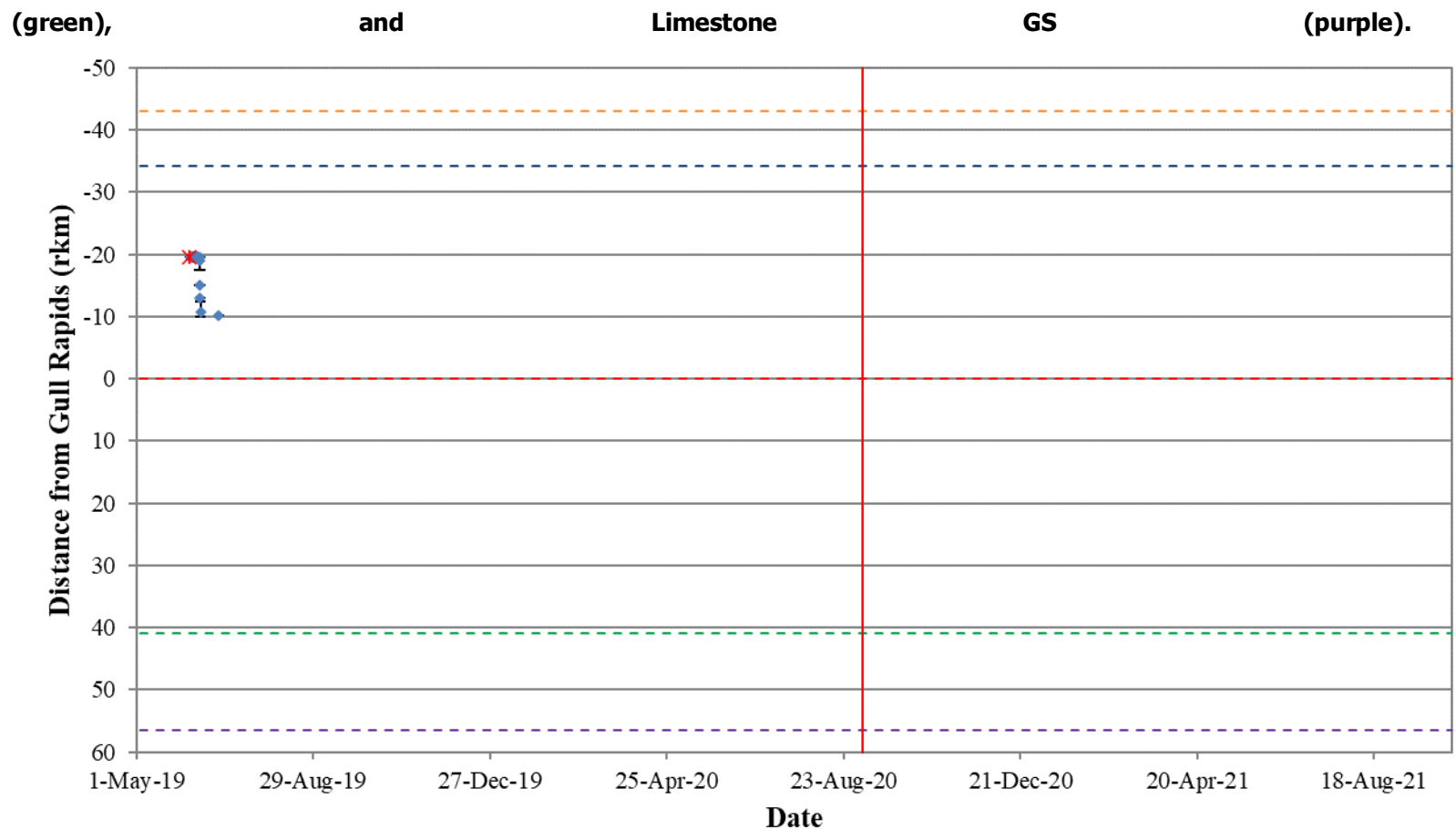


Figure A2-23: Position of a Walleye tagged with an acoustic transmitter (code #20153) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

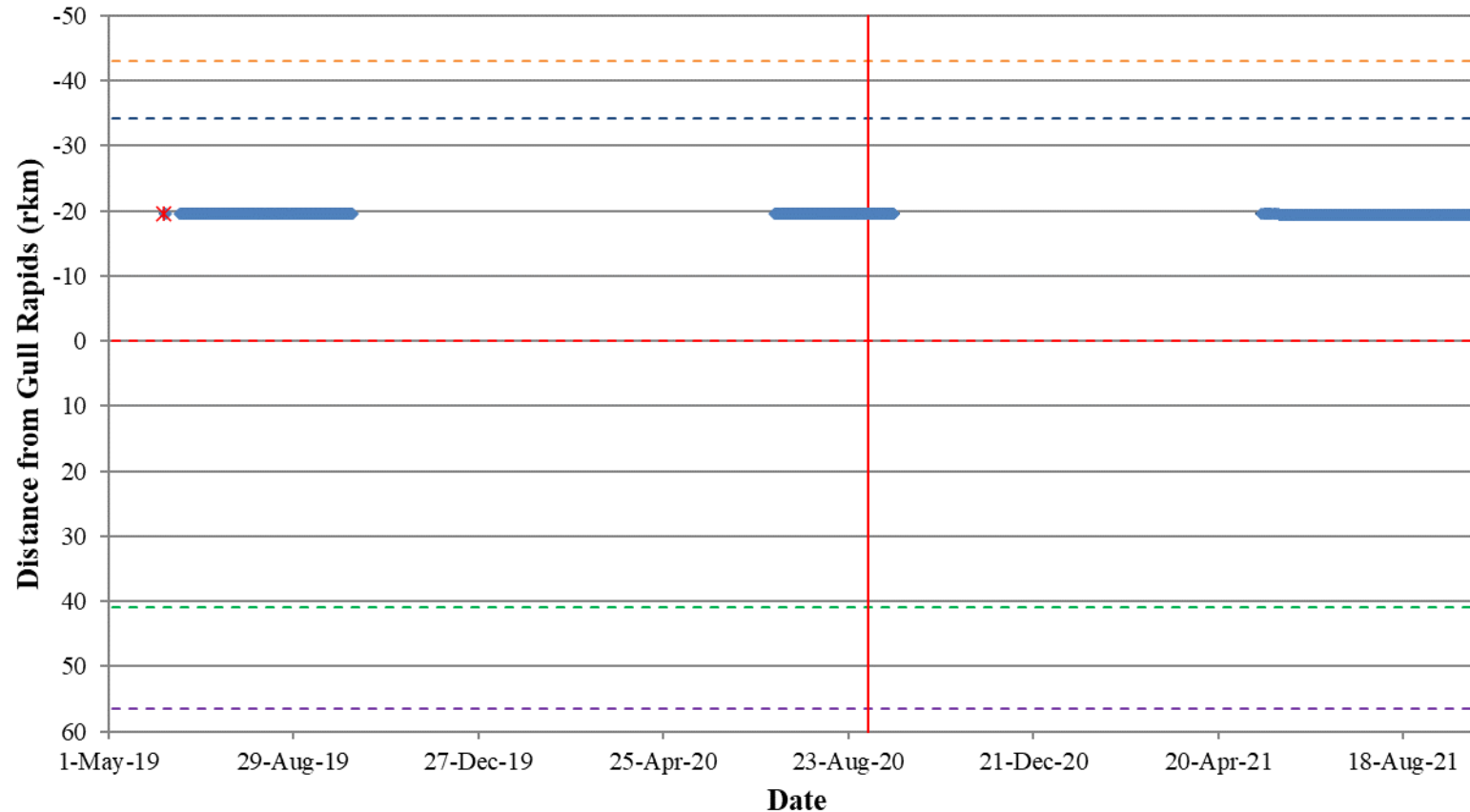


Figure A2-24: Position of a Walleye tagged with an acoustic transmitter (code #20154) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

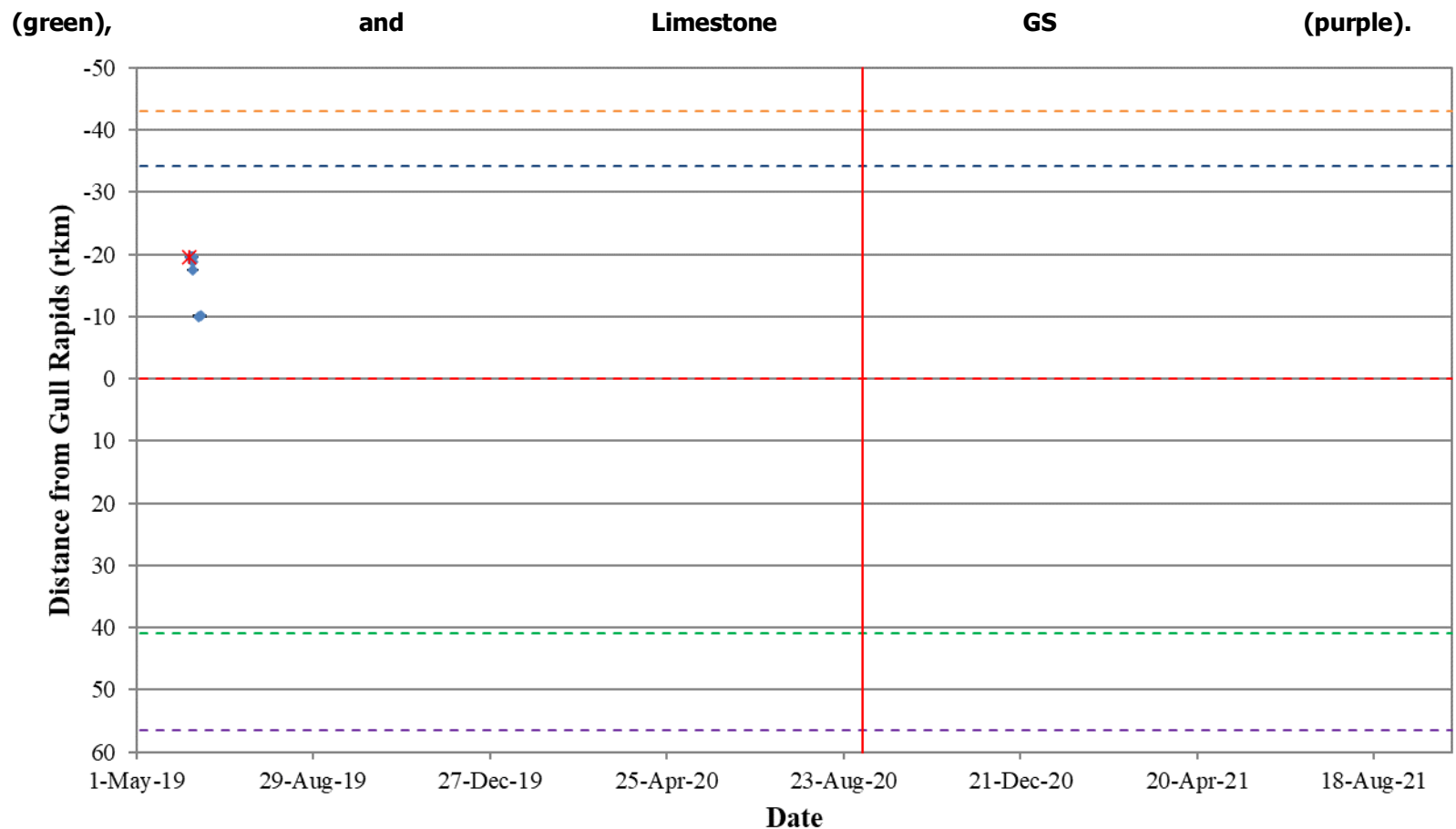


Figure A2-25: Position of a Walleye tagged with an acoustic transmitter (code #20155) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

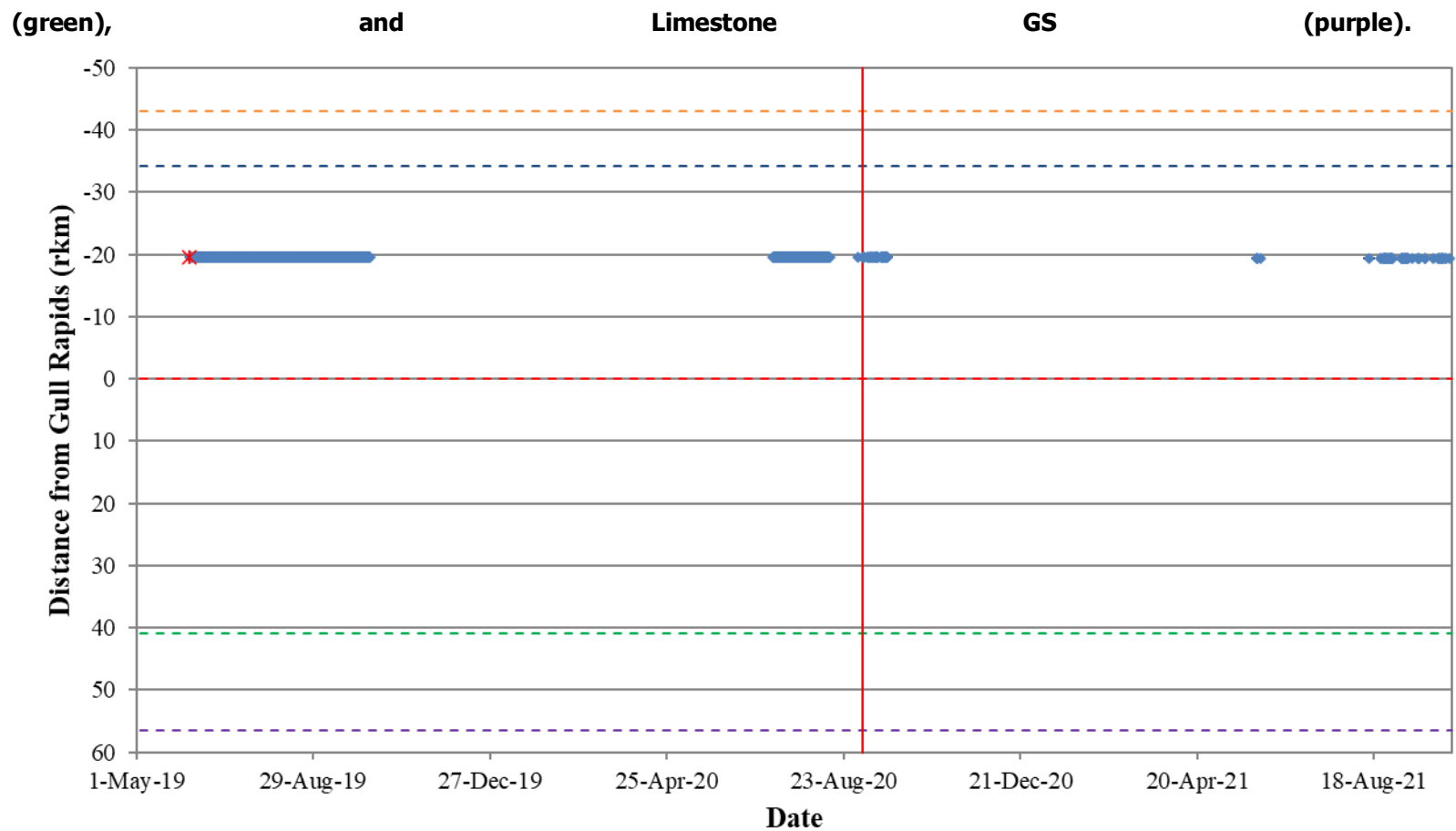


Figure A2-26: Position of a Walleye tagged with an acoustic transmitter (code #20156) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

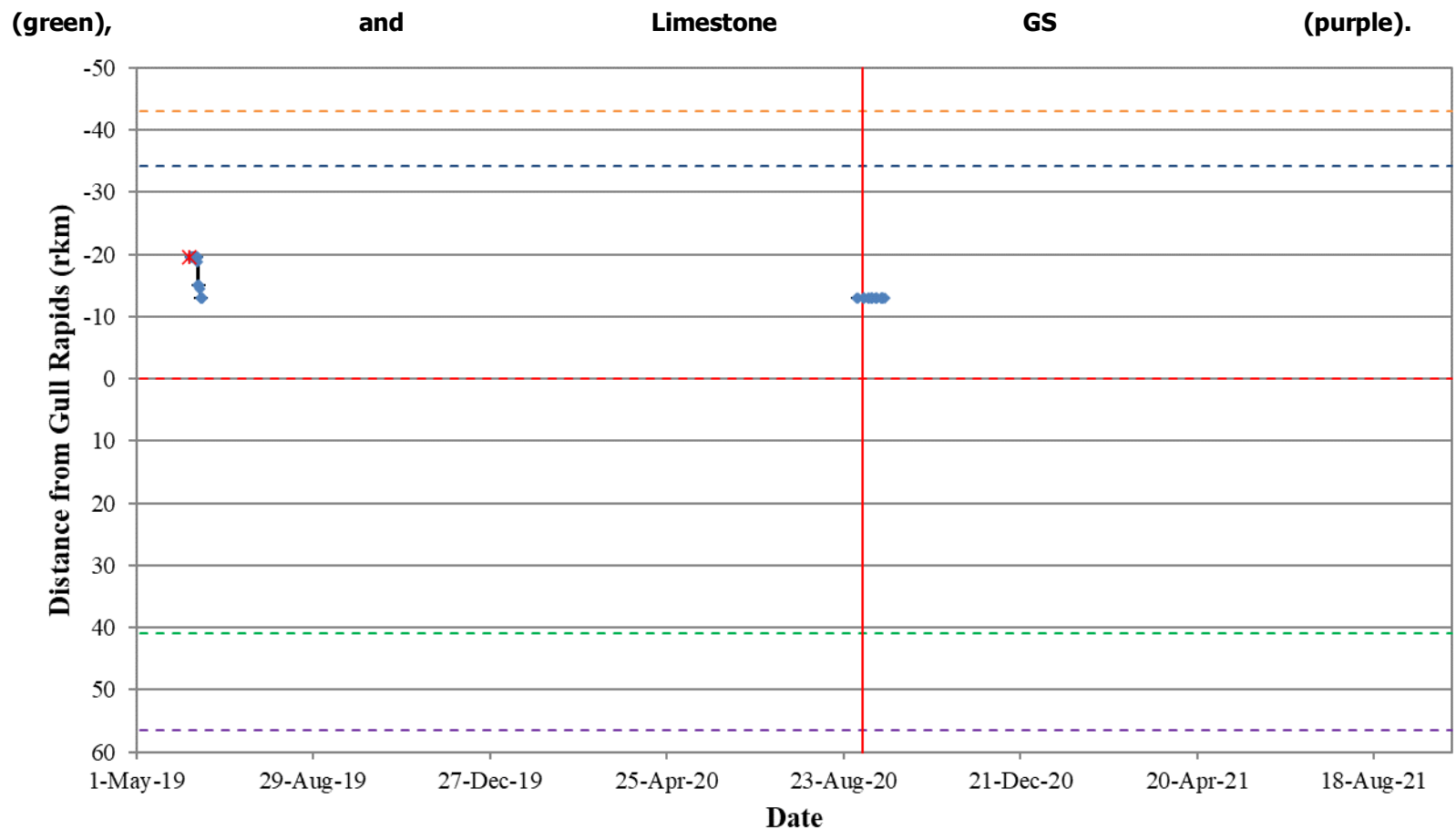


Figure A2-27: Position of a Walleye tagged with an acoustic transmitter (code #20157) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

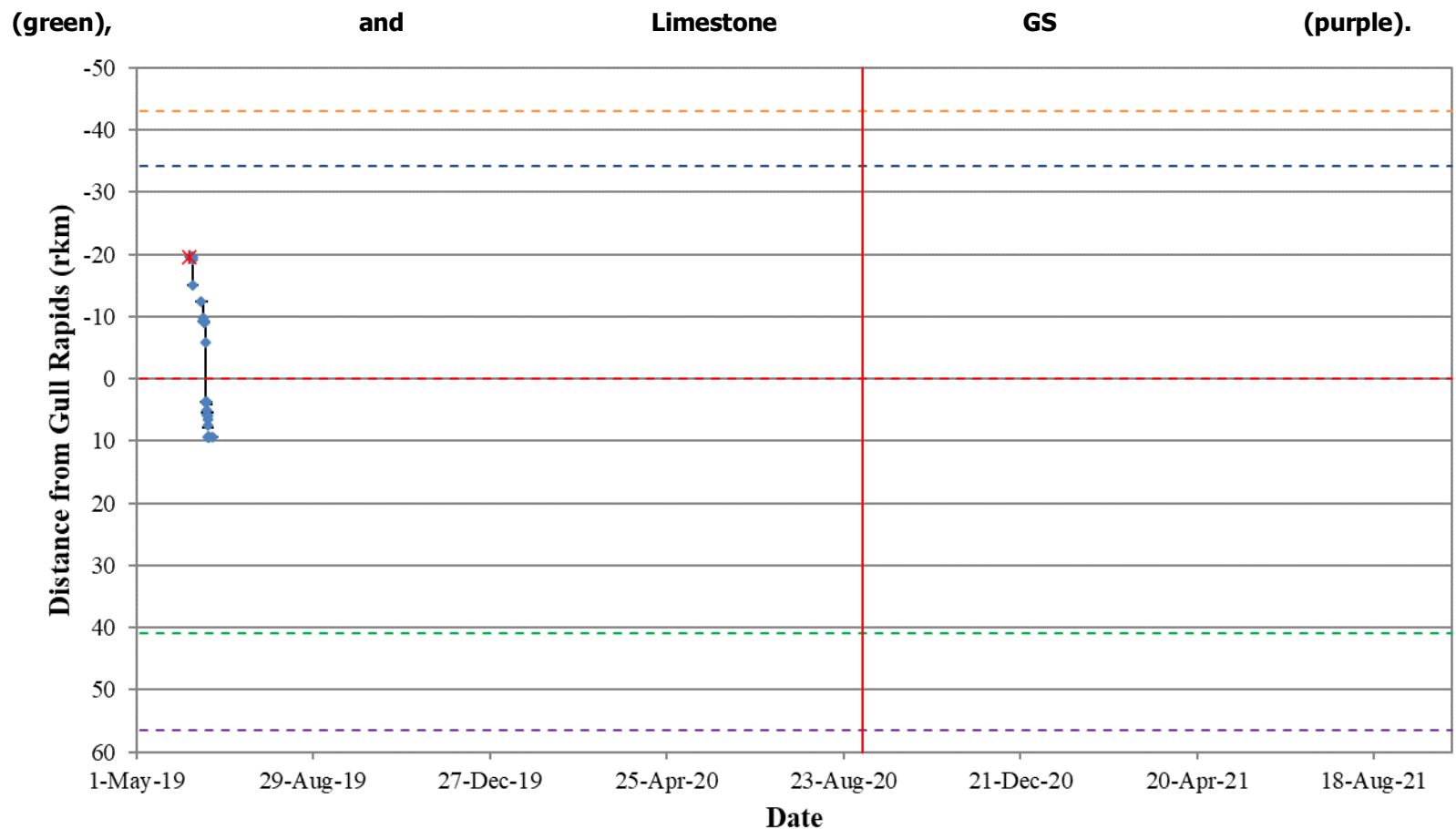


Figure A2-28: Position of a Walleye tagged with an acoustic transmitter (code #20158) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

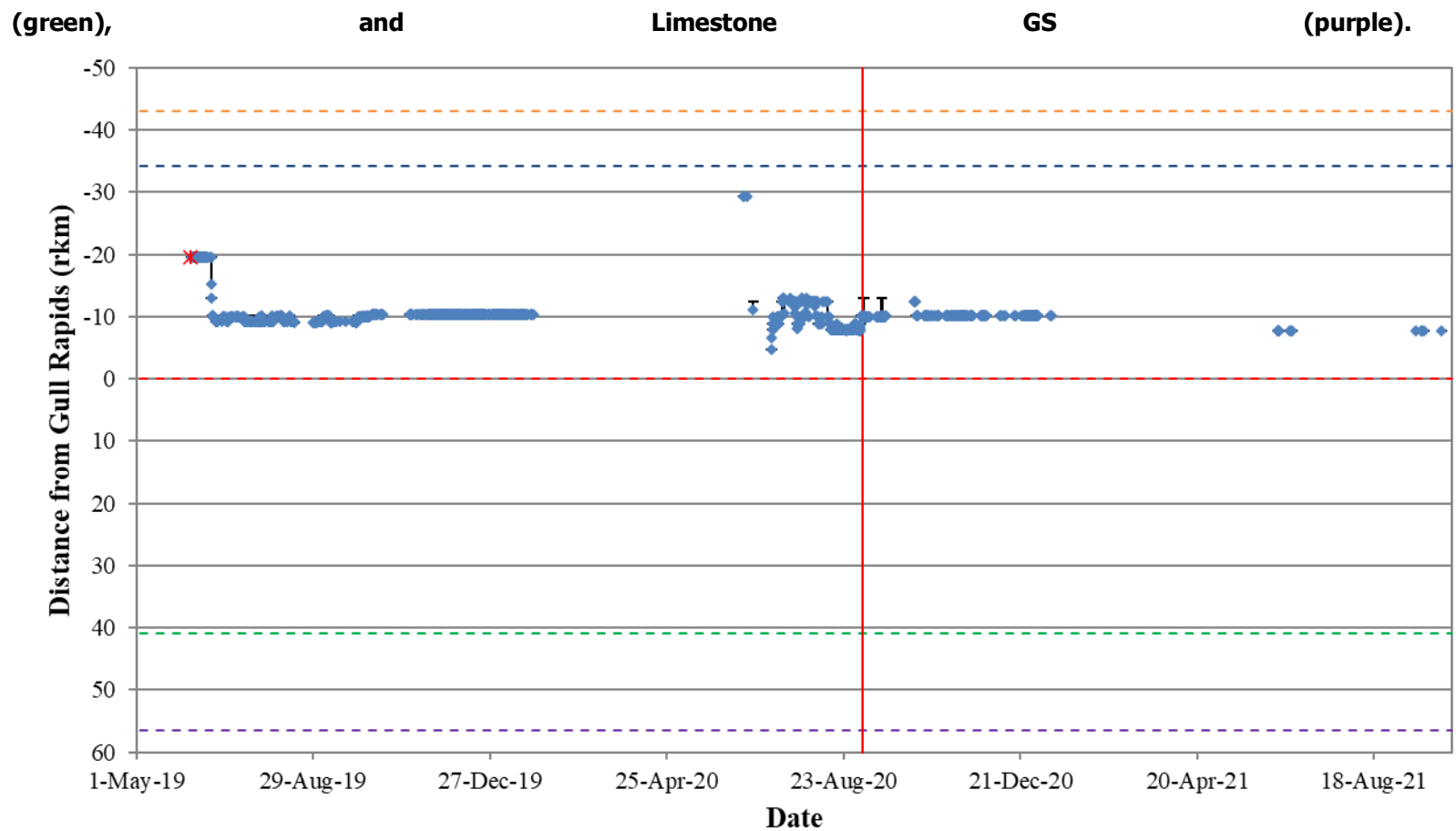


Figure A2-29: Position of a Walleye tagged with an acoustic transmitter (code #20159) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

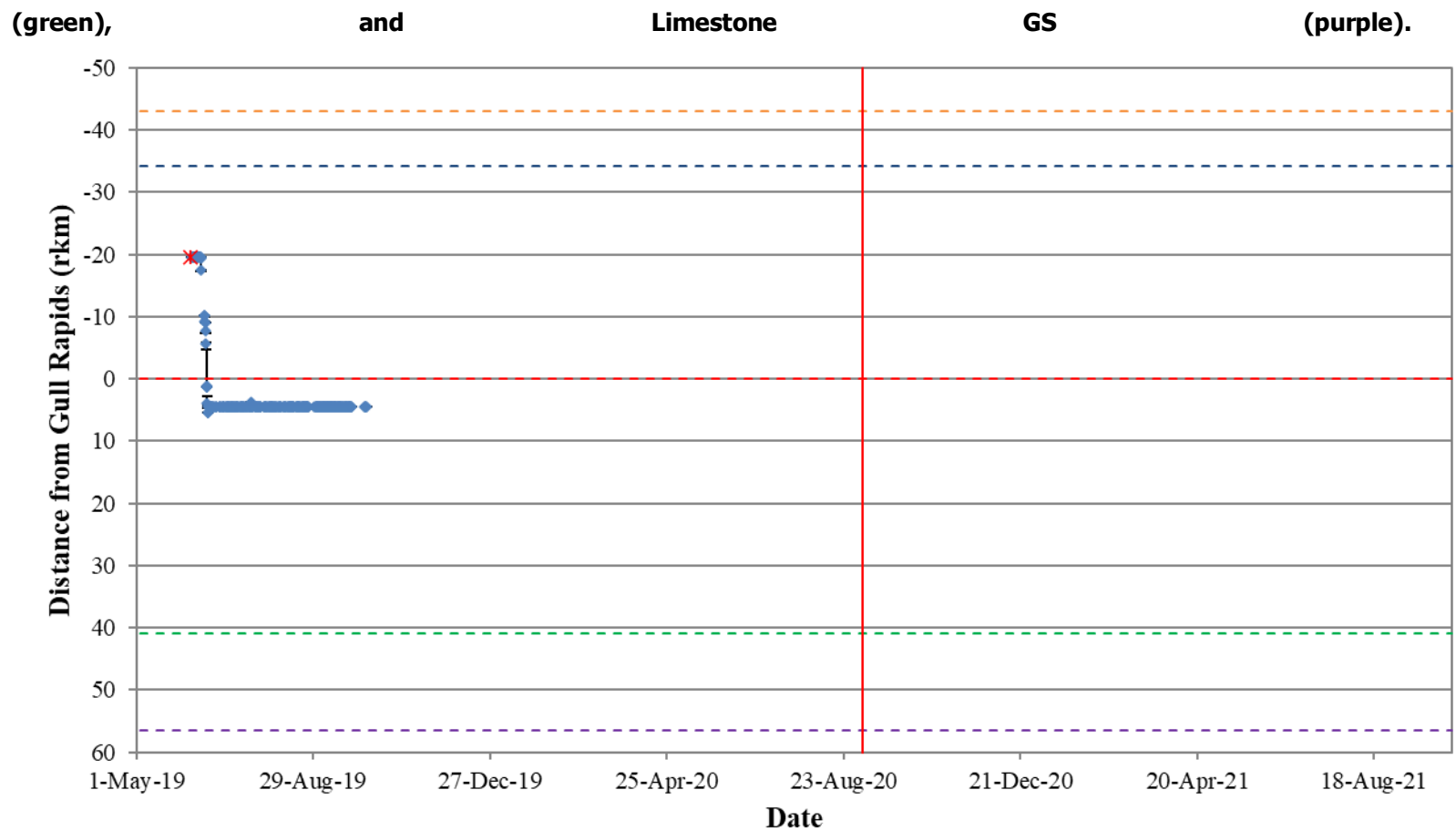


Figure A2-30: Position of a Walleye tagged with an acoustic transmitter (code #20160) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

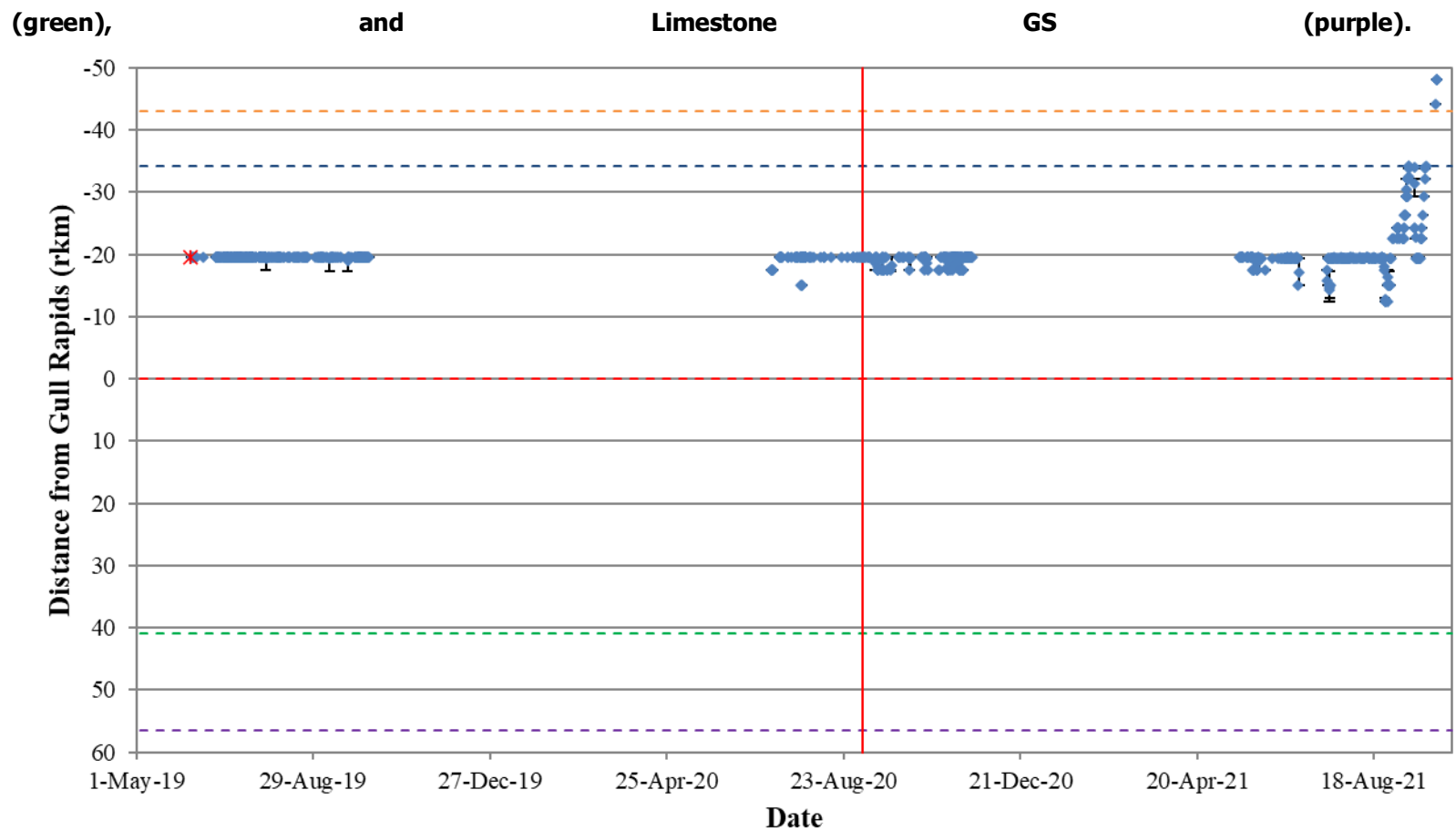


Figure A2-31: Position of a Walleye tagged with an acoustic transmitter (code #20161) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

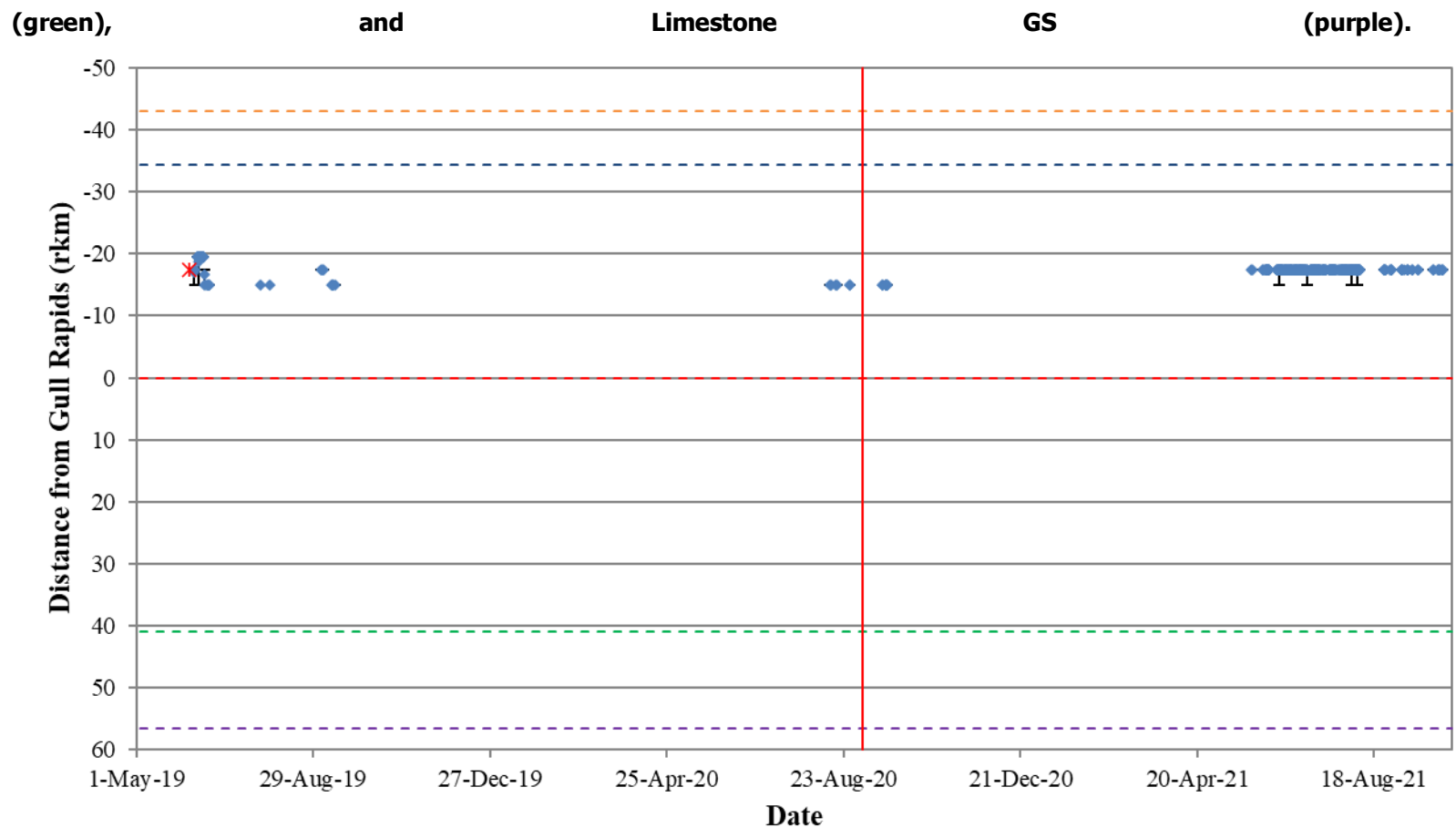


Figure A2-32: Position of a Walleye tagged with an acoustic transmitter (code #20162) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

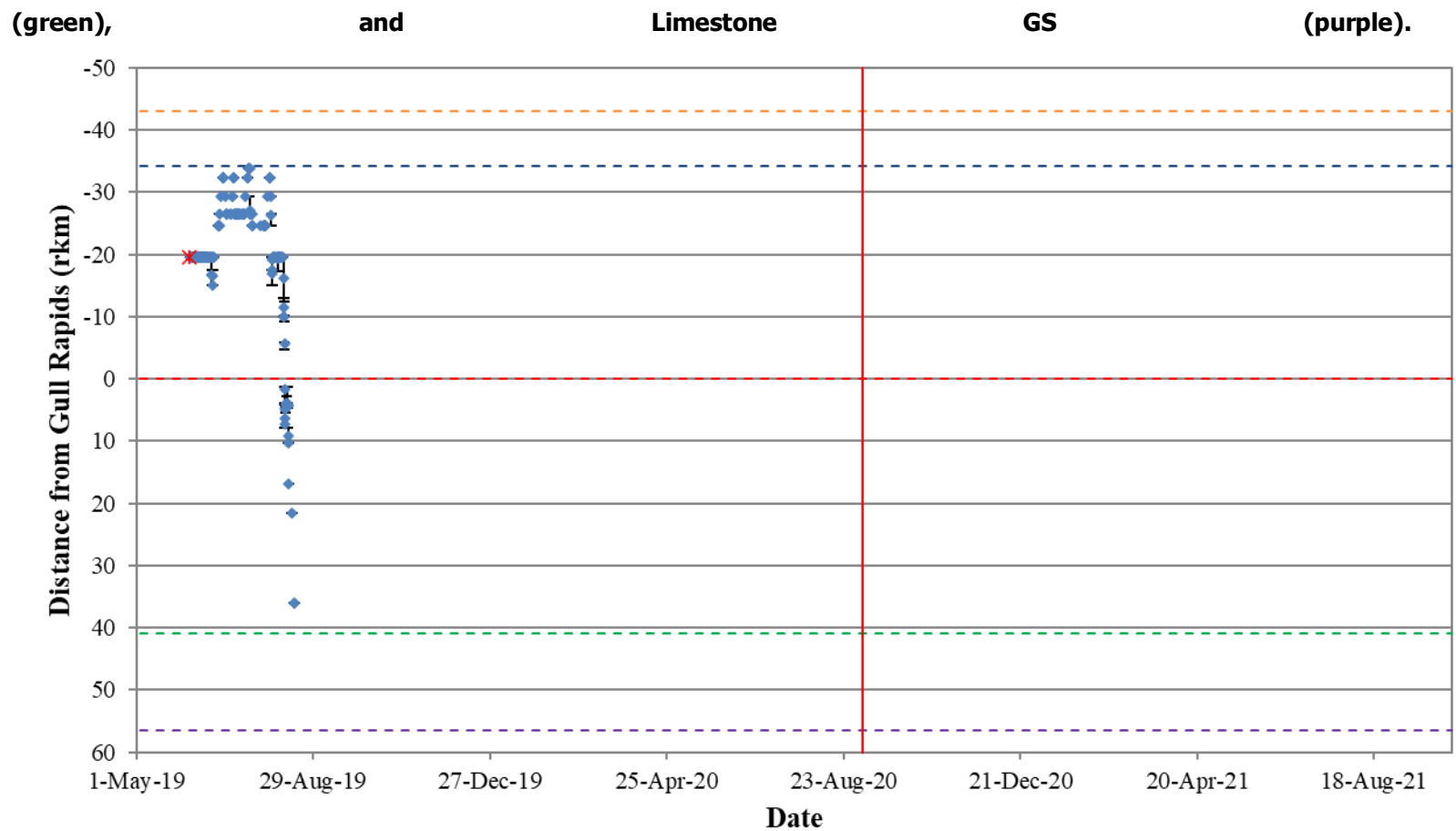


Figure A2-33: Position of a Walleye tagged with an acoustic transmitter (code #20163) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

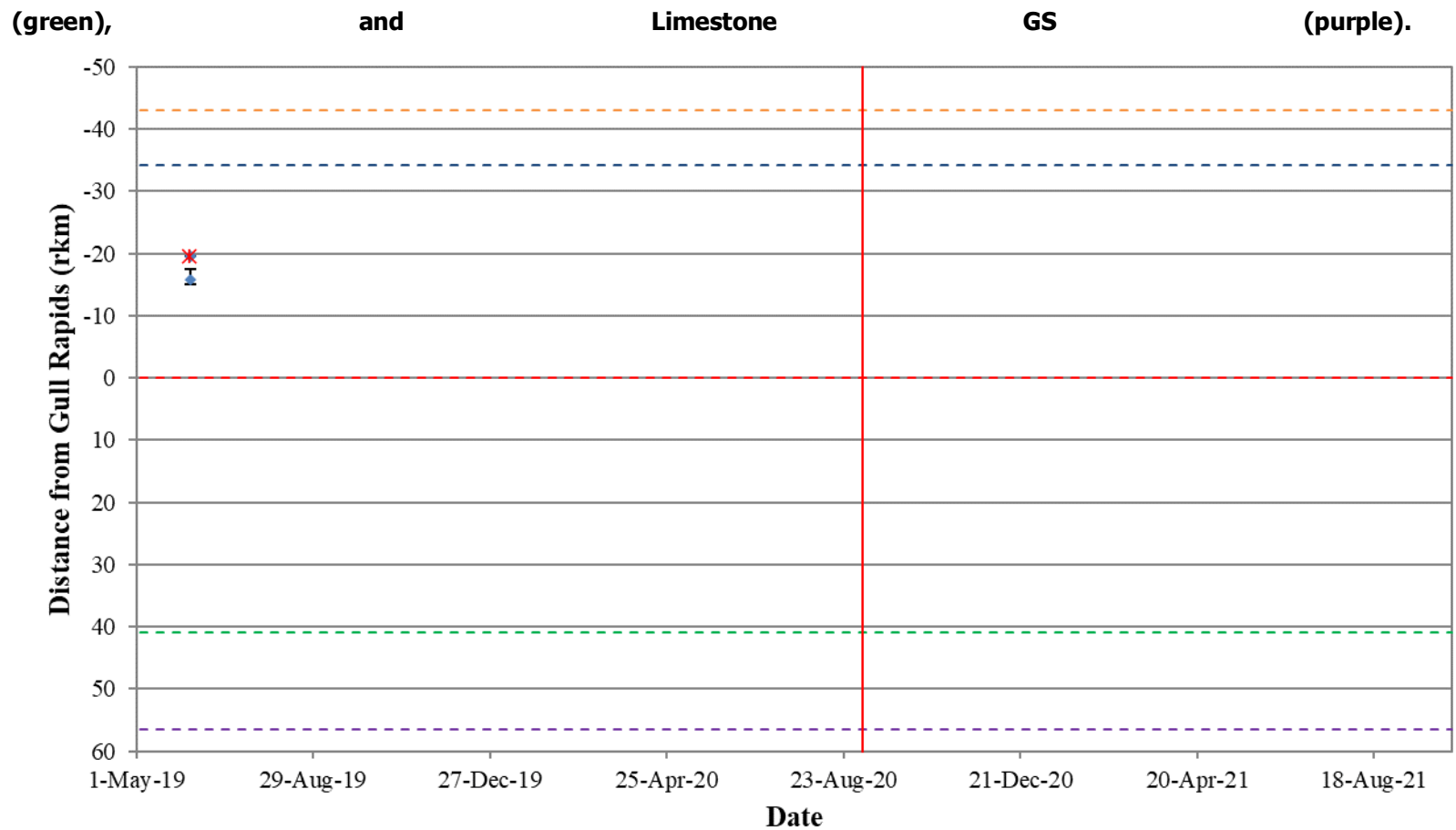


Figure A2-34: Position of a Walleye tagged with an acoustic transmitter (code #20164) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

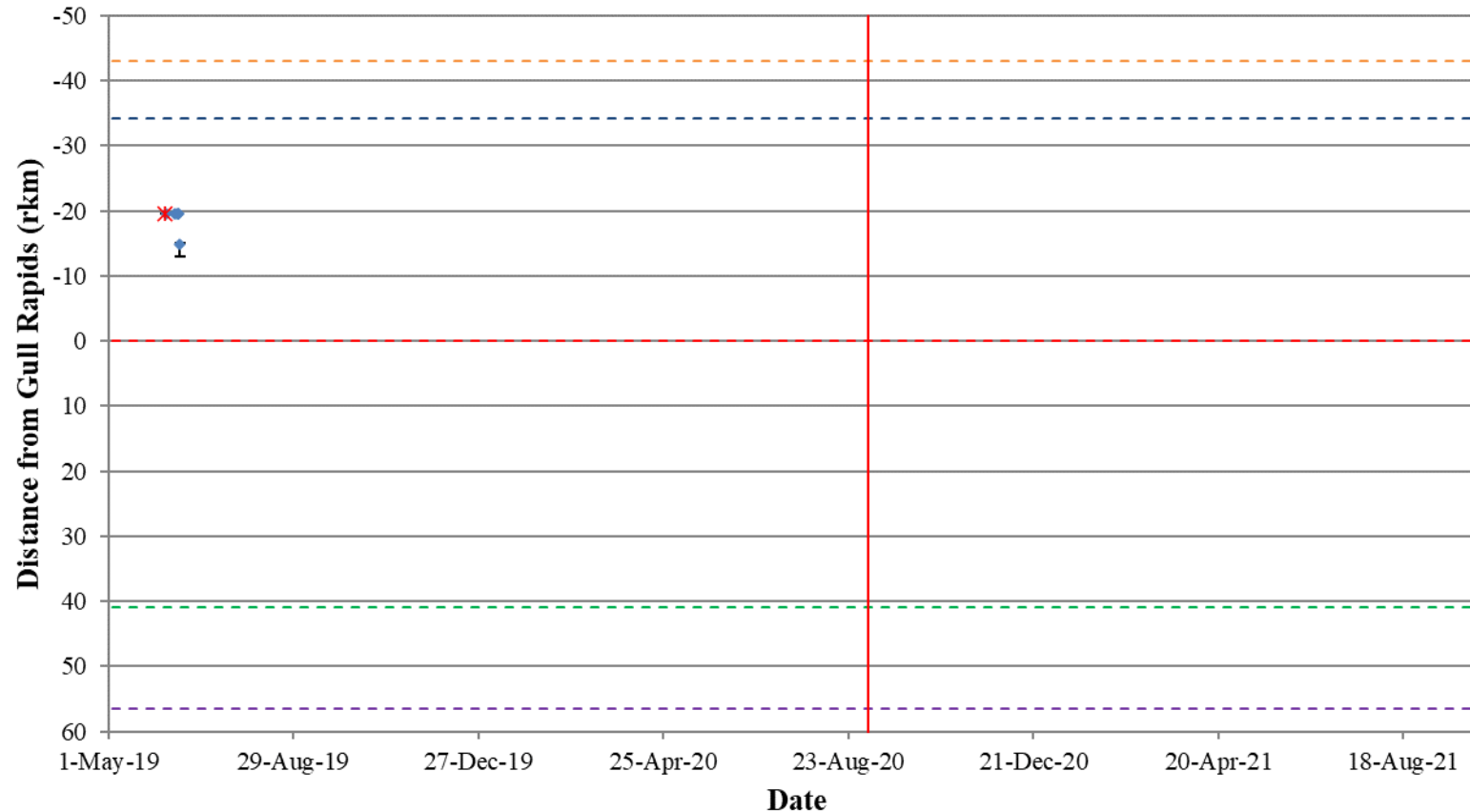


Figure A2-35: Position of a Walleye tagged with an acoustic transmitter (code #20169) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

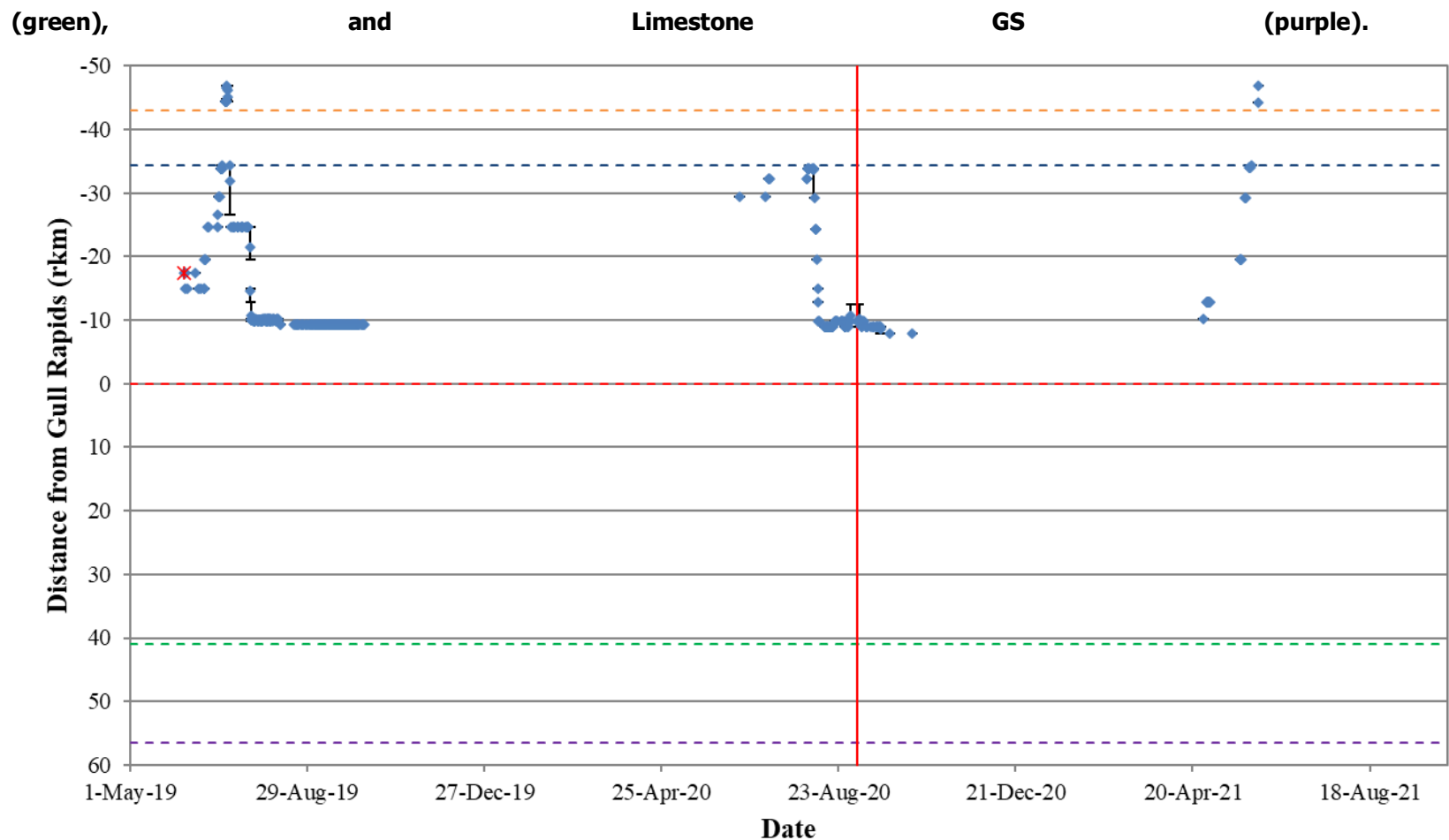


Figure A2-36: Position of a Walleye tagged with an acoustic transmitter (code #20170) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

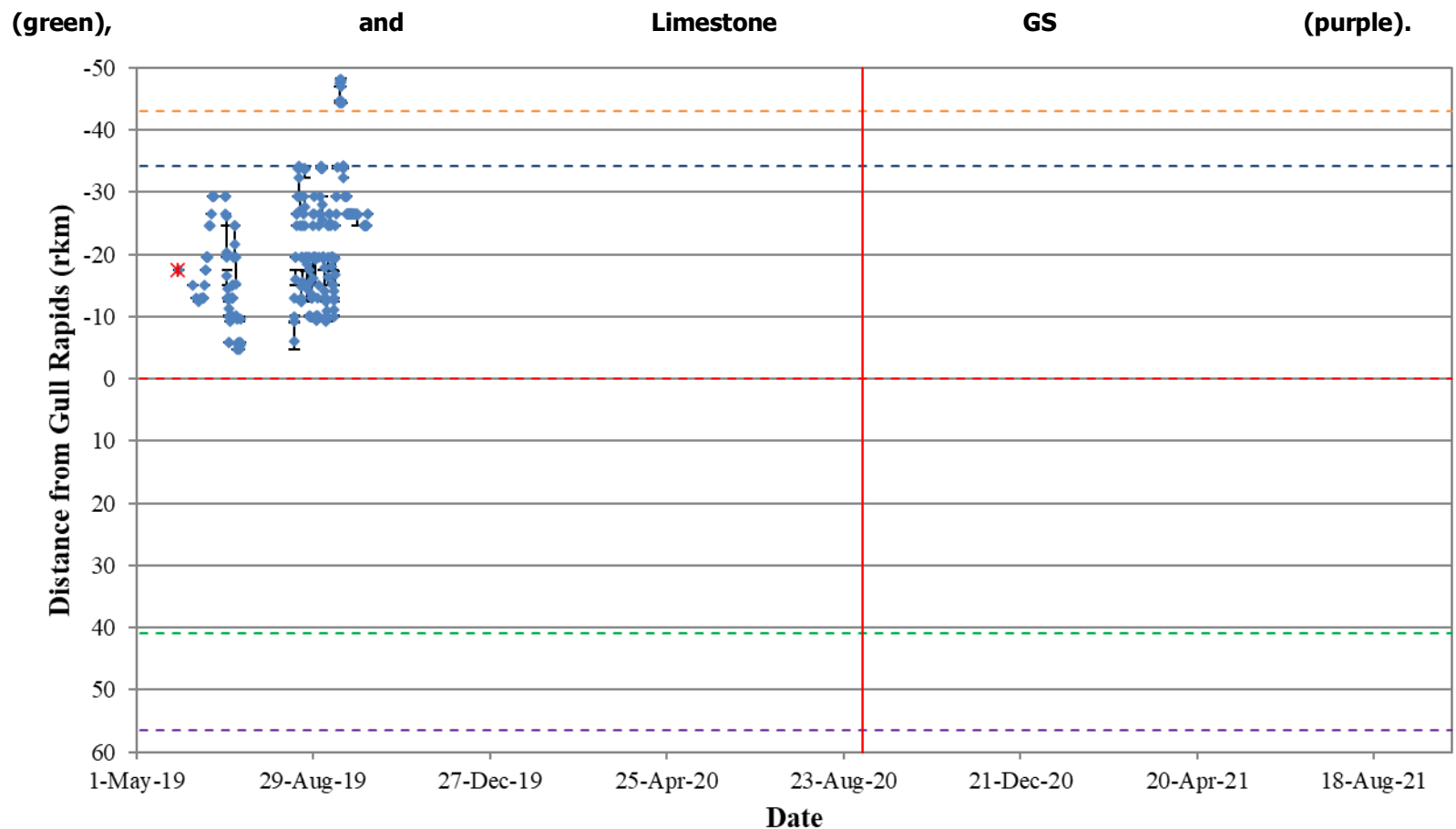


Figure A2-37: Position of a Walleye tagged with an acoustic transmitter (code #20175) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

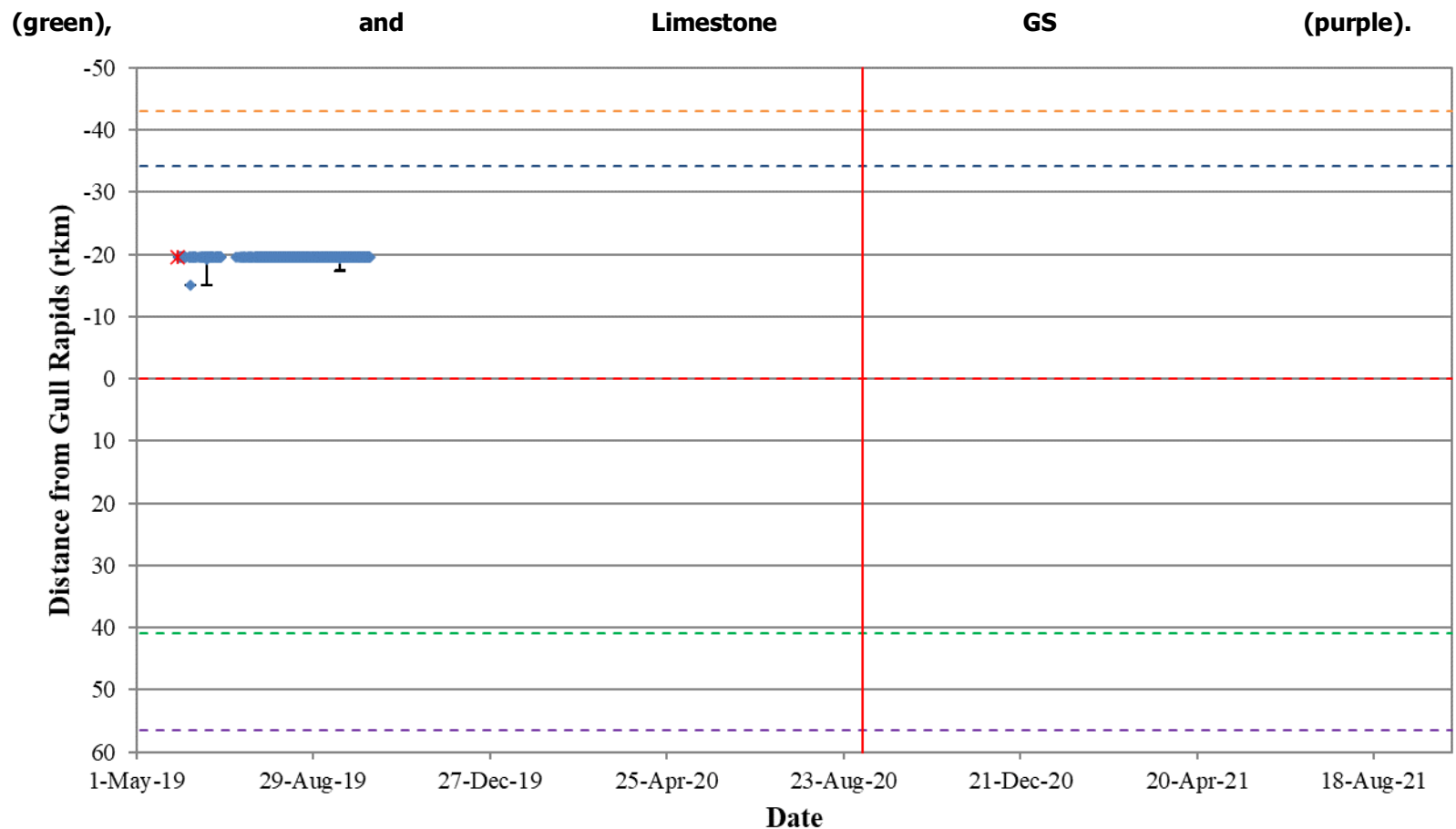


Figure A2-38: Position of a Walleye tagged with an acoustic transmitter (code #20176) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

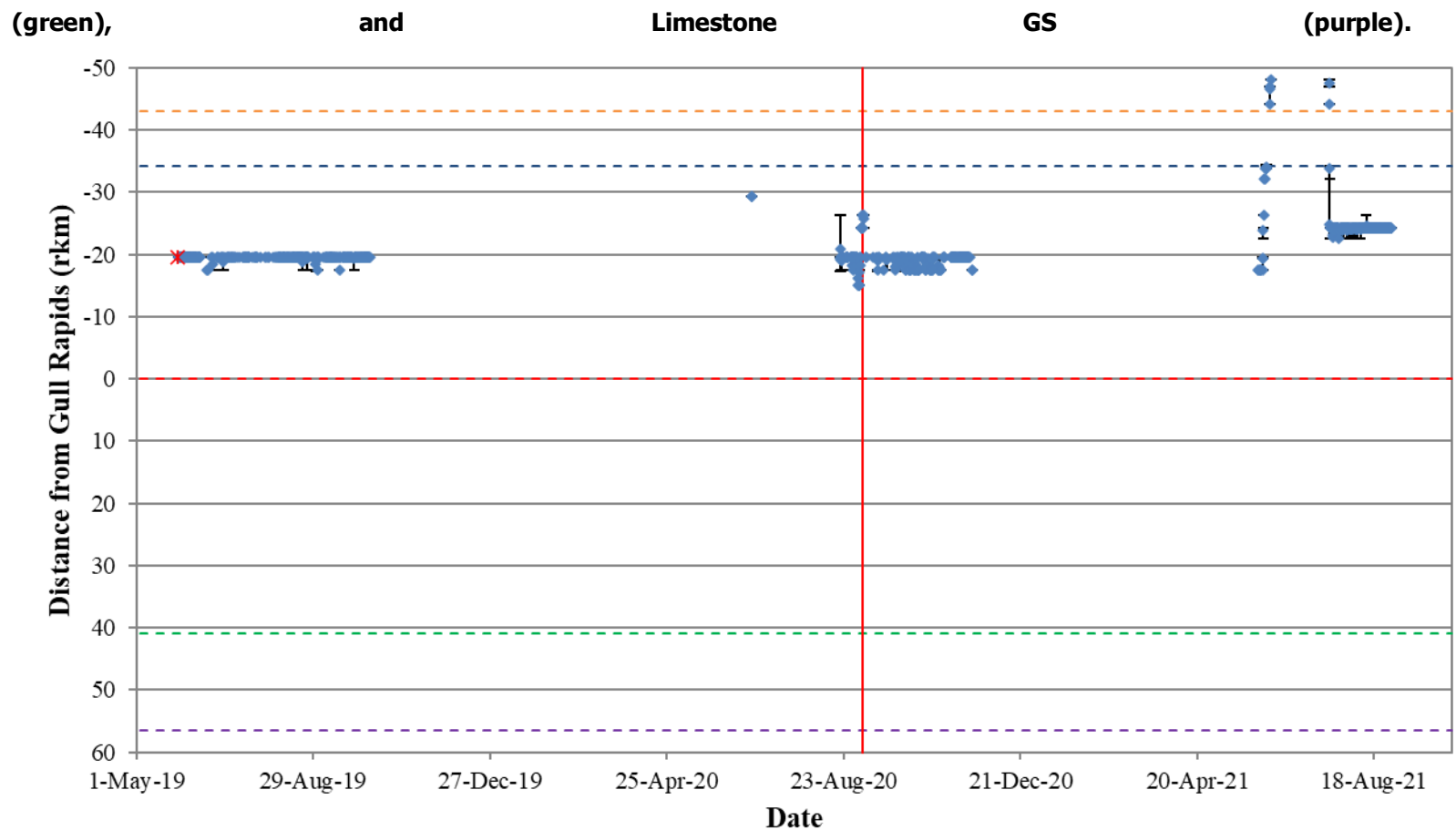


Figure A2-39: Position of a Walleye tagged with an acoustic transmitter (code #20181) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

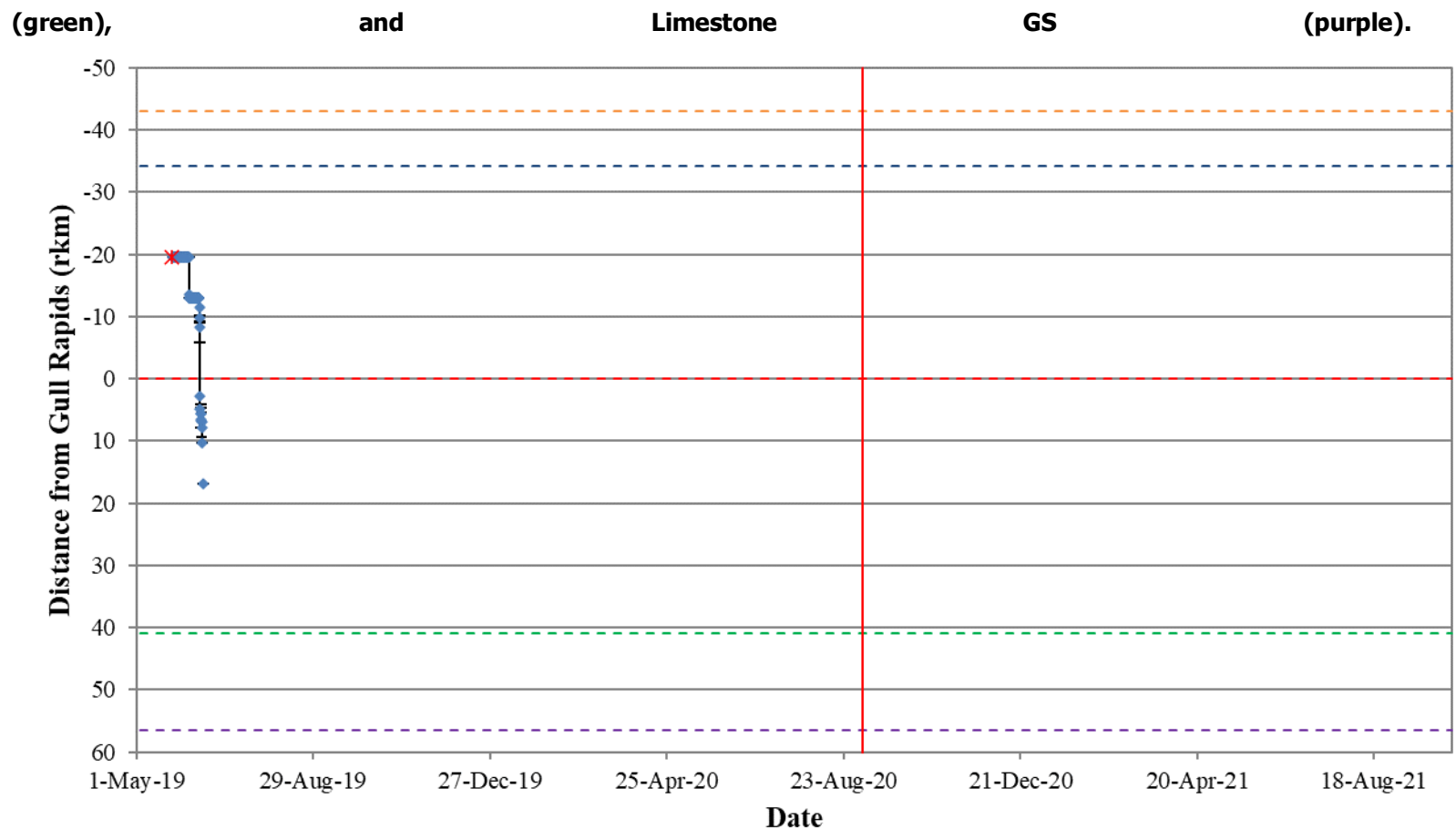


Figure A2-40: Position of a Walleye tagged with an acoustic transmitter (code #20182) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

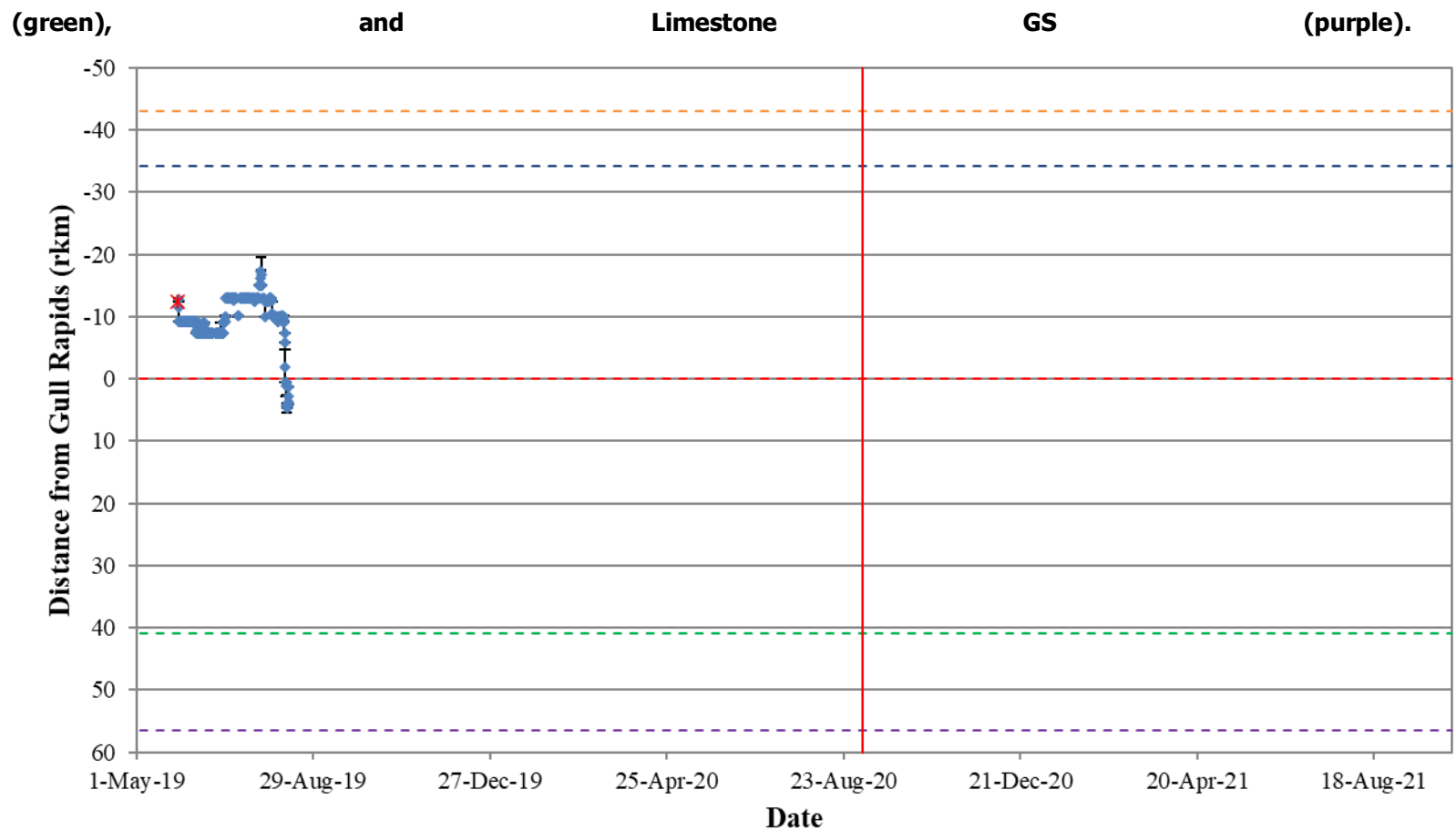


Figure A2-41: Position of a Walleye tagged with an acoustic transmitter (code #20186) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

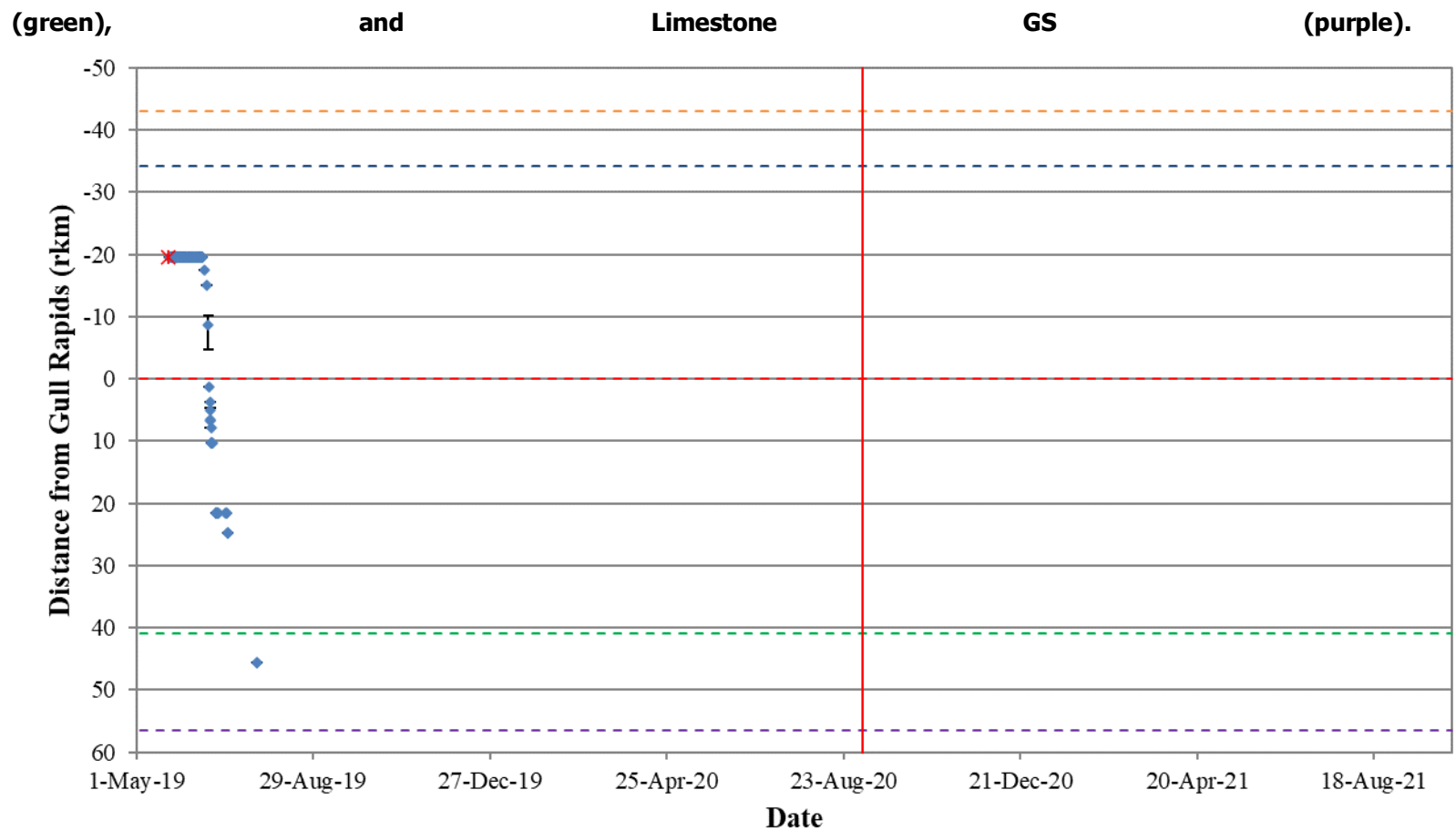


Figure A2-42: Position of a Walleye tagged with an acoustic transmitter (code #20187) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS

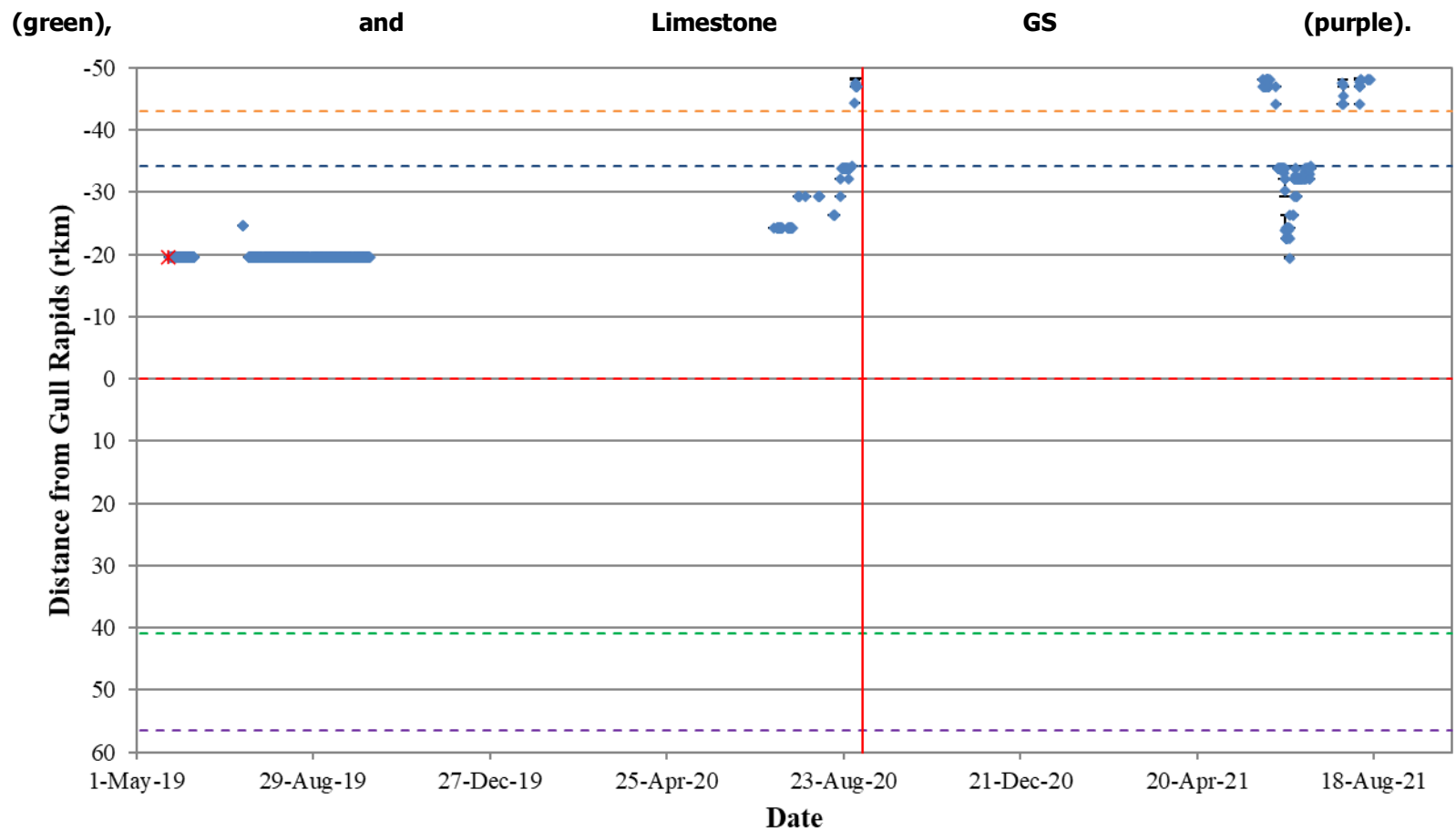


Figure A2-43: Position of a Walleye tagged with an acoustic transmitter (code #20188) in the Nelson River between Clark Lake and the Keeyask GS in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

APPENDIX 3:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE IN STEPHENS LAKE IN 2018/2019: JUNE 2018 TO OCTOBER 2021

Figure A3-1: Position of a Walleye tagged with an acoustic transmitter (code #25732) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021.....	127
Figure A3-2: Position of a Walleye tagged with an acoustic transmitter (code #25734) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021.....	128
Figure A3-3: Position of a Walleye tagged with an acoustic transmitter (code #25735) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021.....	129
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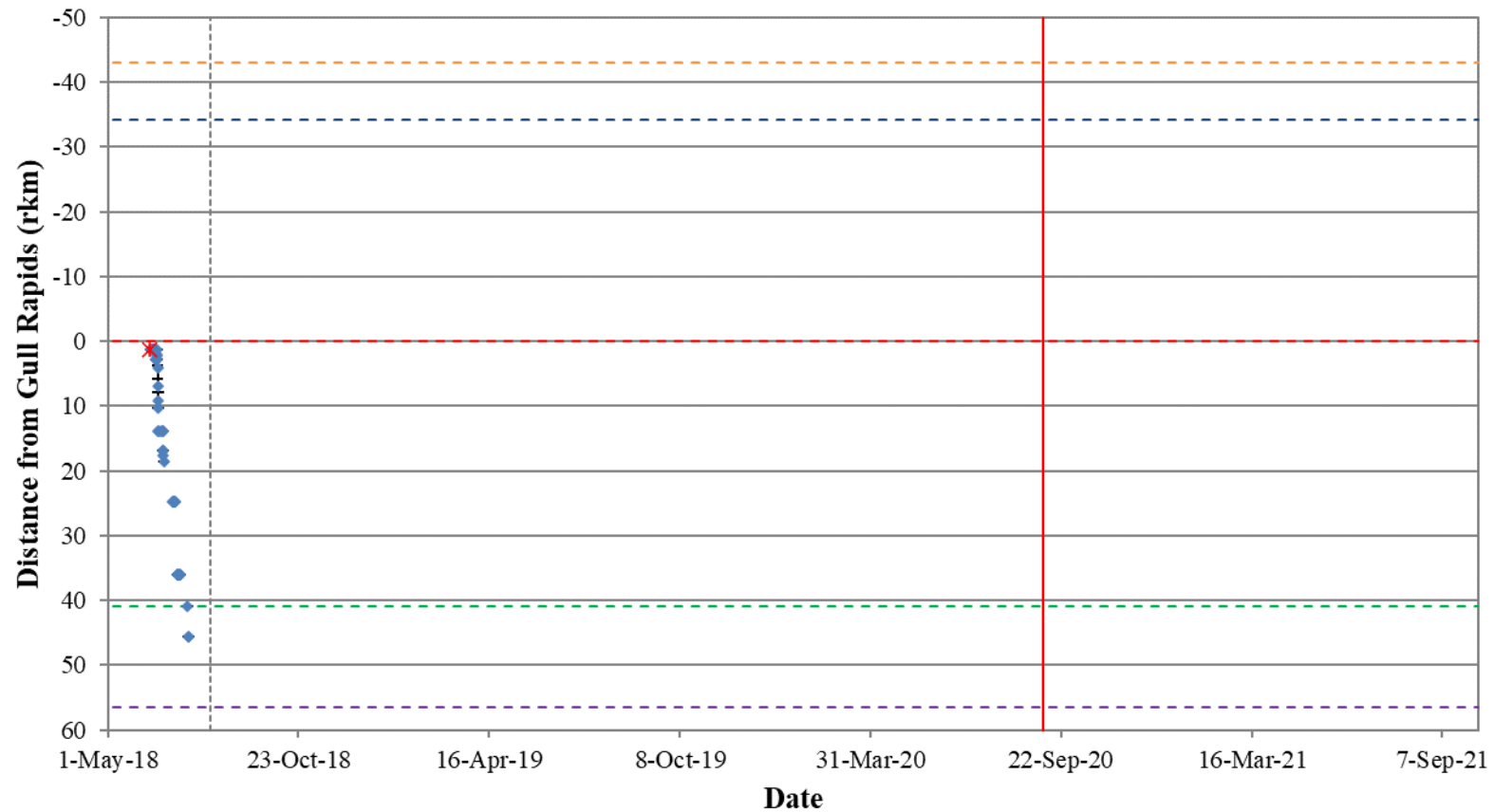


Figure A3-1: Position of a Walleye tagged with an acoustic transmitter (code #25732) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

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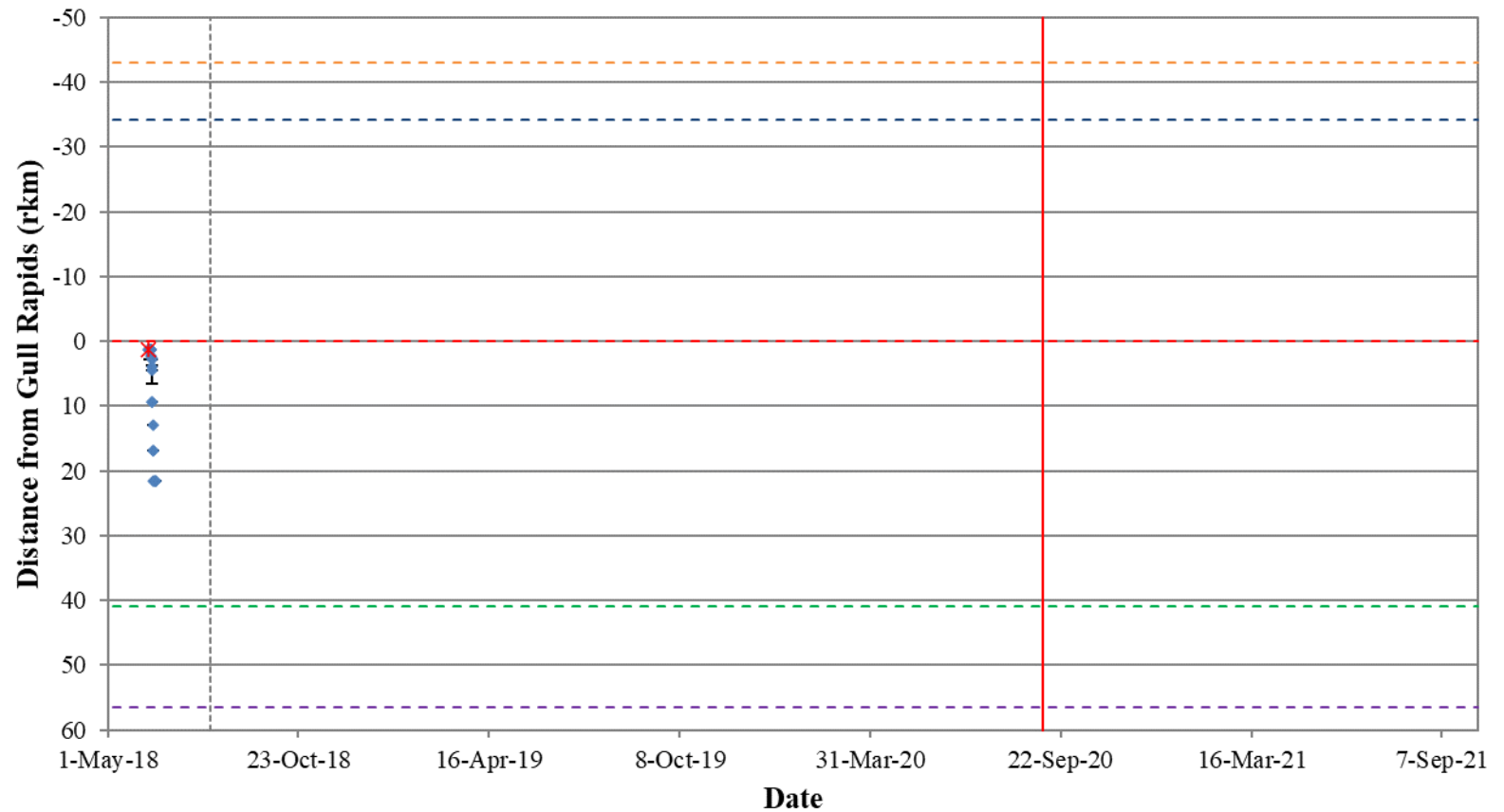


Figure A3-2: Position of a Walleye tagged with an acoustic transmitter (code #25734) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

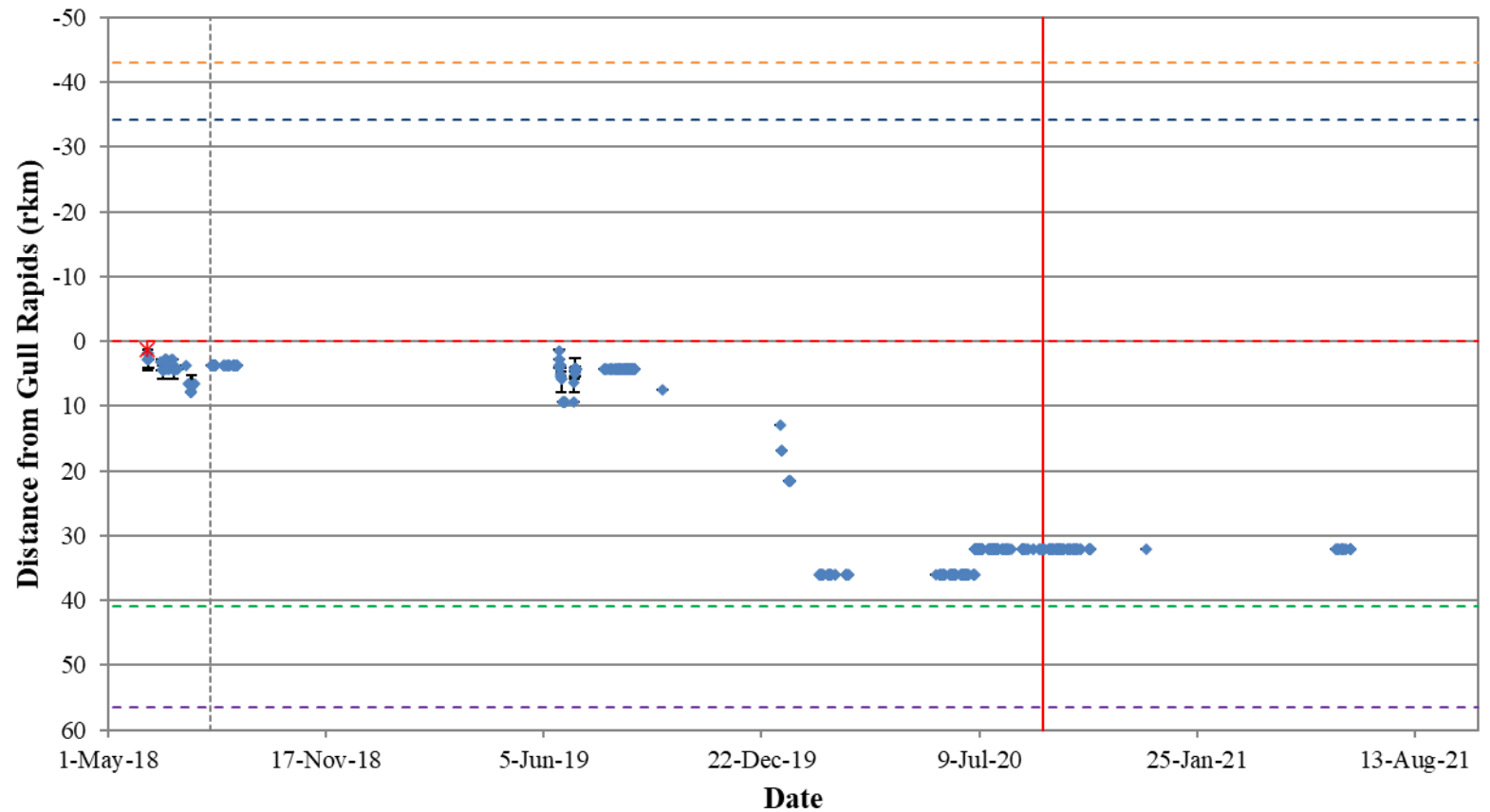


Figure A3-3: Position of a Walleye tagged with an acoustic transmitter (code #25735) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

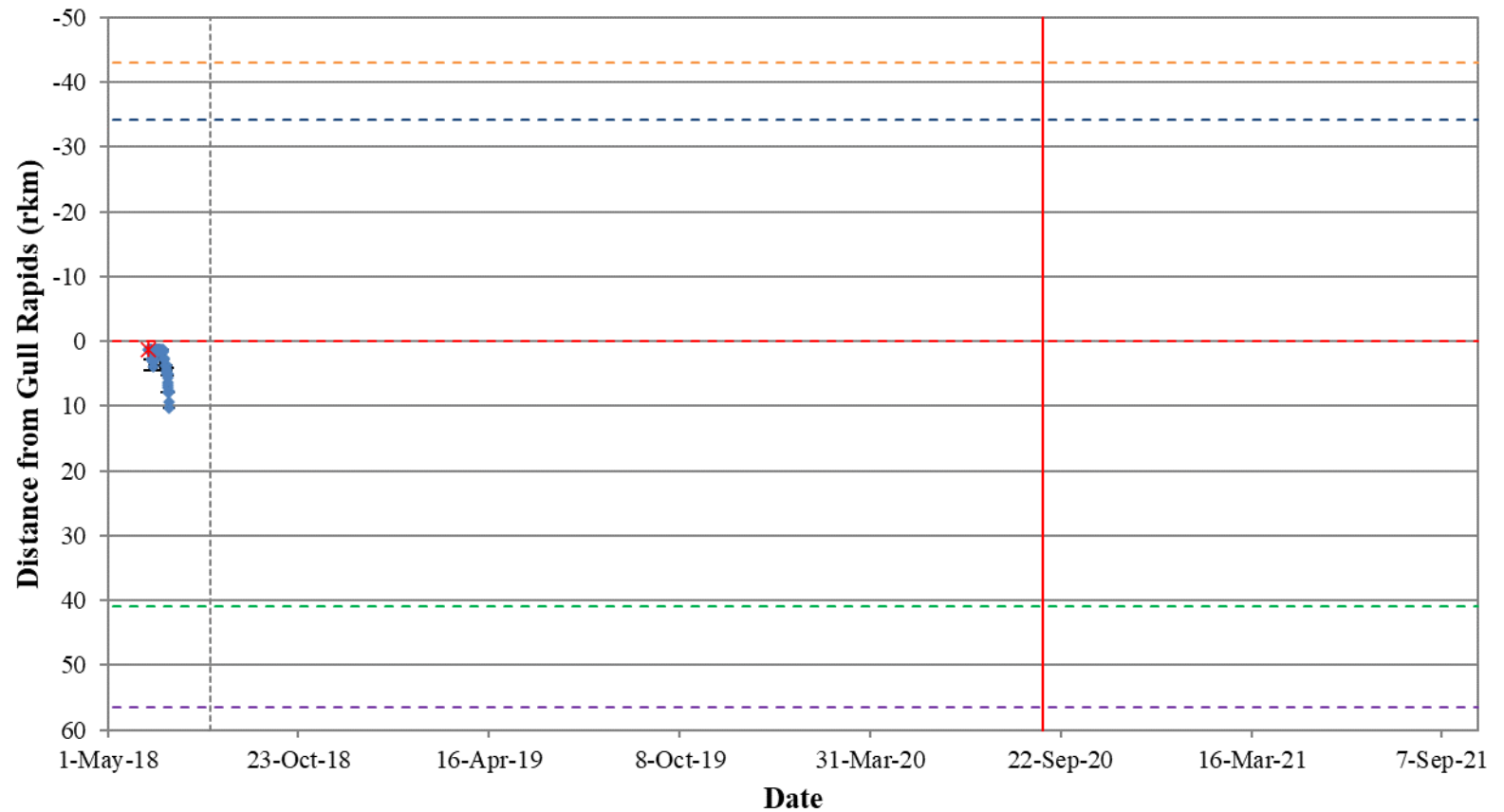


Figure A3-4: Position of a Walleye tagged with an acoustic transmitter (code #25736) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

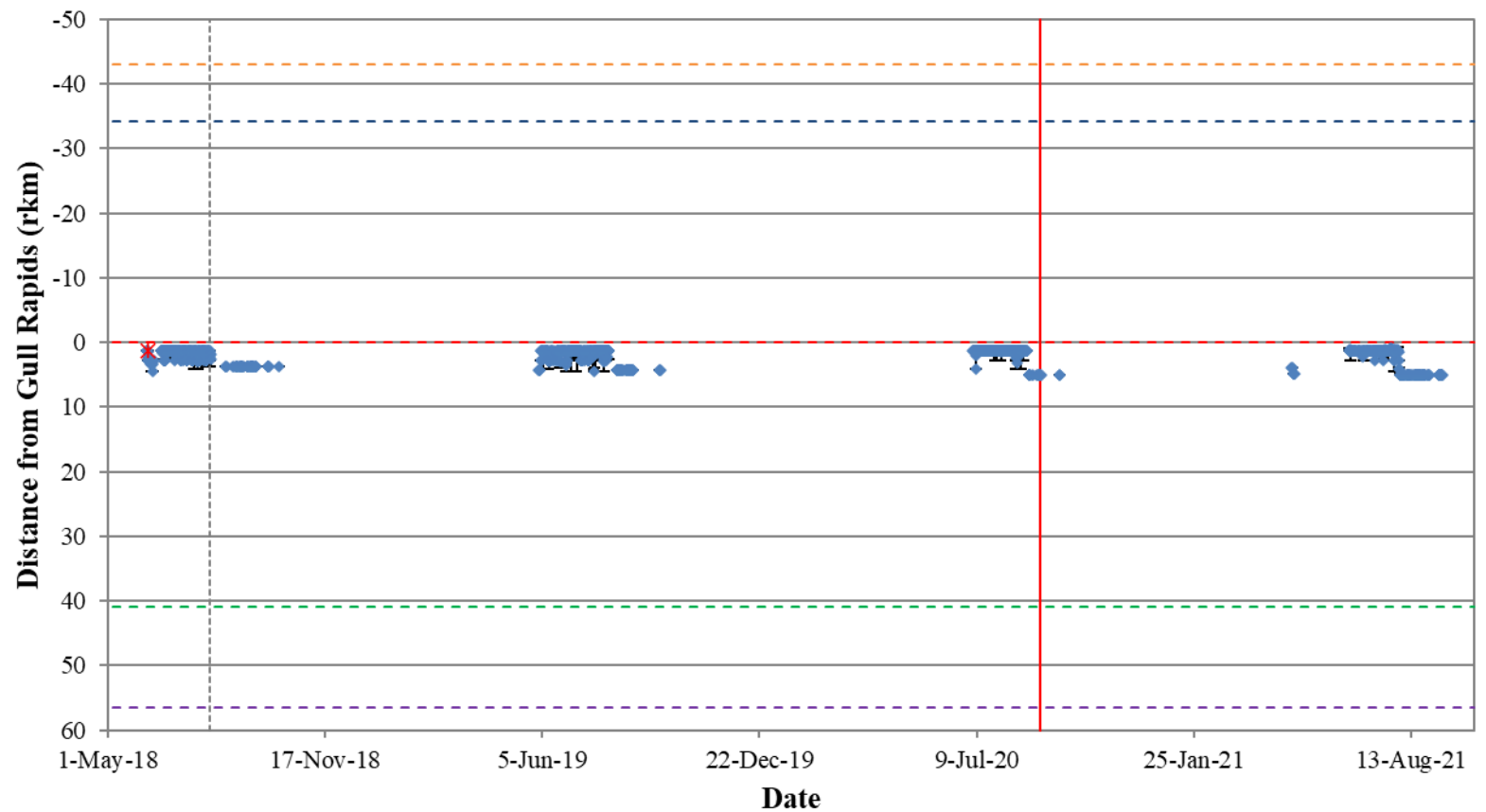


Figure A3-5: Position of a Walleye tagged with an acoustic transmitter (code #25737) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

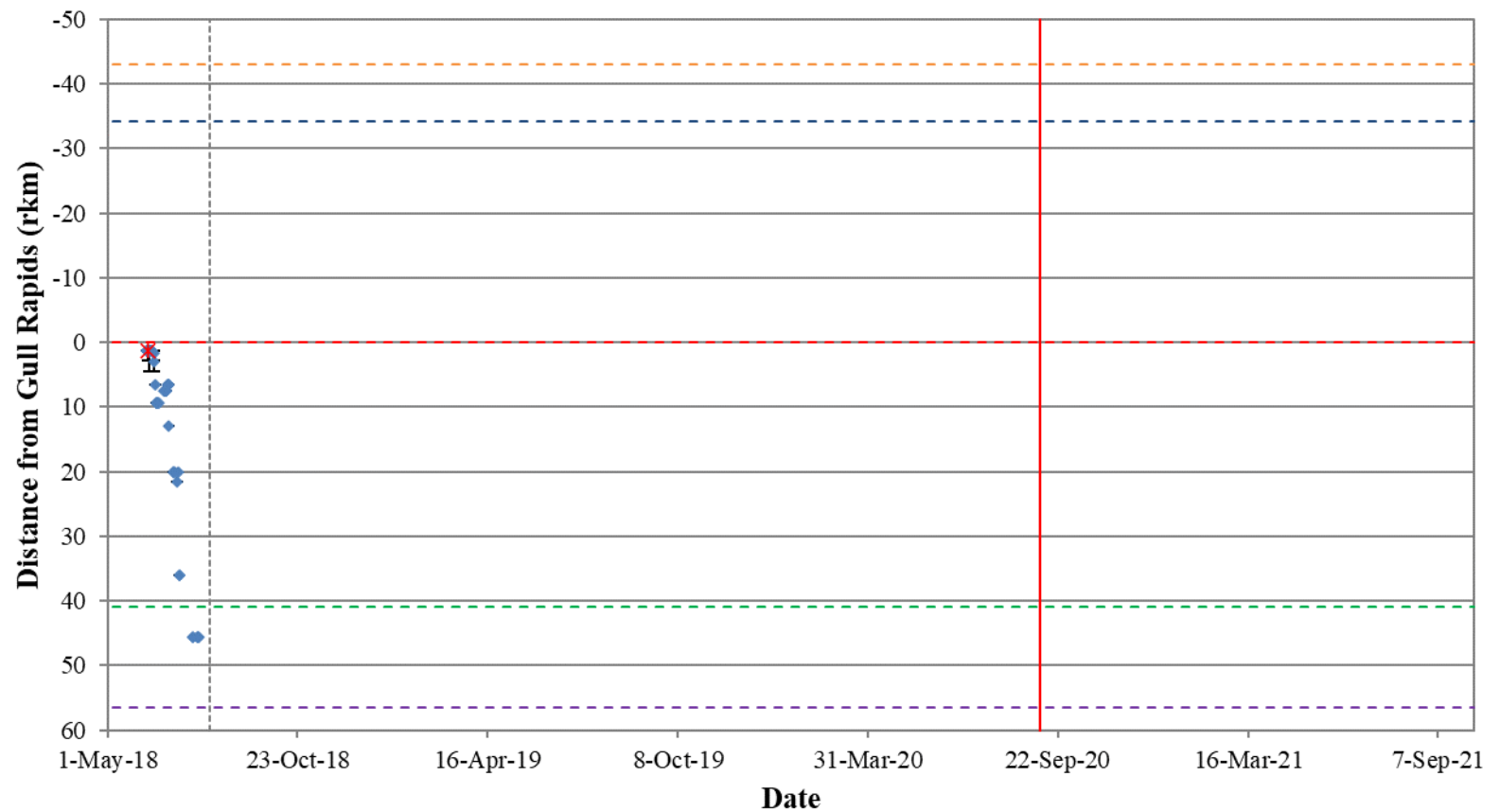


Figure A3-6: Position of a Walleye tagged with an acoustic transmitter (code #25738) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

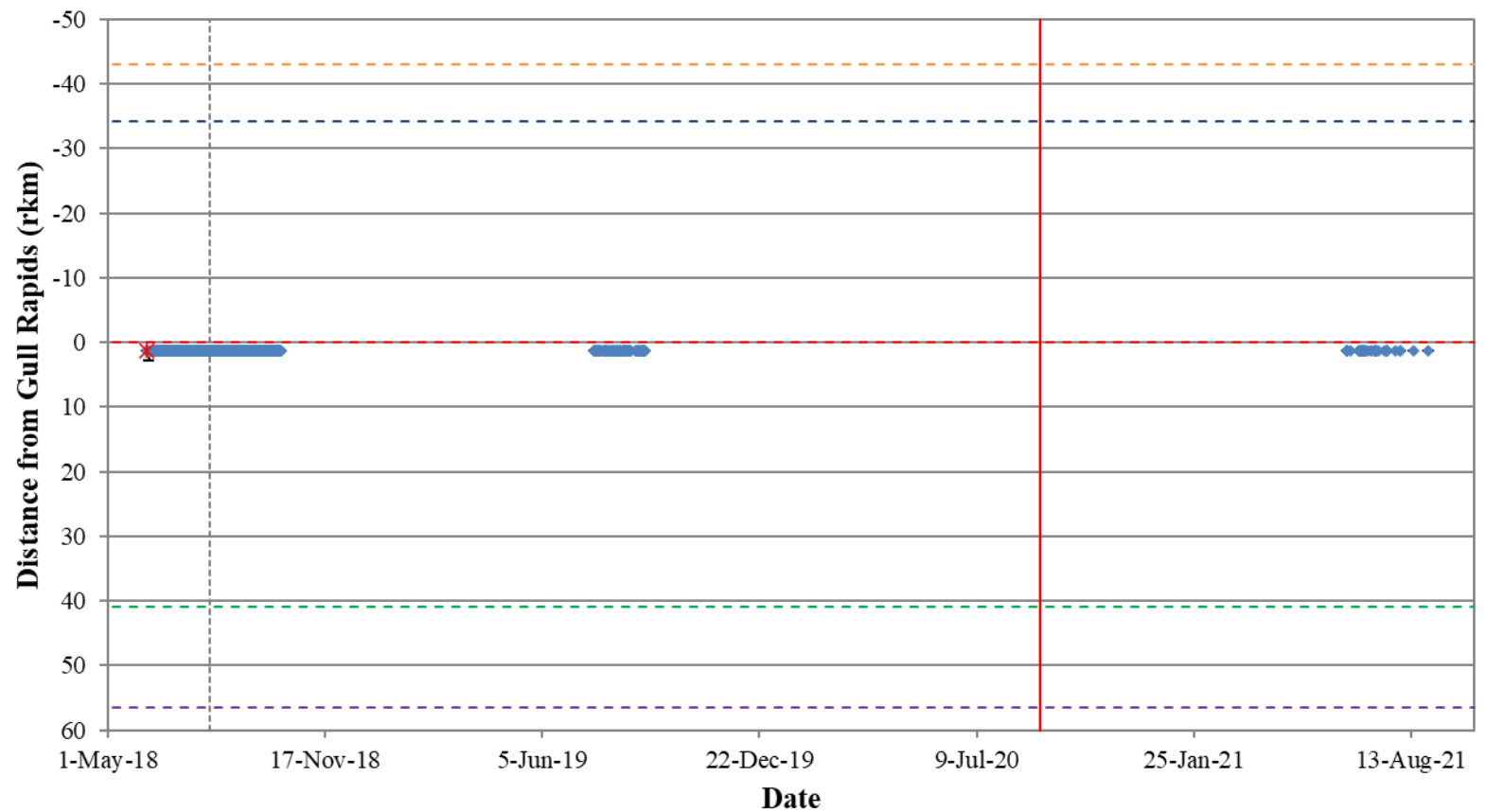


Figure A3-7: Position of a Walleye tagged with an acoustic transmitter (code #25741) in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1, 2018, to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to

Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

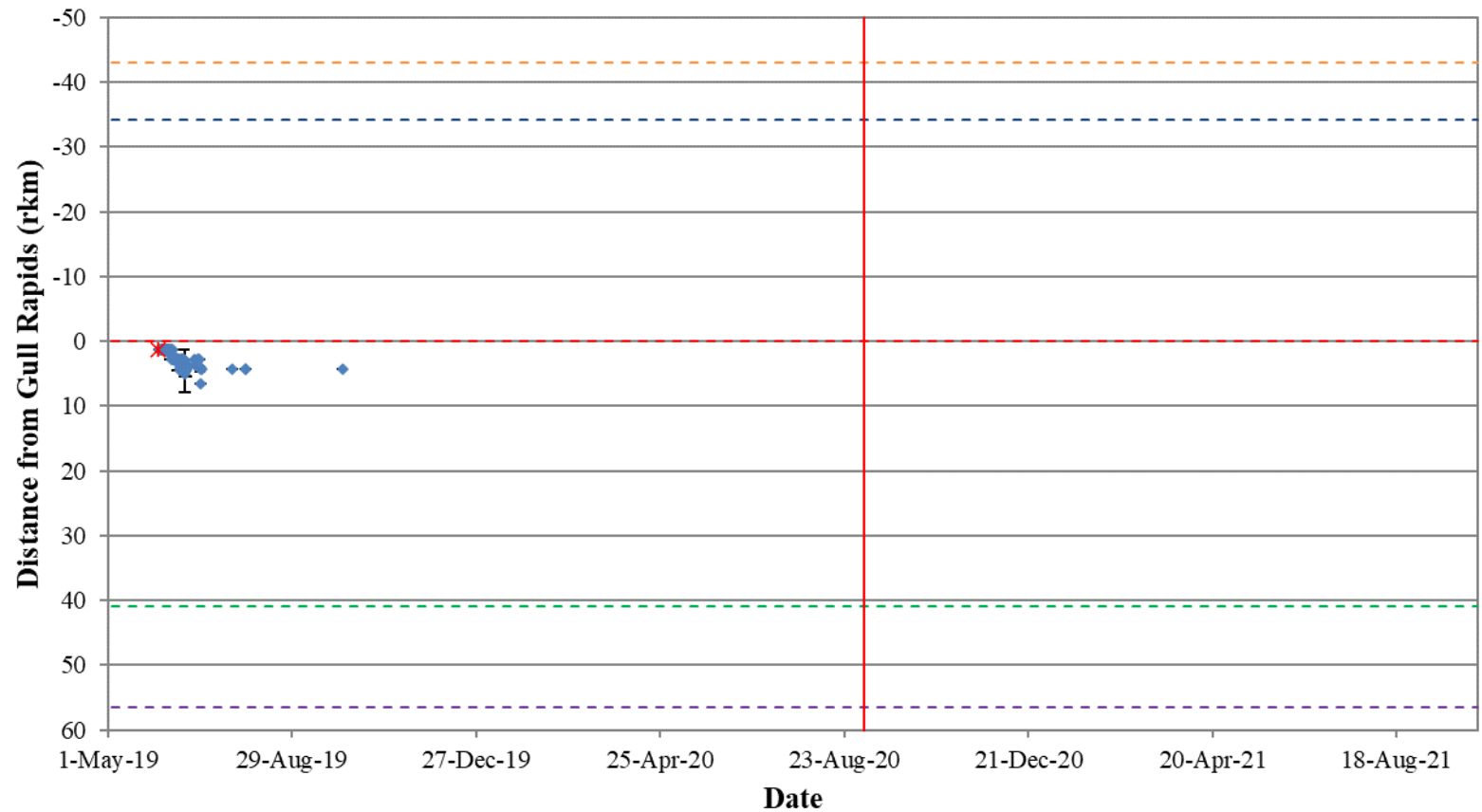


Figure A3-8: Position of a Walleye tagged with an acoustic transmitter (code #20129) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

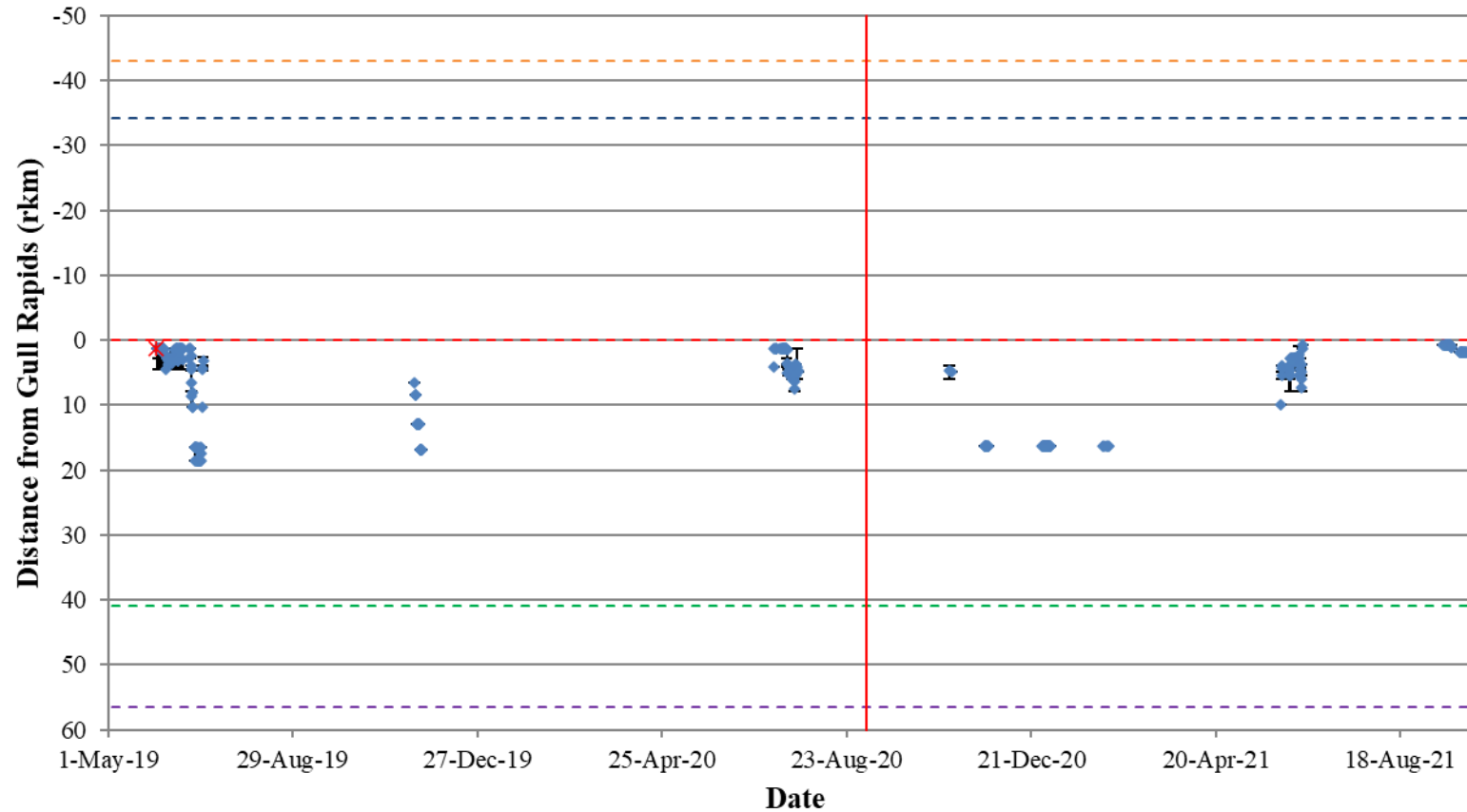


Figure A3-9: Position of a Walleye tagged with an acoustic transmitter (code #20130) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

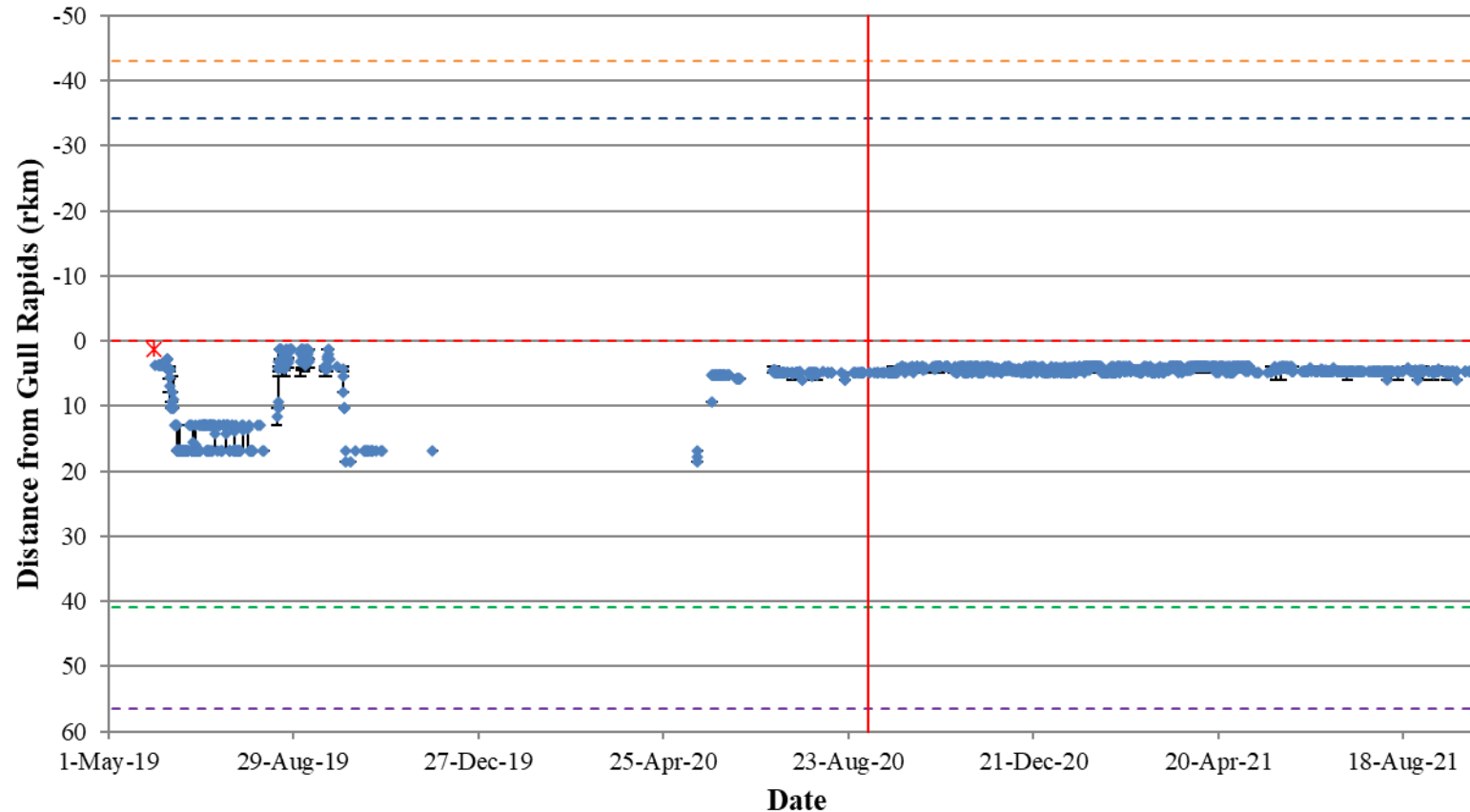


Figure A3-10: Position of a Walleye tagged with an acoustic transmitter (code #20131) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

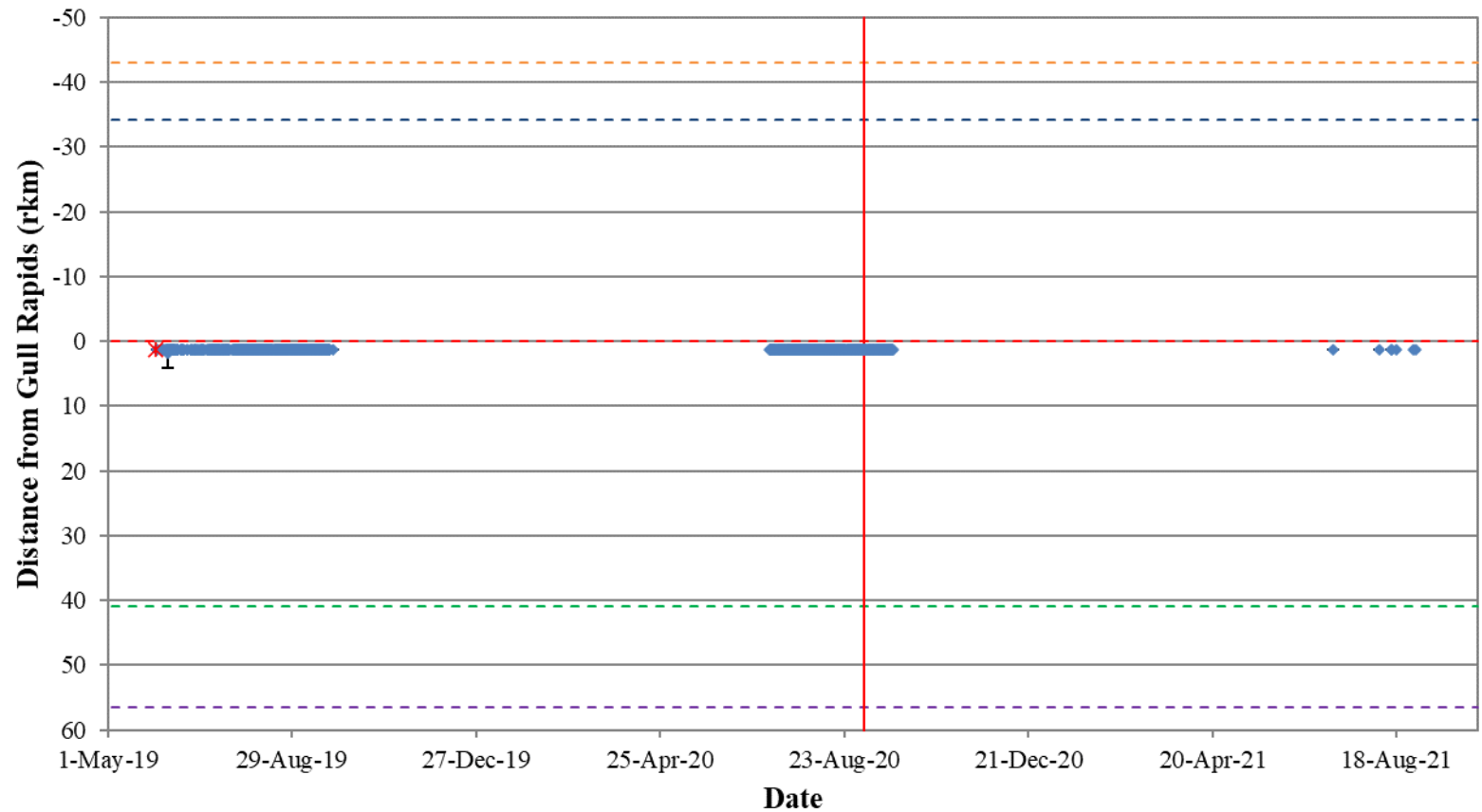


Figure A3-11: Position of a Walleye tagged with an acoustic transmitter (code #20132) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

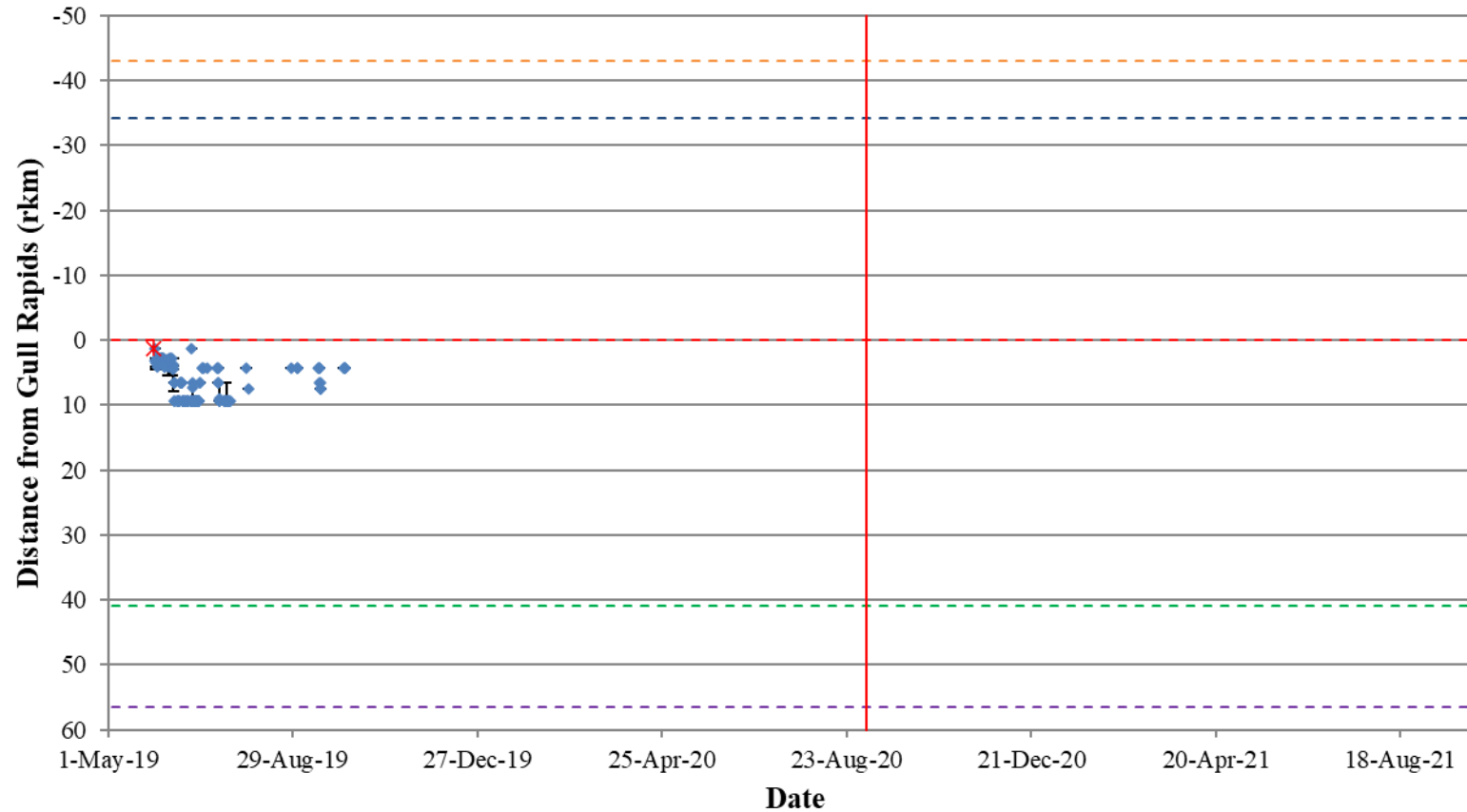


Figure A3-12: Position of a Walleye tagged with an acoustic transmitter (code #20133) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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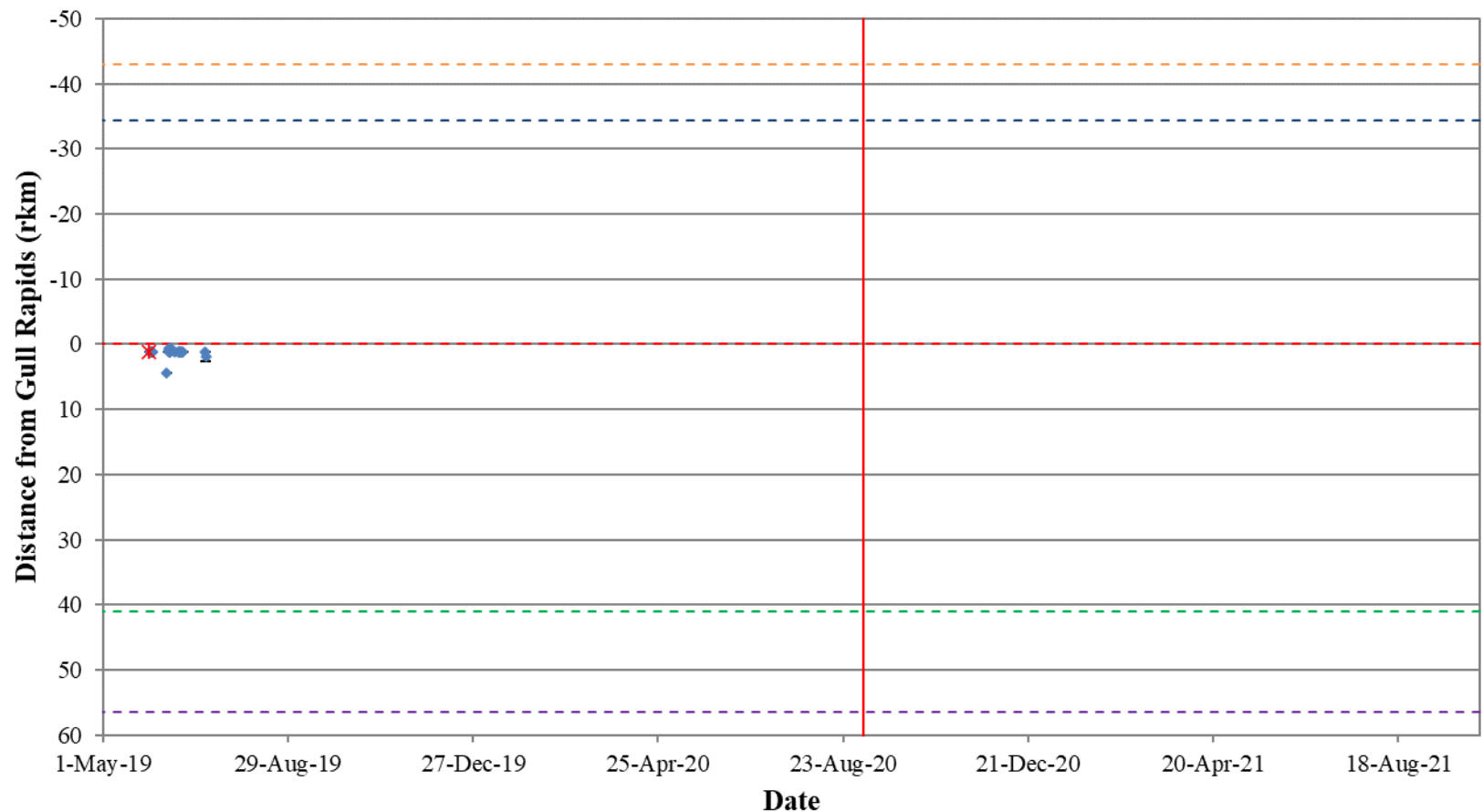


Figure A3-13: Position of a Walleye tagged with an acoustic transmitter (code #20134) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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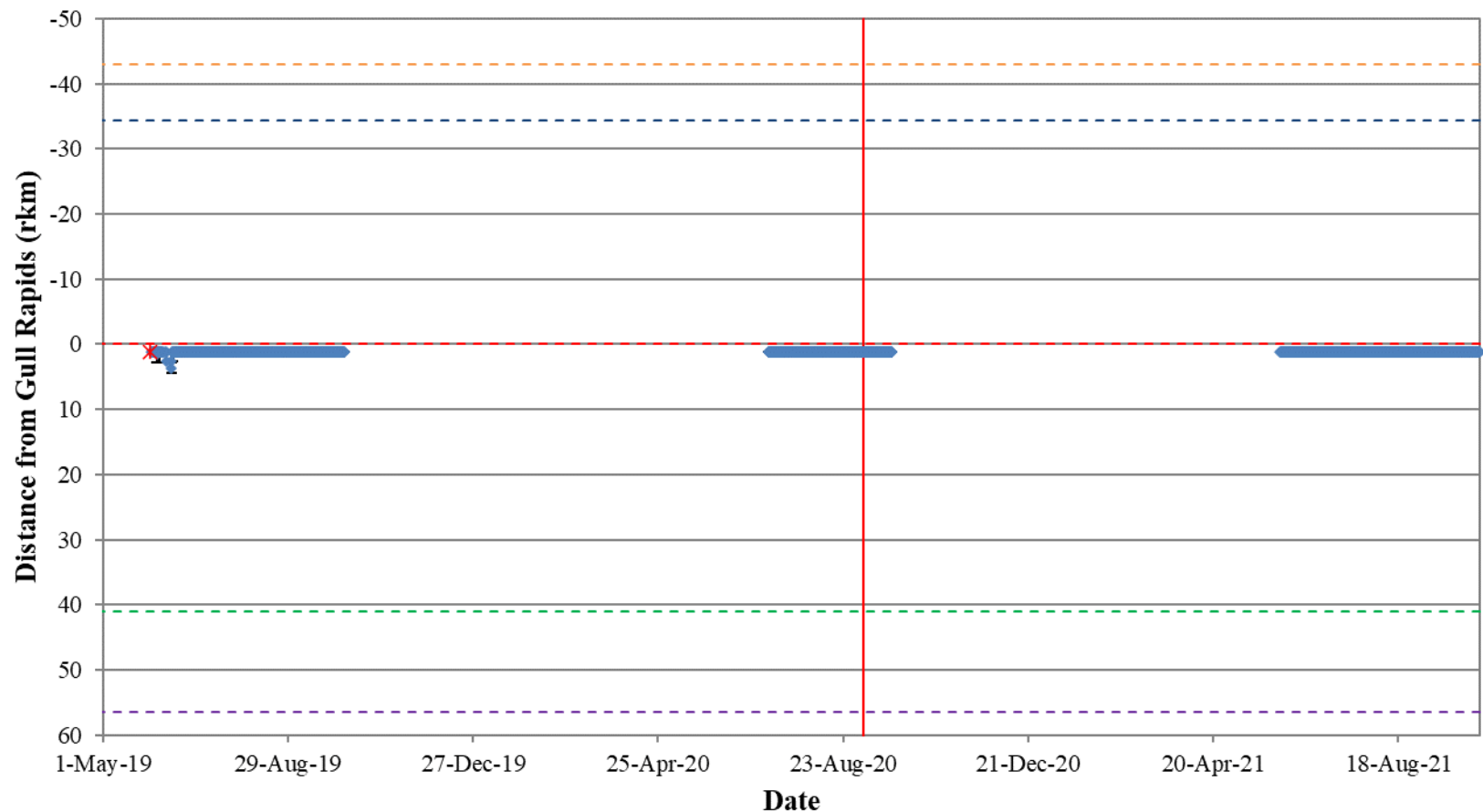


Figure A3-14: Position of a Walleye tagged with an acoustic transmitter (code #20135) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

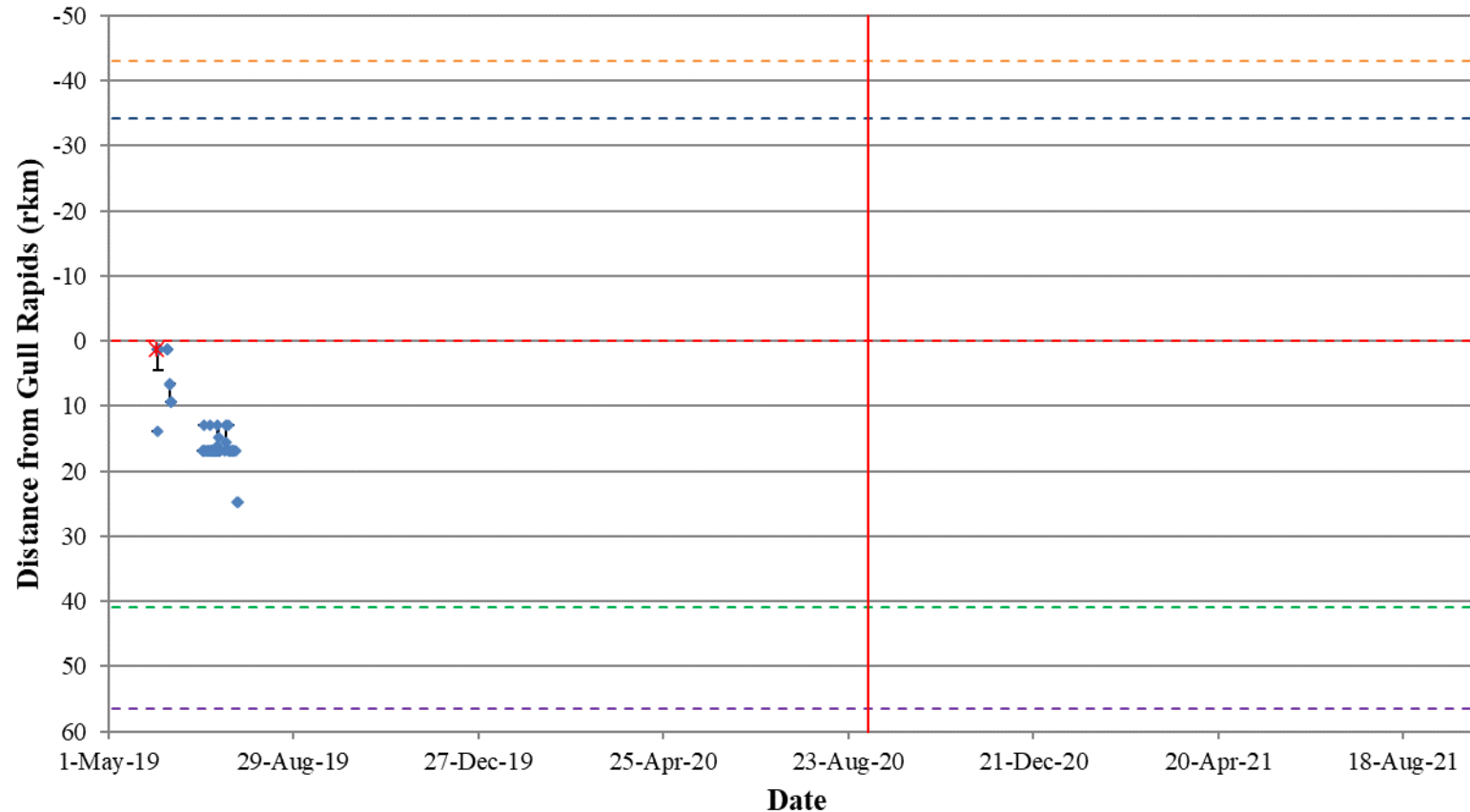


Figure A3-15: Position of a Walleye tagged with an acoustic transmitter (code #20136) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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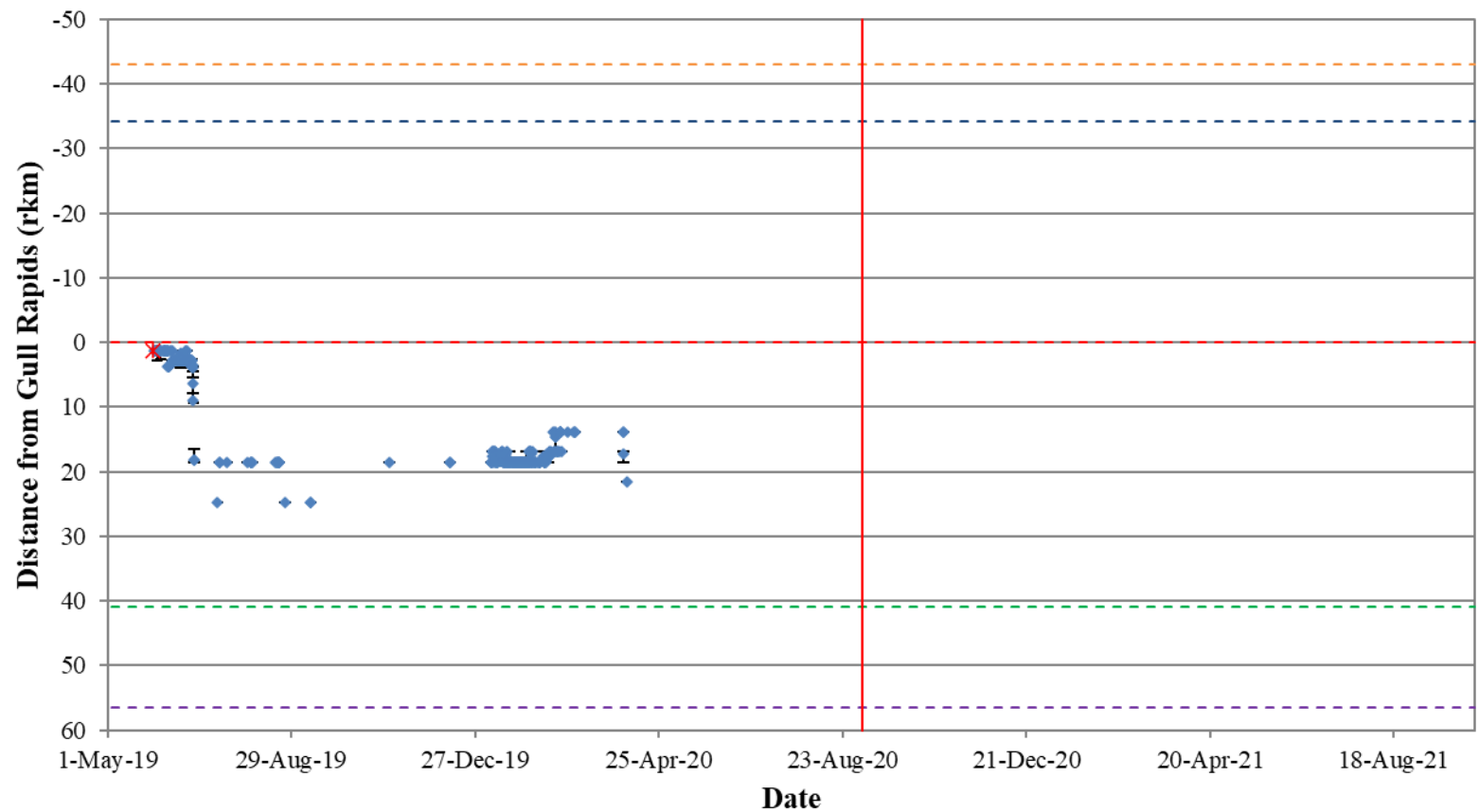


Figure A3-16: Position of a Walleye tagged with an acoustic transmitter (code #20137) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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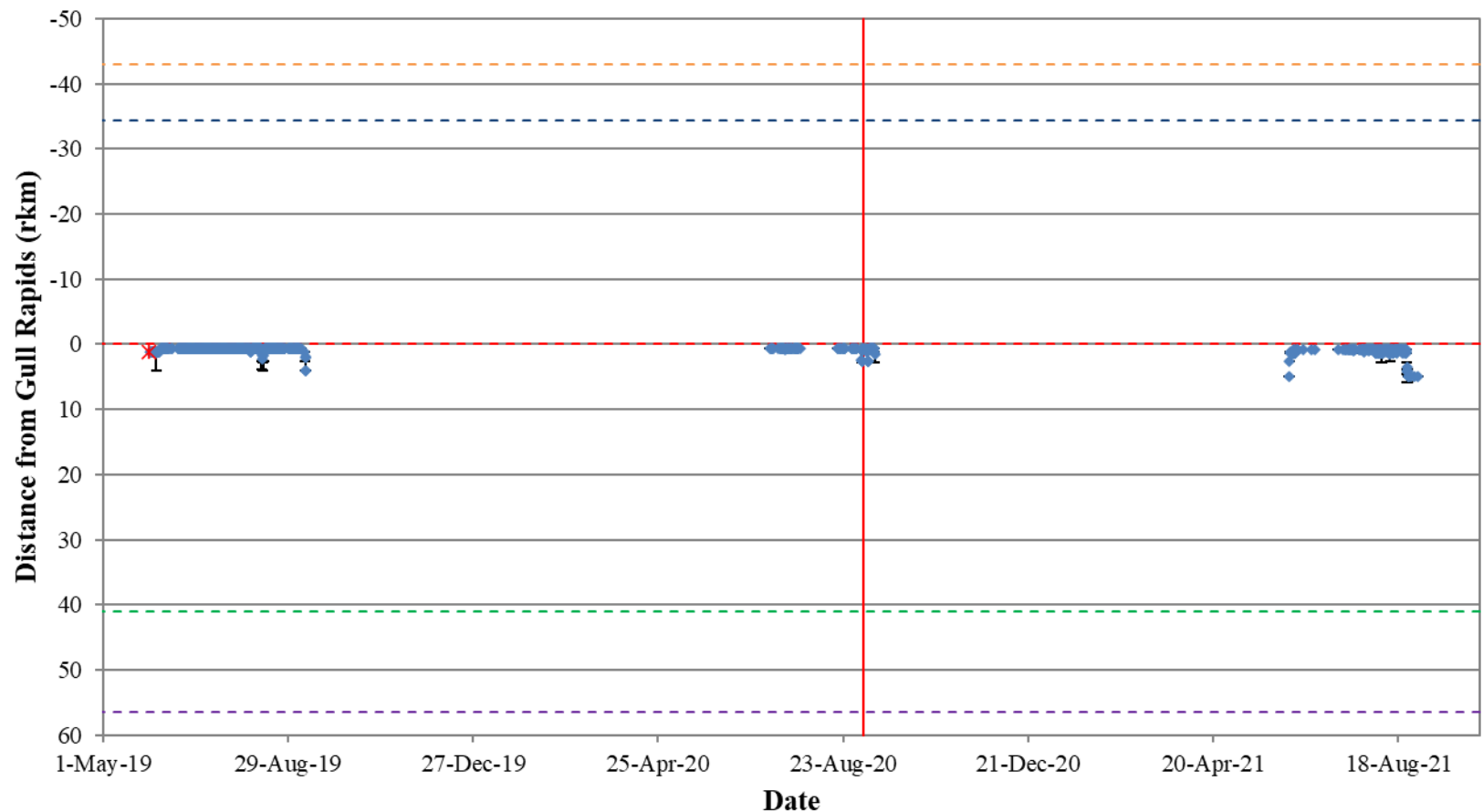


Figure A3-17: Position of a Walleye tagged with an acoustic transmitter (code #20138) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

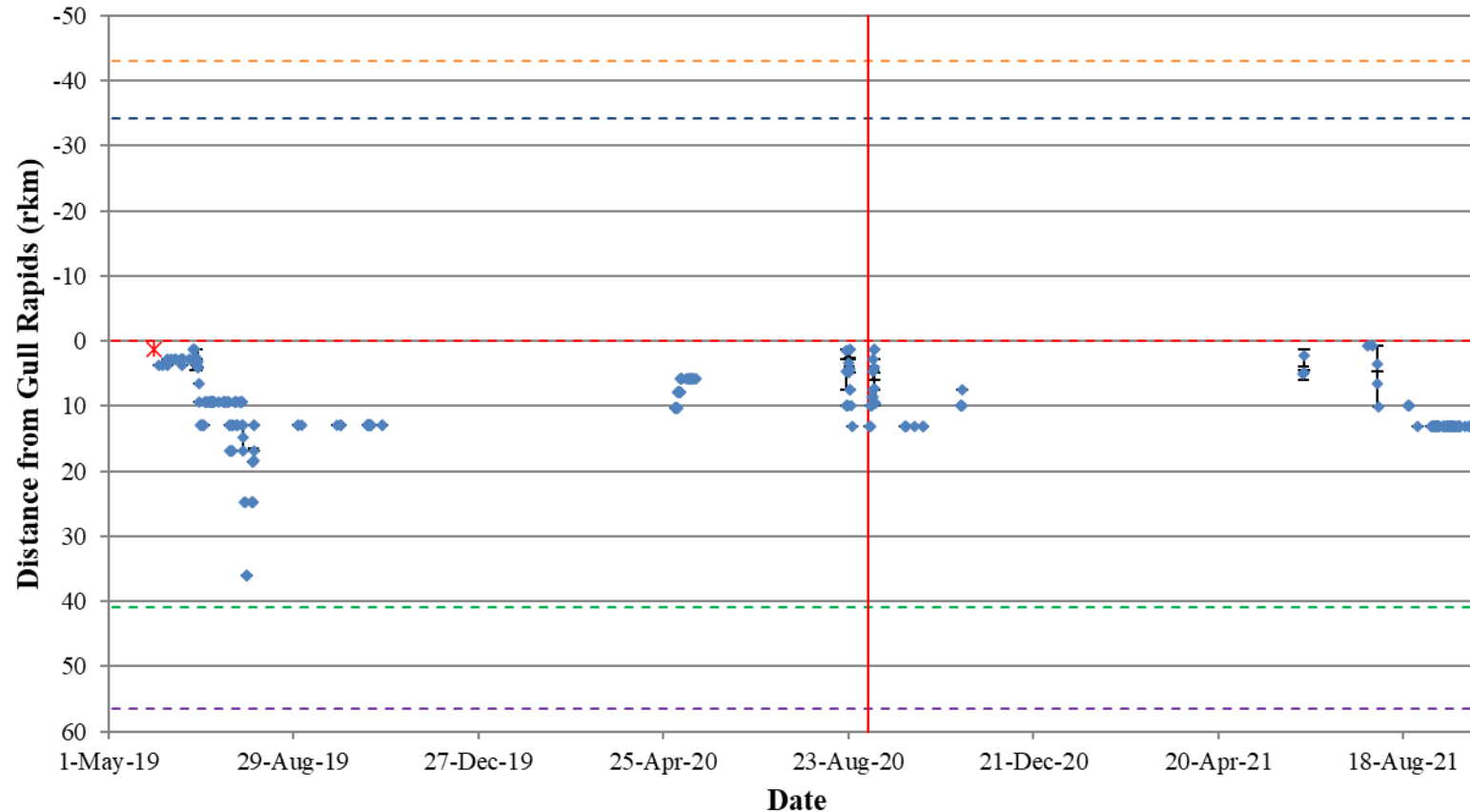


Figure A3-18: Position of a Walleye tagged with an acoustic transmitter (code #20139) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

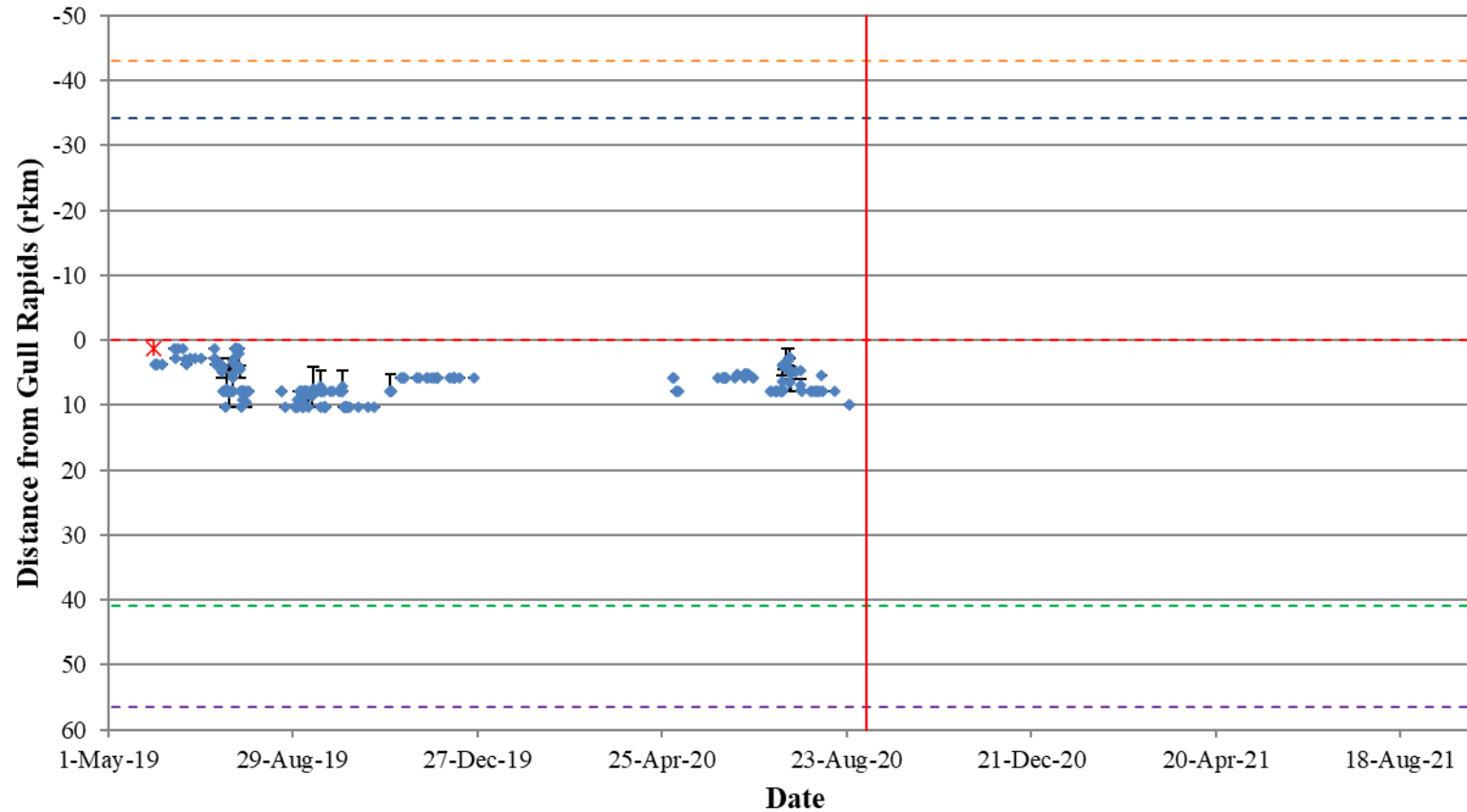


Figure A3-19: Position of a Walleye tagged with an acoustic transmitter (code #20140) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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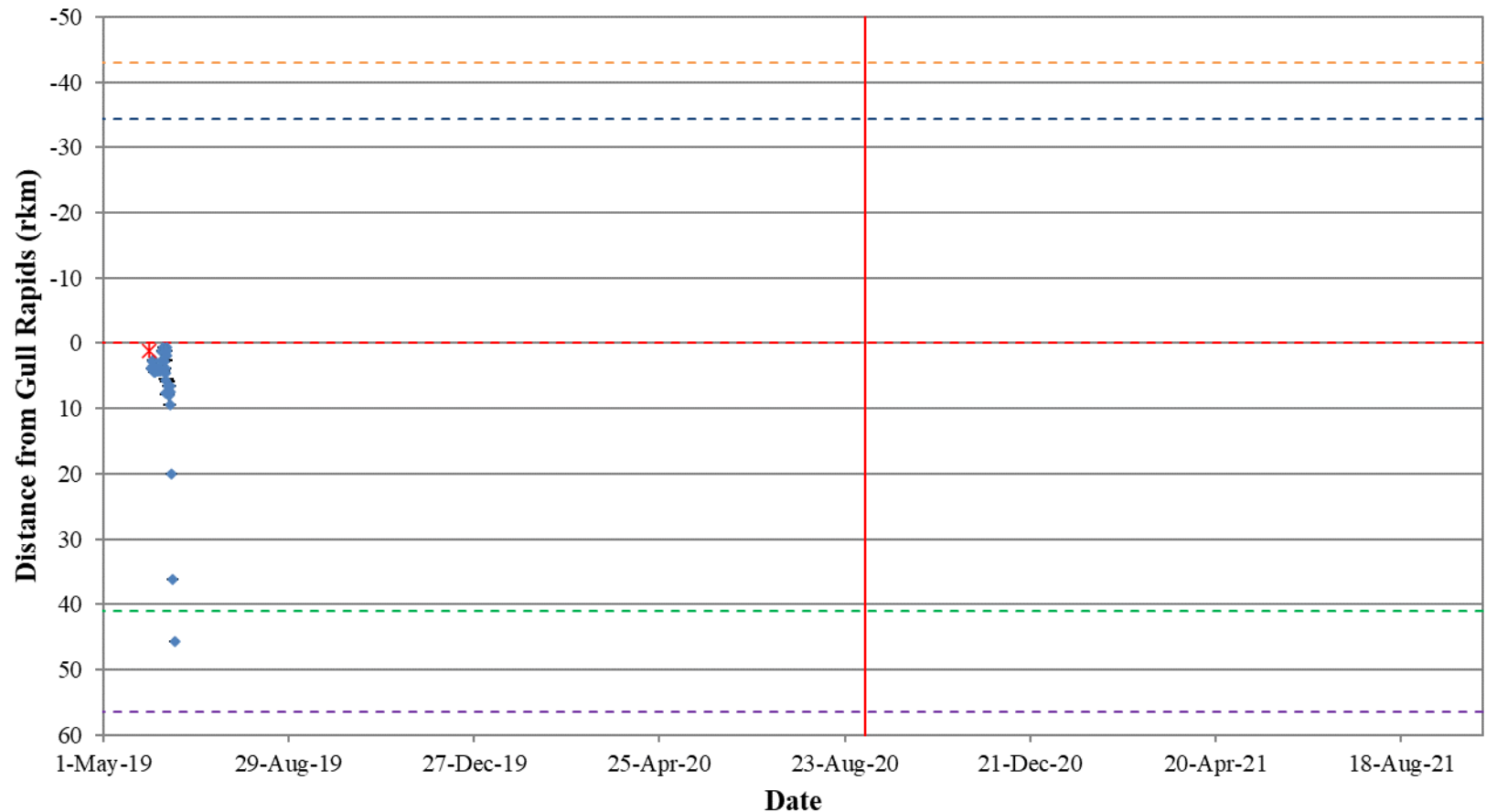


Figure A3-20: Position of a Walleye tagged with an acoustic transmitter (code #20141) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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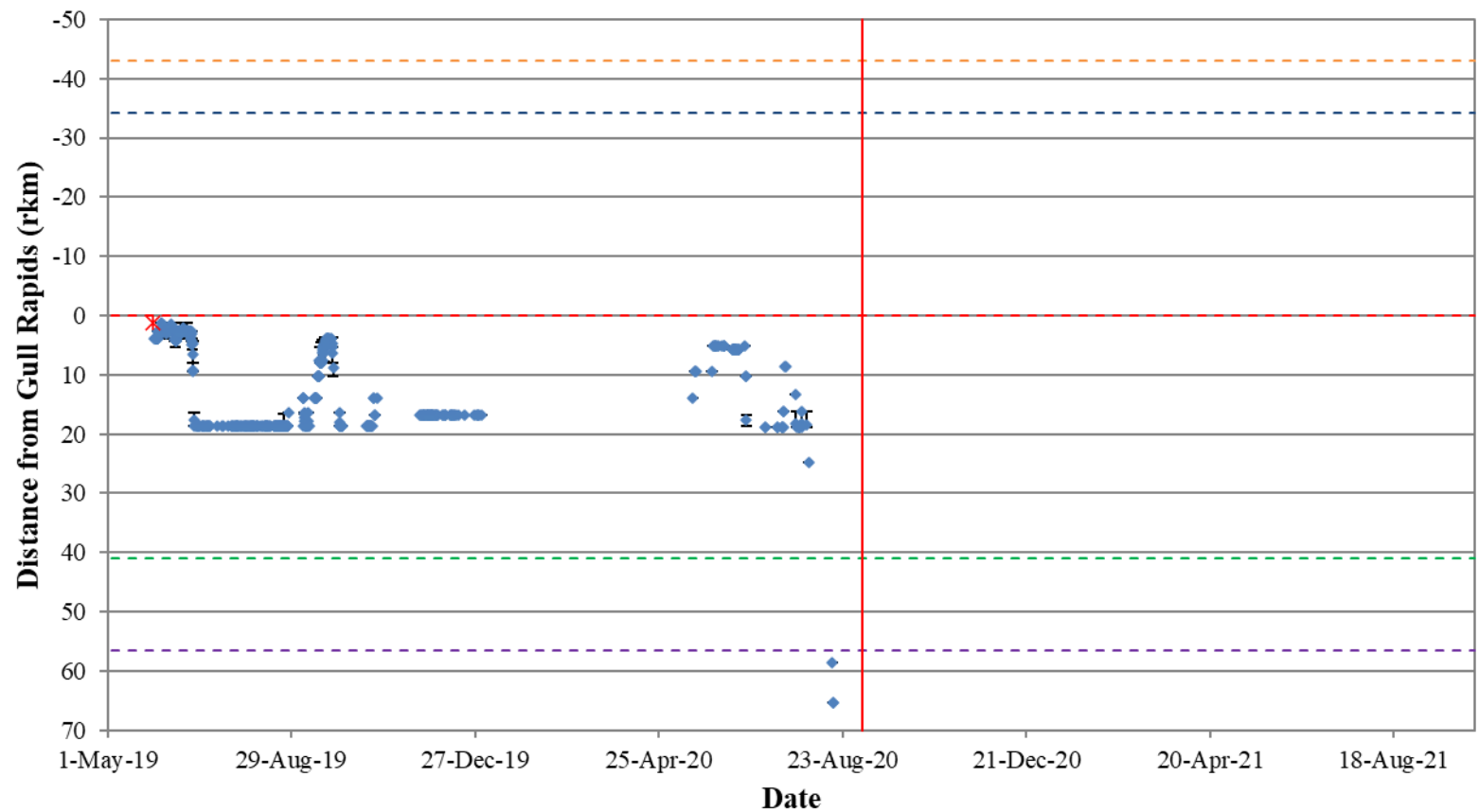


Figure A3-21: Position of a Walleye tagged with an acoustic transmitter (code #20142) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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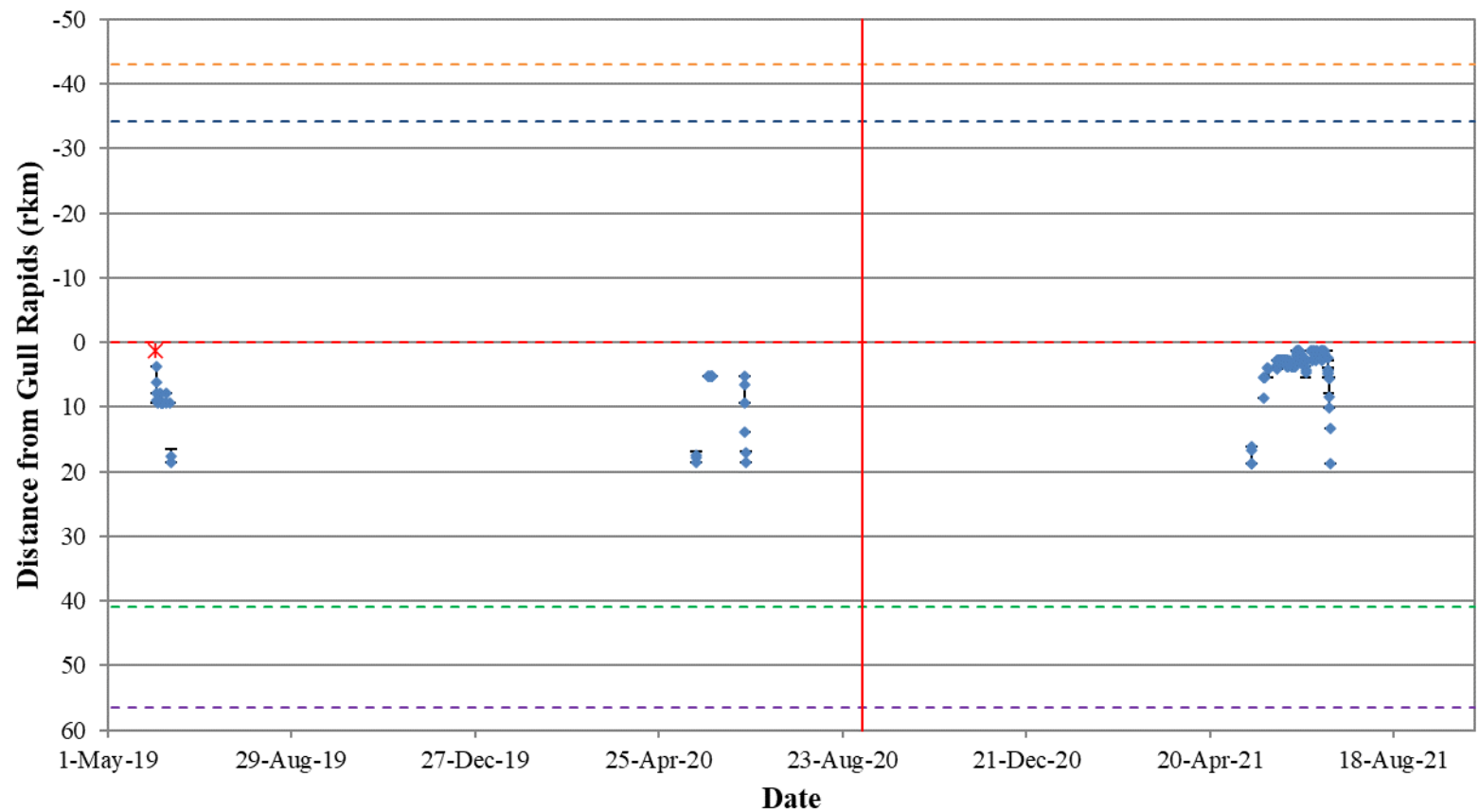


Figure A3-22: Position of a Walleye tagged with an acoustic transmitter (code #20143) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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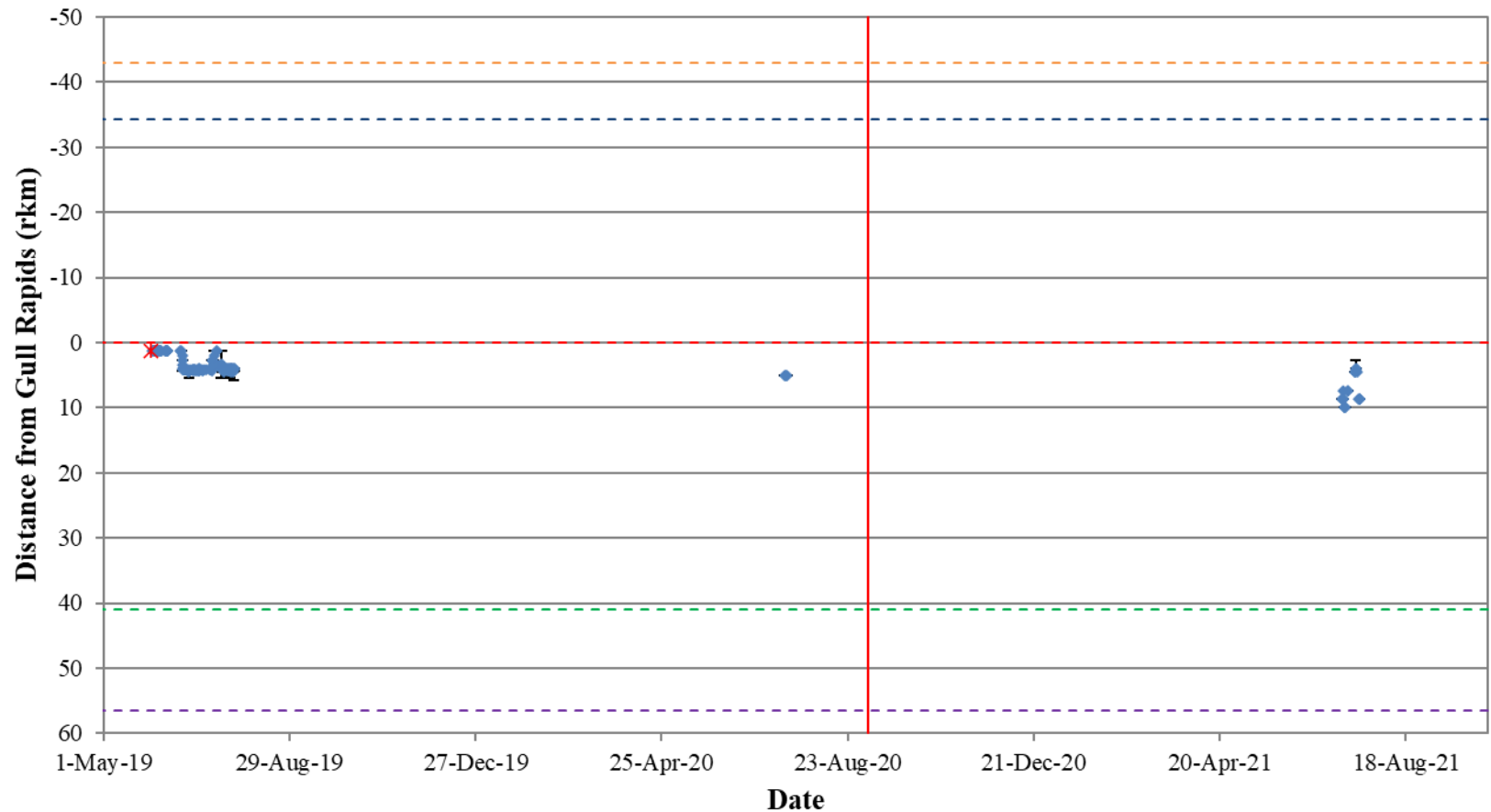


Figure A3-23: Position of a Walleye tagged with an acoustic transmitter (code #20144) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

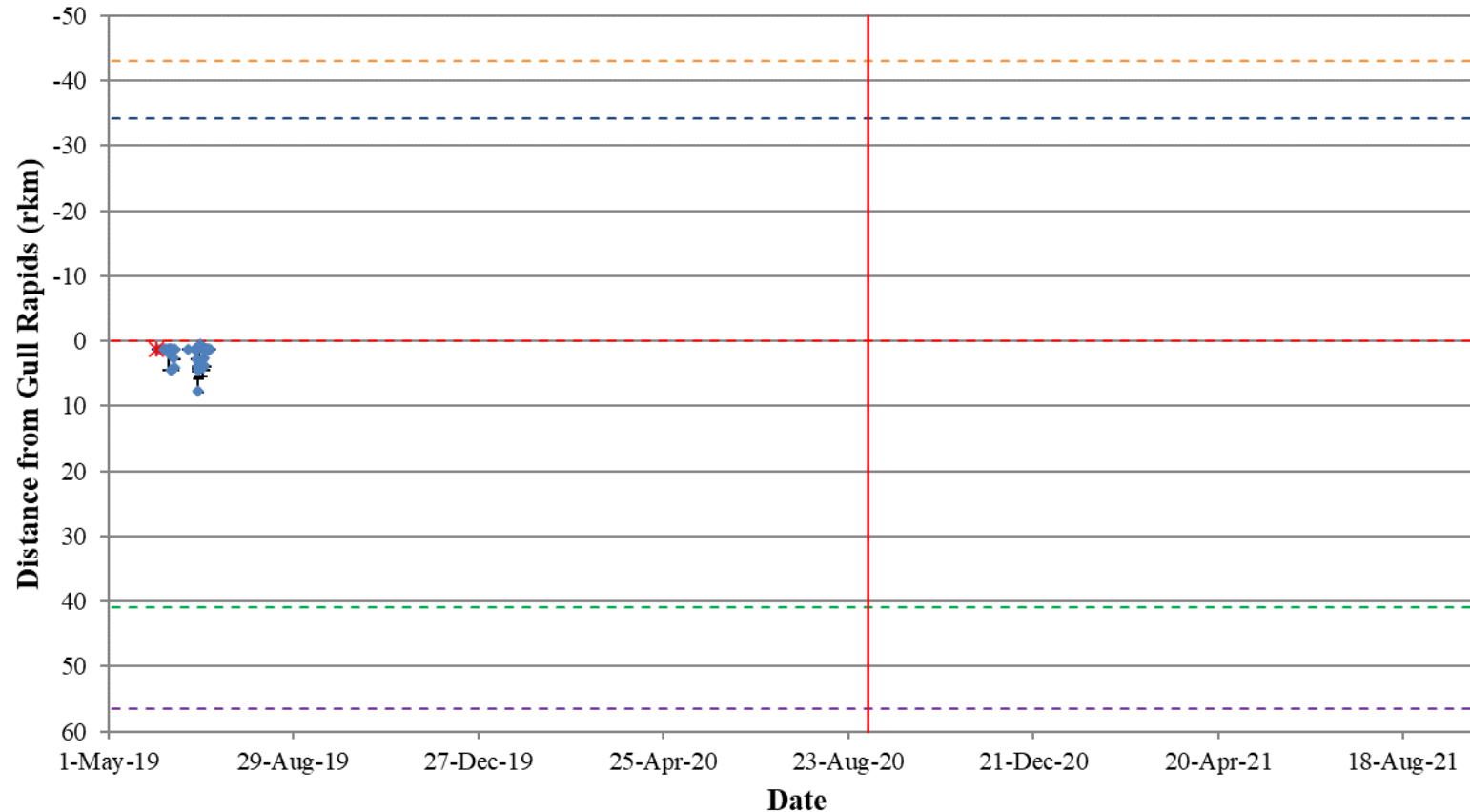


Figure A3-24: Position of a Walleye tagged with an acoustic transmitter (code #20145) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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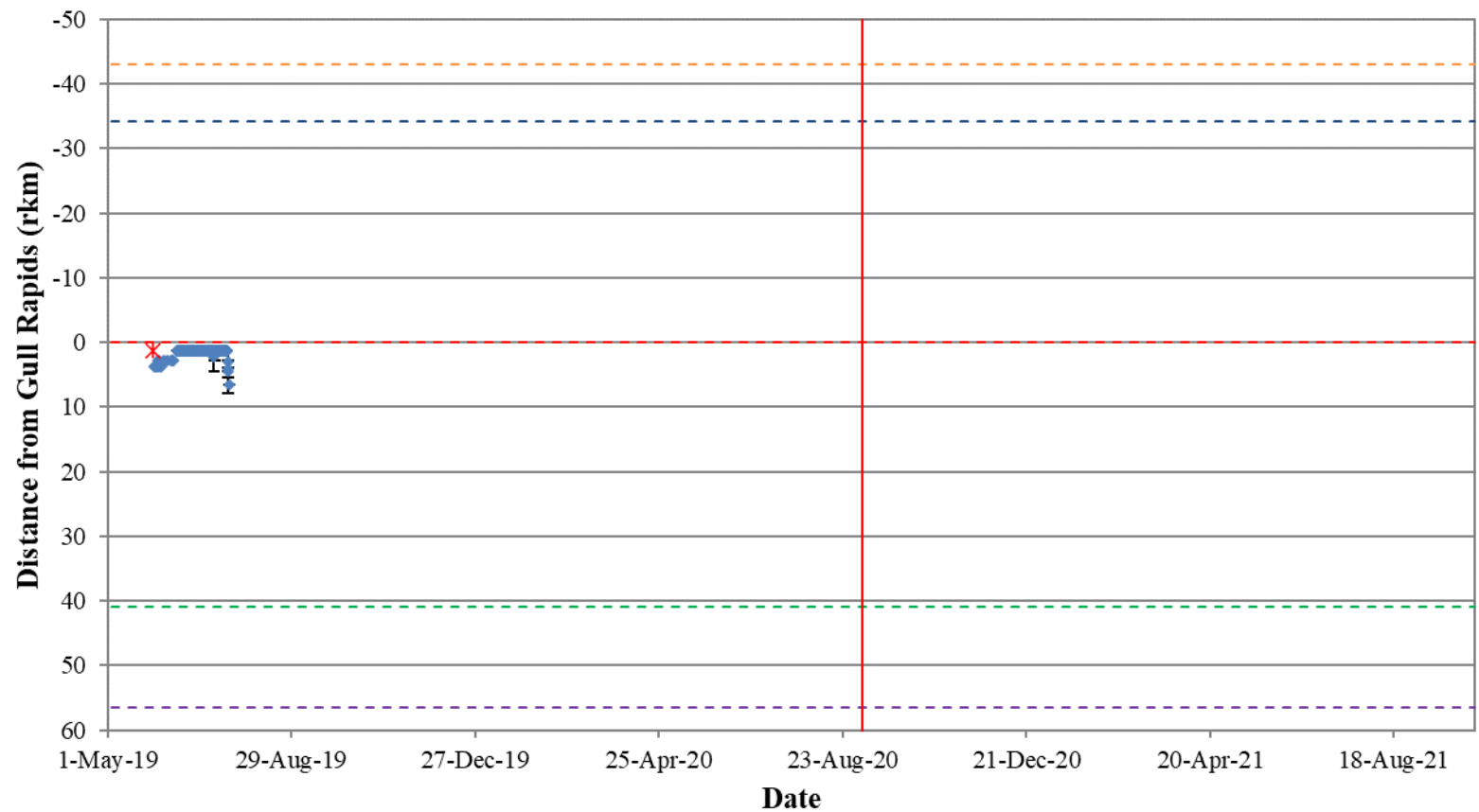


Figure A3-25: Position of a Walleye tagged with an acoustic transmitter (code #20152) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

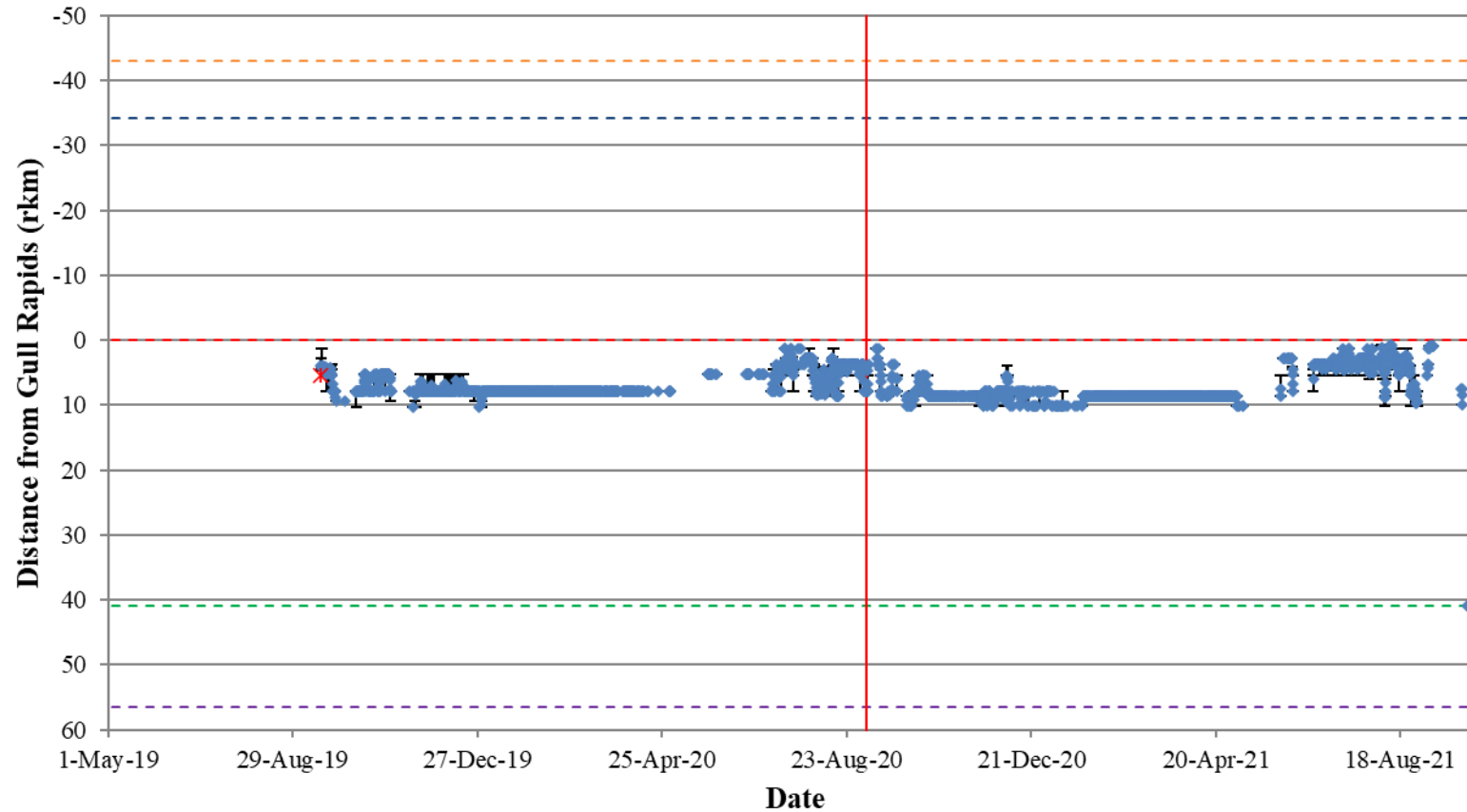


Figure A3-26: Position of a Walleye tagged with an acoustic transmitter (code #20165) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

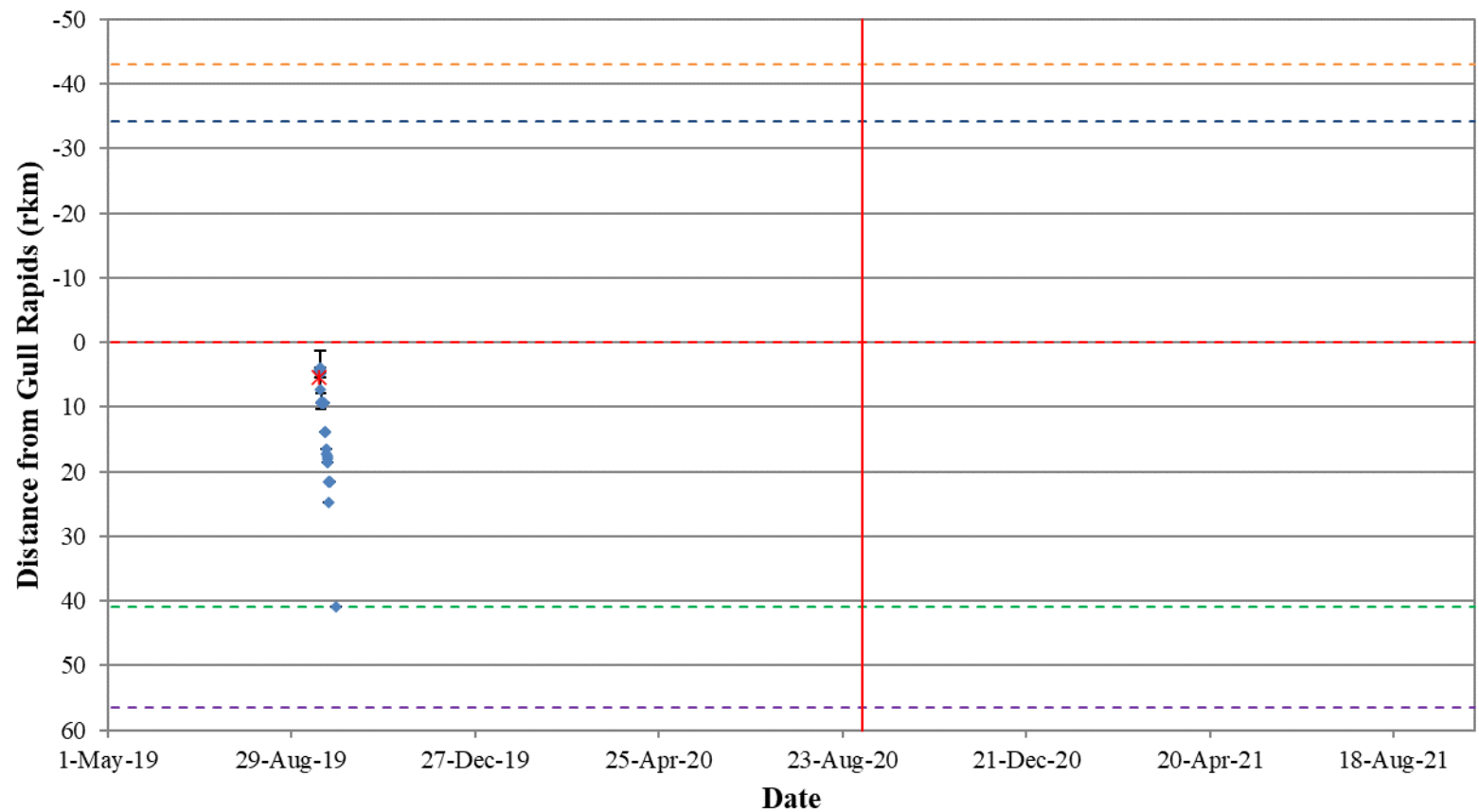


Figure A3-27: Position of a Walleye tagged with an acoustic transmitter (code #20167) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

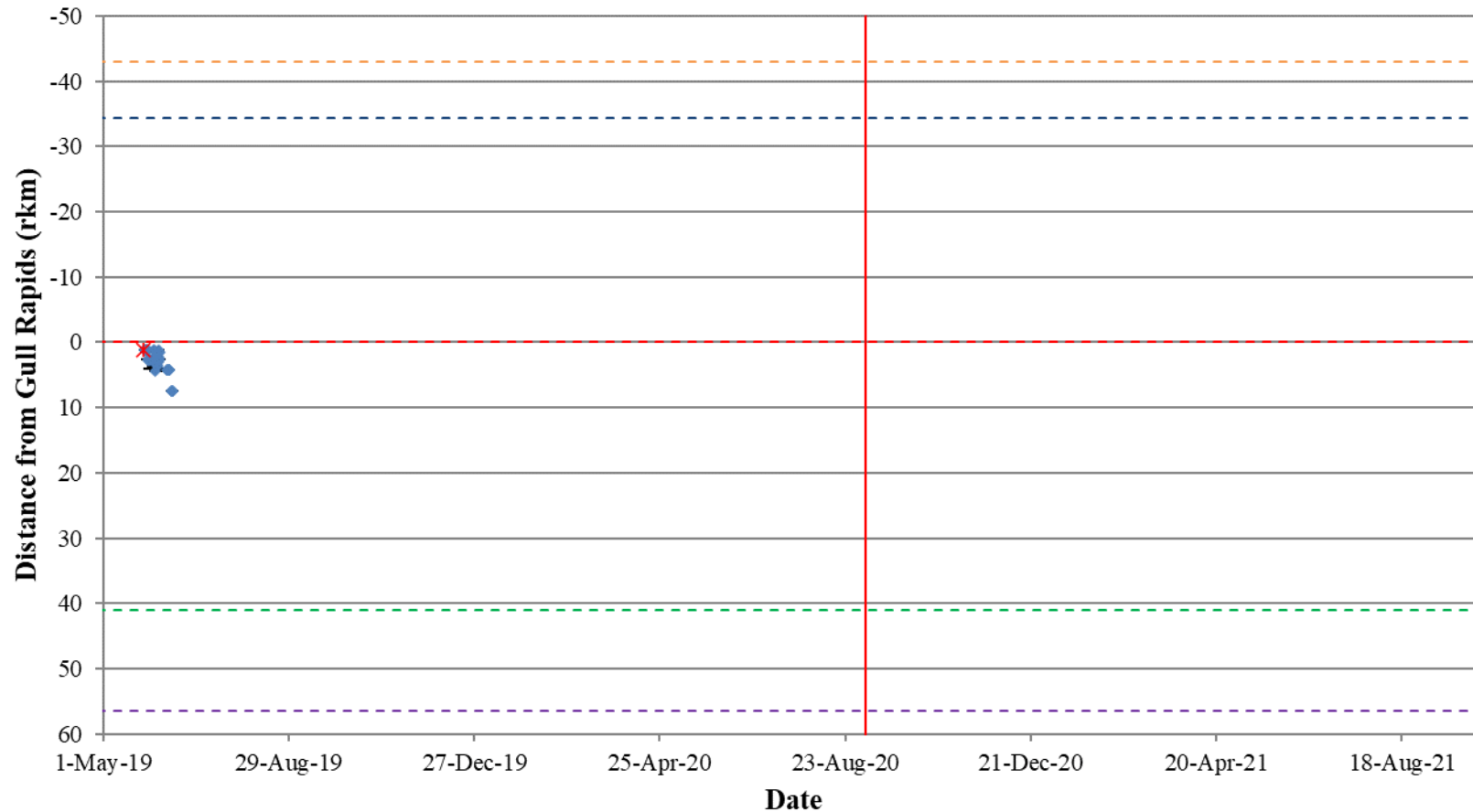


Figure A3-28: Position of a Walleye tagged with an acoustic transmitter (code #20171) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

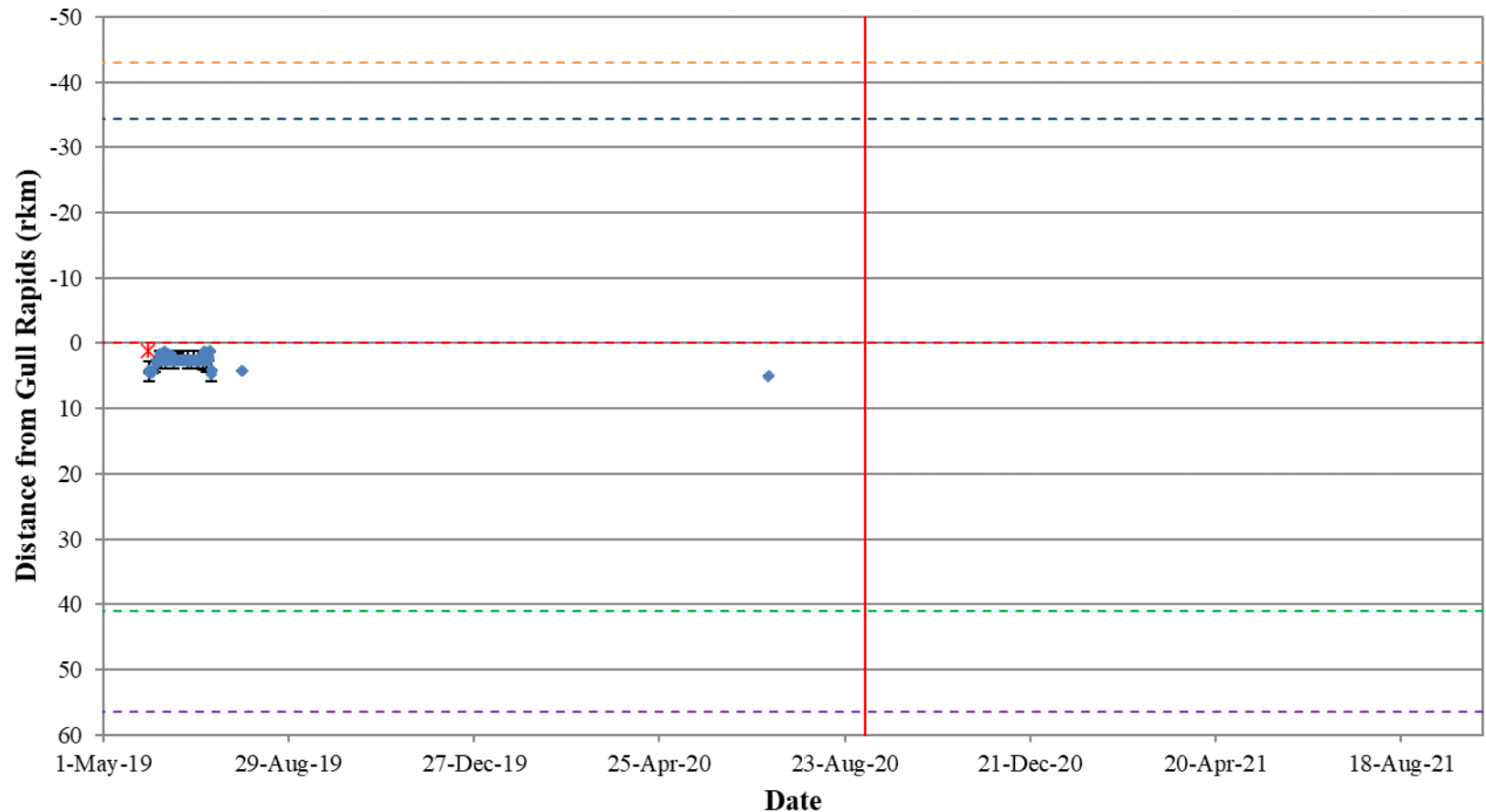


Figure A3-29: Position of a Walleye tagged with an acoustic transmitter (code #20172) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).



Figure A3-30: Position of a Walleye tagged with an acoustic transmitter (code #20173) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

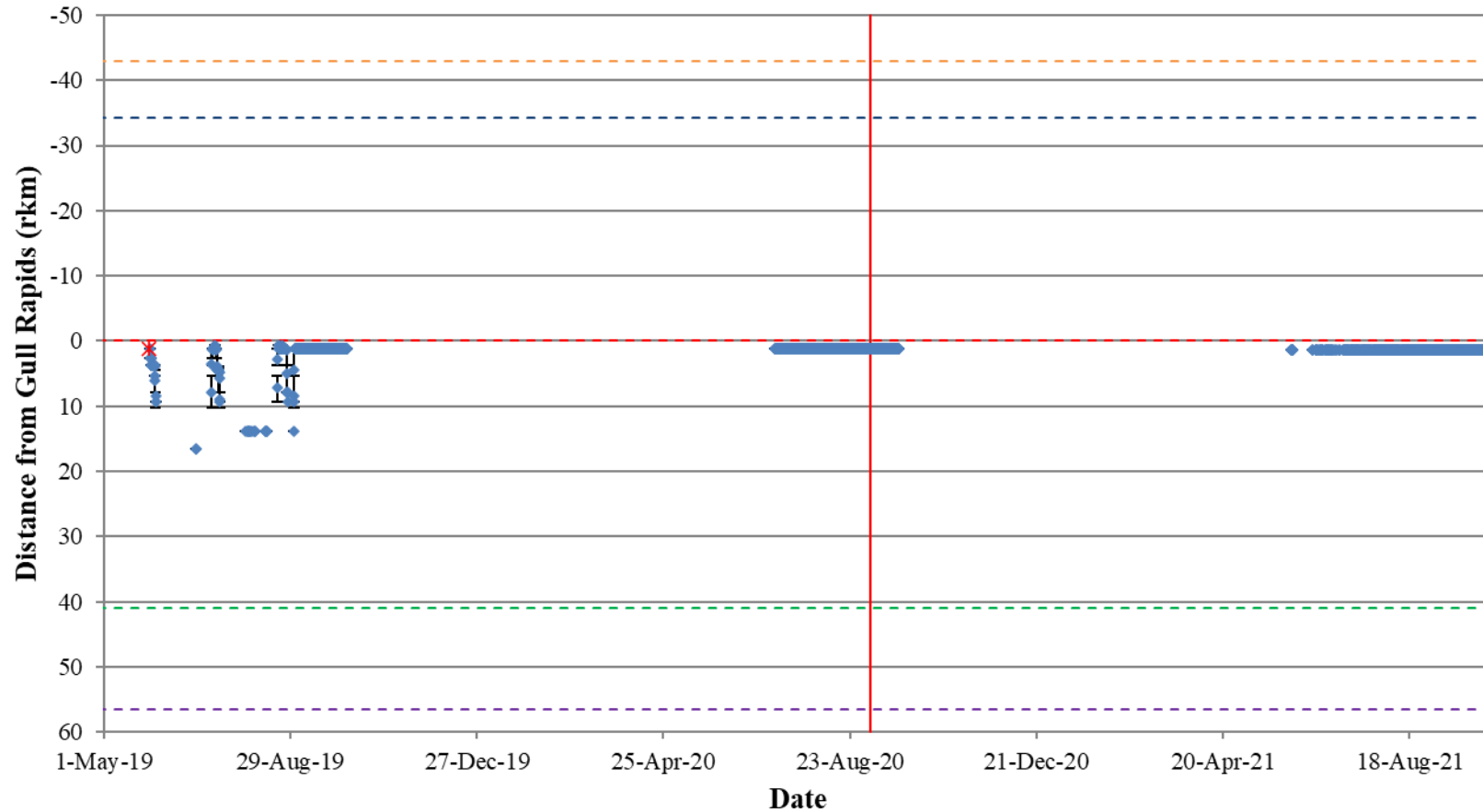


Figure A3-31: Position of a Walleye tagged with an acoustic transmitter (code #20174) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

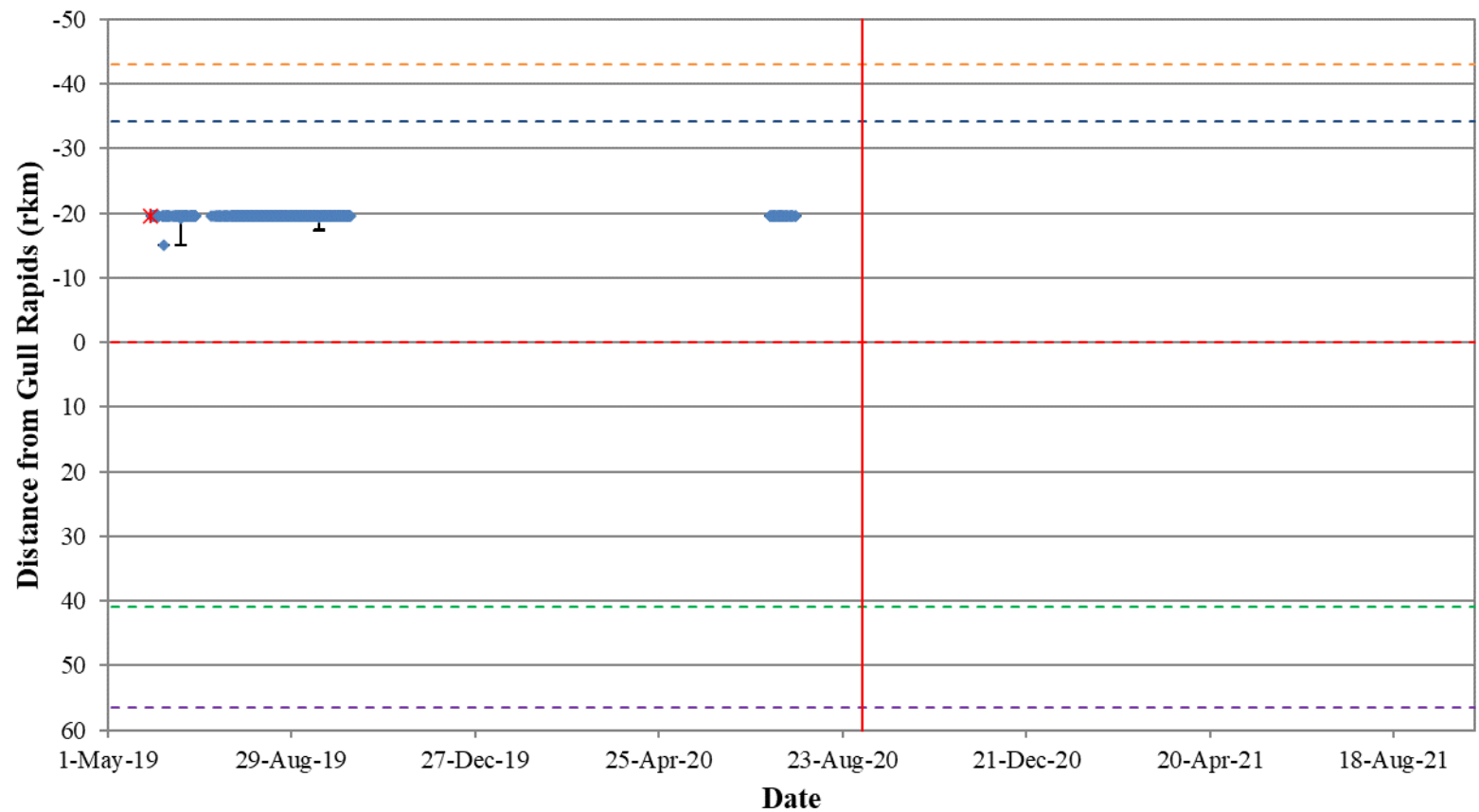


Figure A3-32: Position of a Walleye tagged with an acoustic transmitter (code #20176) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

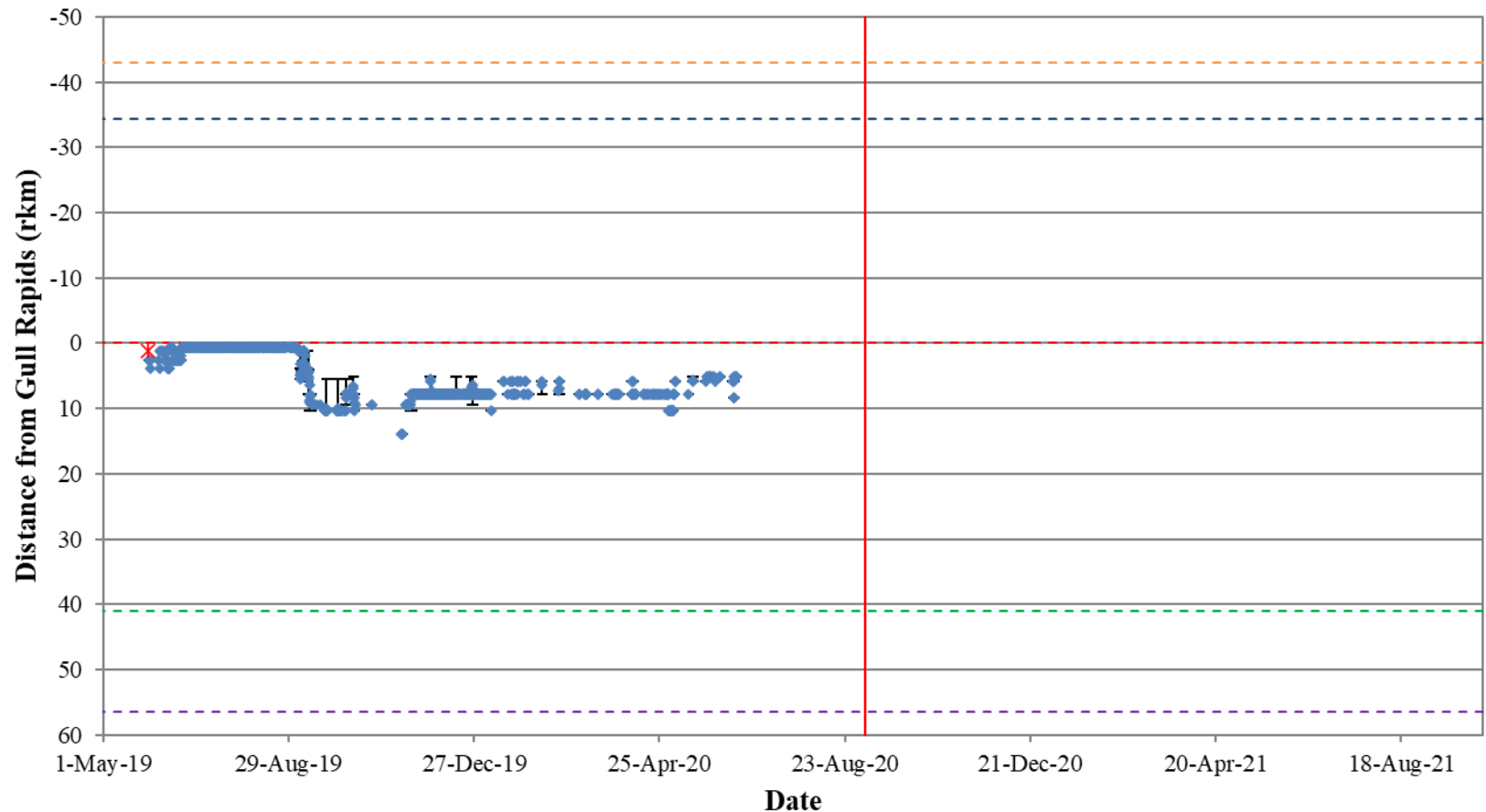


Figure A3-33: Position of a Walleye tagged with an acoustic transmitter (code #20177) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

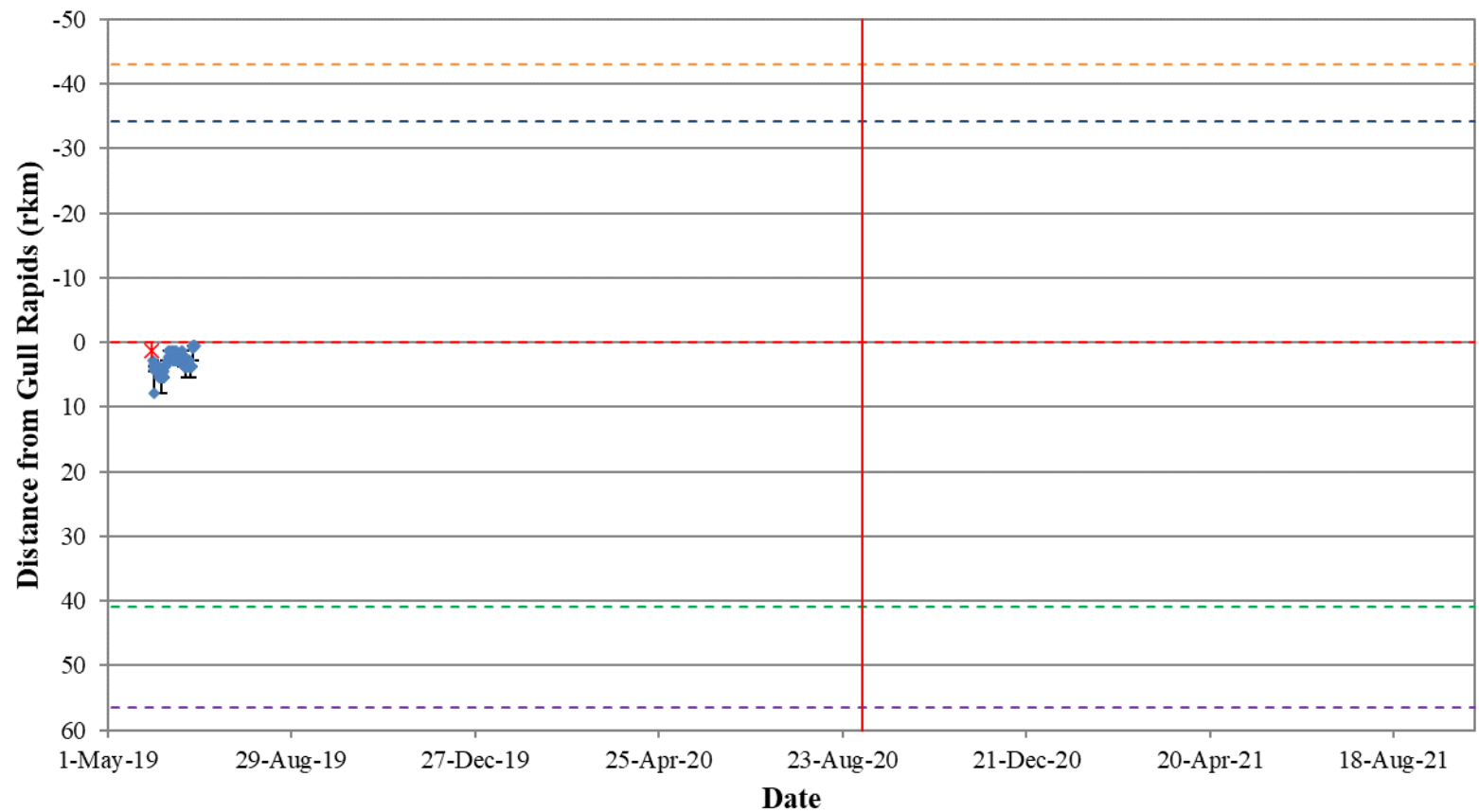


Figure A3-34: Position of a Walleye tagged with an acoustic transmitter (code #20178) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

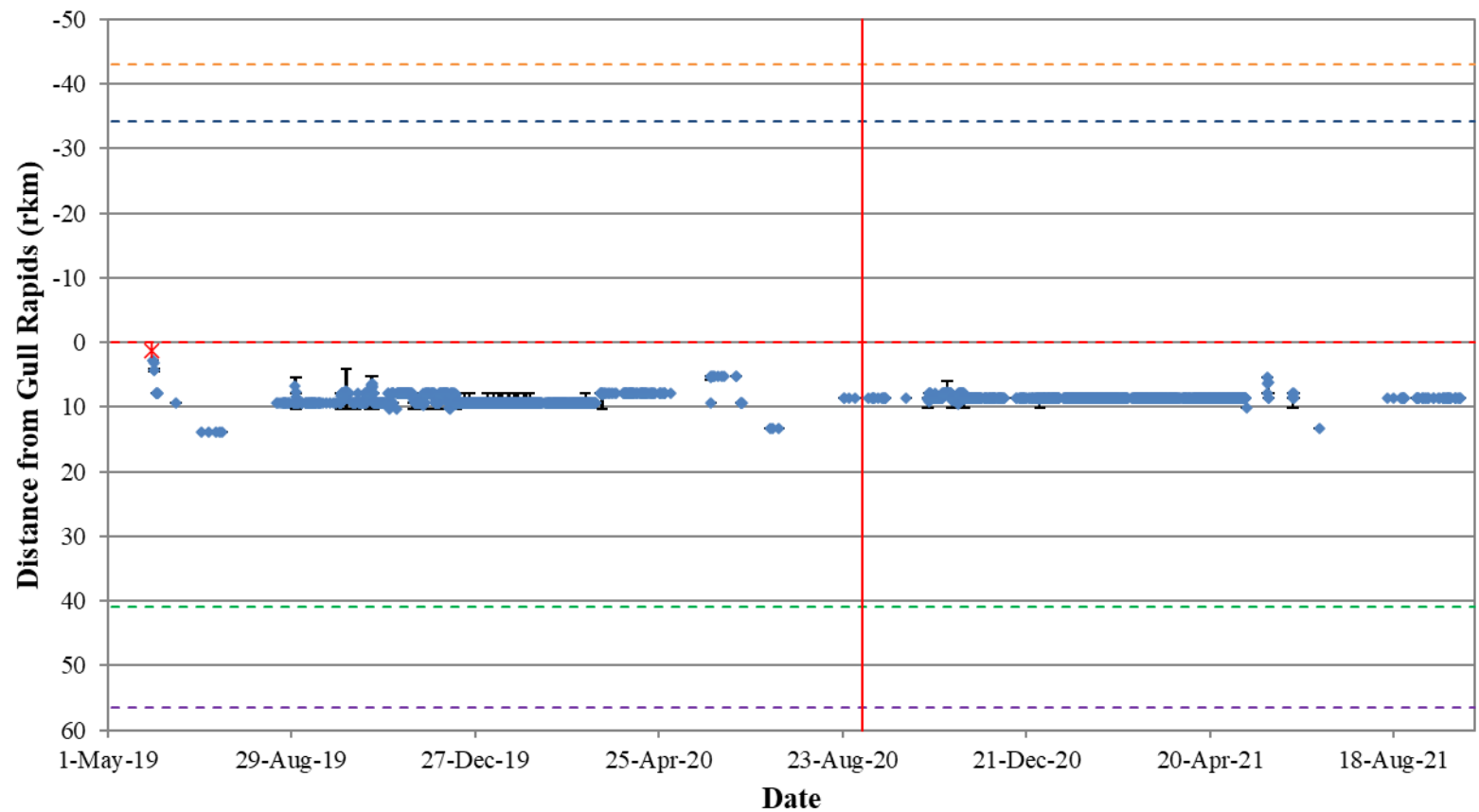


Figure A3-35: Position of a Walleye tagged with an acoustic transmitter (code #20179) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

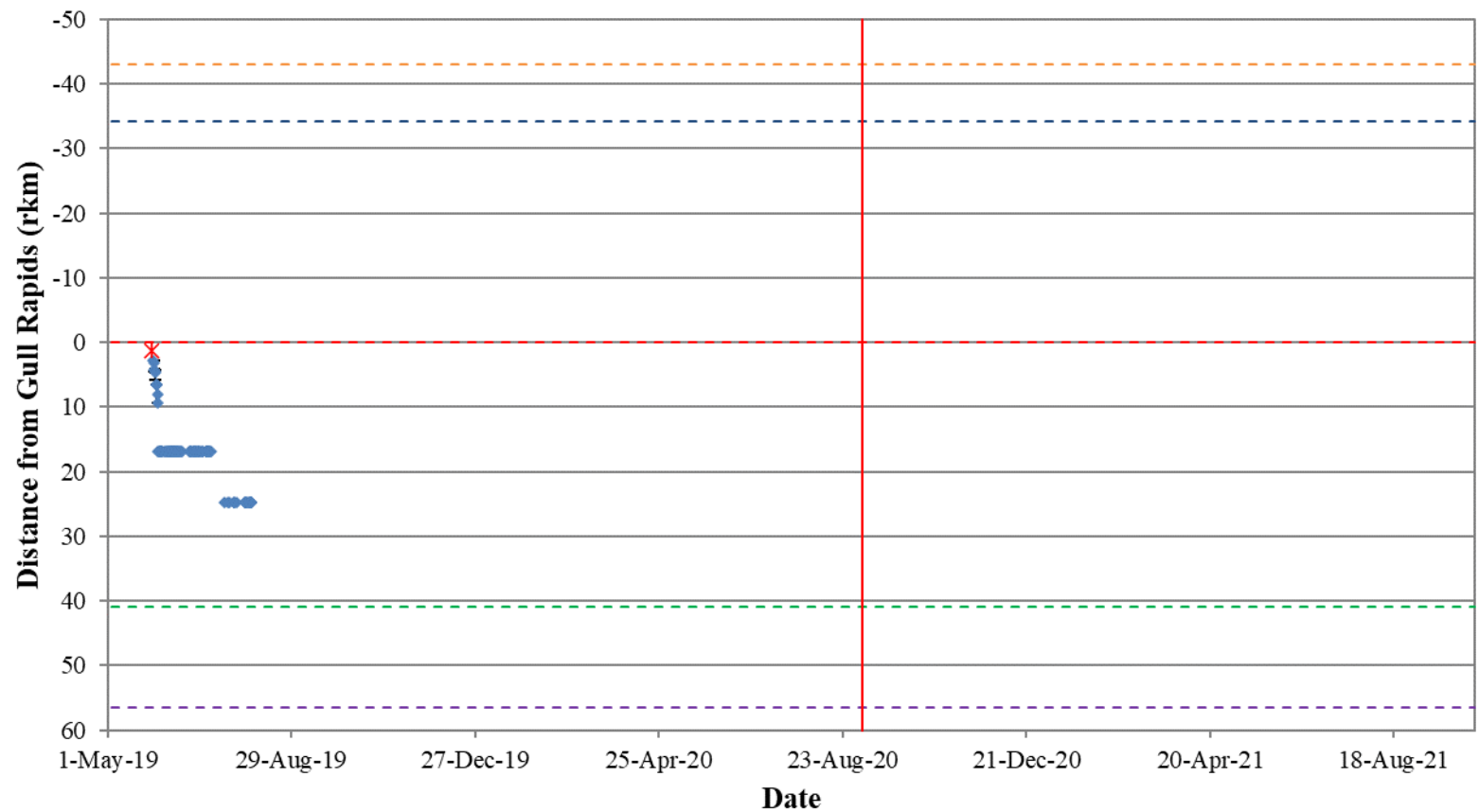


Figure A3-36: Position of a Walleye tagged with an acoustic transmitter (code #20180) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

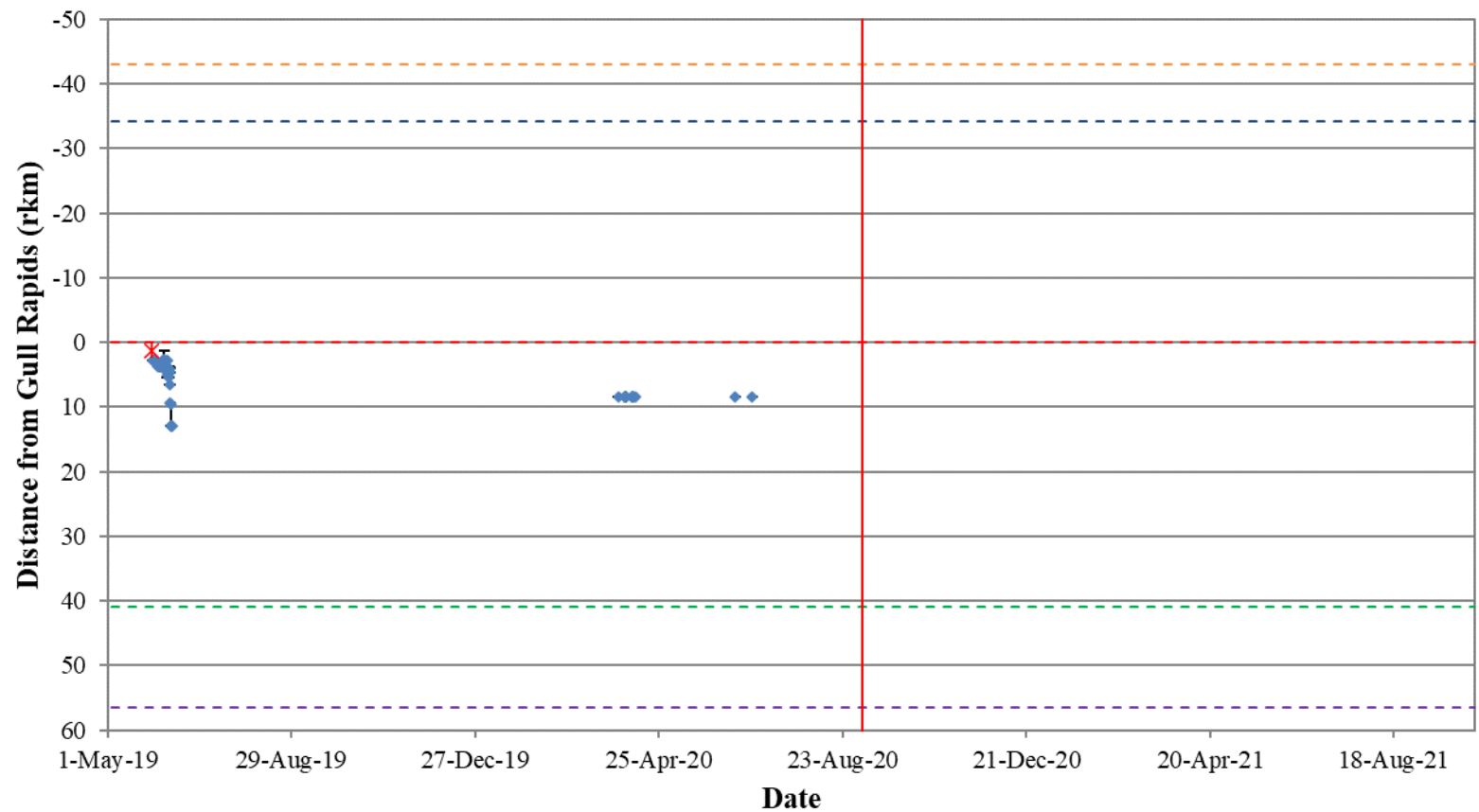


Figure A3-37: Position of a Walleye tagged with an acoustic transmitter (code #20183) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

(purple).

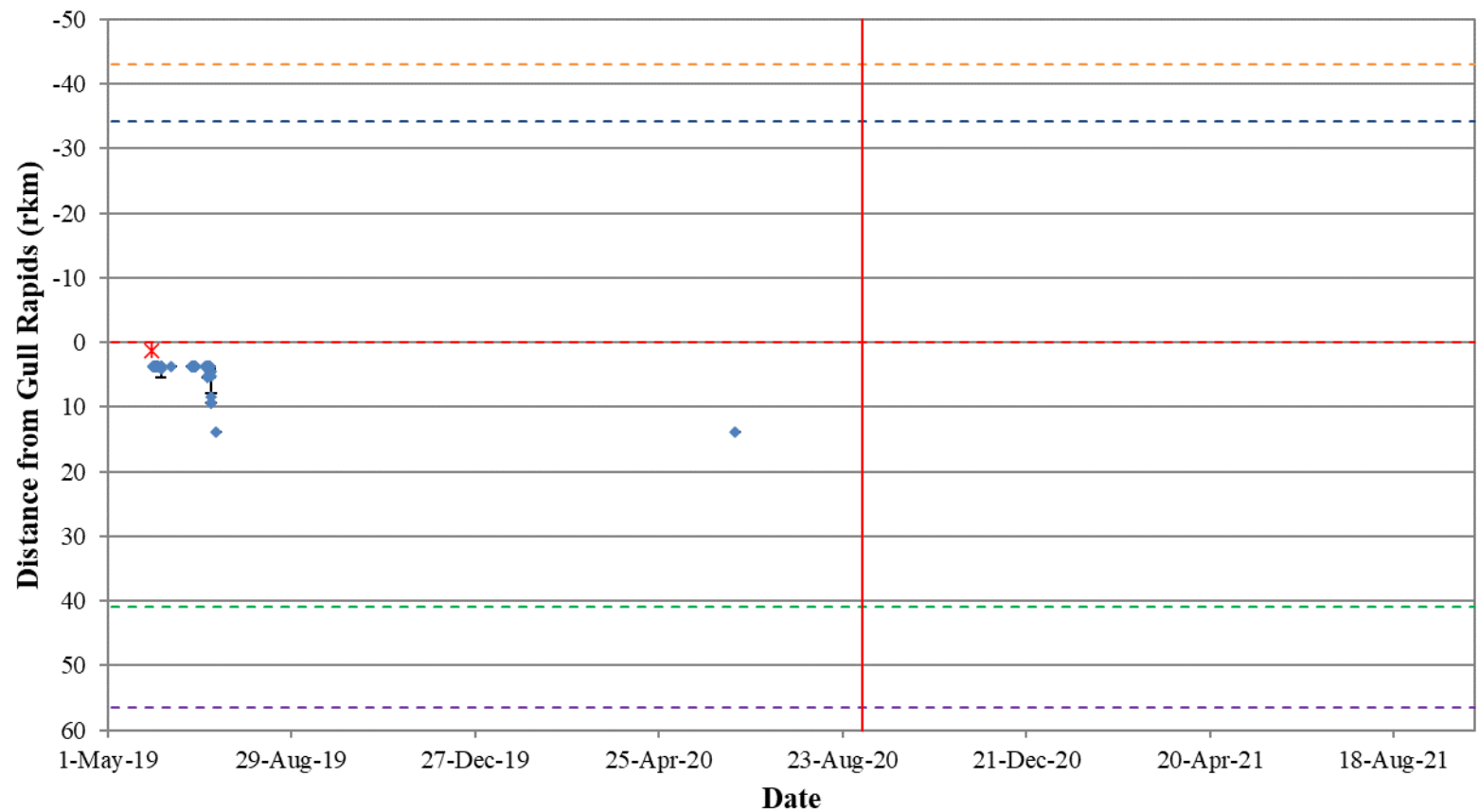


Figure A3-38: Position of a Walleye tagged with an acoustic transmitter (code #20184) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS

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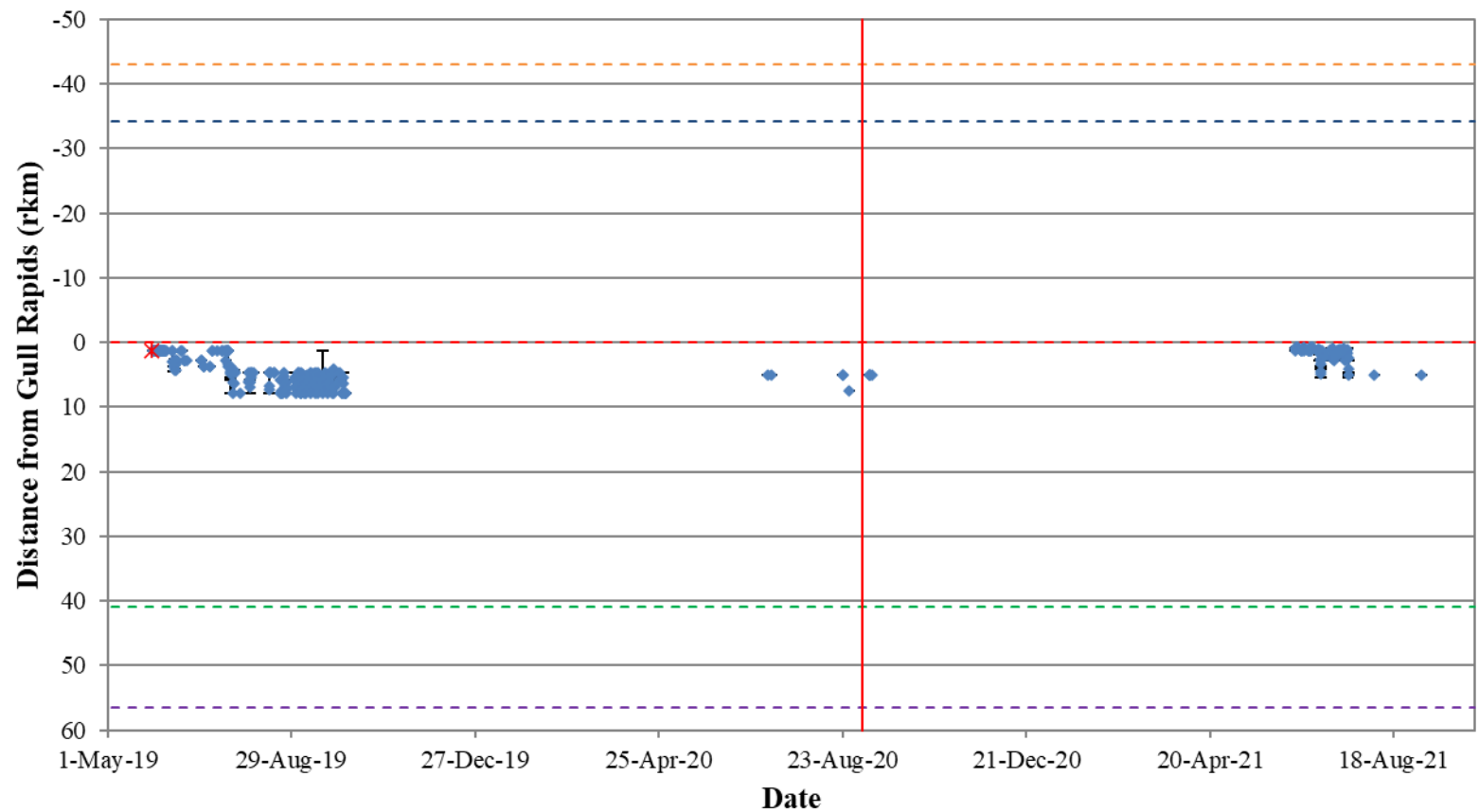


Figure A3-39: Position of a Walleye tagged with an acoustic transmitter (code #20185) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Beginning of Keeyask spillway commissioning is indicated with a vertical dotted line and end of reservoir impoundment is indicated with a solid vertical red line. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

APPENDIX 4:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE UPSTREAM OF THE KEEYASK GS IN 2021: MAY TO OCTOBER 2021

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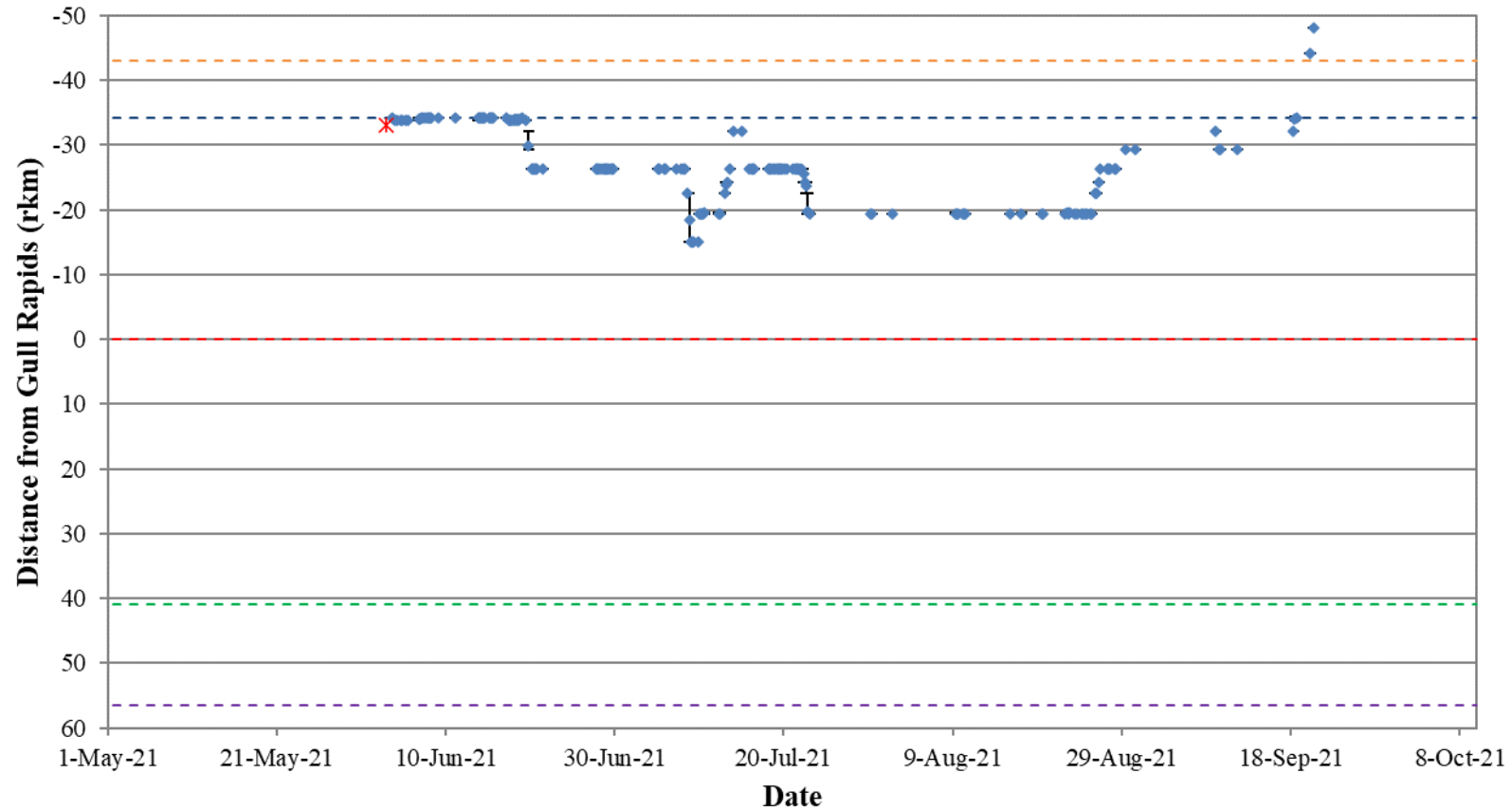


Figure A4-1: Position of a Walleye tagged with an acoustic transmitter (code #48244) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

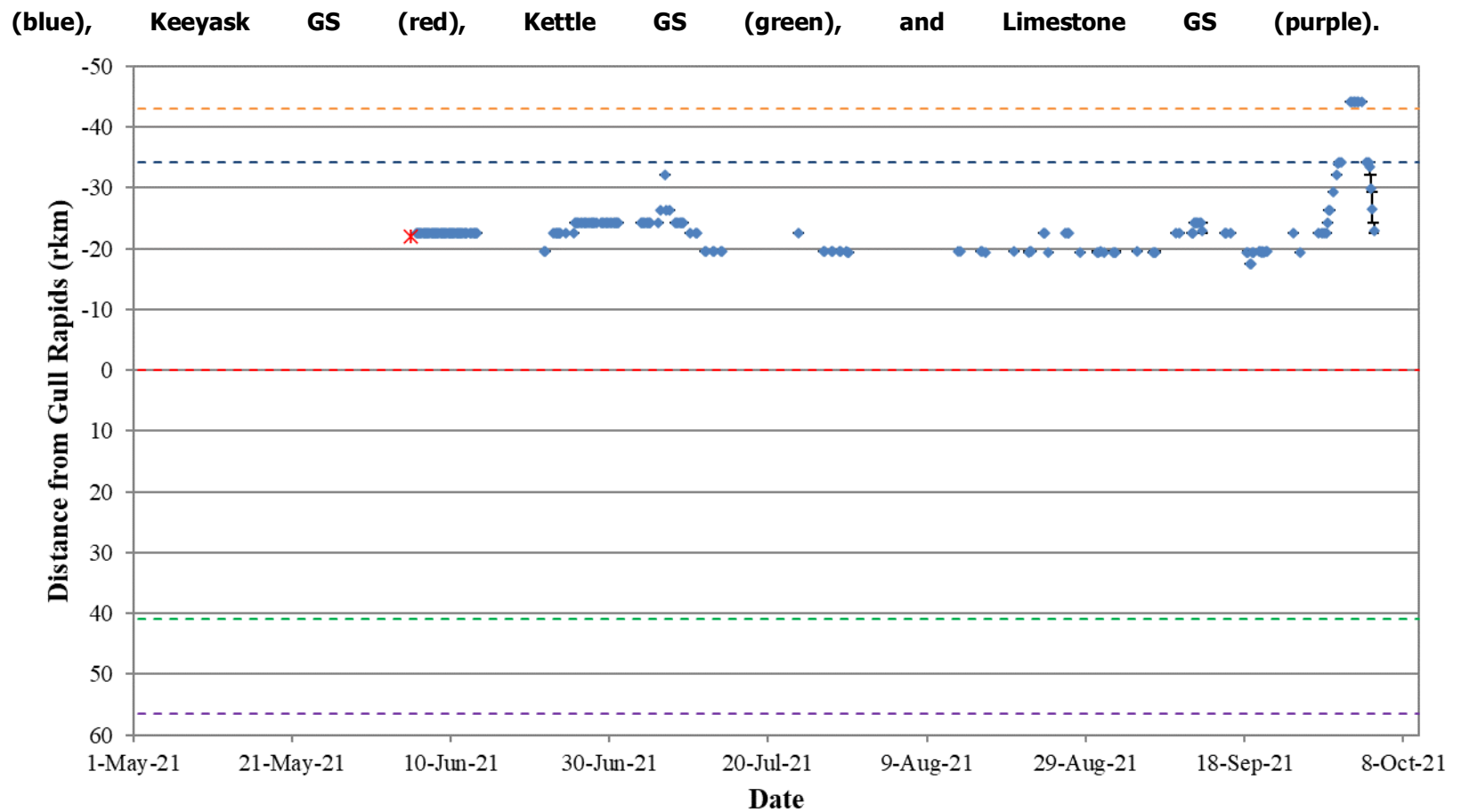


Figure A4-2: Position of a Walleye tagged with an acoustic transmitter (code #48258) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

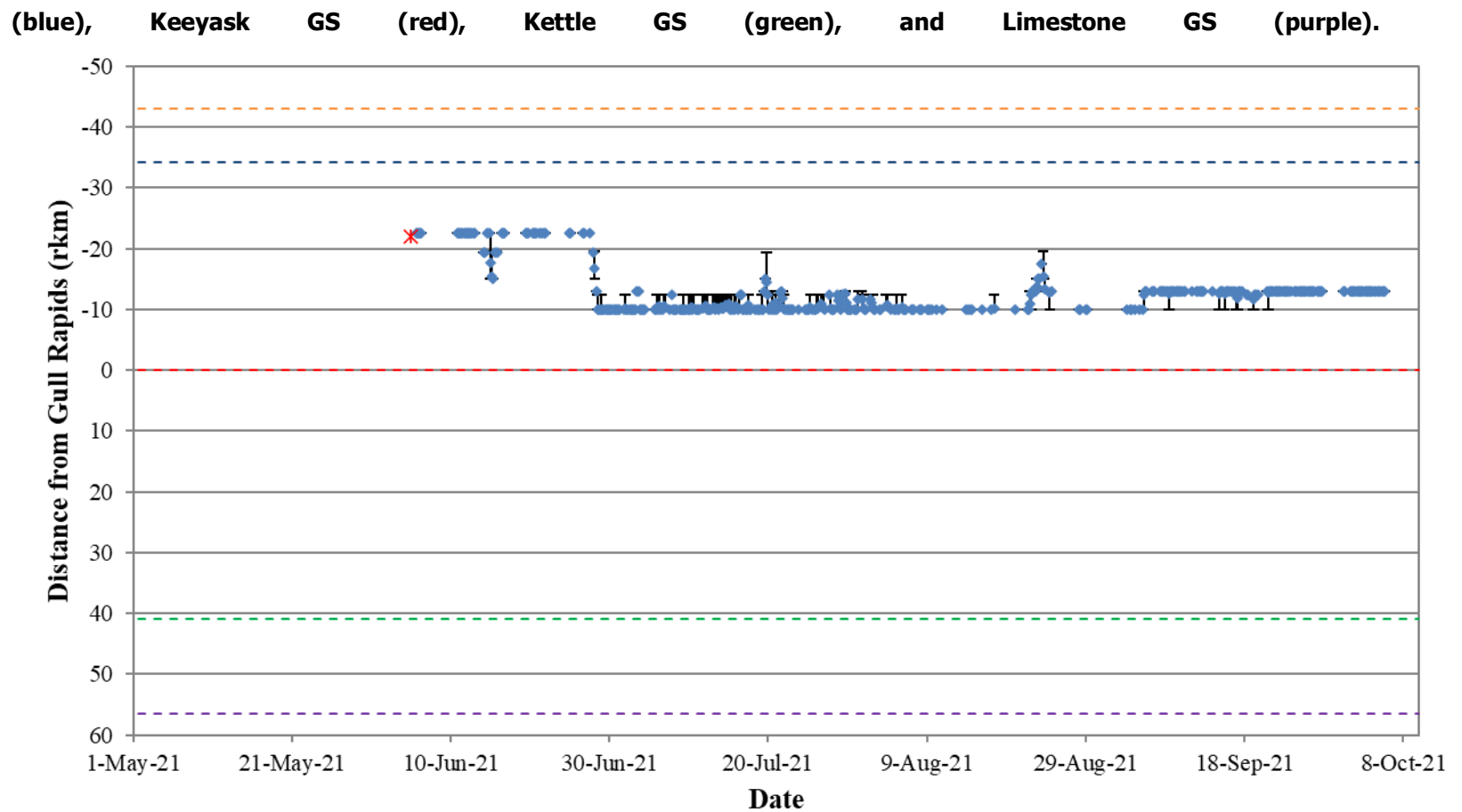


Figure A4-3: Position of a Walleye tagged with an acoustic transmitter (code #48259) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids



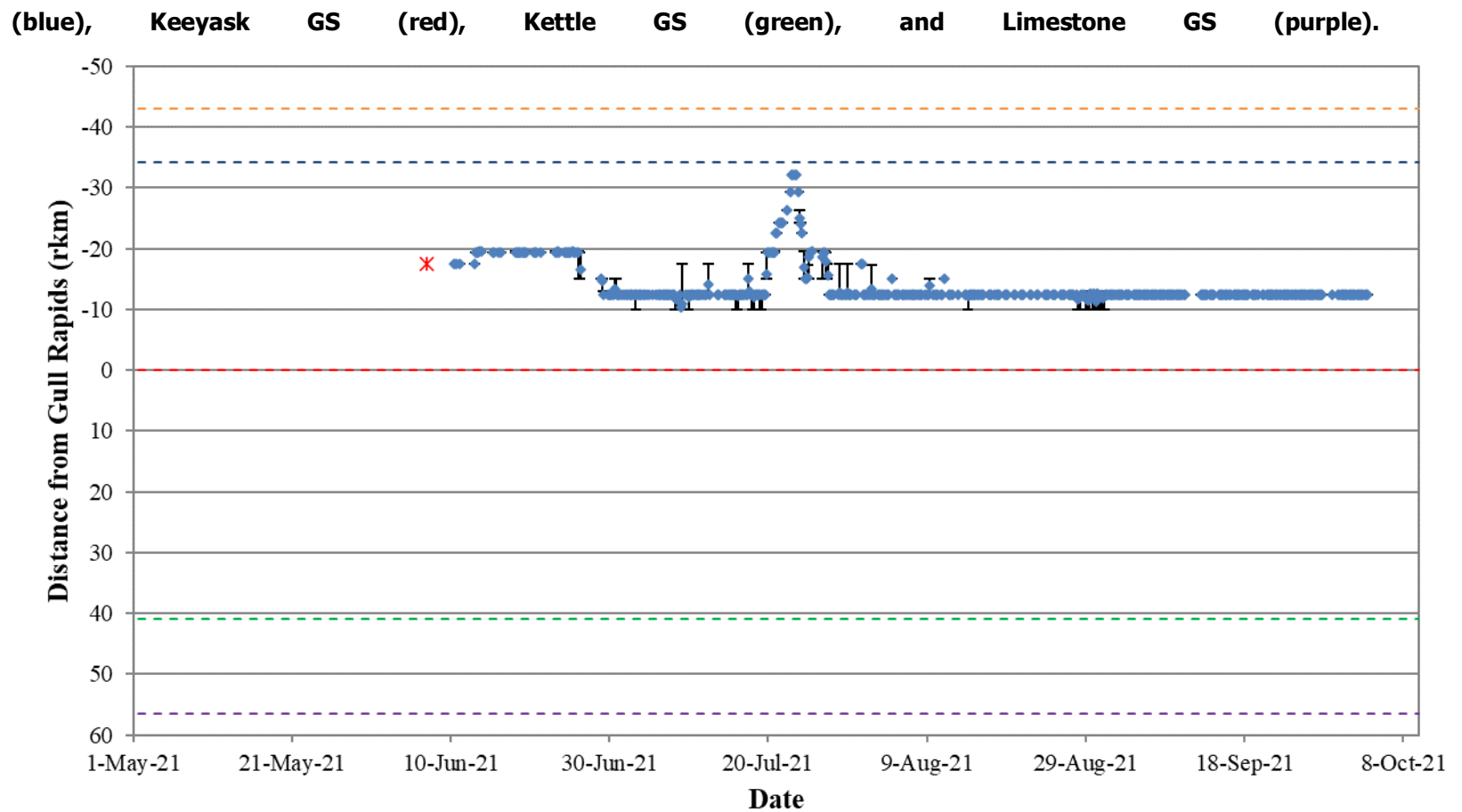


Figure A4-5: Position of a Walleye tagged with an acoustic transmitter (code #48261) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

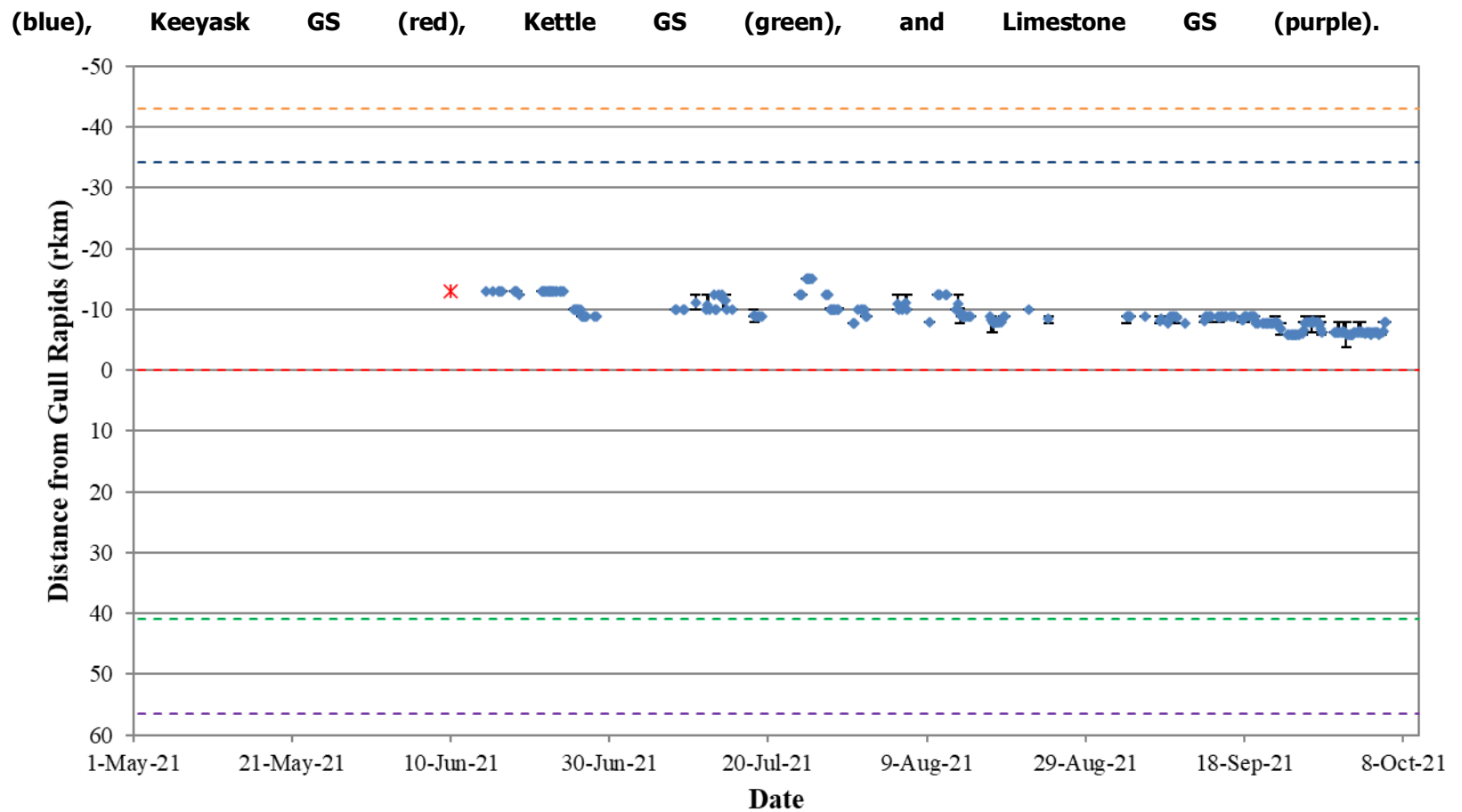


Figure A4-6: Position of a Walleye tagged with an acoustic transmitter (code #48262) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

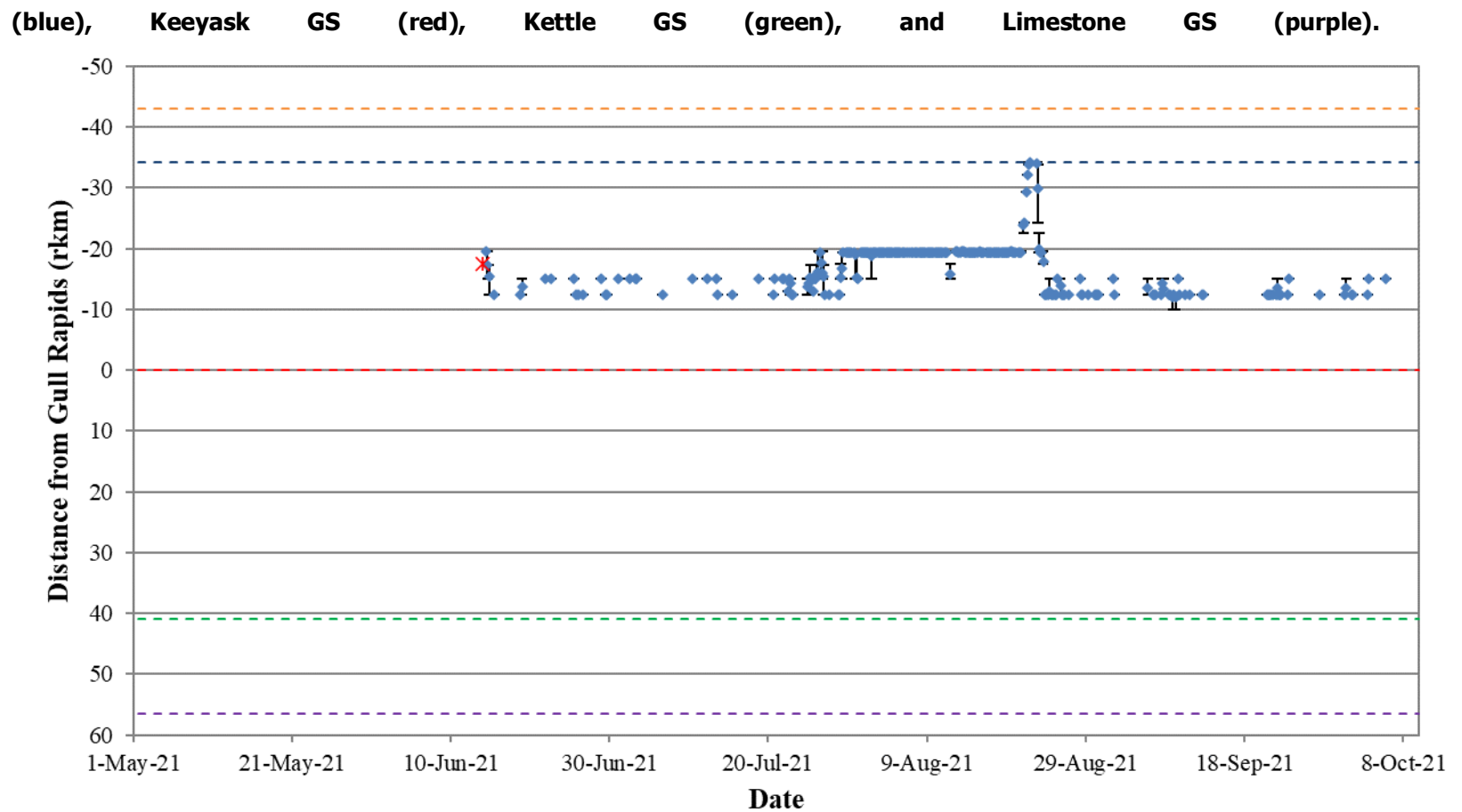


Figure A4-7: Position of a Walleye tagged with an acoustic transmitter (code #48263) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

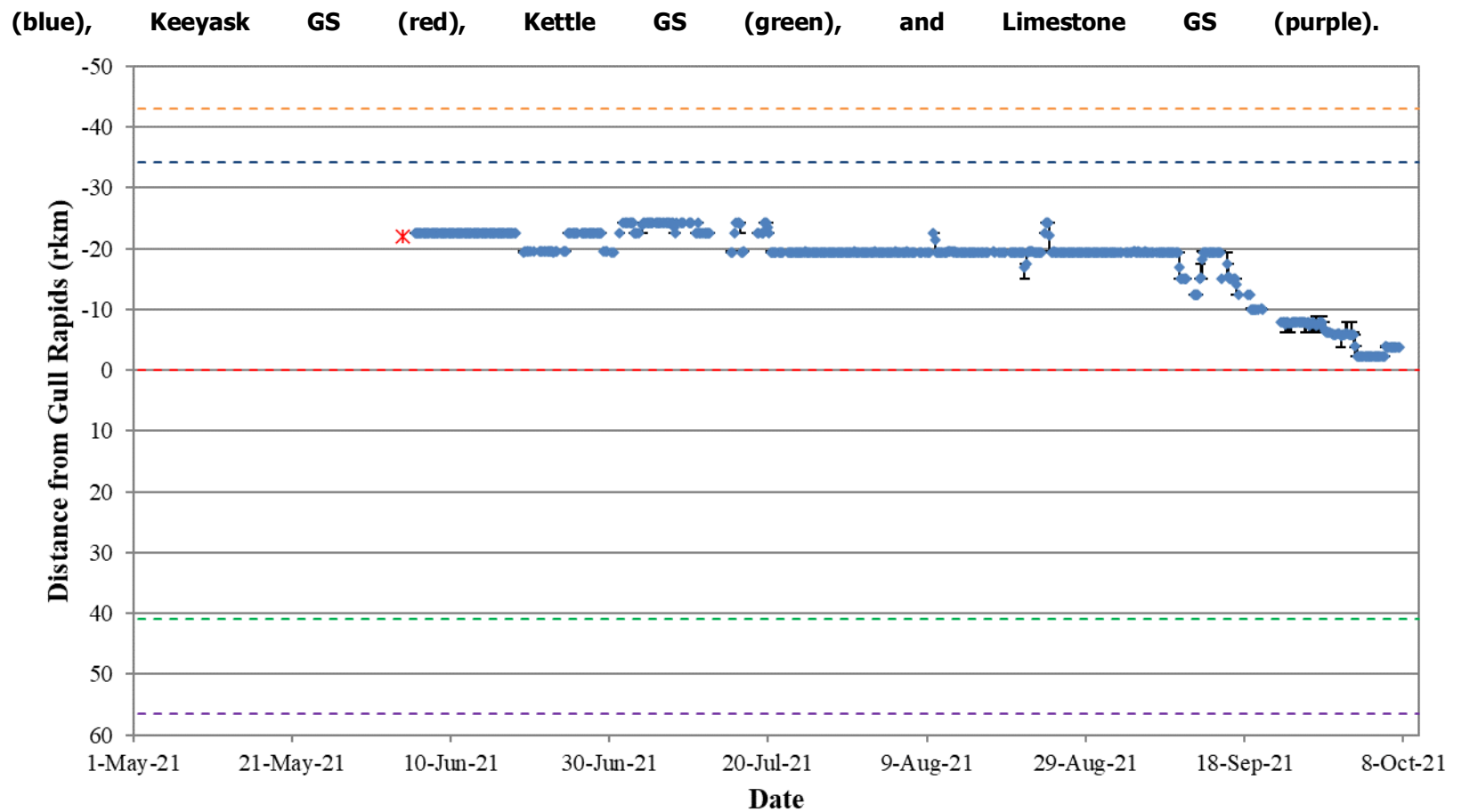


Figure A4-8: Position of a Walleye tagged with an acoustic transmitter (code #48264) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

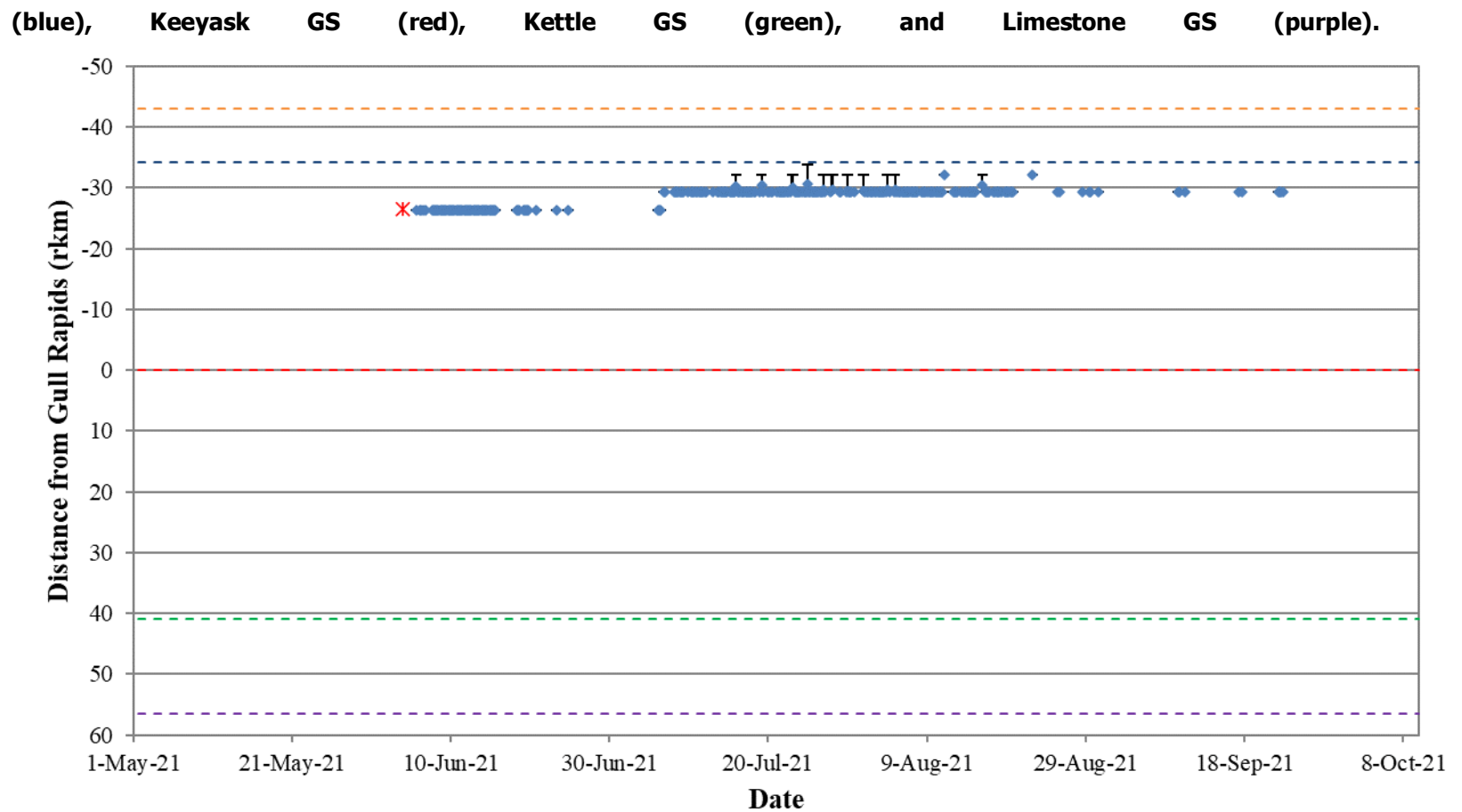


Figure A4-9: Position of a Walleye tagged with an acoustic transmitter (code #48265) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

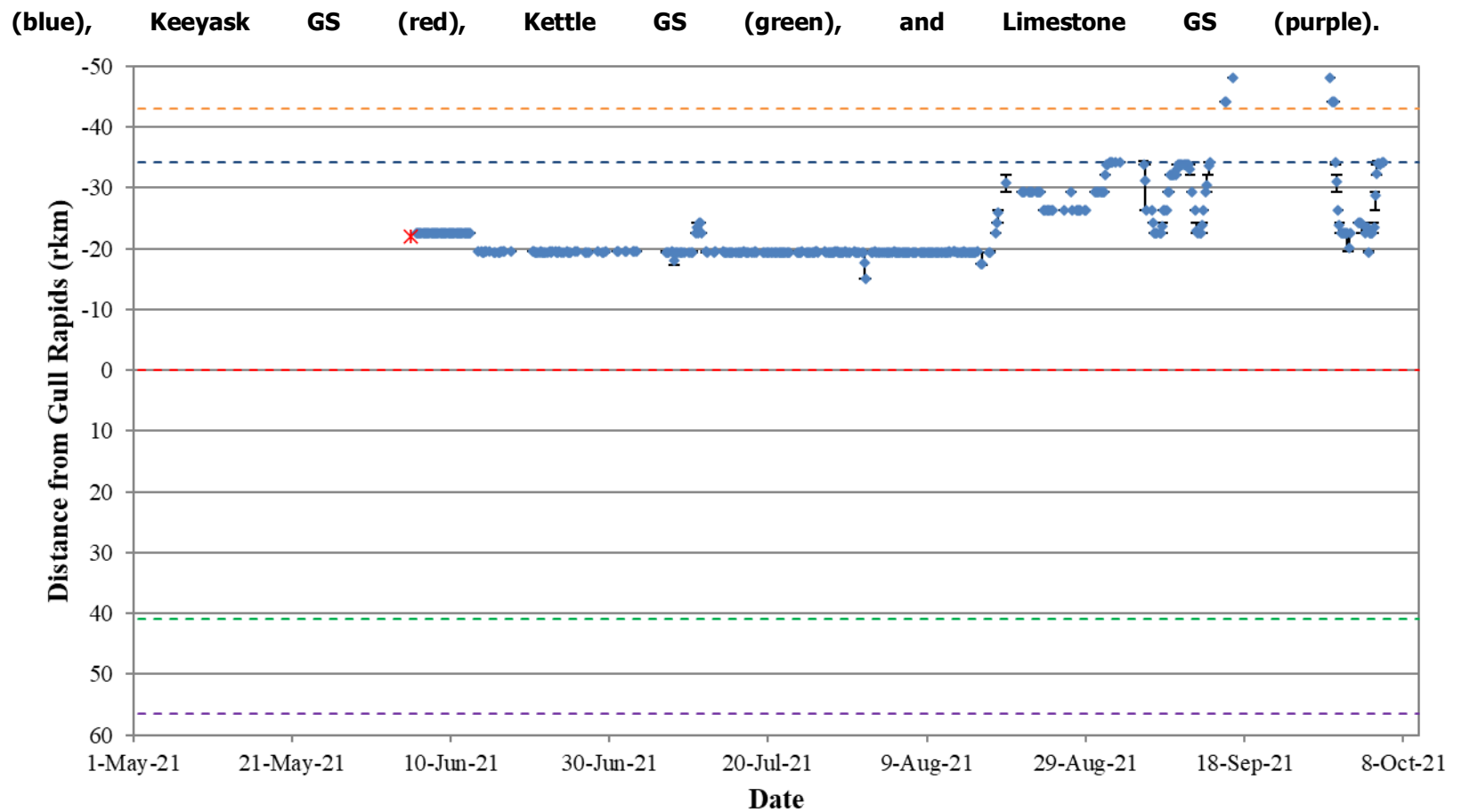


Figure A4-10: Position of a Walleye tagged with an acoustic transmitter (code #48266) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

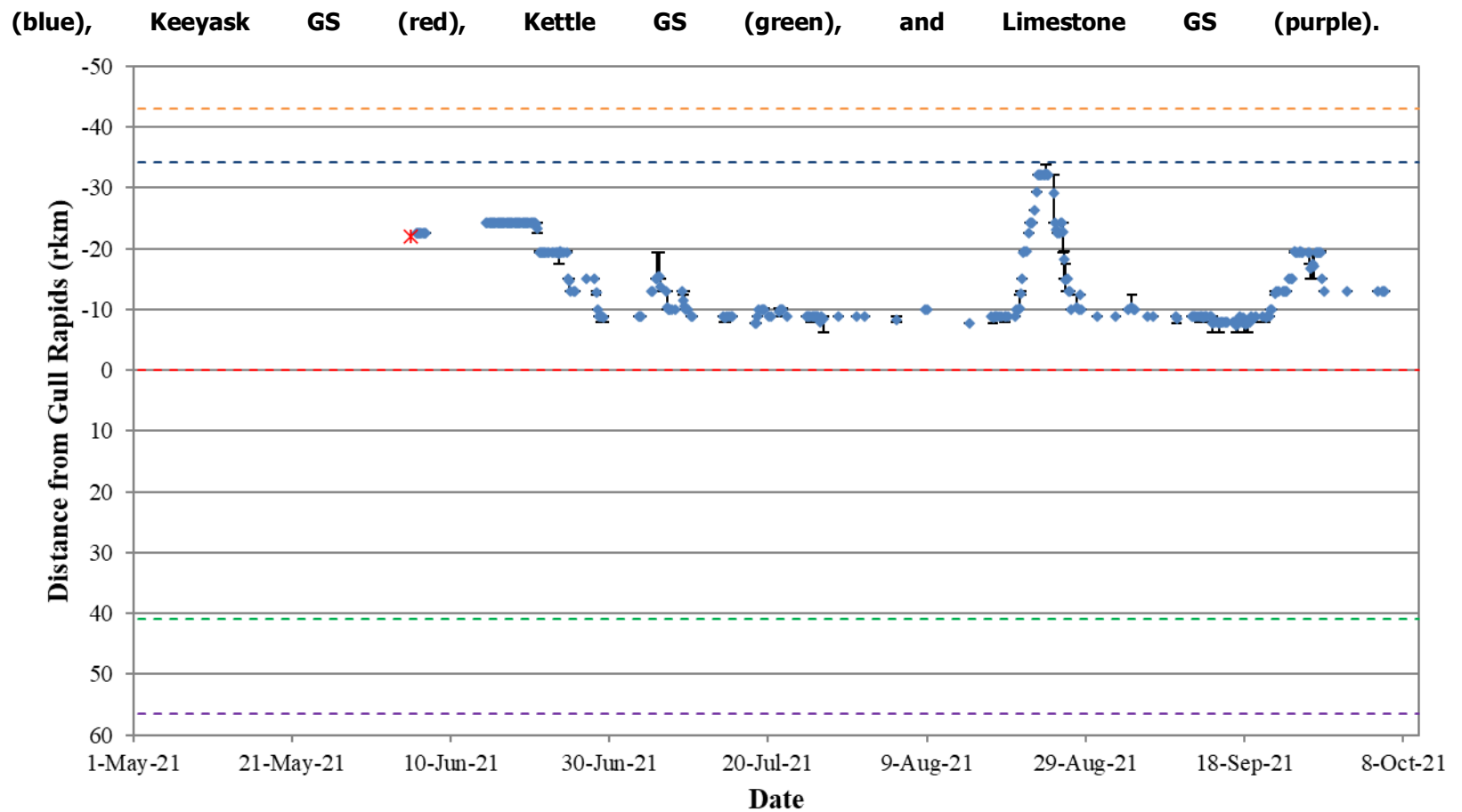


Figure A4-11: Position of a Walleye tagged with an acoustic transmitter (code #48267) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

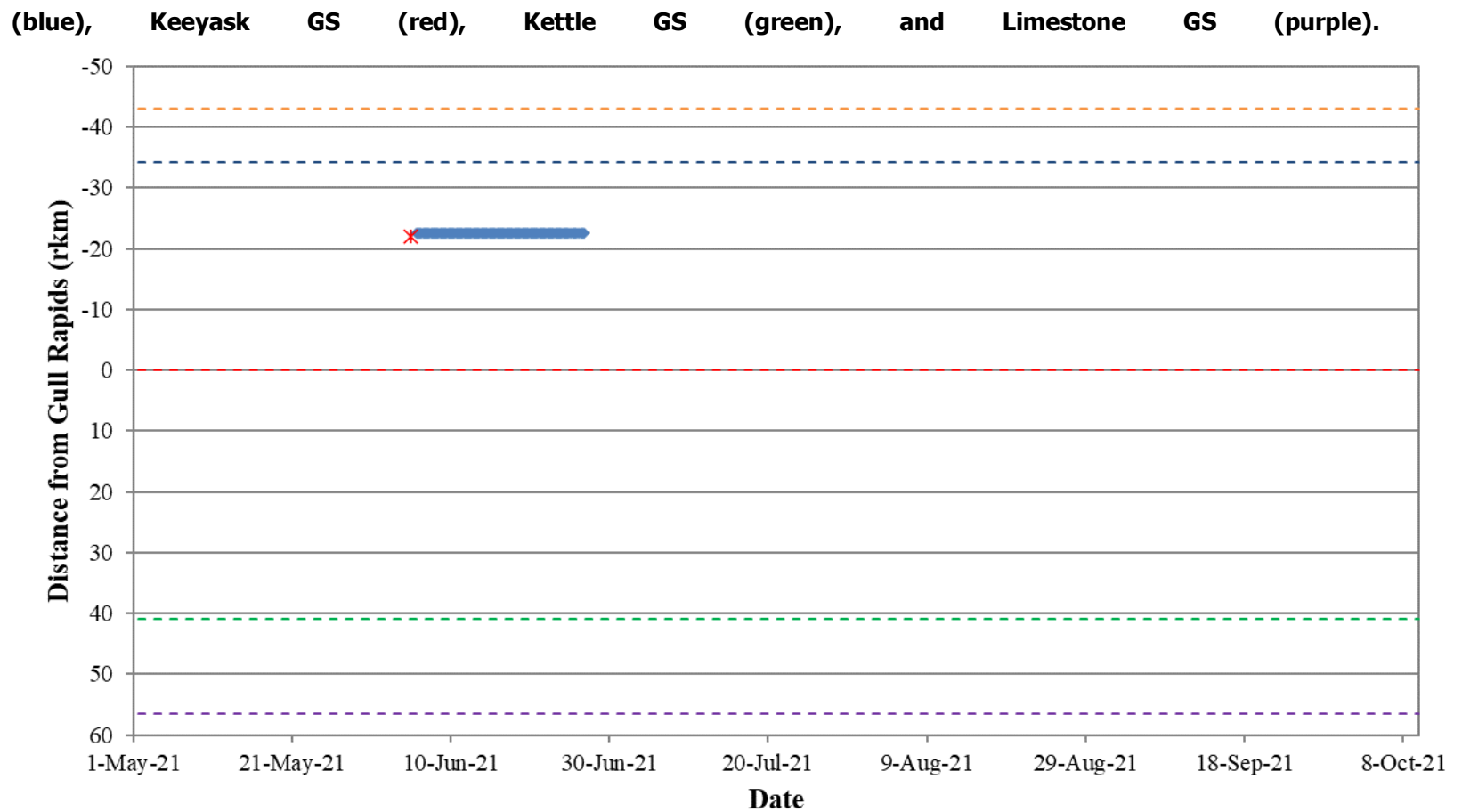


Figure A4-12: Position of a Walleye tagged with an acoustic transmitter (code #48268) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

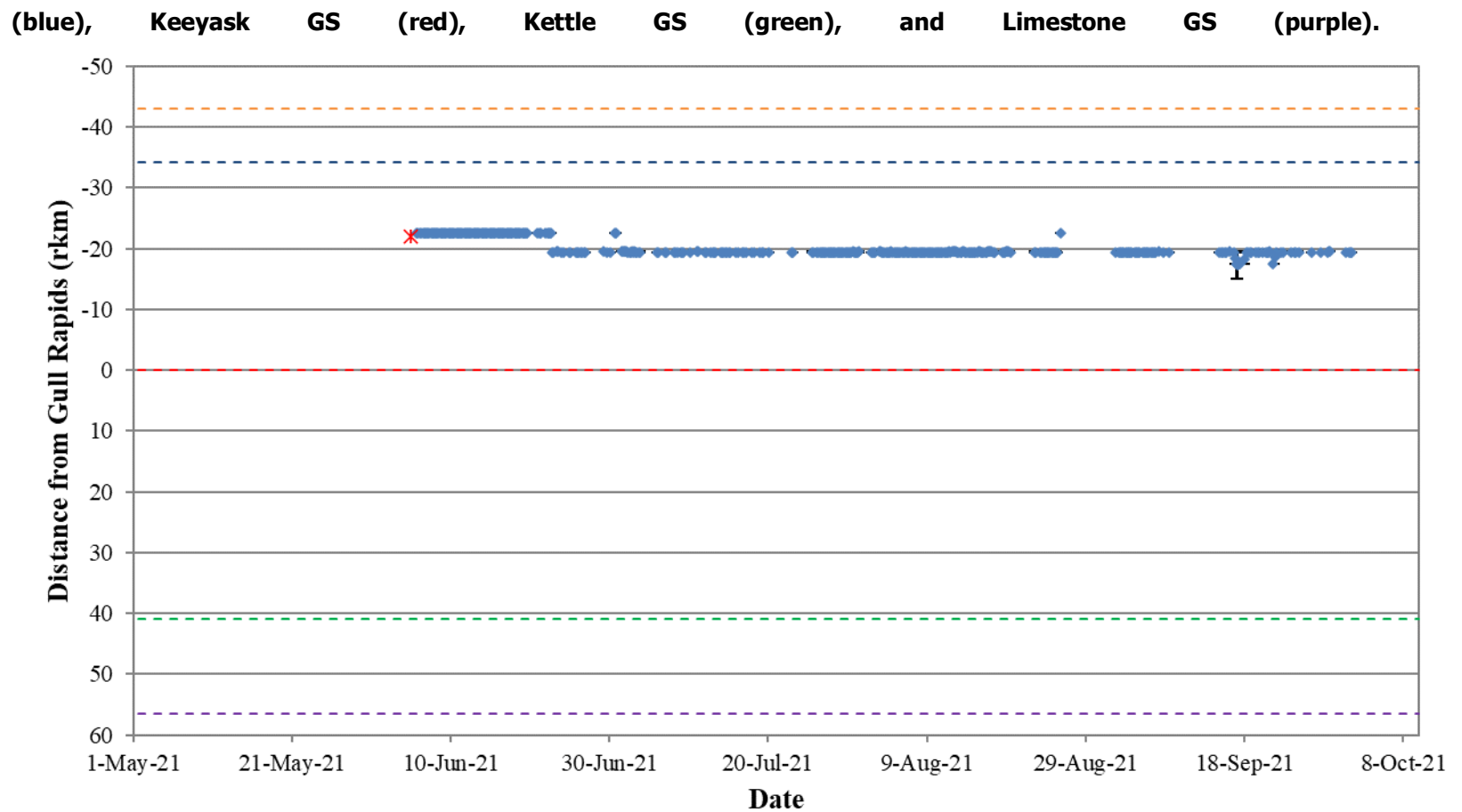


Figure A4-13: Position of a Walleye tagged with an acoustic transmitter (code #48269) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids



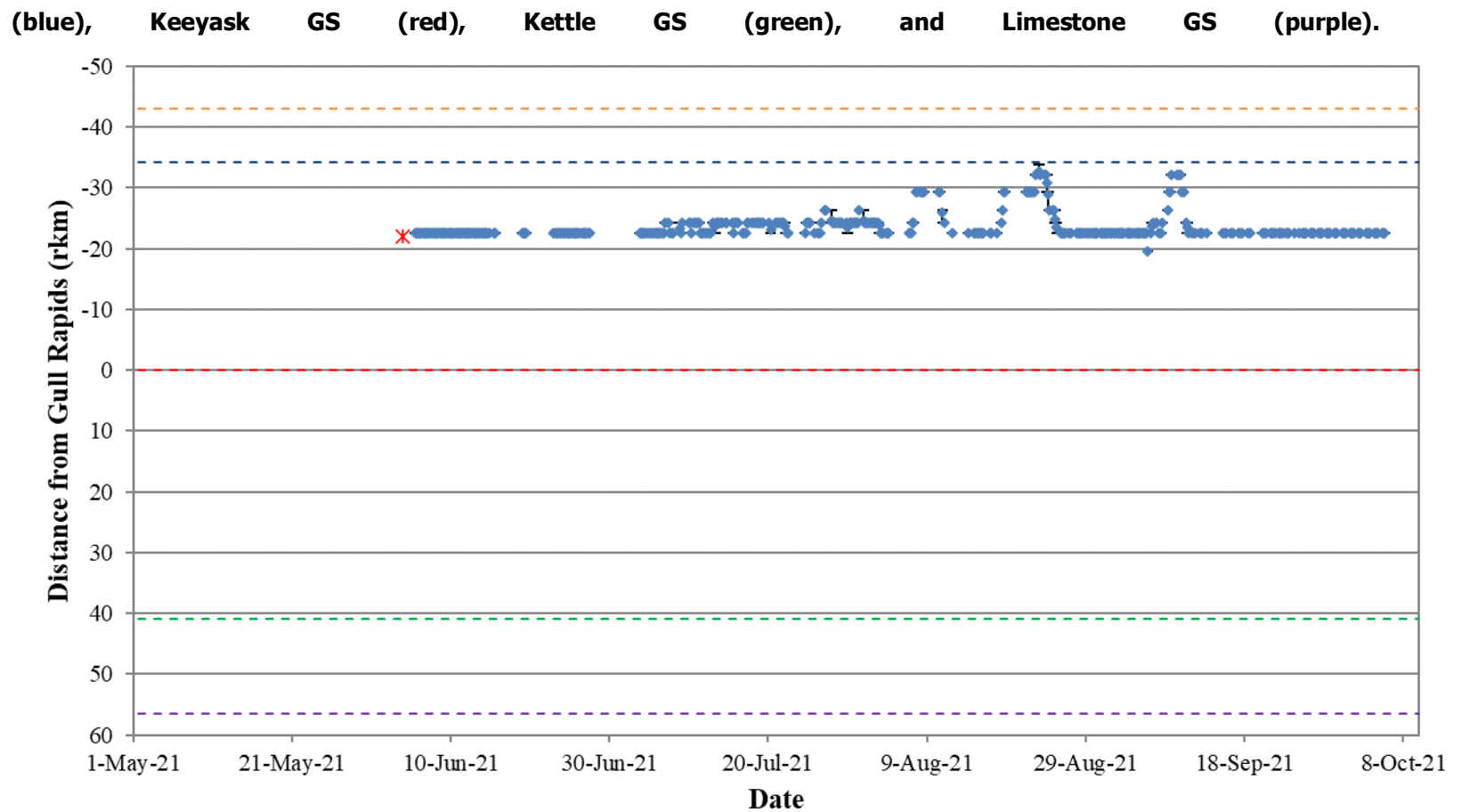


Figure A4-15: Position of a Walleye tagged with an acoustic transmitter (code #48271) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

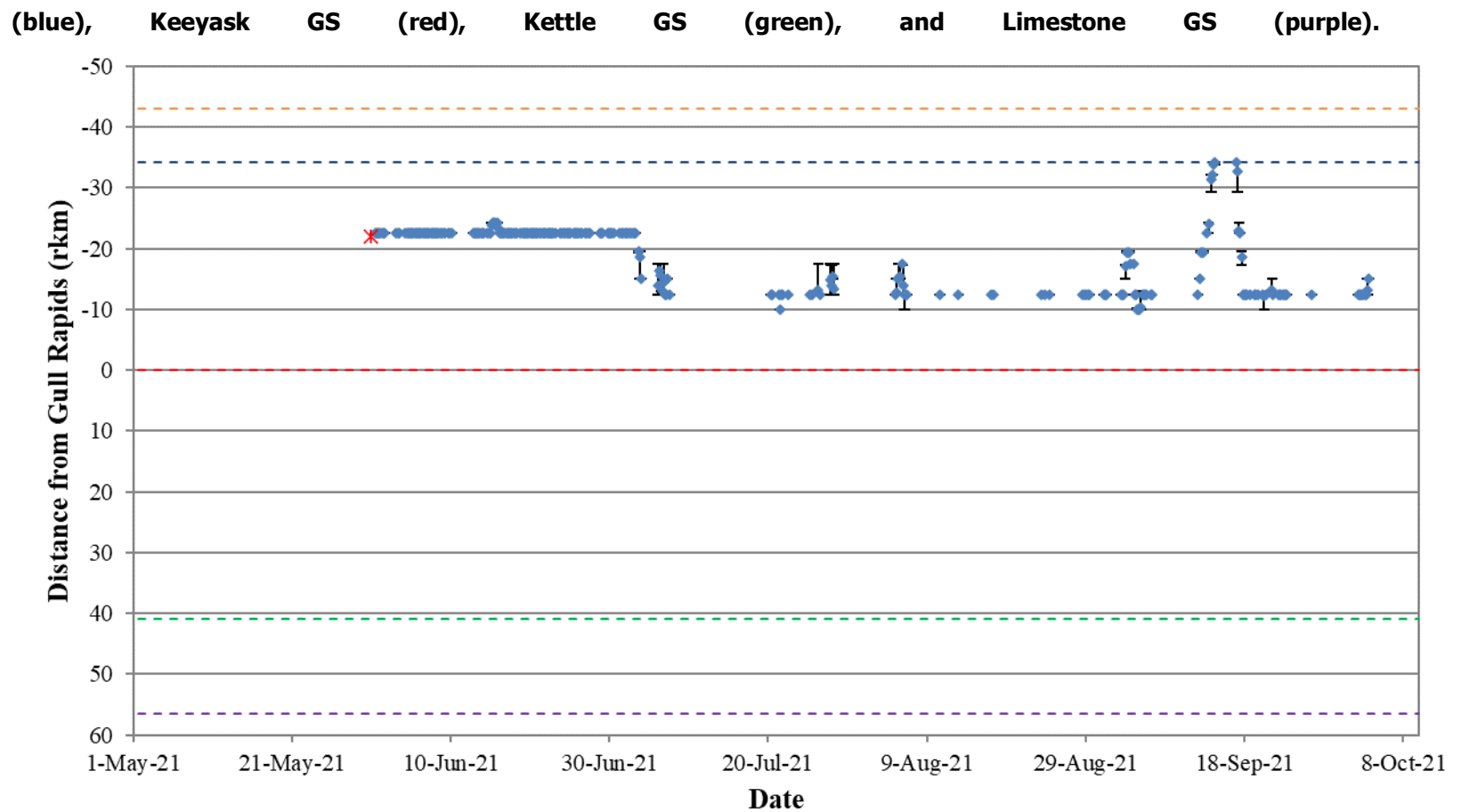


Figure A4-16: Position of a Walleye tagged with an acoustic transmitter (code #48313) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

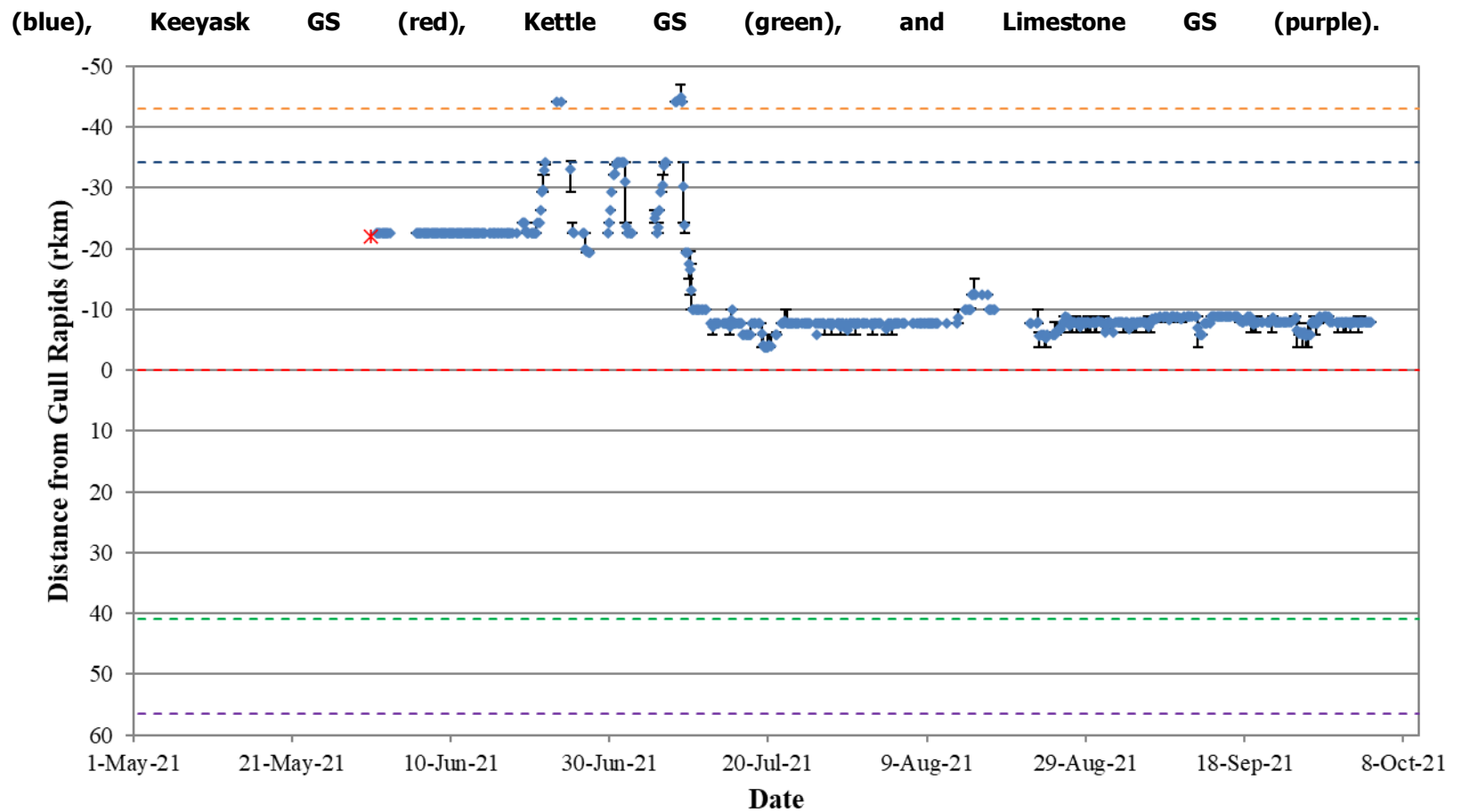


Figure A4-17: Position of a Walleye tagged with an acoustic transmitter (code #48314) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

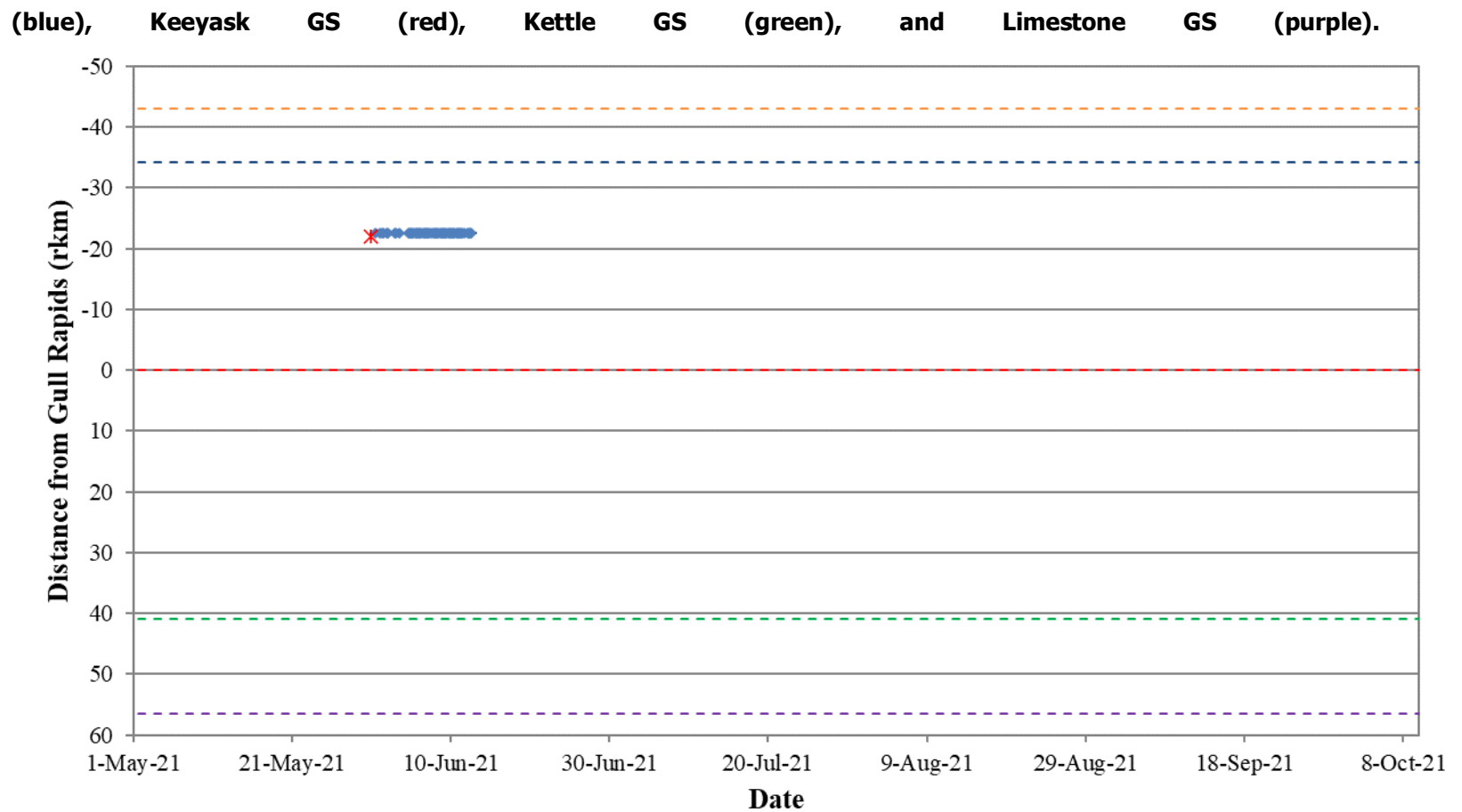


Figure A4-18: Position of a Walleye tagged with an acoustic transmitter (code #48319) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

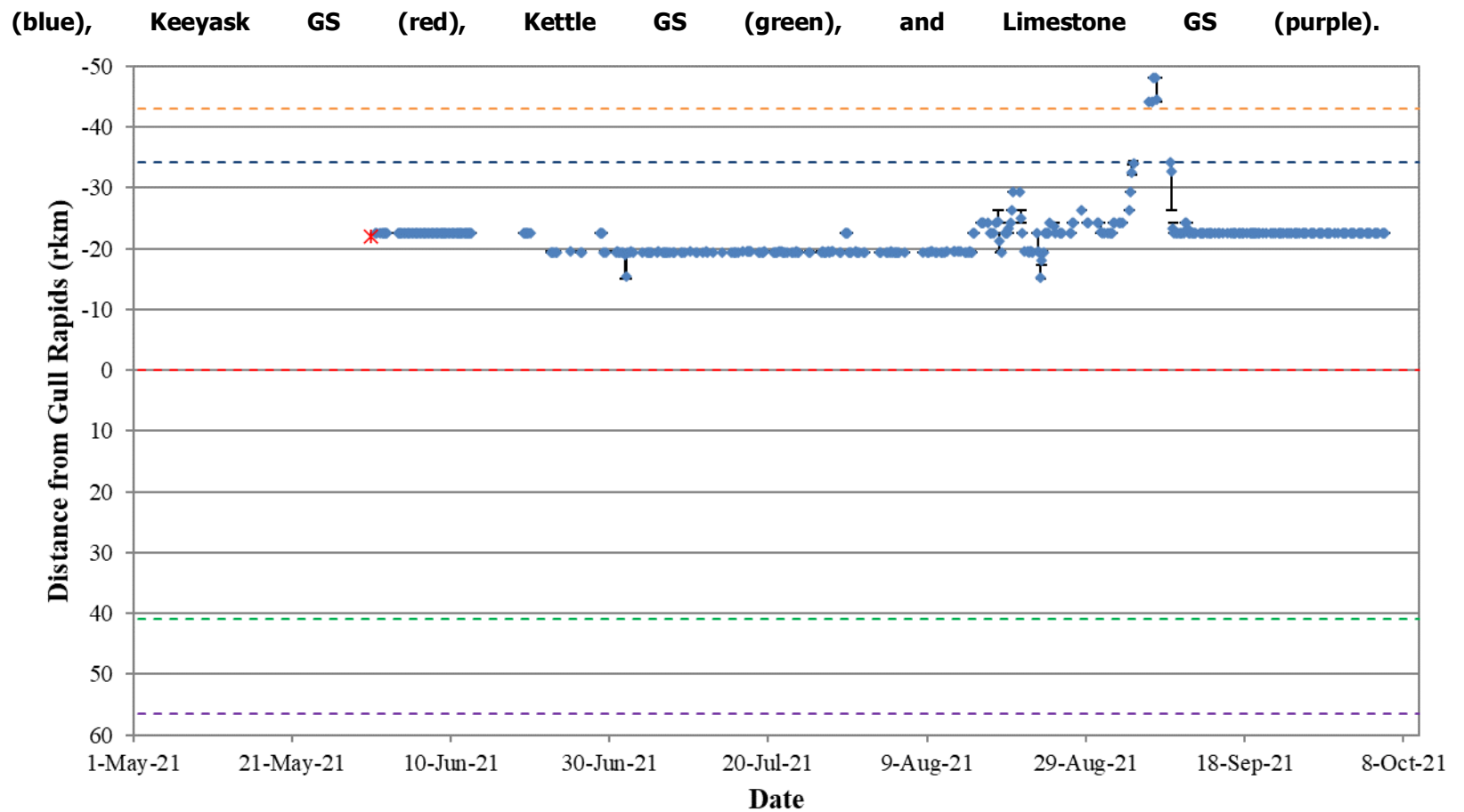


Figure A4-19: Position of a Walleye tagged with an acoustic transmitter (code #48320) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

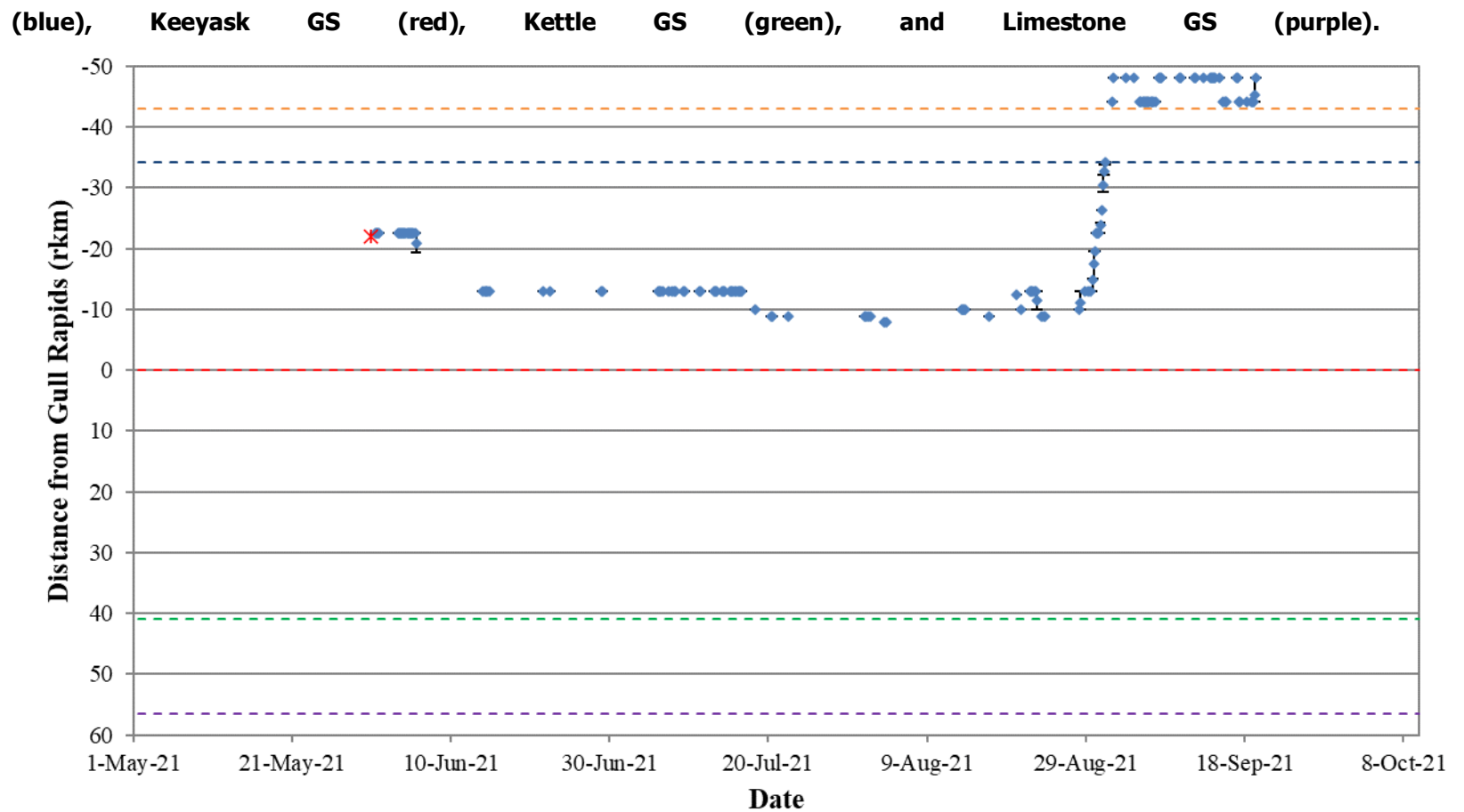


Figure A4-20: Position of a Walleye tagged with an acoustic transmitter (code #48321) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

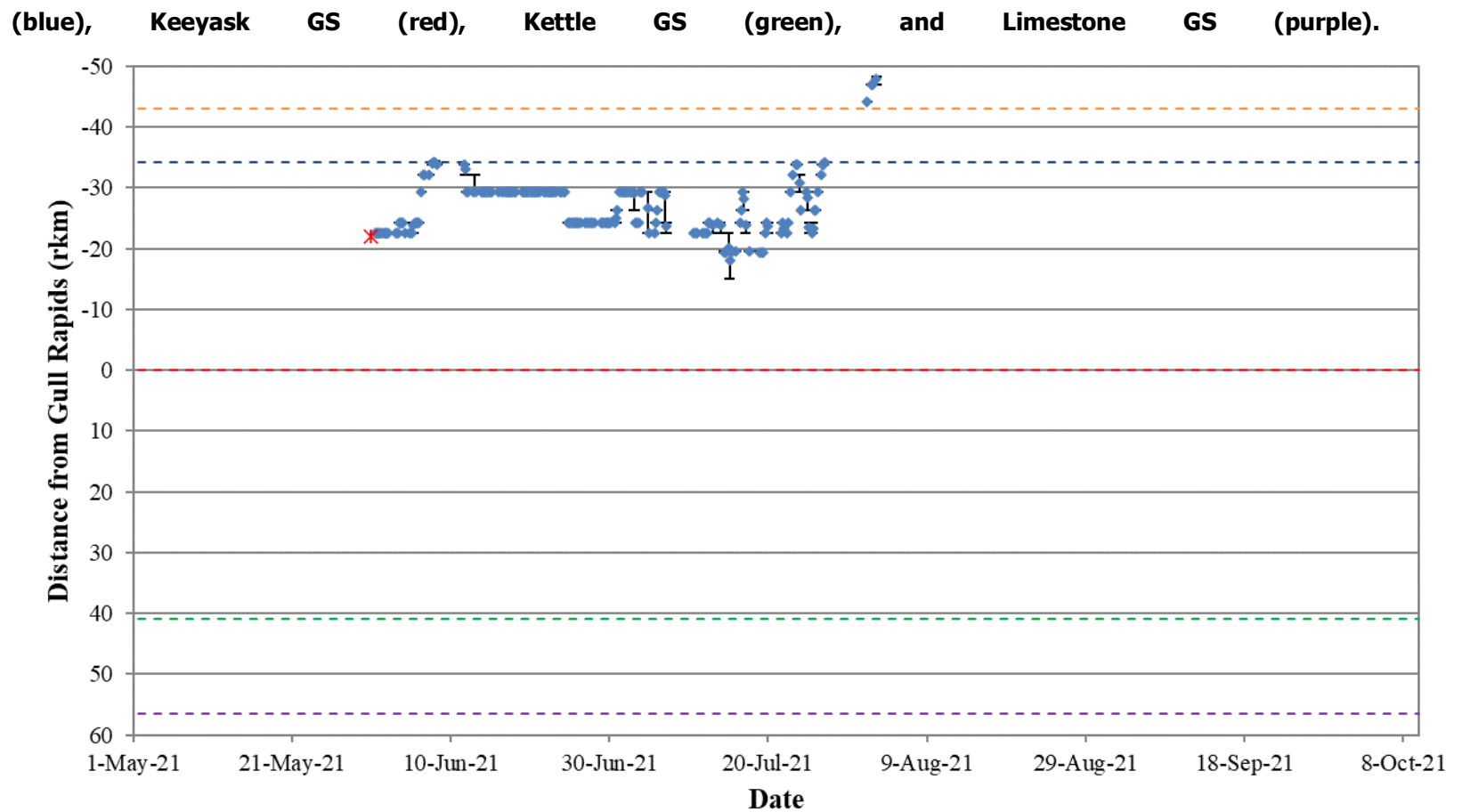


Figure A4-21: Position of a Walleye tagged with an acoustic transmitter (code #48322) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

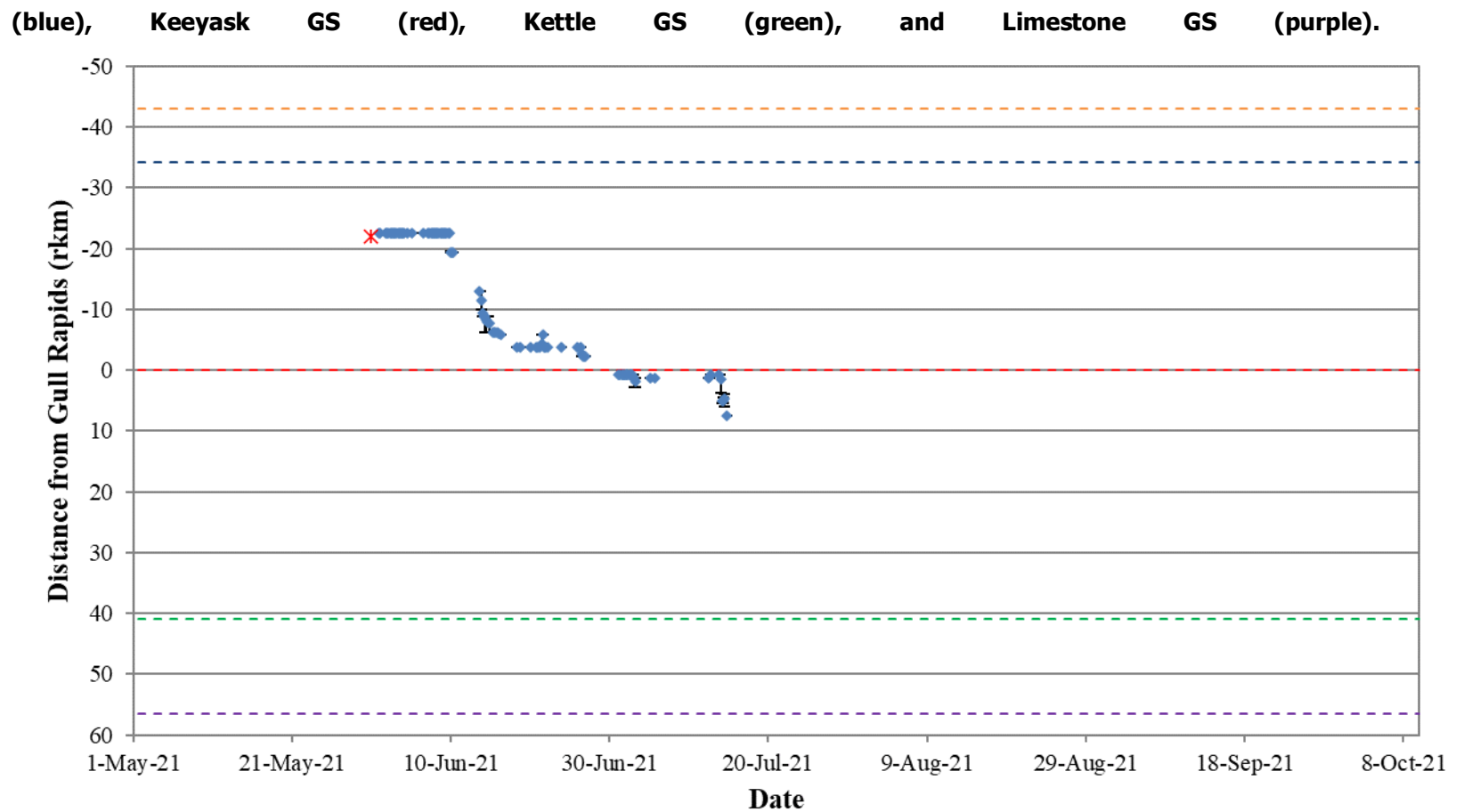


Figure A4-22: Position of a Walleye tagged with an acoustic transmitter (code #48323) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

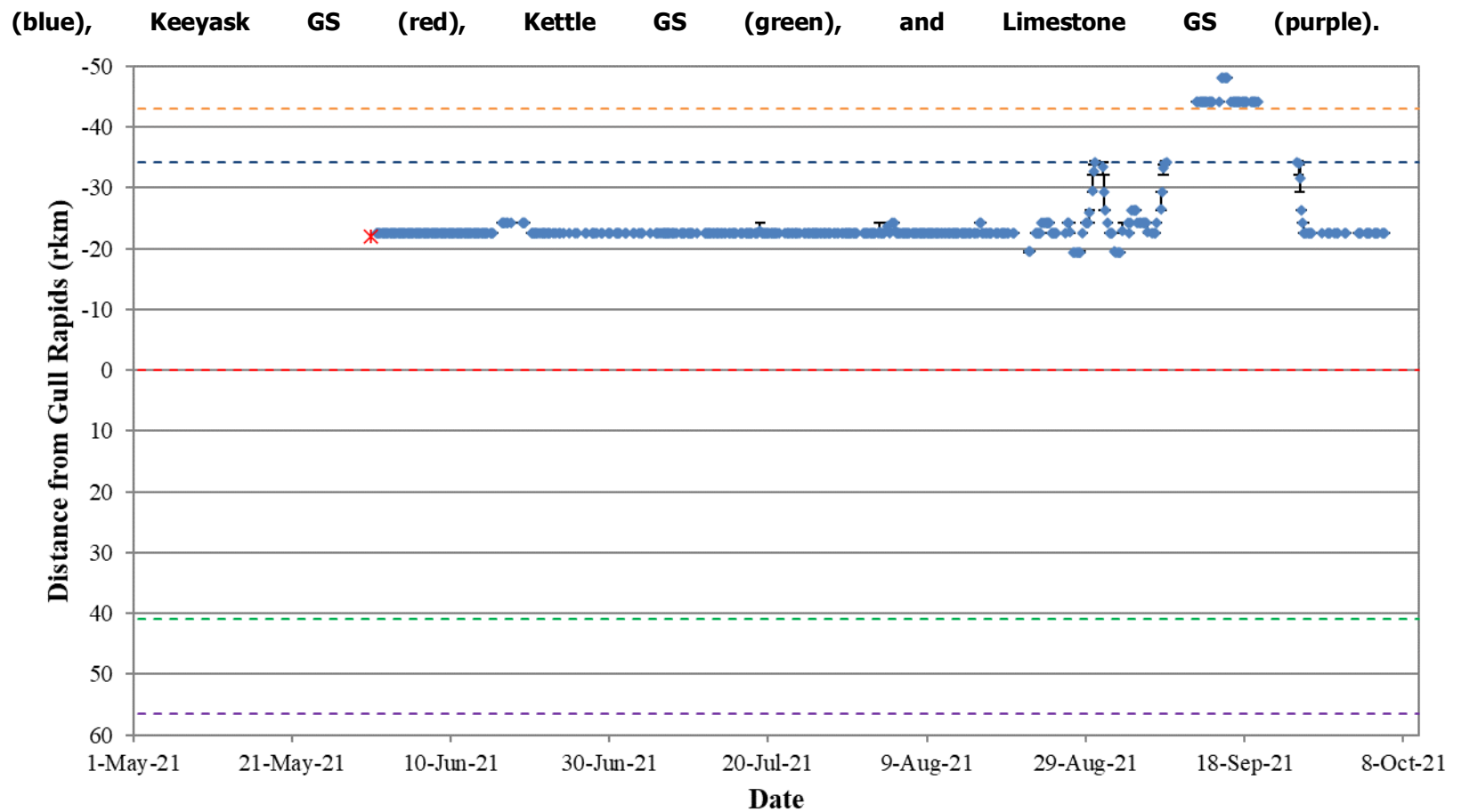


Figure A4-23: Position of a Walleye tagged with an acoustic transmitter (code #48326) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

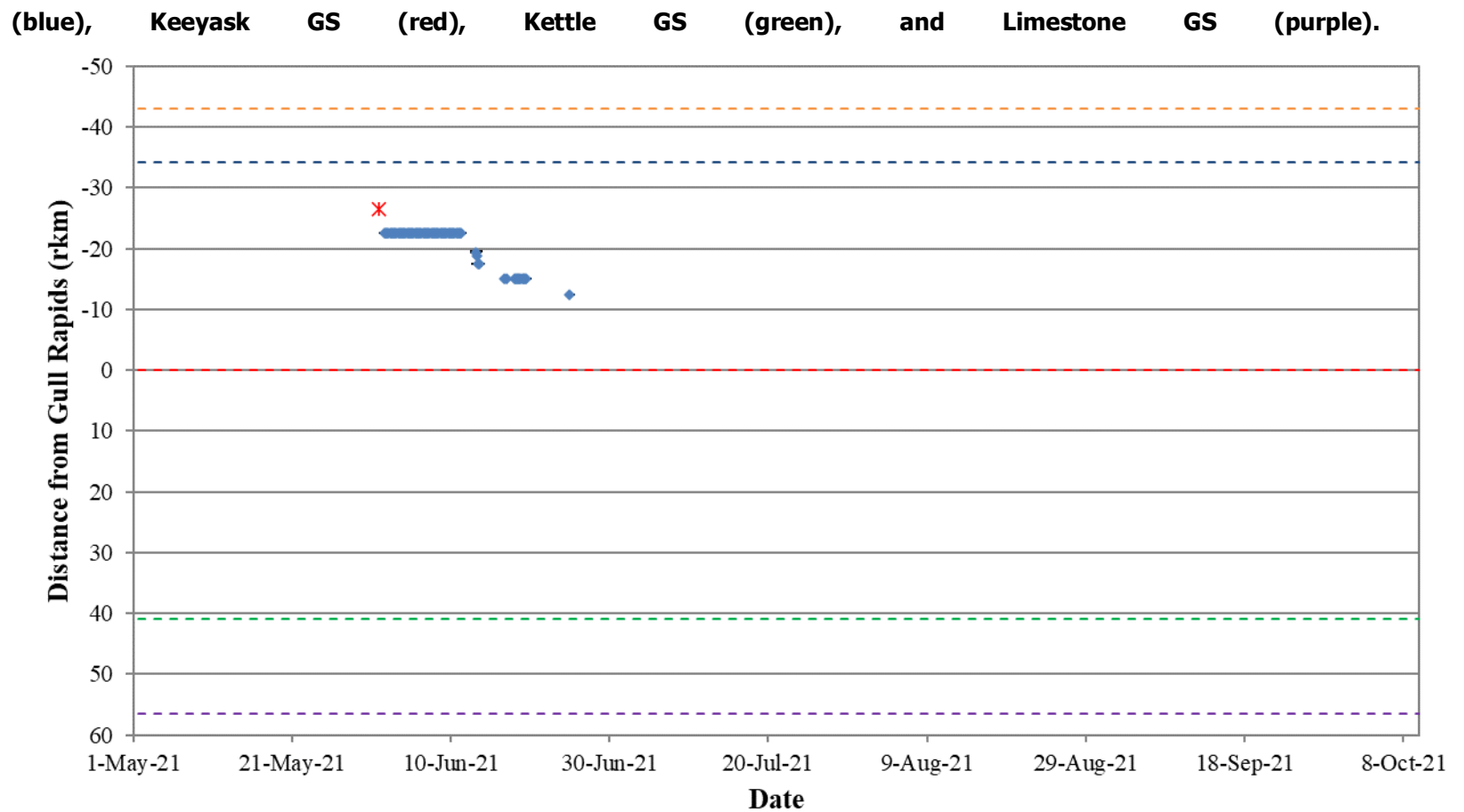


Figure A4-24: Position of a Walleye tagged with an acoustic transmitter (code #48327) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

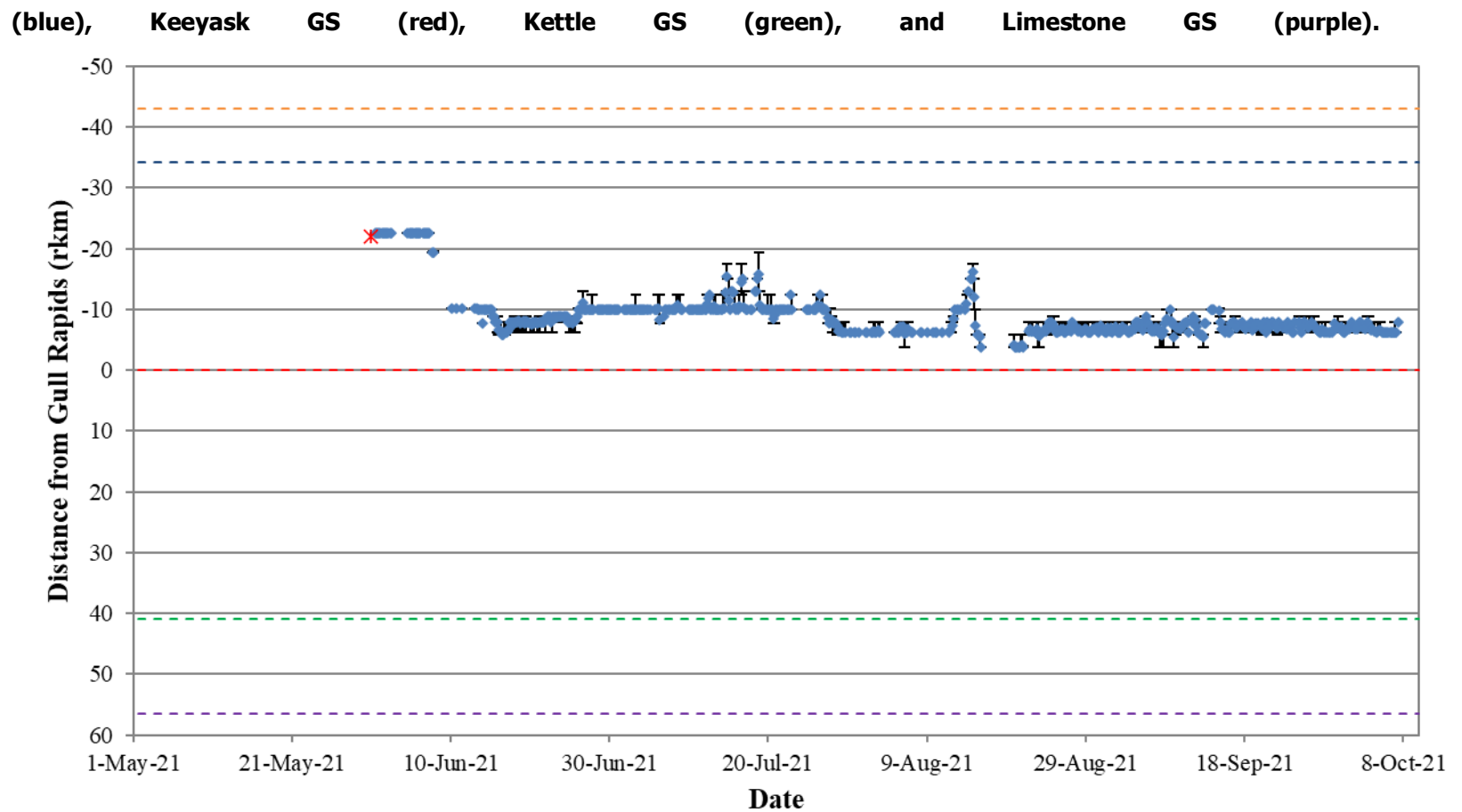


Figure A4-25: Position of a Walleye tagged with an acoustic transmitter (code #48328) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

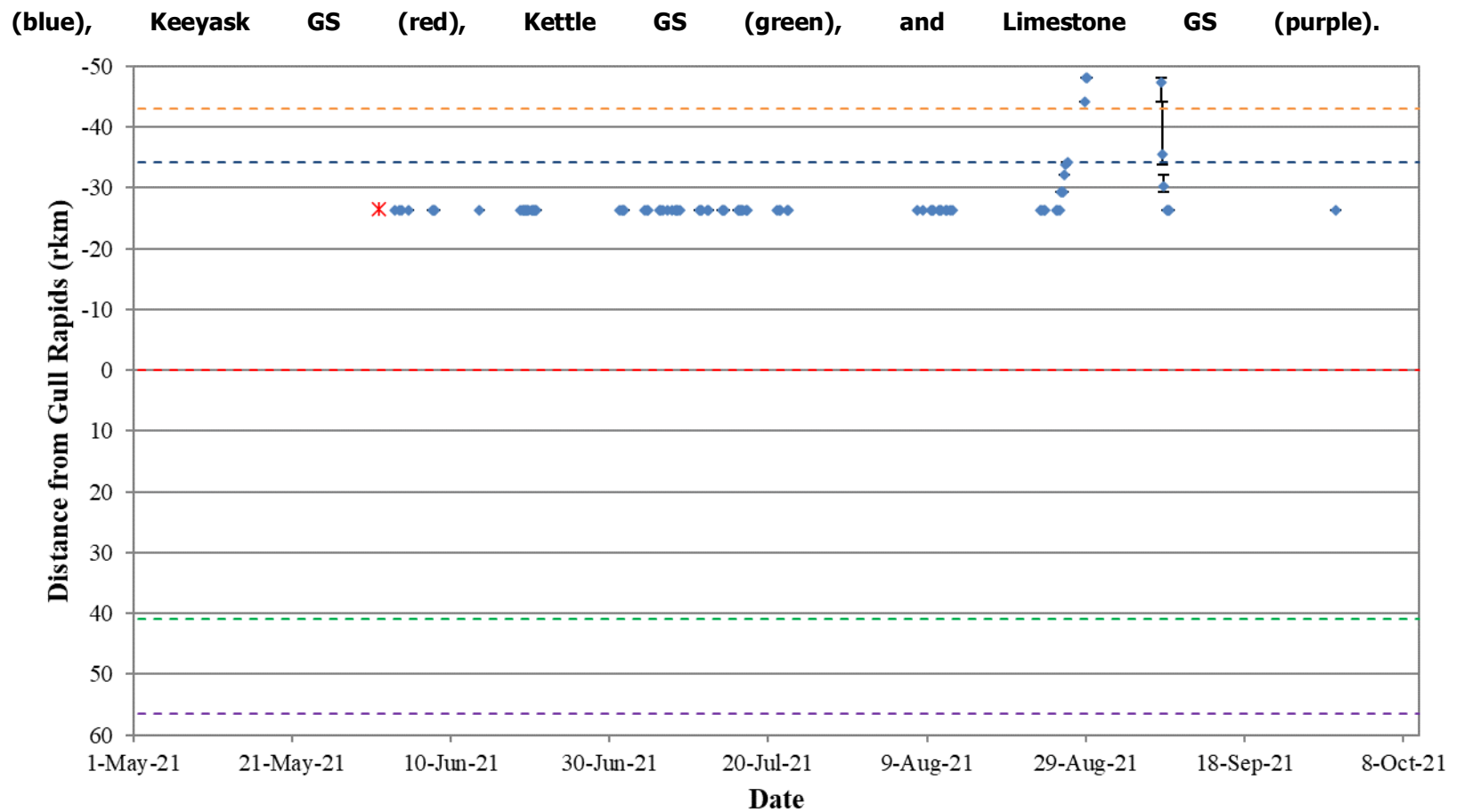


Figure A4-26: Position of a Walleye tagged with an acoustic transmitter (code #48329) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

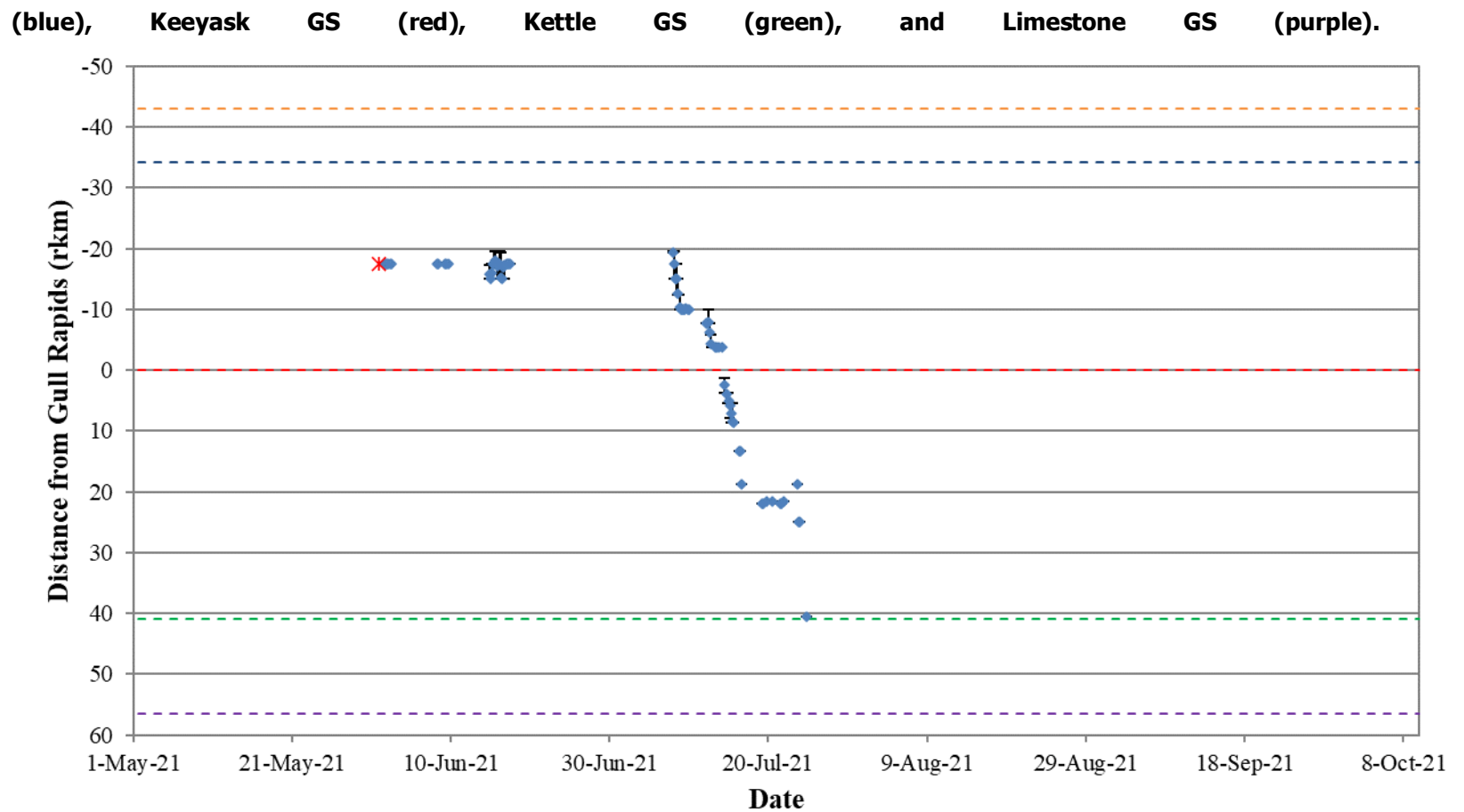


Figure A4-27: Position of a Walleye tagged with an acoustic transmitter (code #48330) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

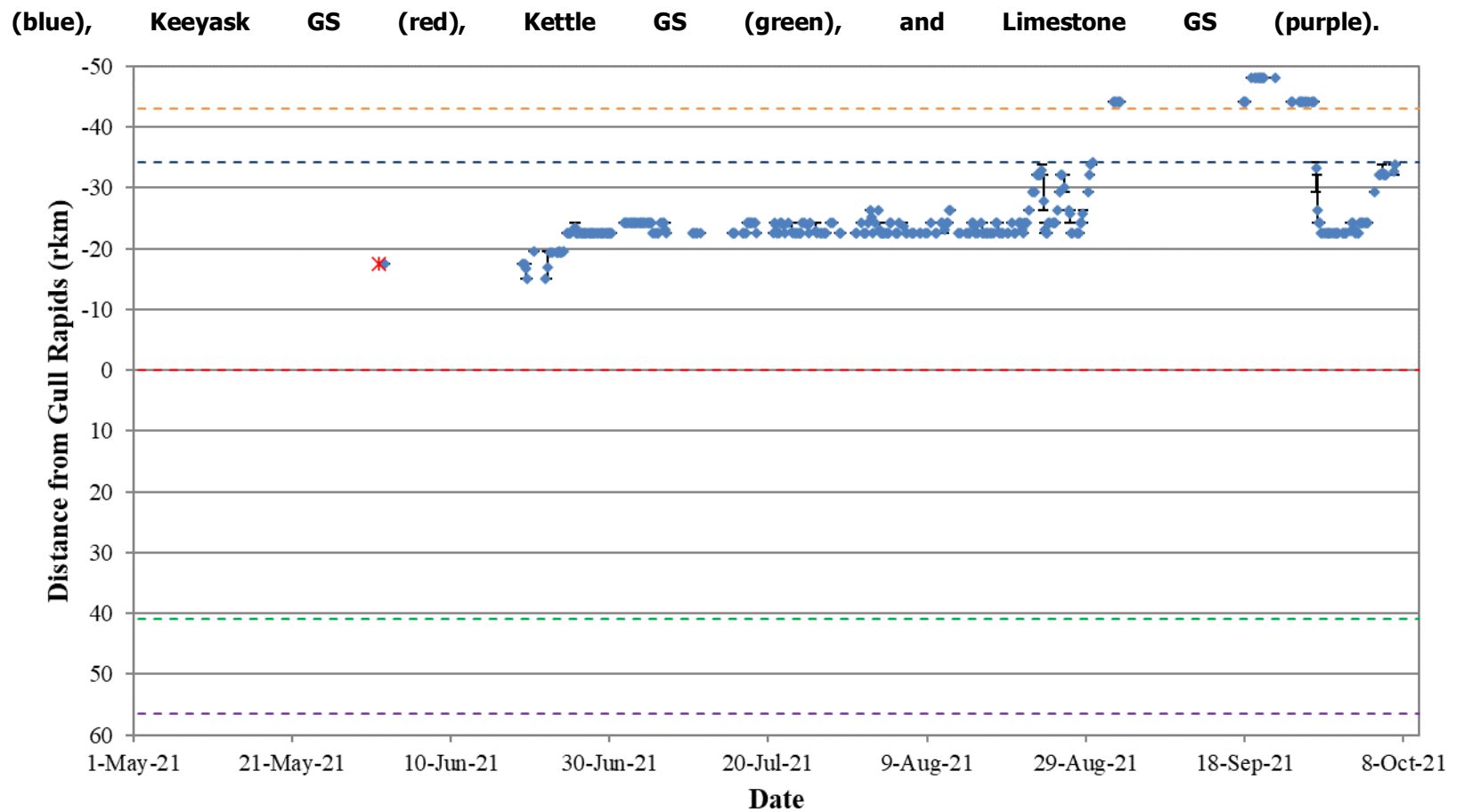


Figure A4-28: Position of a Walleye tagged with an acoustic transmitter (code #48331) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

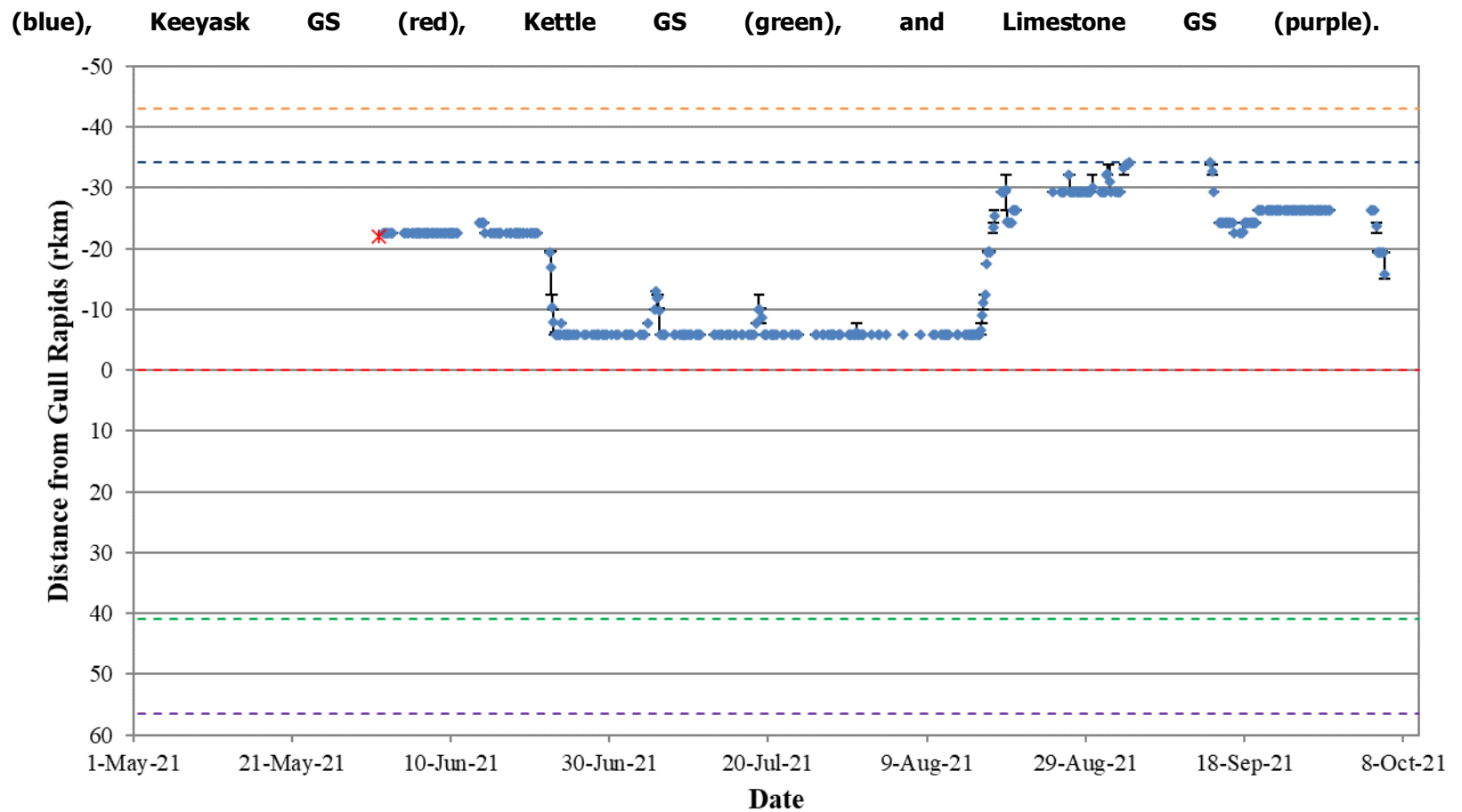


Figure A4-29: Position of a Walleye tagged with an acoustic transmitter (code #48332) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

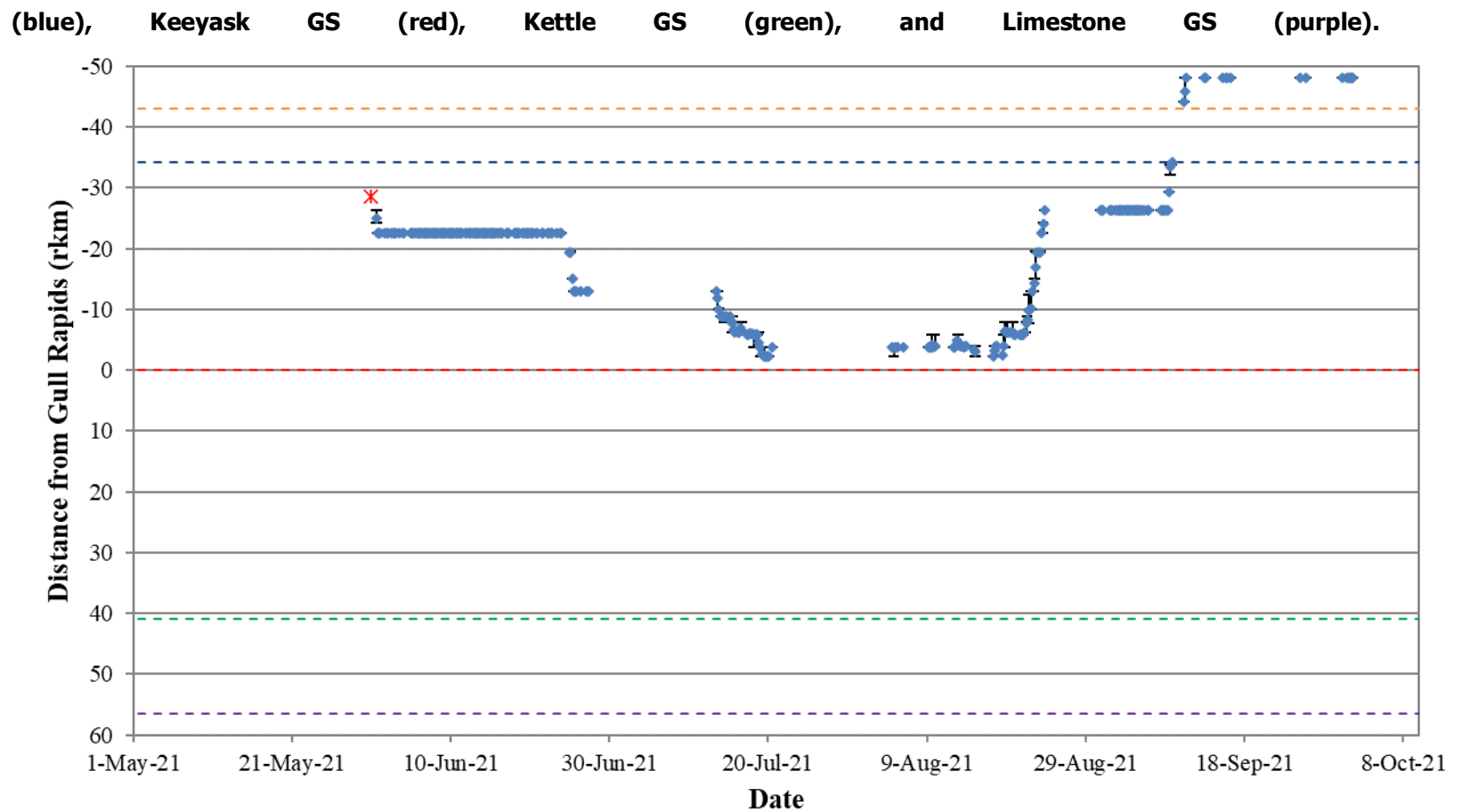


Figure A4-30: Position of a Walleye tagged with an acoustic transmitter (code #48333) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

APPENDIX 5:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE IN STEPHENS LAKE IN 2021: MAY TO OCTOBER 2021

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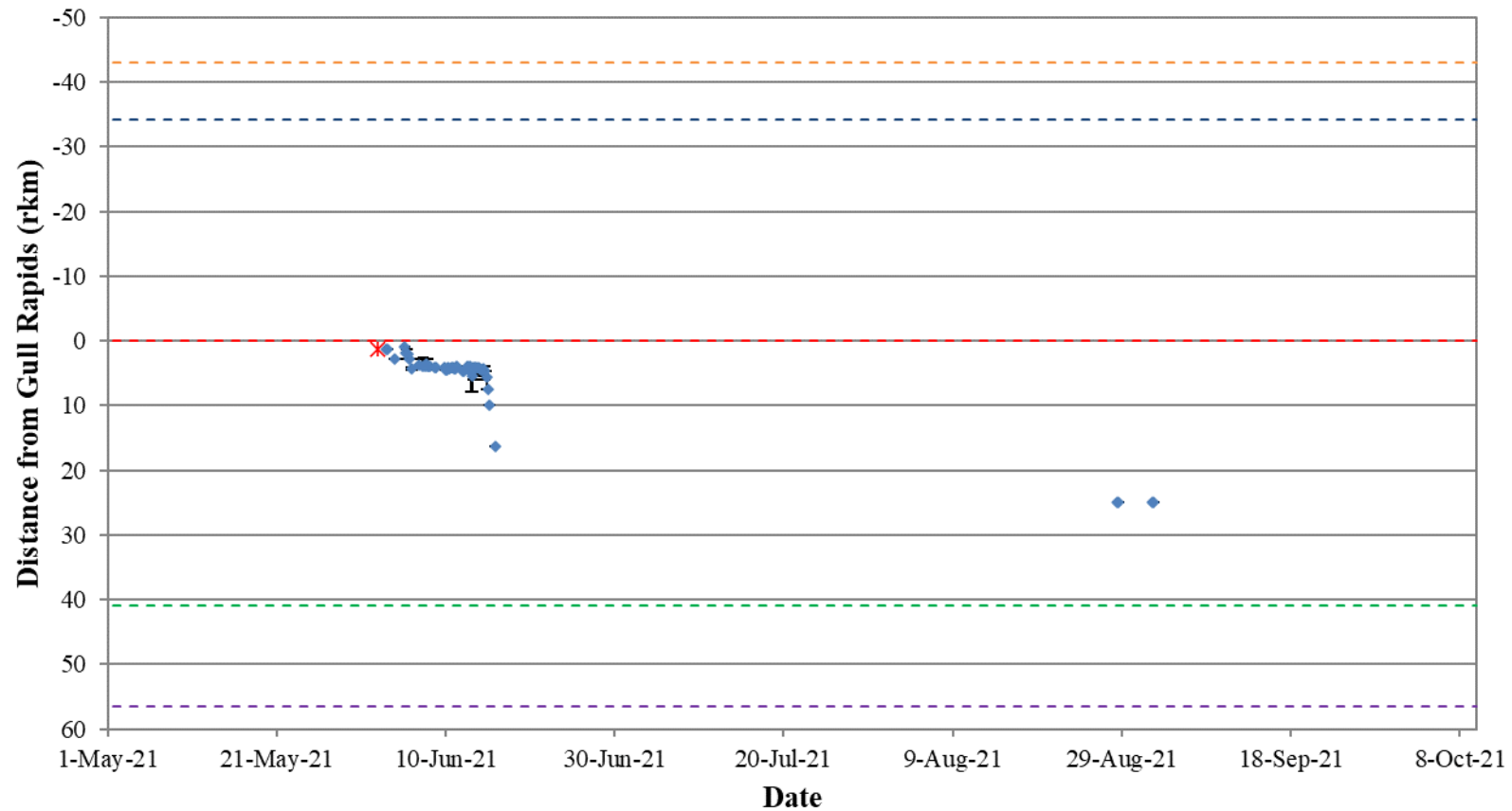


Figure A5-1: Position of a Walleye tagged with an acoustic transmitter (code #48234) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

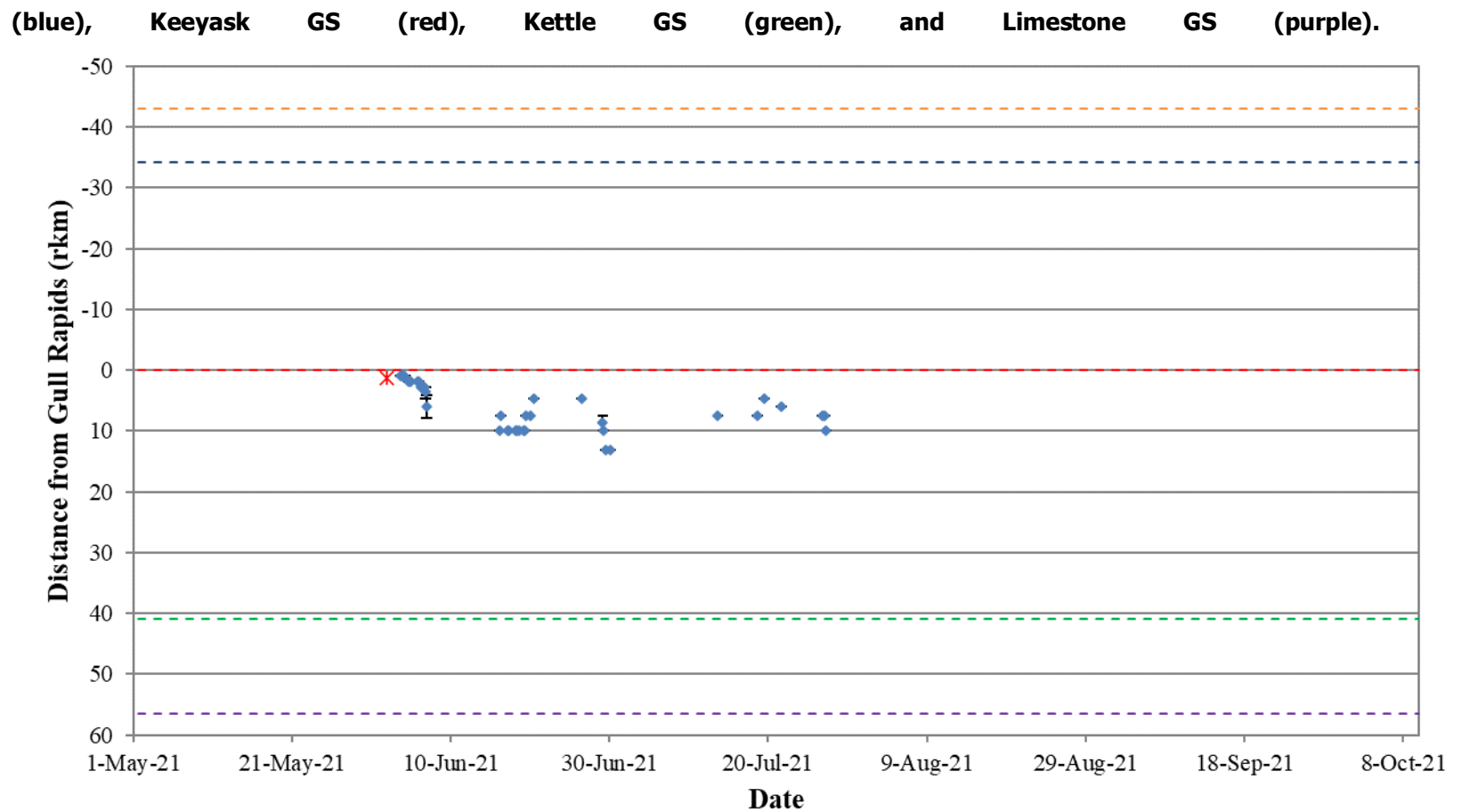


Figure A5-2: Position of a Walleye tagged with an acoustic transmitter (code #48235) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

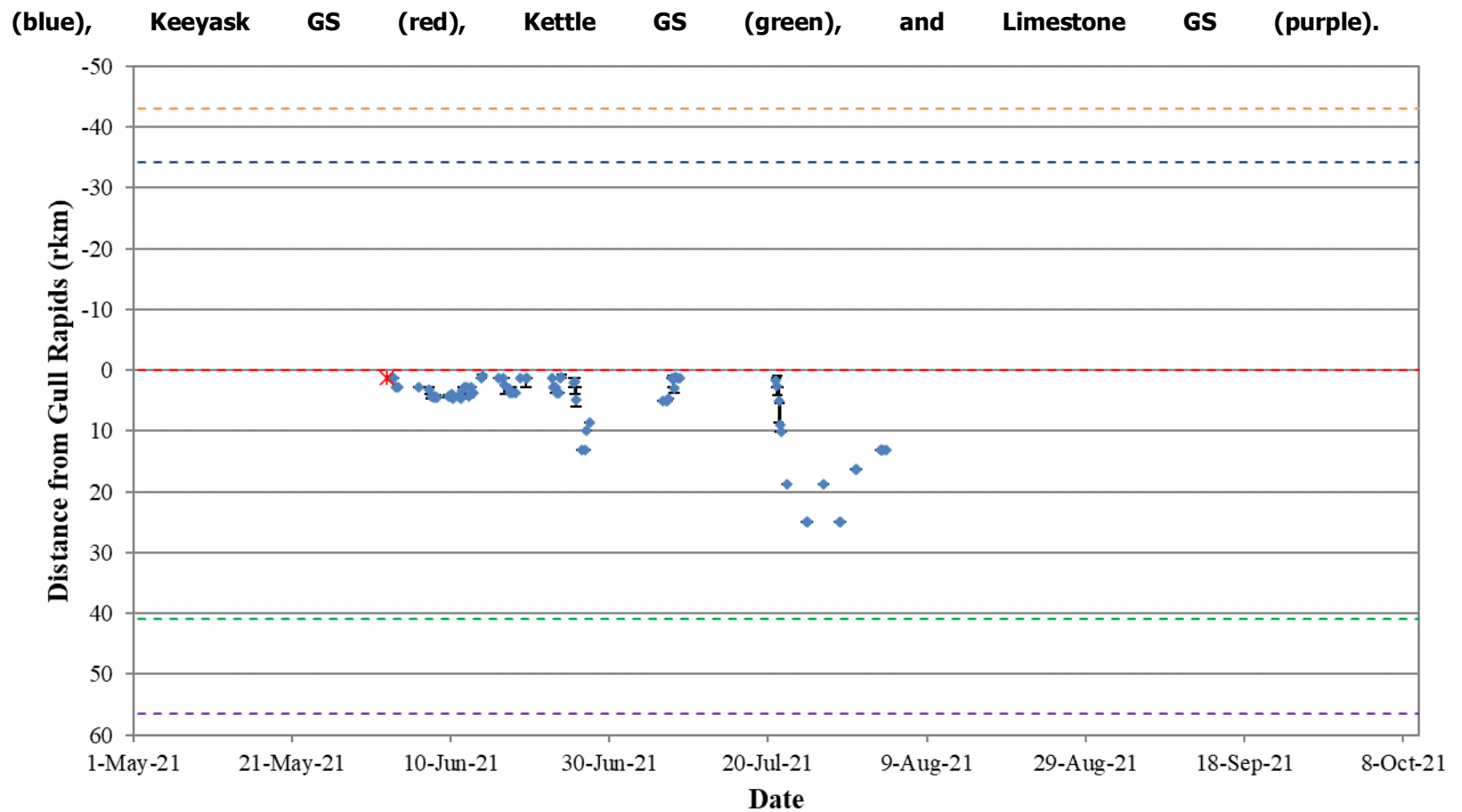


Figure A5-3: Position of a Walleye tagged with an acoustic transmitter (code #48236) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

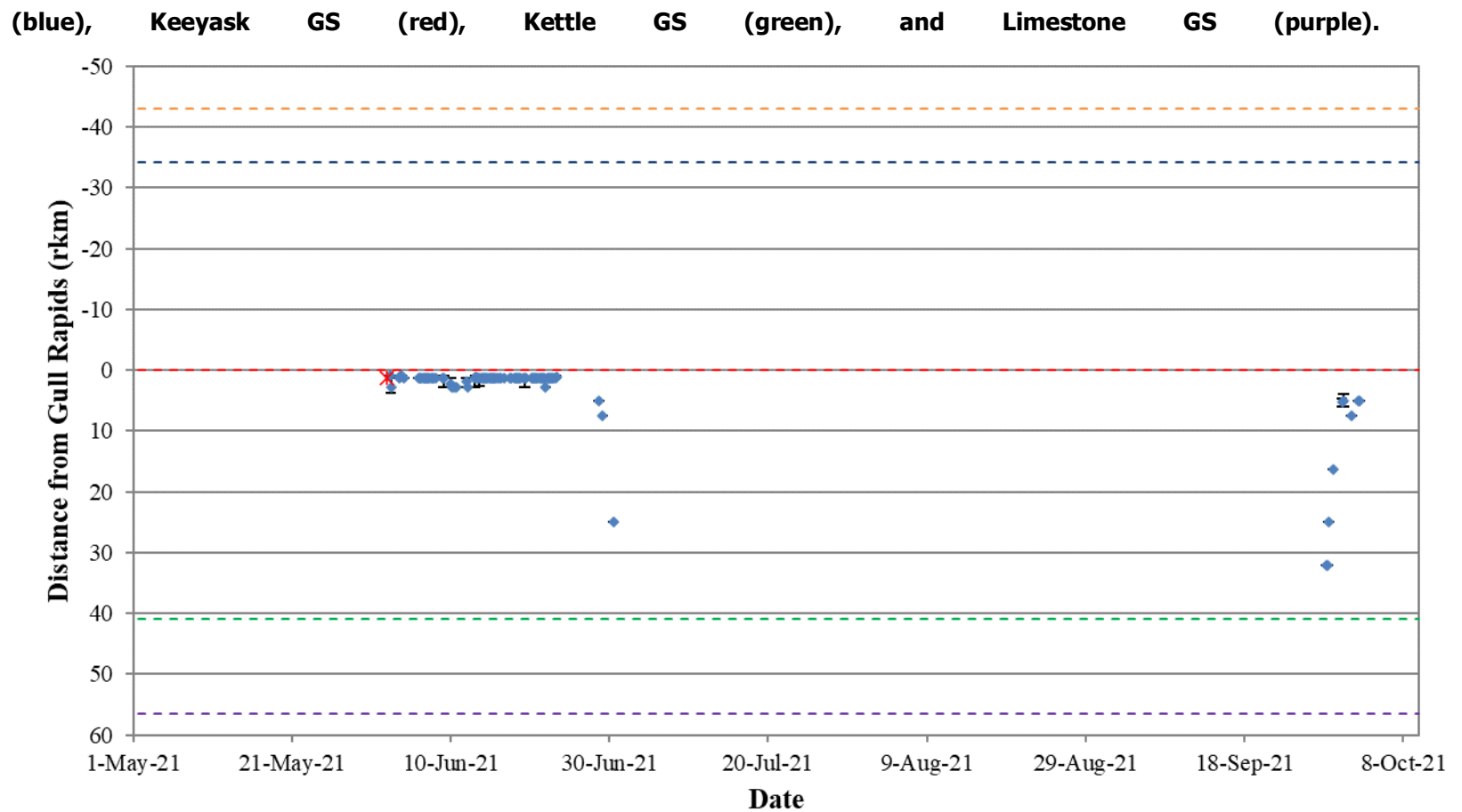


Figure A5-4: Position of a Walleye tagged with an acoustic transmitter (code #48237) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

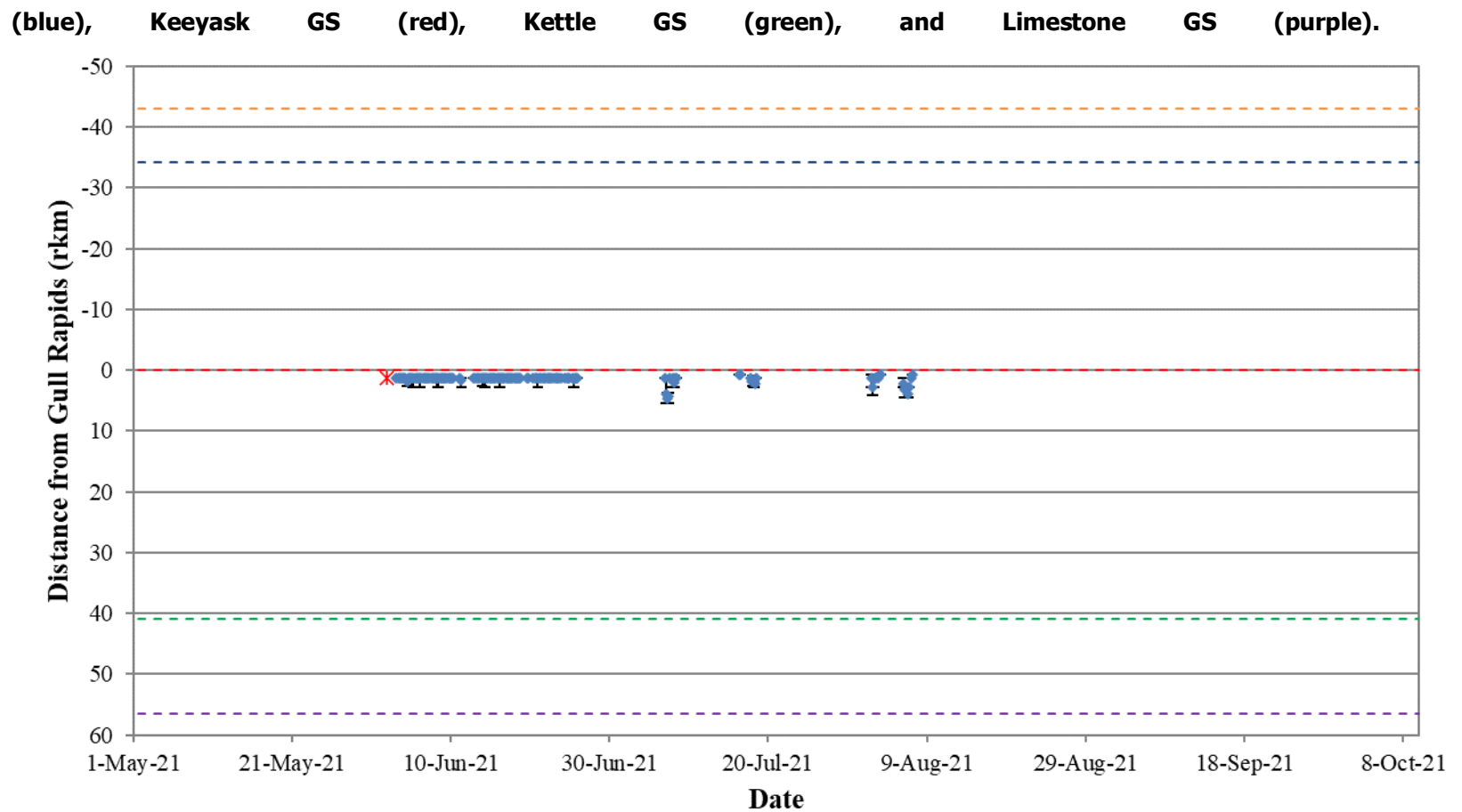


Figure A5-5: Position of a Walleye tagged with an acoustic transmitter (code #48238) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

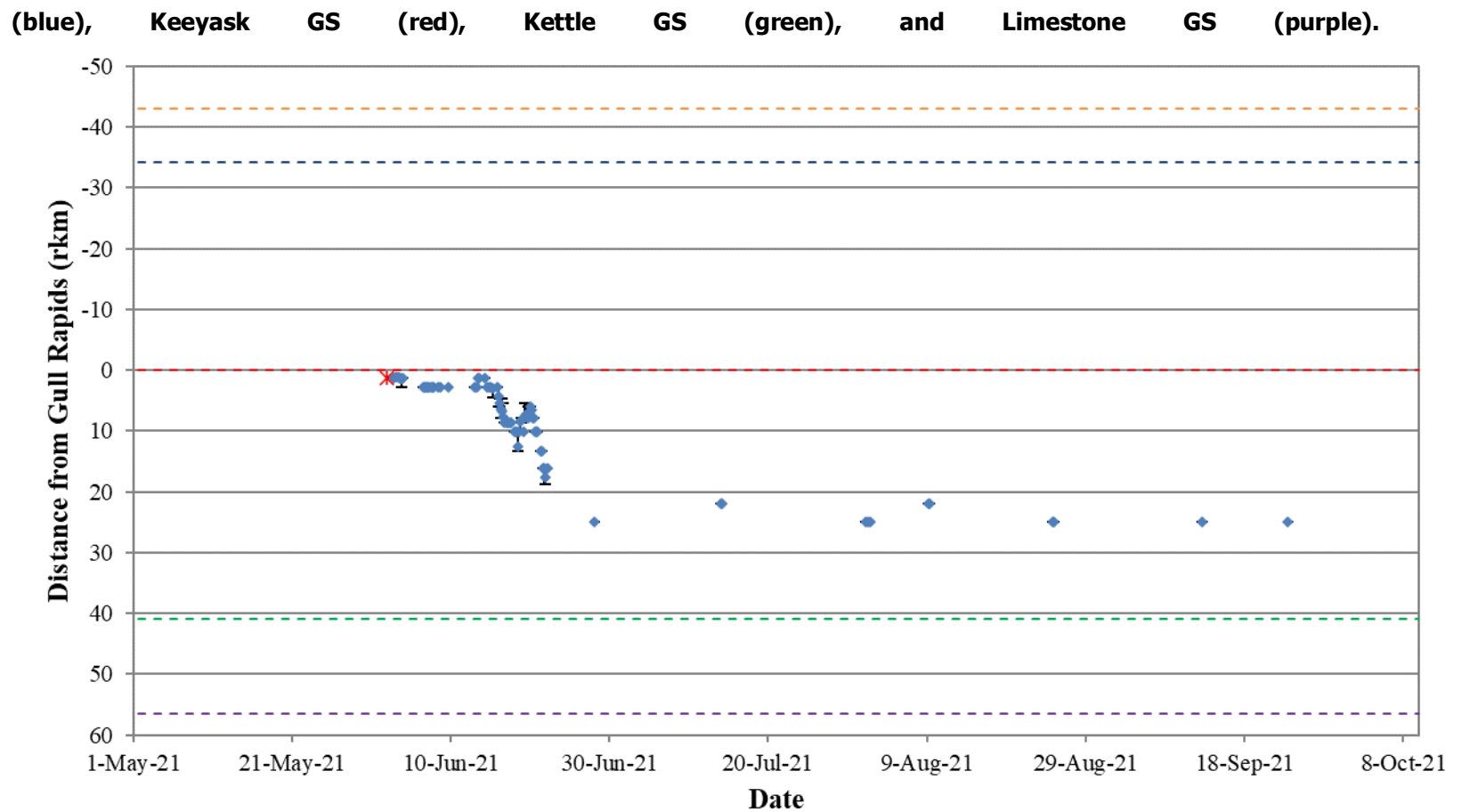


Figure A5-6: Position of a Walleye tagged with an acoustic transmitter (code #48239) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

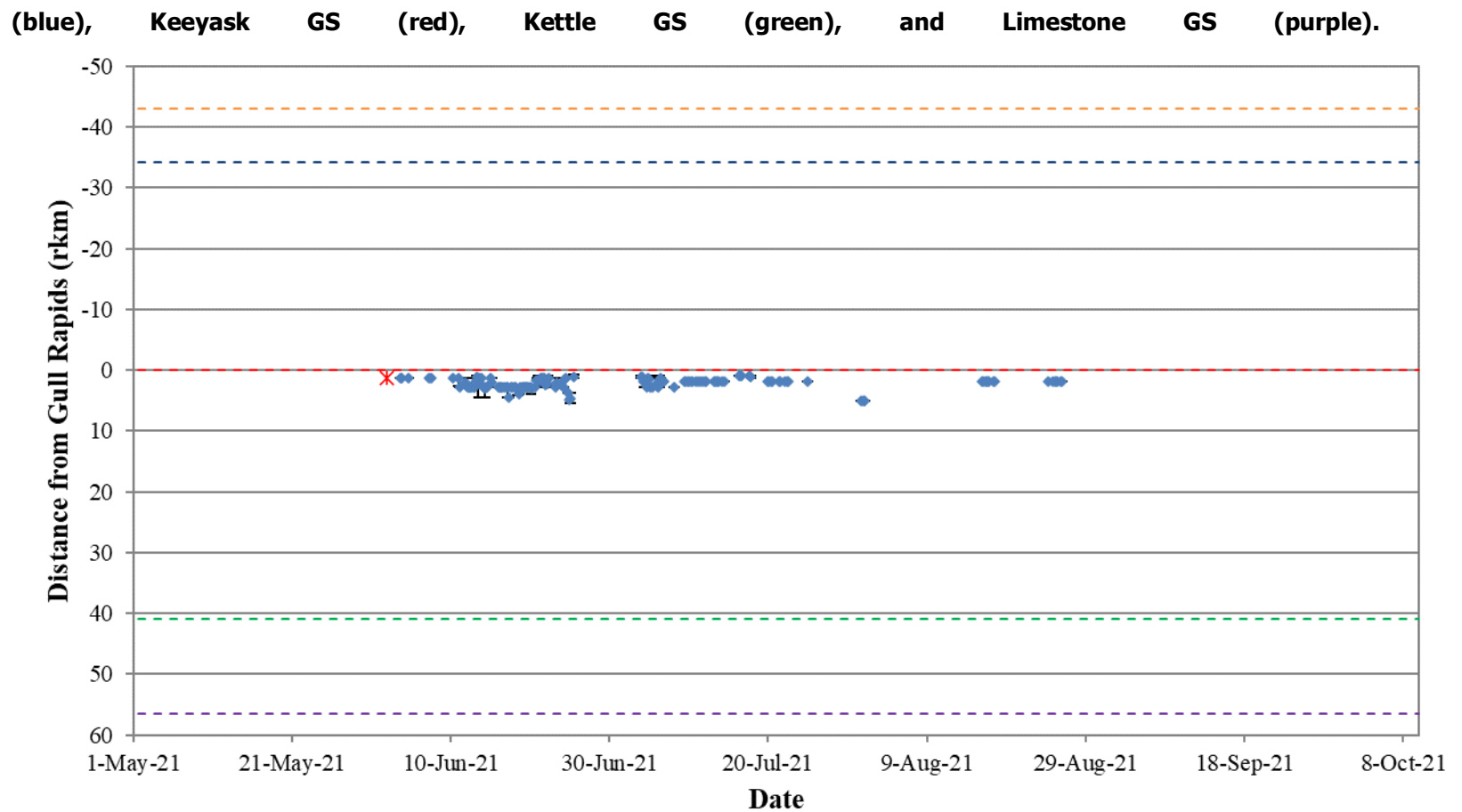


Figure A5-7: Position of a Walleye tagged with an acoustic transmitter (code #48240) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

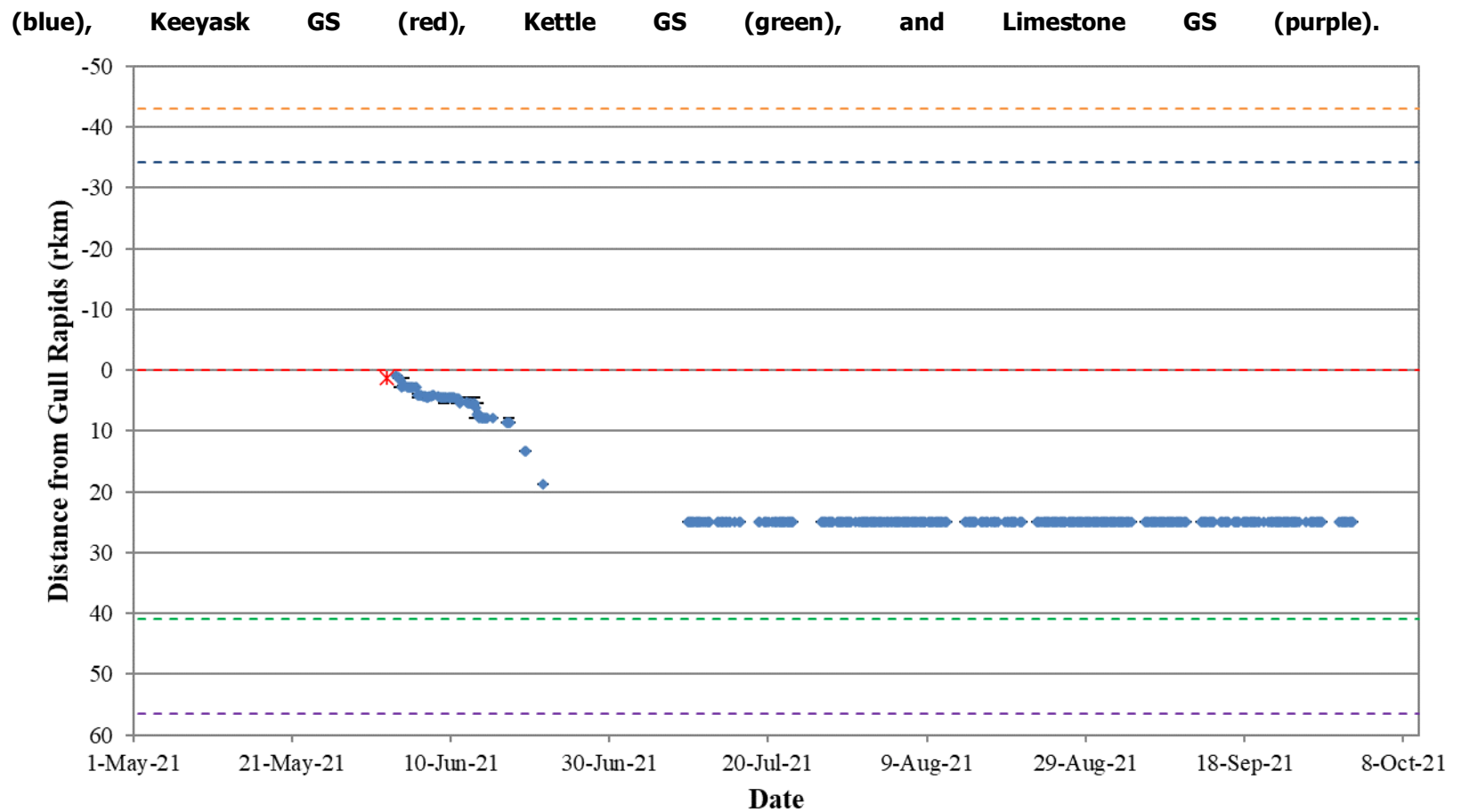


Figure A5-8: Position of a Walleye tagged with an acoustic transmitter (code #48241) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

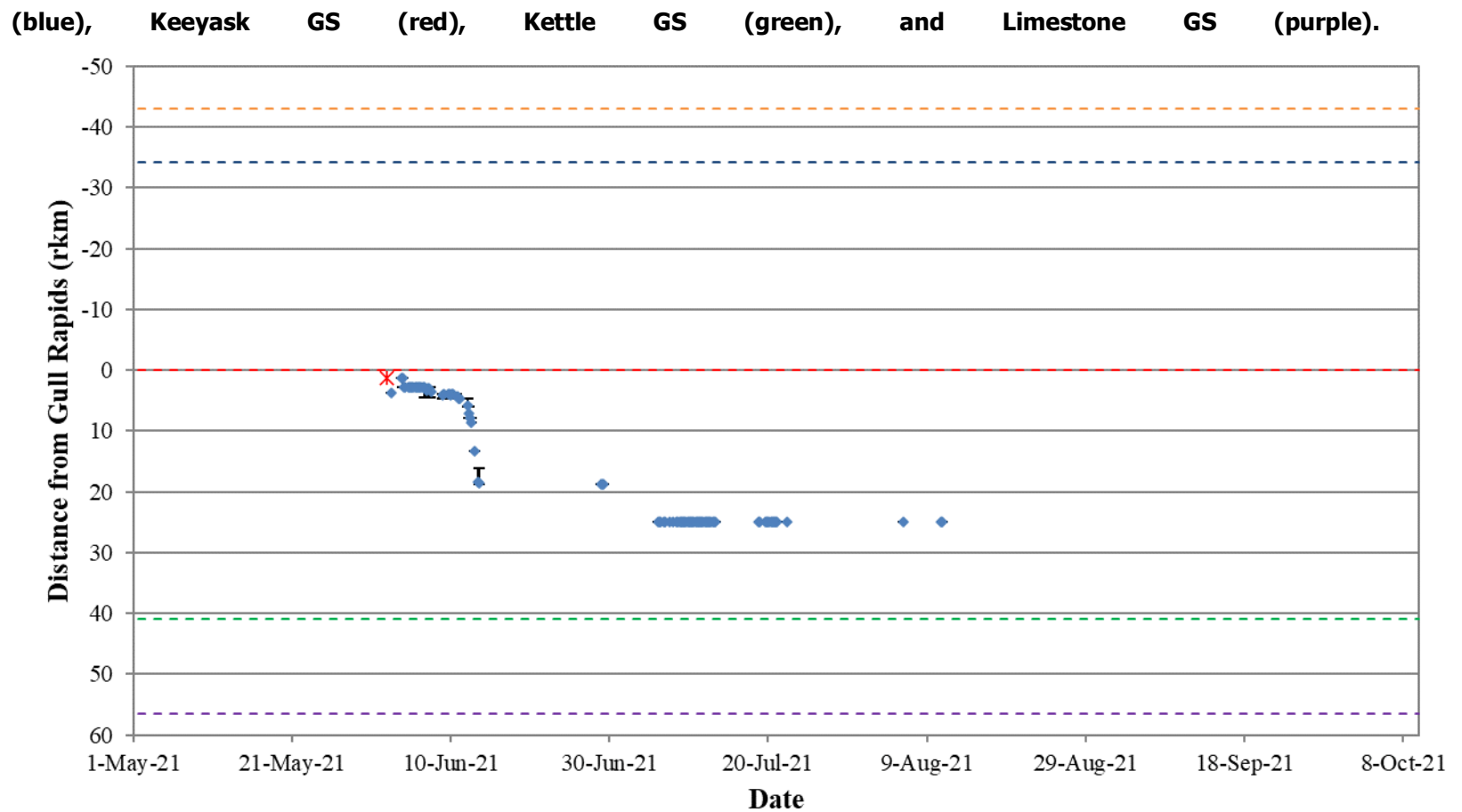


Figure A5-9: Position of a Walleye tagged with an acoustic transmitter (code #48242) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

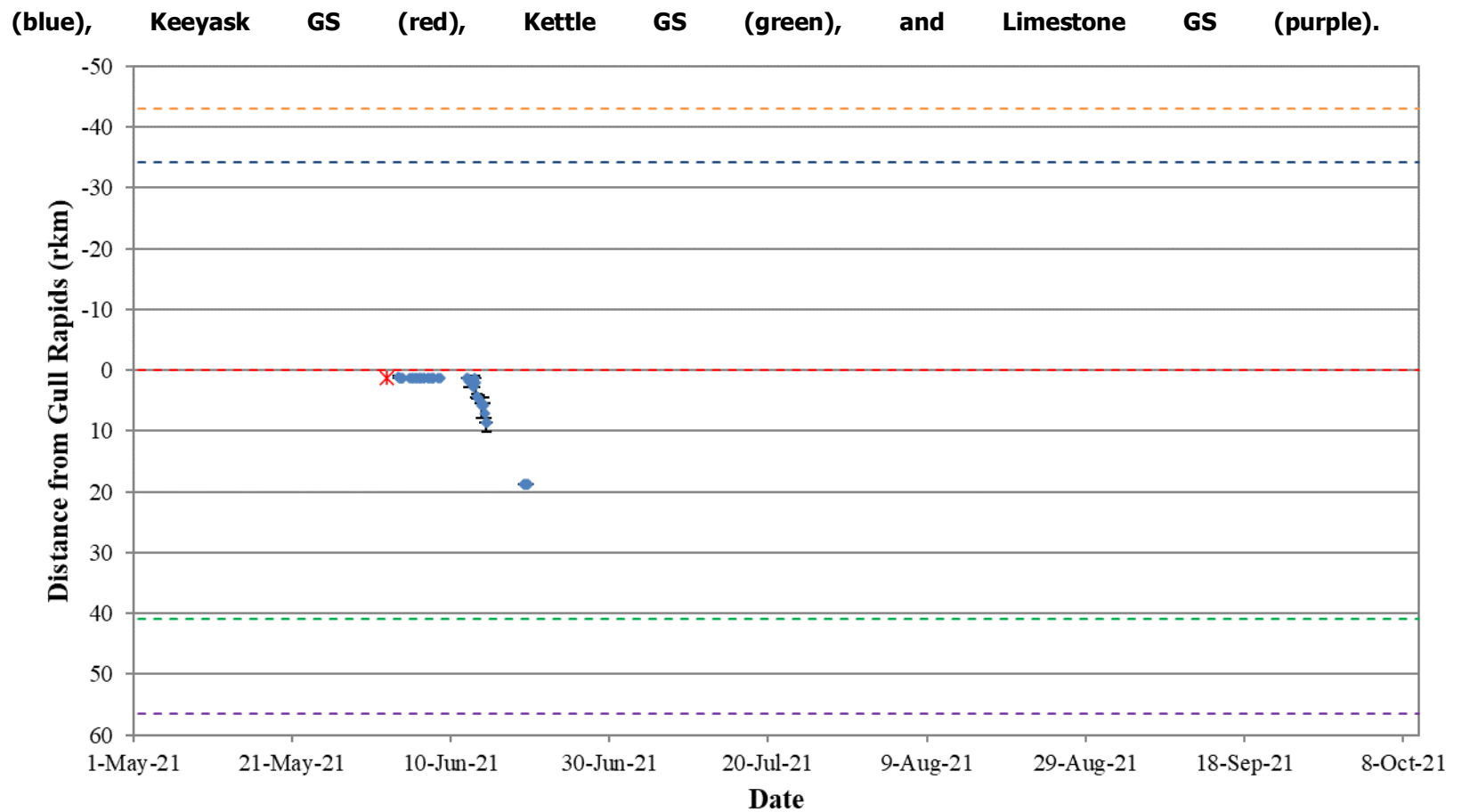


Figure A5-10: Position of a Walleye tagged with an acoustic transmitter (code #48243) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

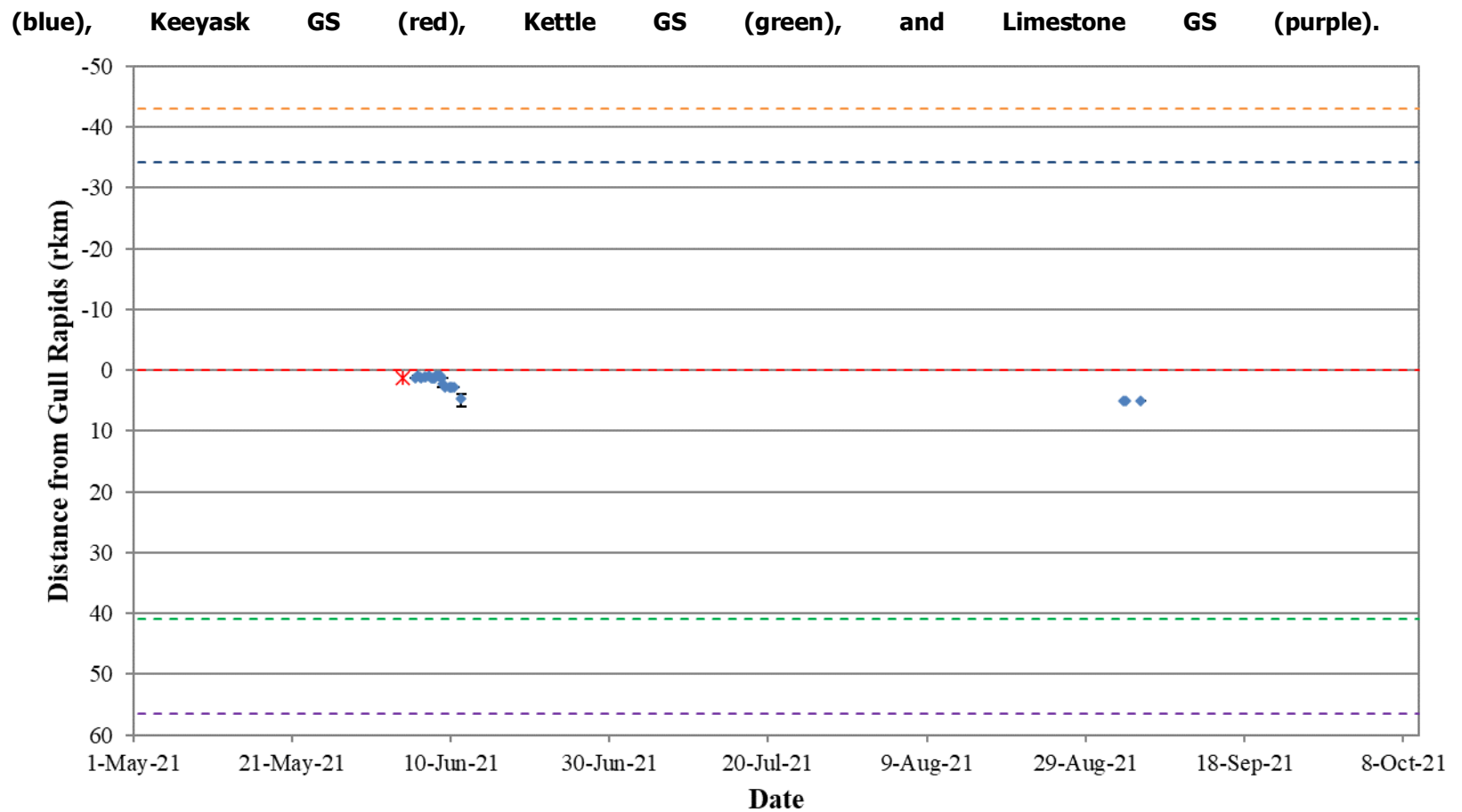


Figure A5-11: Position of a Walleye tagged with an acoustic transmitter (code #48245) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

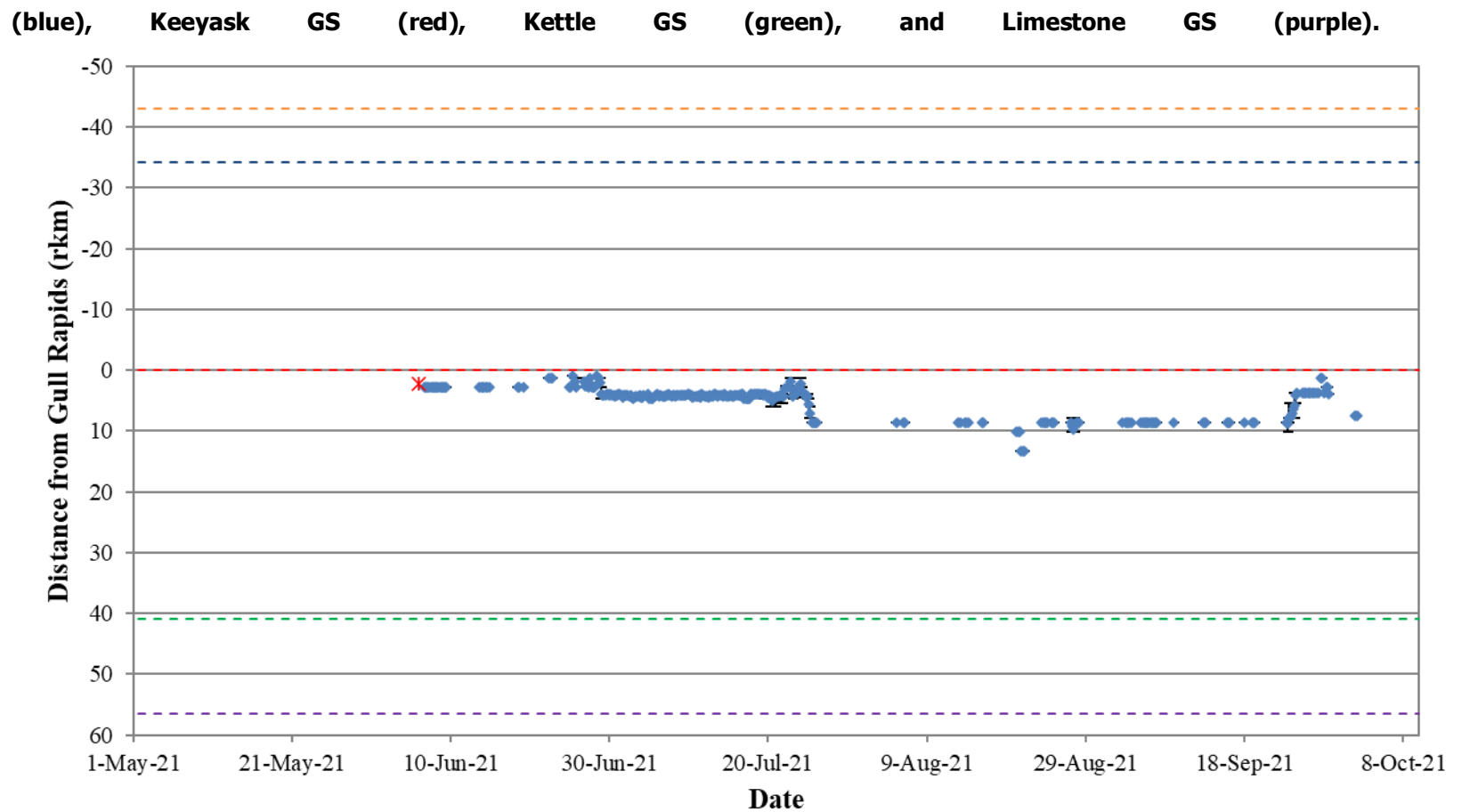


Figure A5-12: Position of a Walleye tagged with an acoustic transmitter (code #48246) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

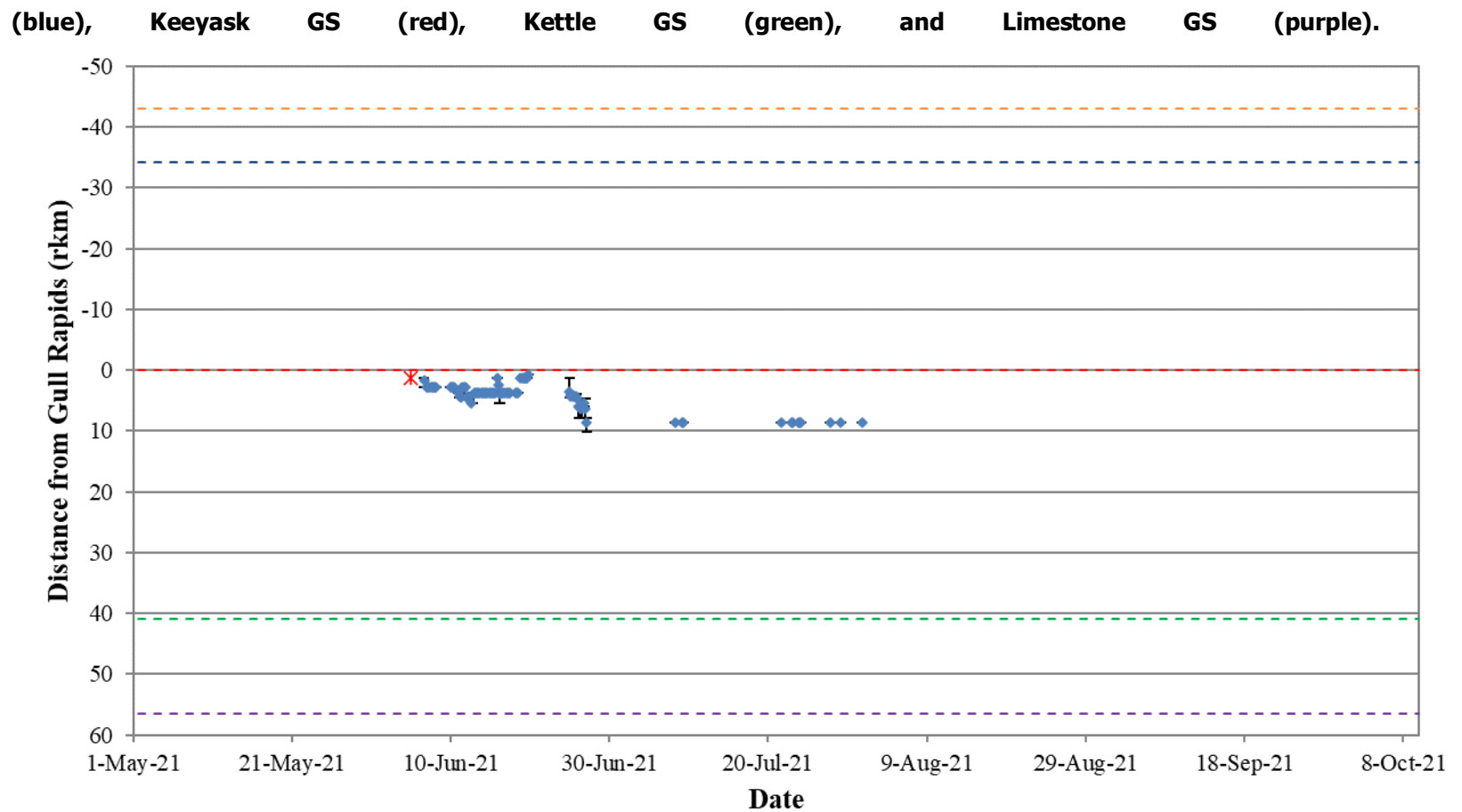


Figure A5-13: Position of a Walleye tagged with an acoustic transmitter (code #48247) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

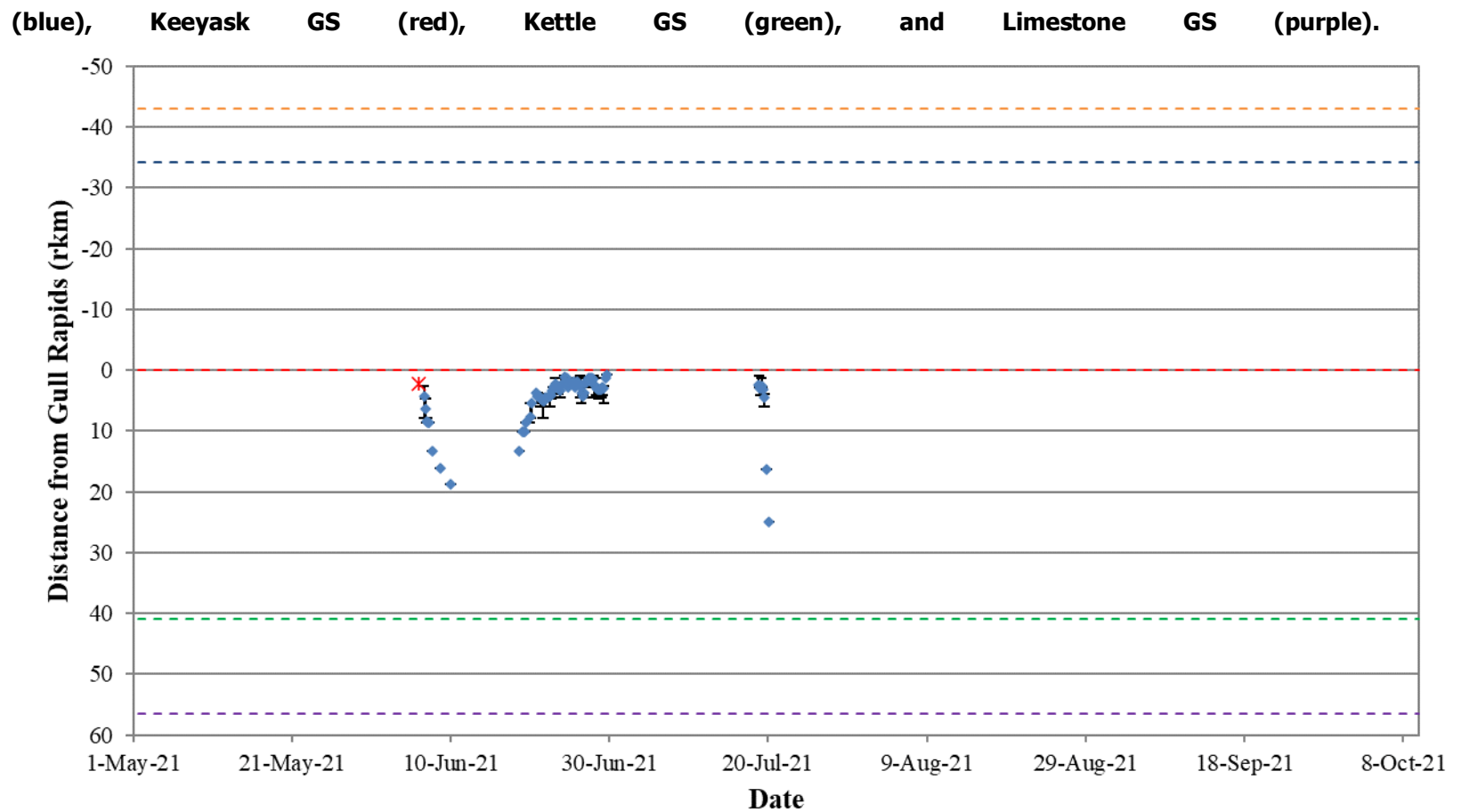


Figure A5-14: Position of a Walleye tagged with an acoustic transmitter (code #48248) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

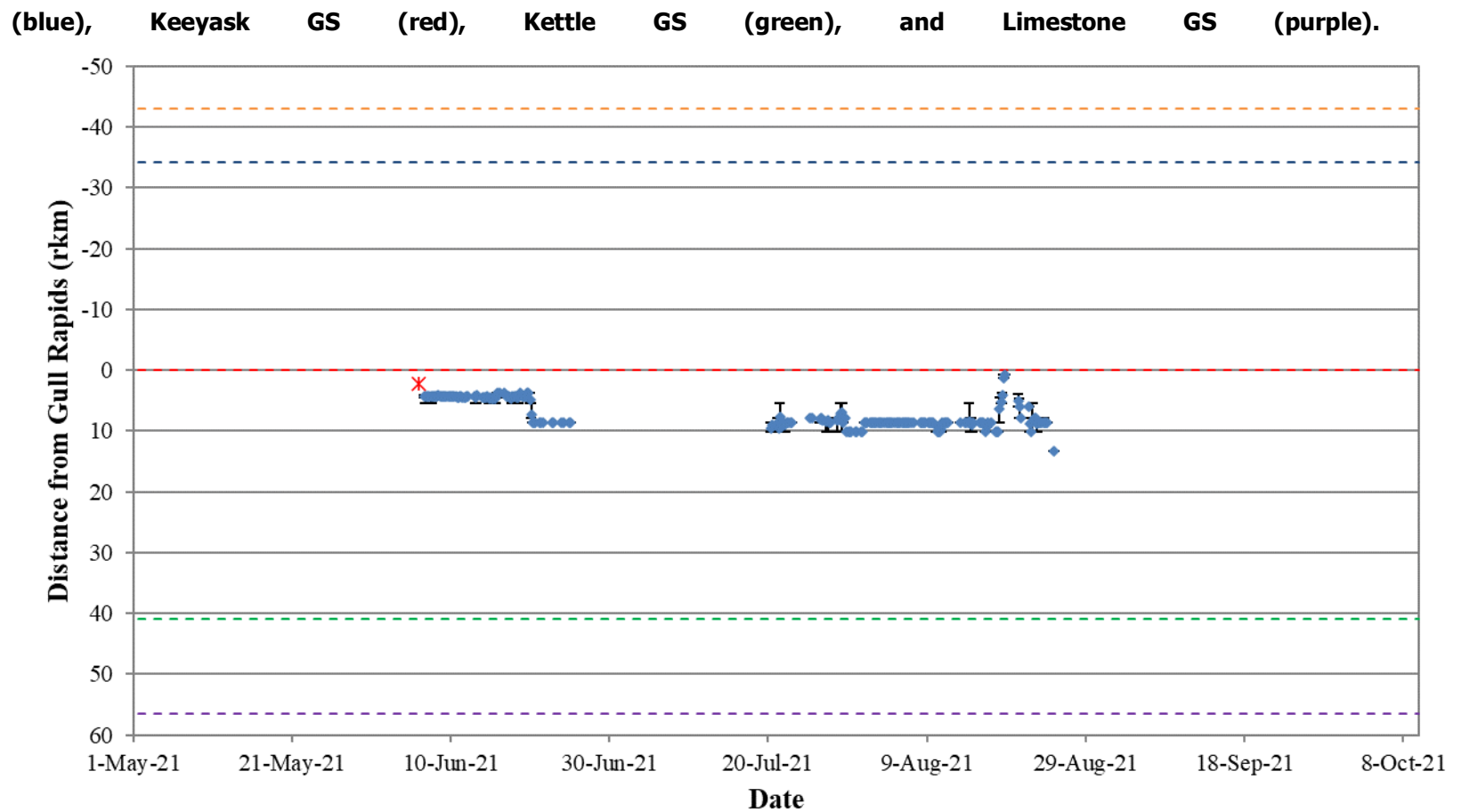


Figure A5-15: Position of a Walleye tagged with an acoustic transmitter (code #48249) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

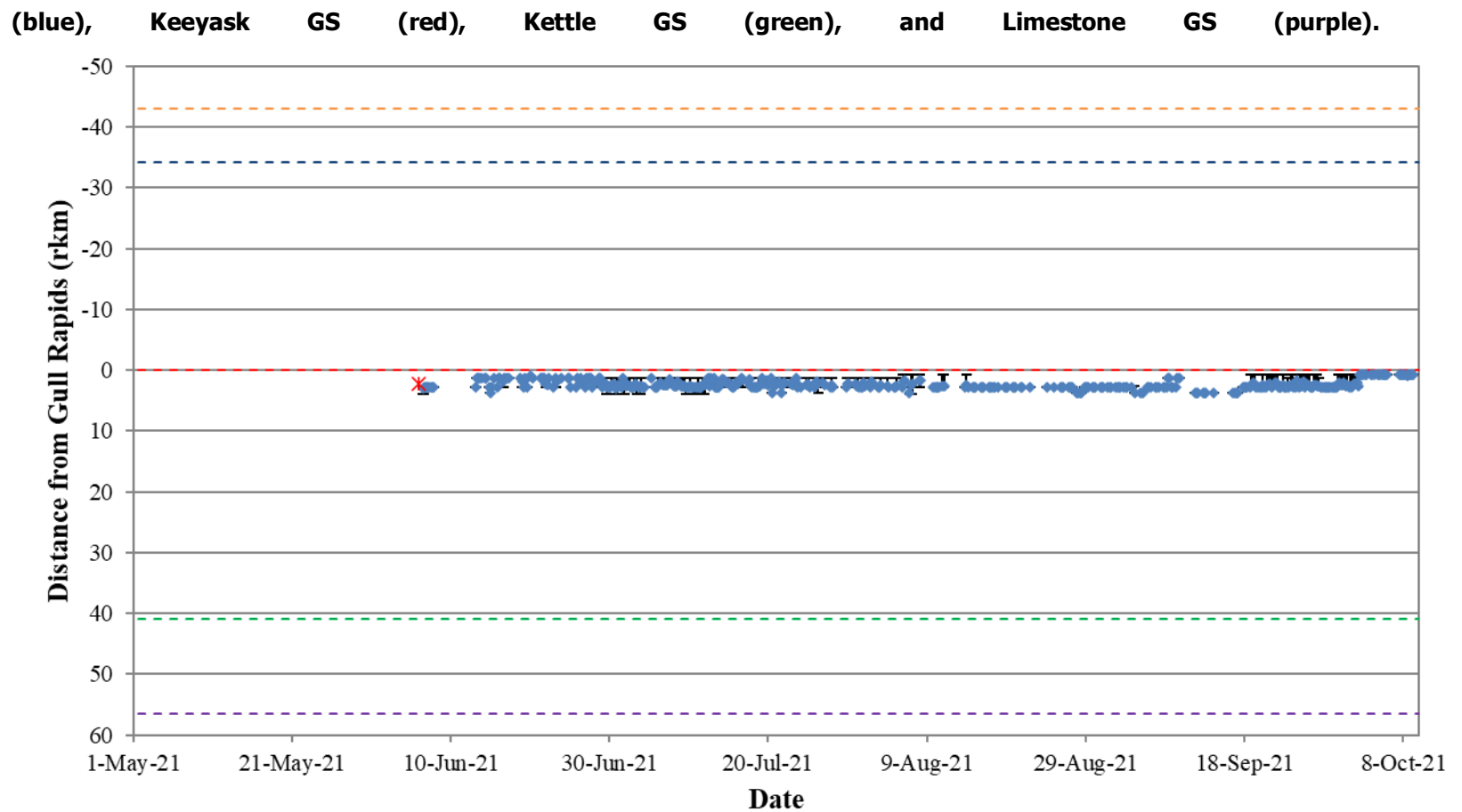


Figure A5-16: Position of a Walleye tagged with an acoustic transmitter (code #48250) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

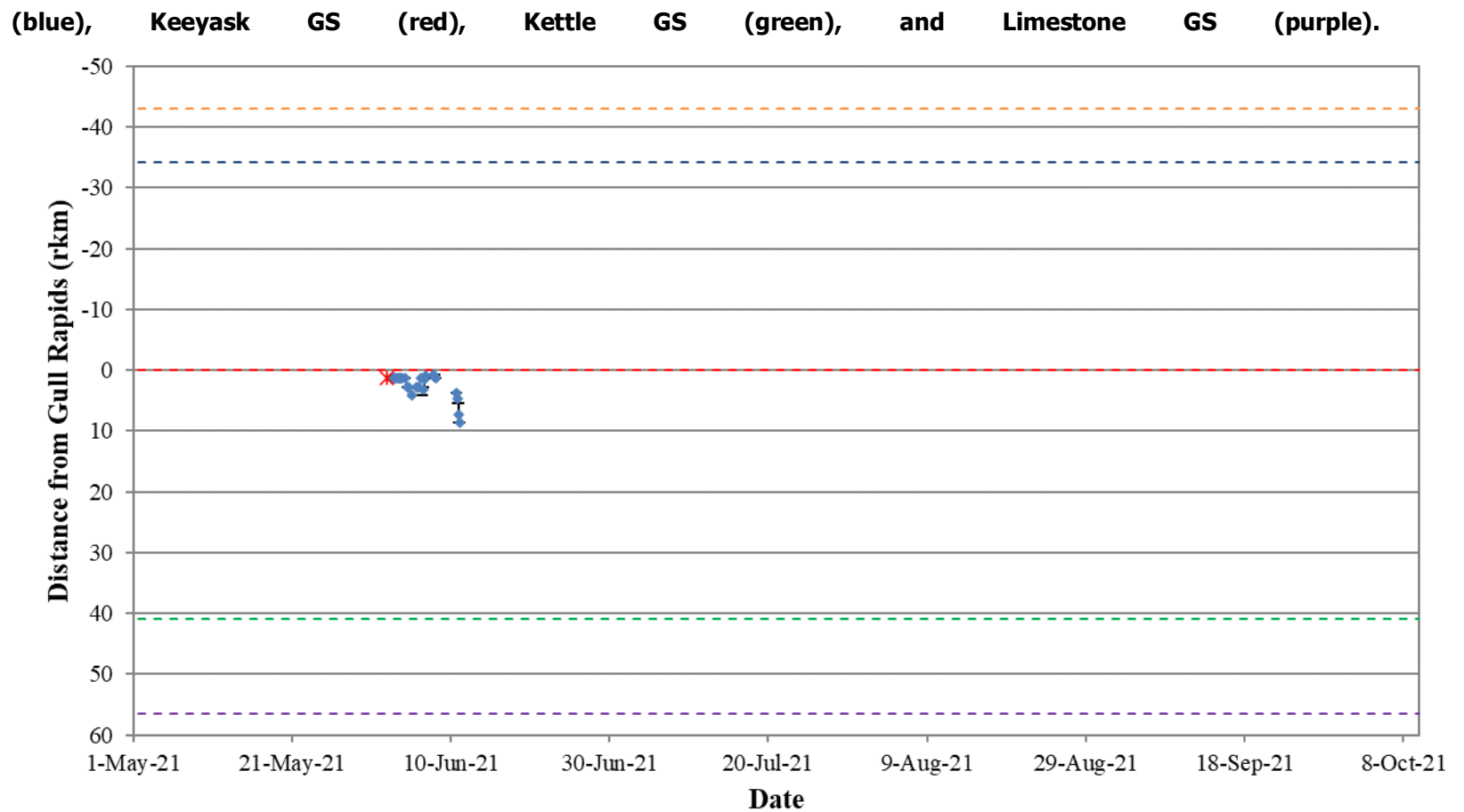


Figure A5-17: Position of a Walleye tagged with an acoustic transmitter (code #48251) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

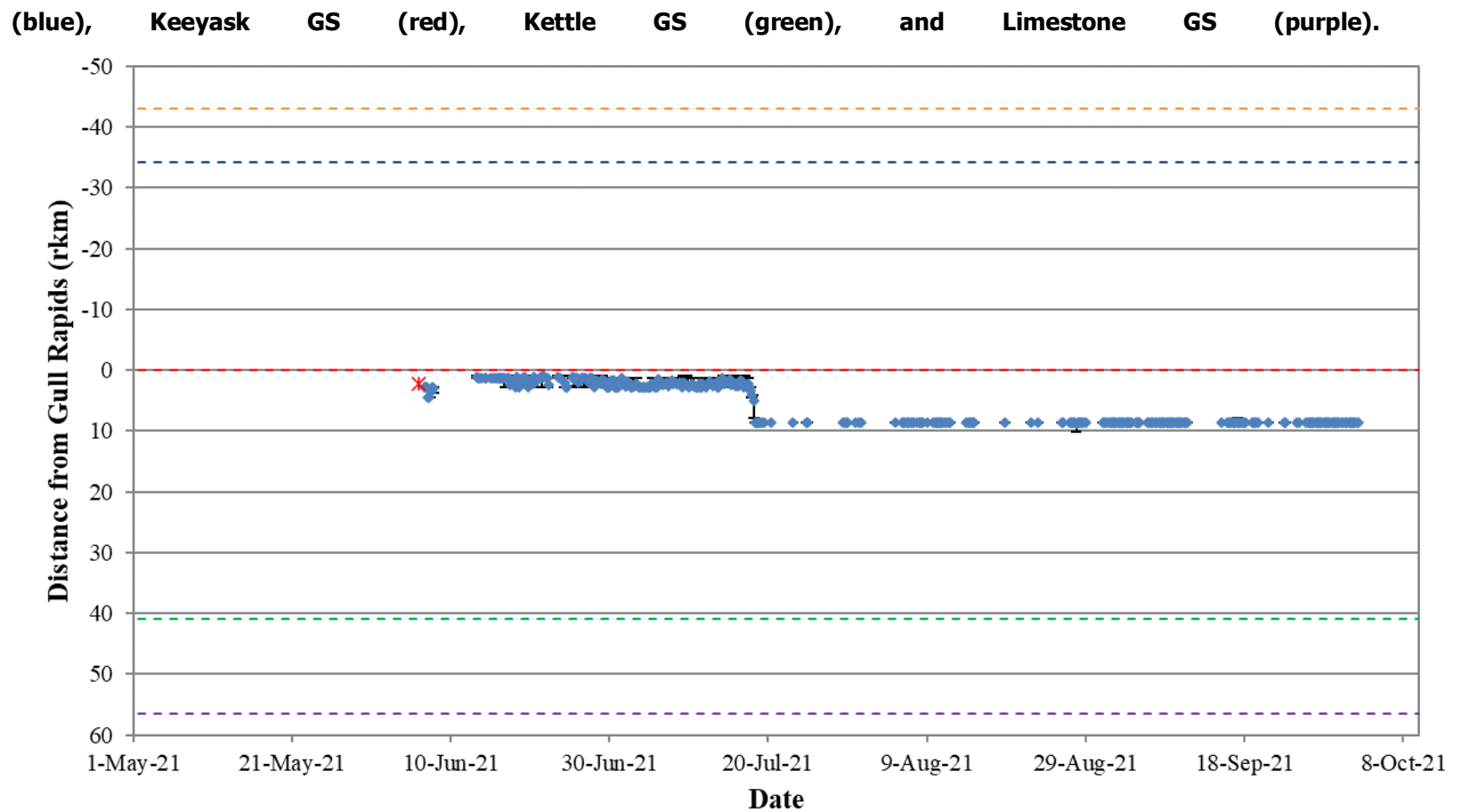


Figure A5-18: Position of a Walleye tagged with an acoustic transmitter (code #48252) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

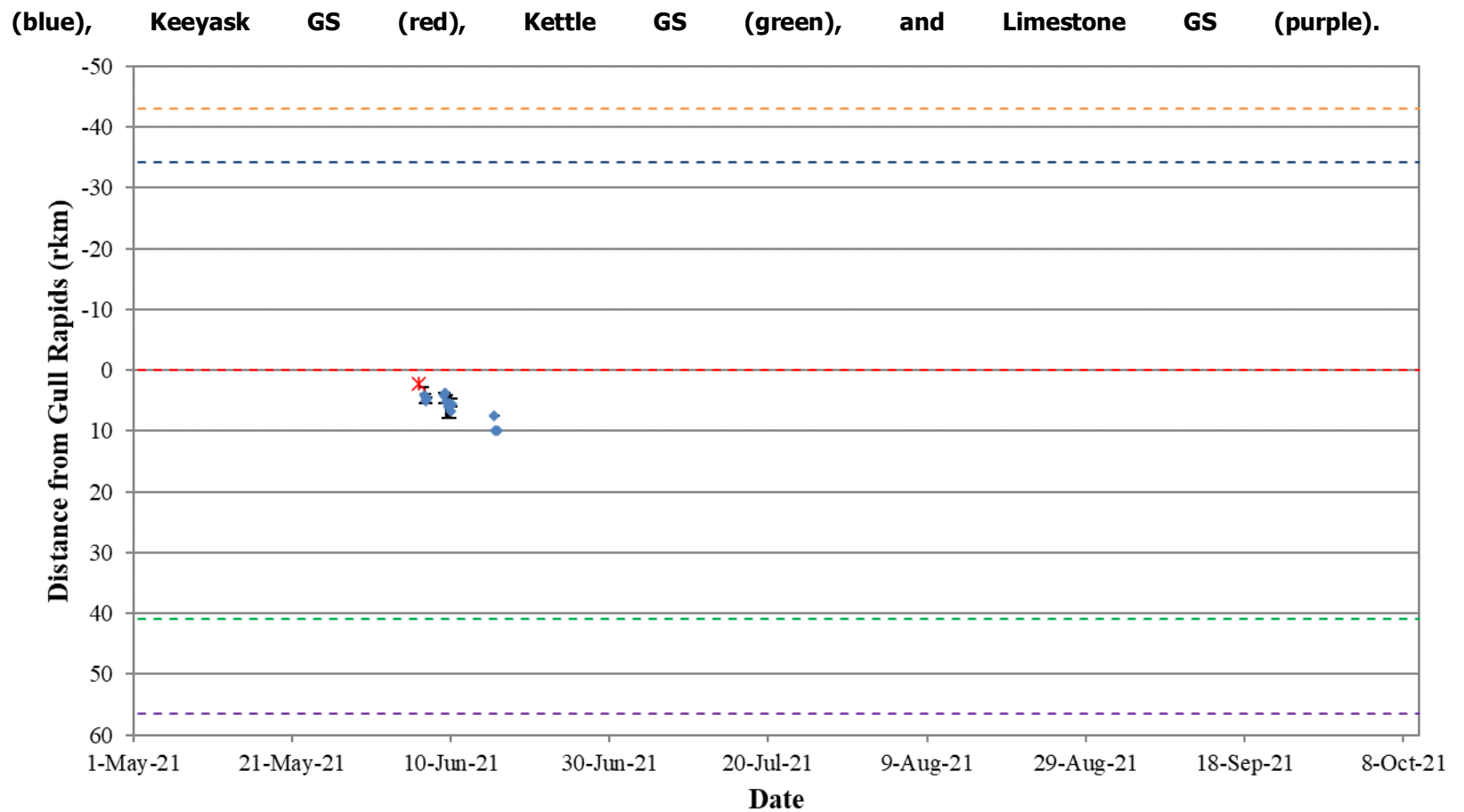


Figure A5-19: Position of a Walleye tagged with an acoustic transmitter (code #48253) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

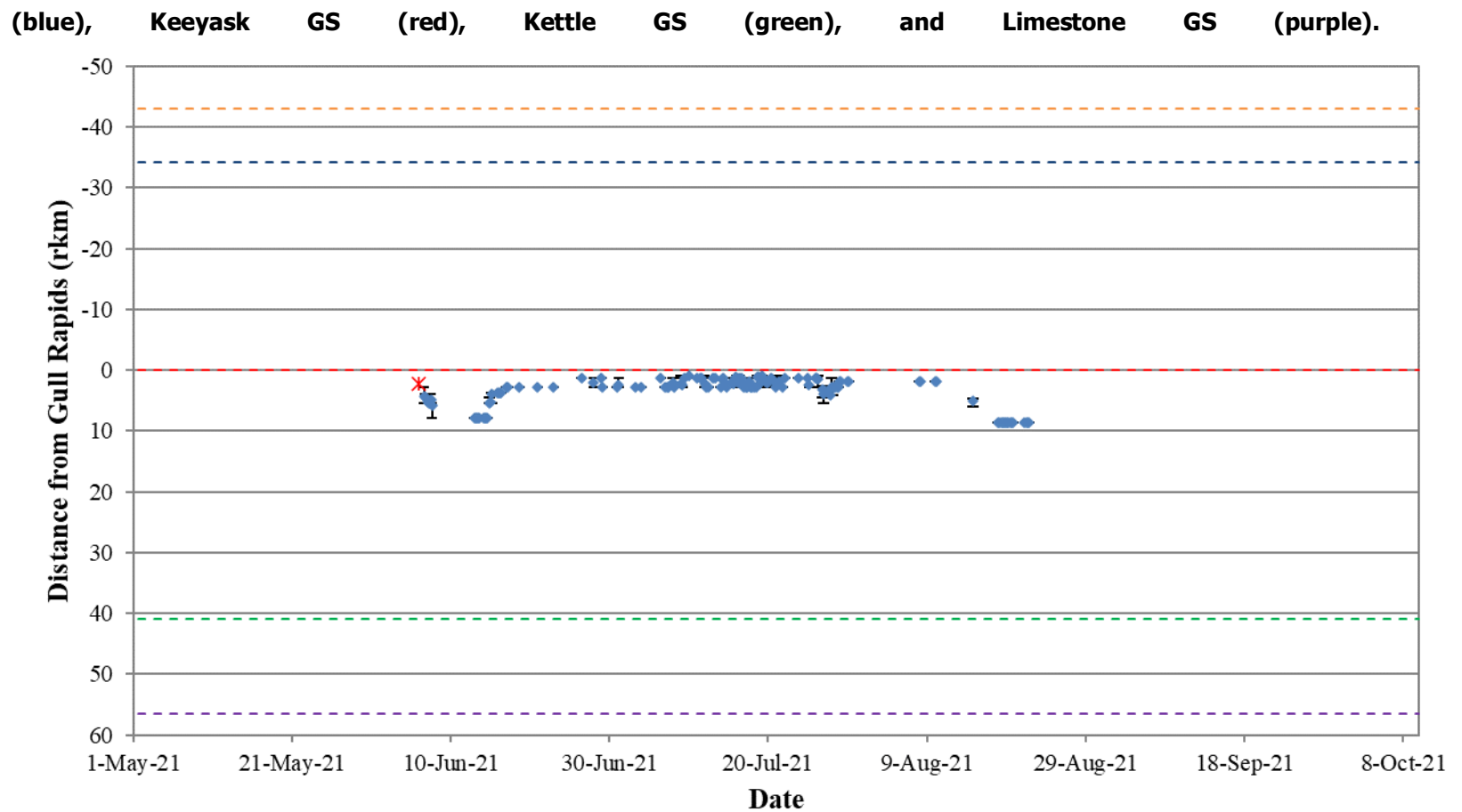


Figure A5-20: Position of a Walleye tagged with an acoustic transmitter (code #48254) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

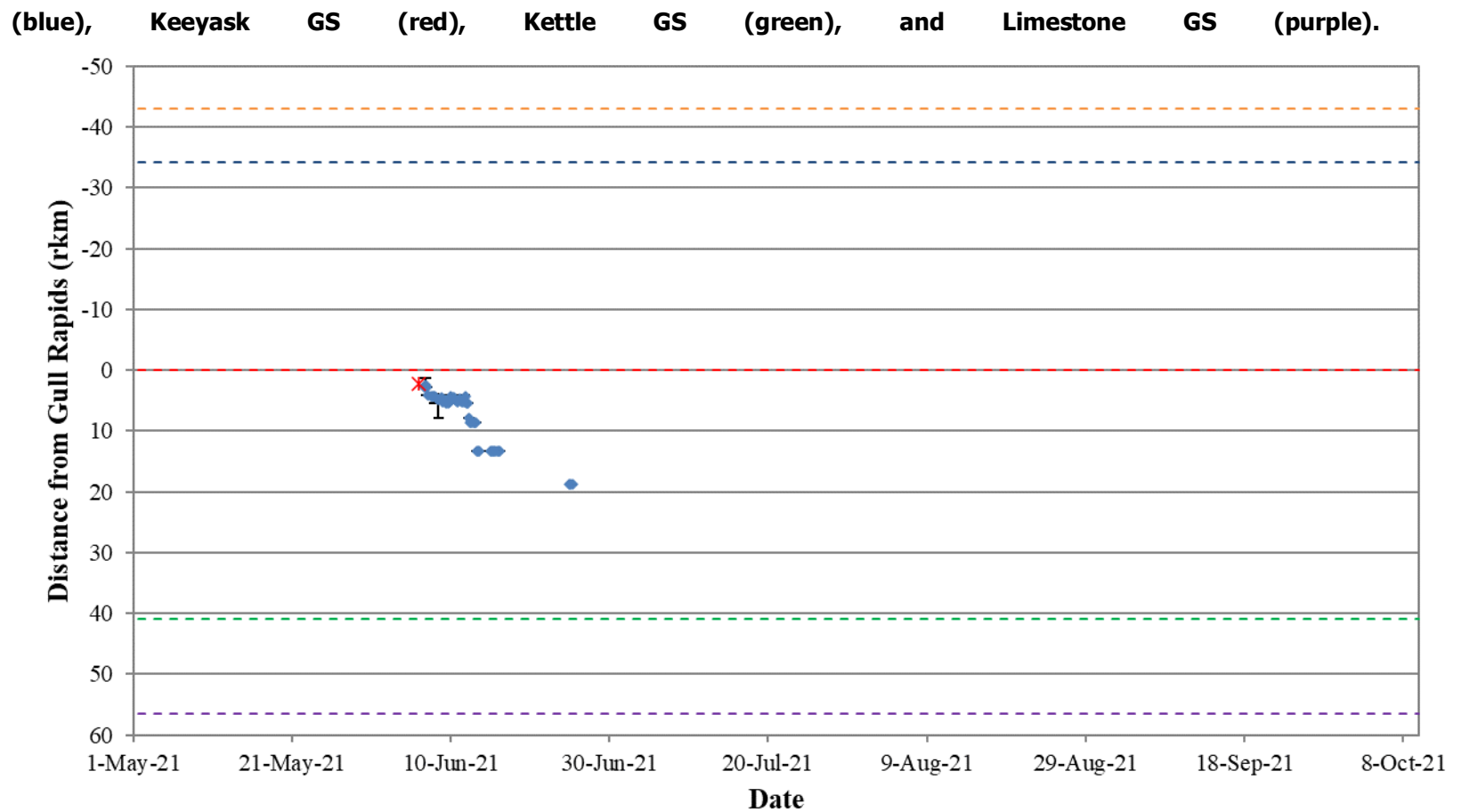


Figure A5-21: Position of a Walleye tagged with an acoustic transmitter (code #48255) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

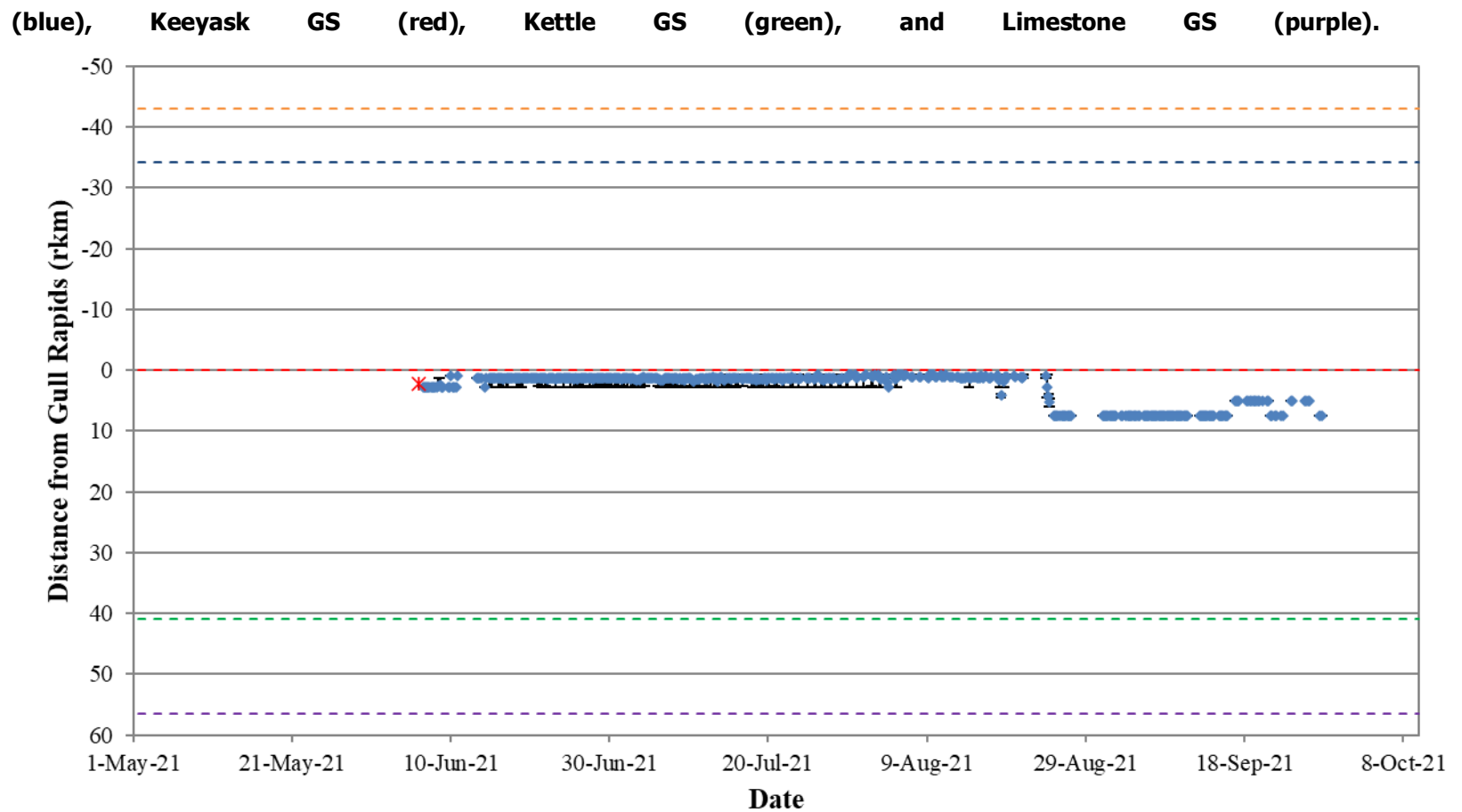


Figure A5-22: Position of a Walleye tagged with an acoustic transmitter (code #48256) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

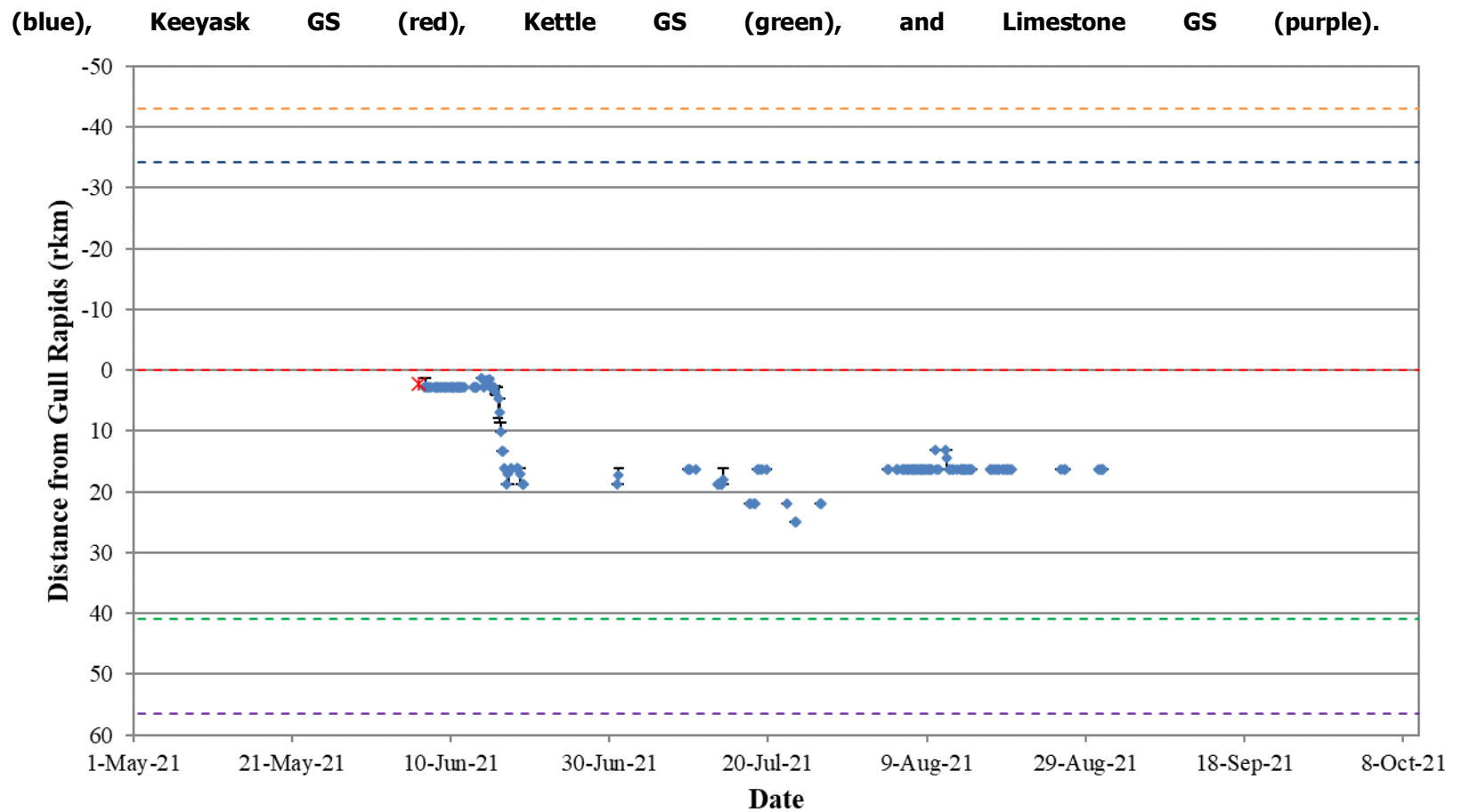


Figure A5-23: Position of a Walleye tagged with an acoustic transmitter (code #48257) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

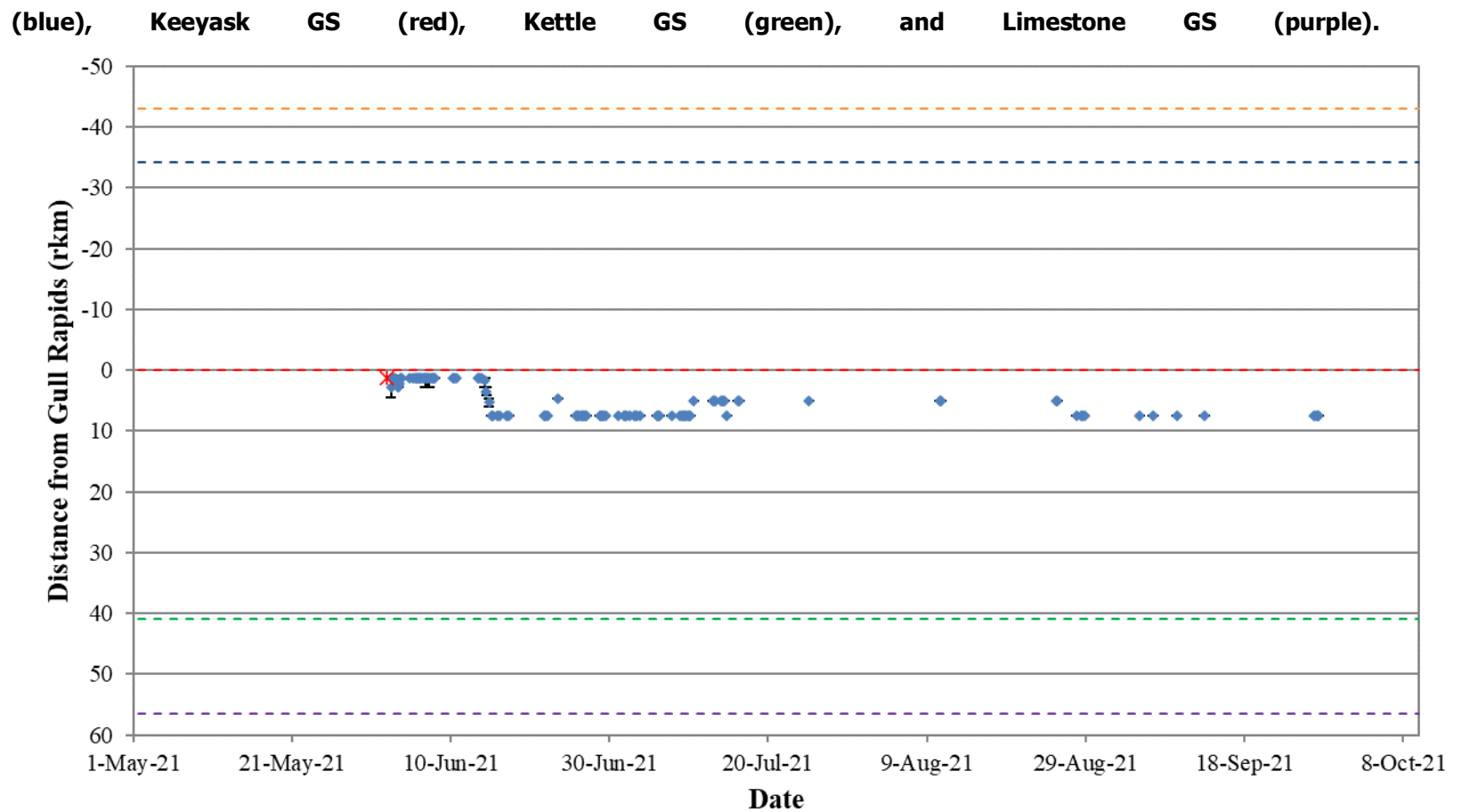


Figure A5-24: Position of a Walleye tagged with an acoustic transmitter (code #48272) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

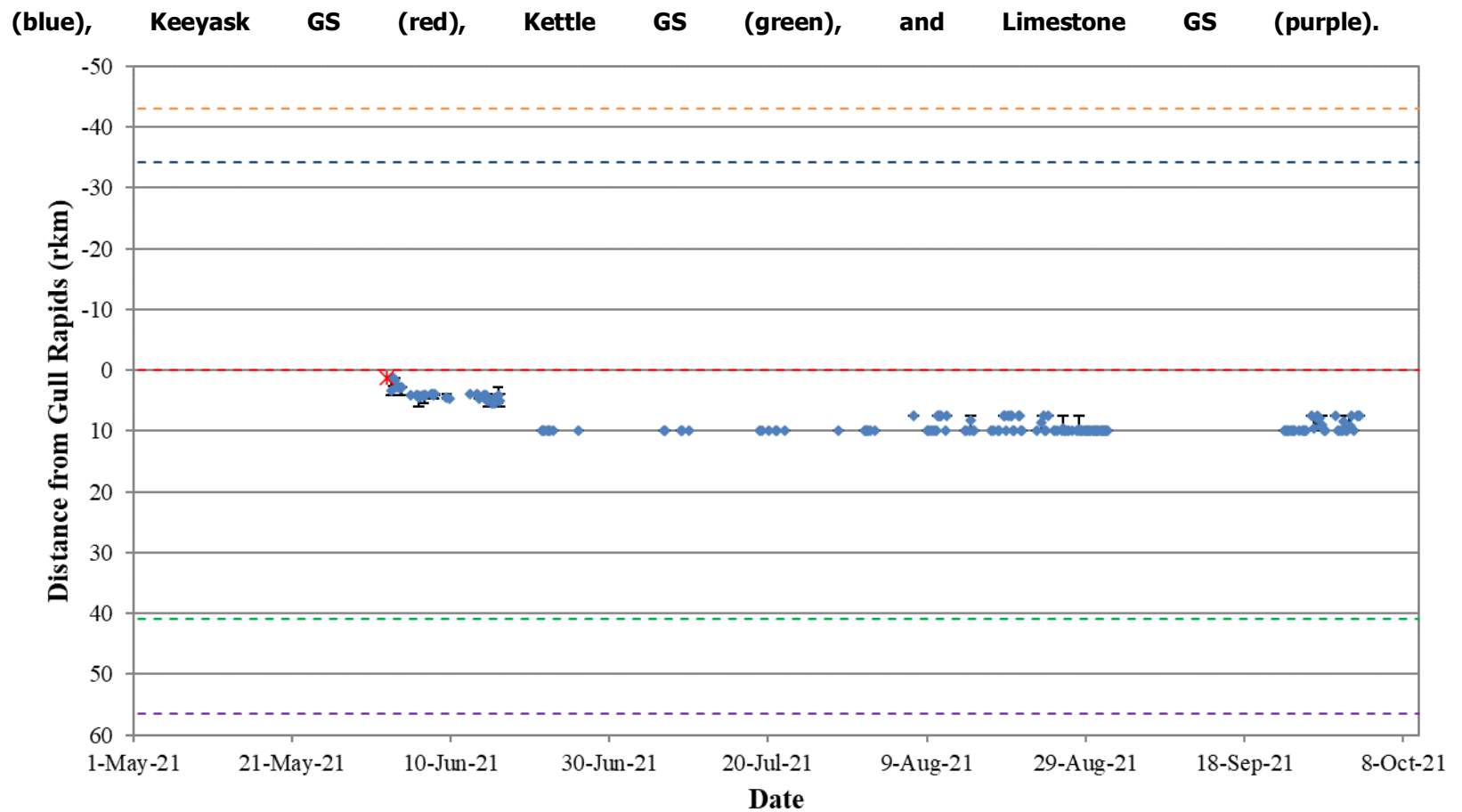


Figure A5-25: Position of a Walleye tagged with an acoustic transmitter (code #48273) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

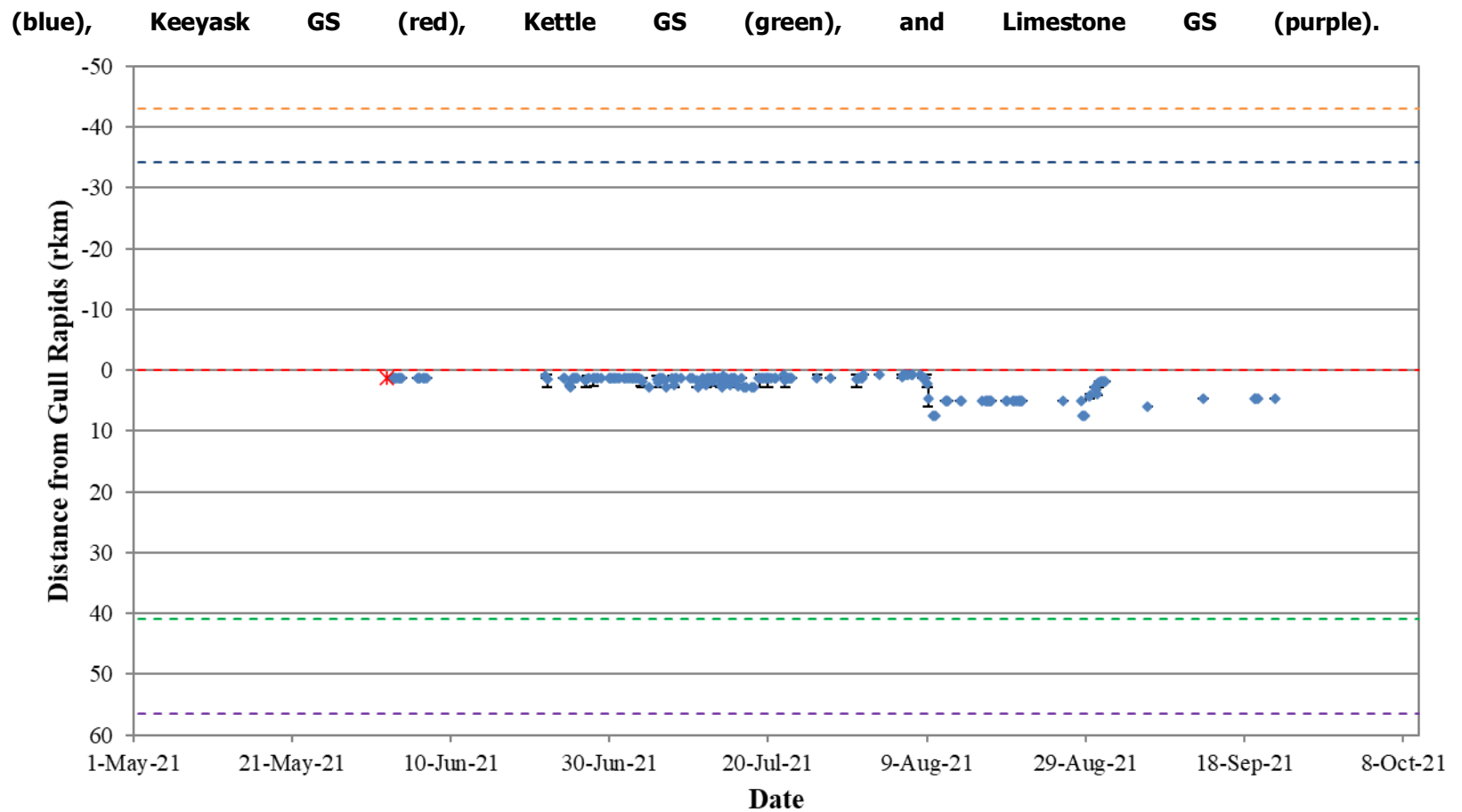


Figure A5-26: Position of a Walleye tagged with an acoustic transmitter (code #48274) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

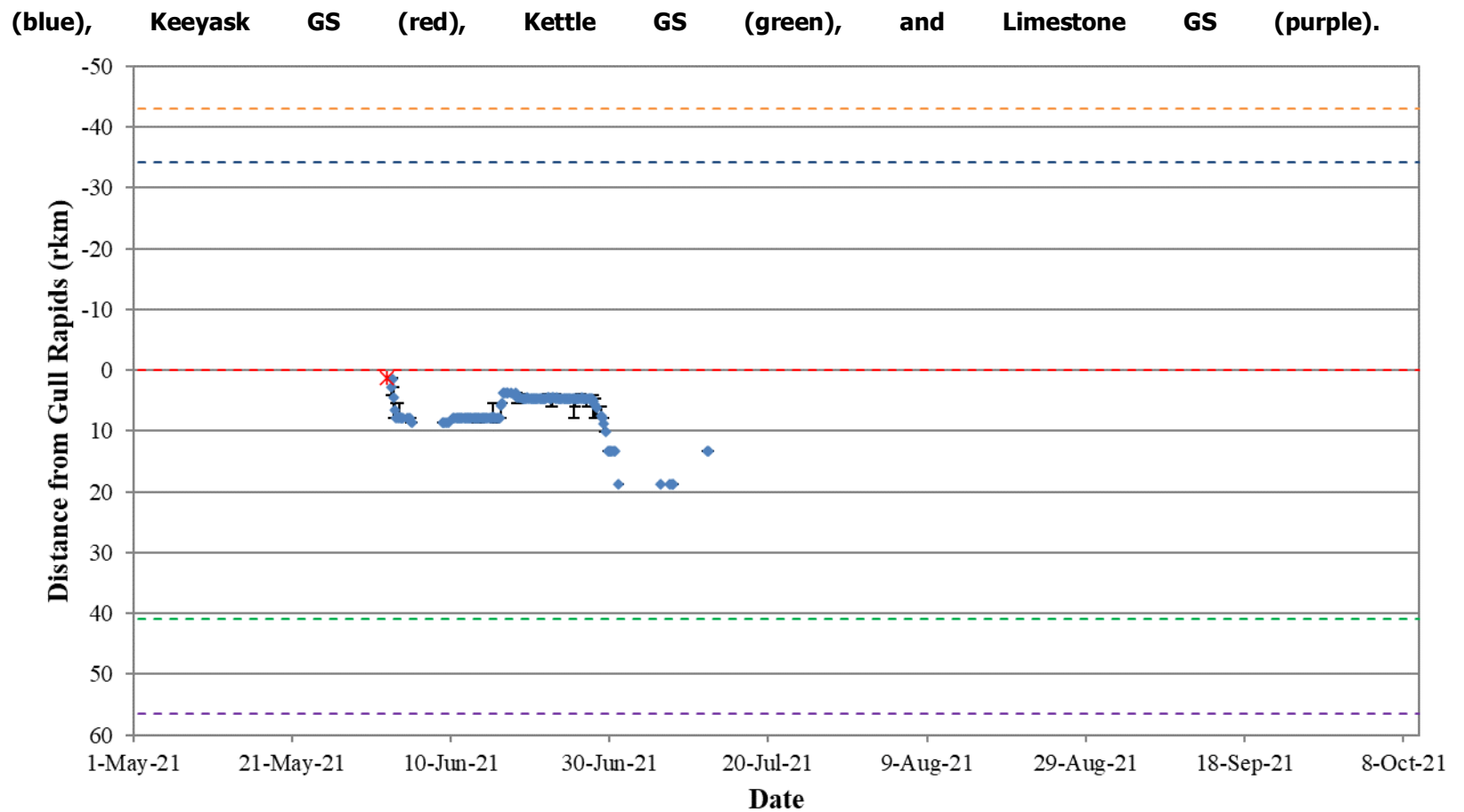


Figure A5-27: Position of a Walleye tagged with an acoustic transmitter (code #48275) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

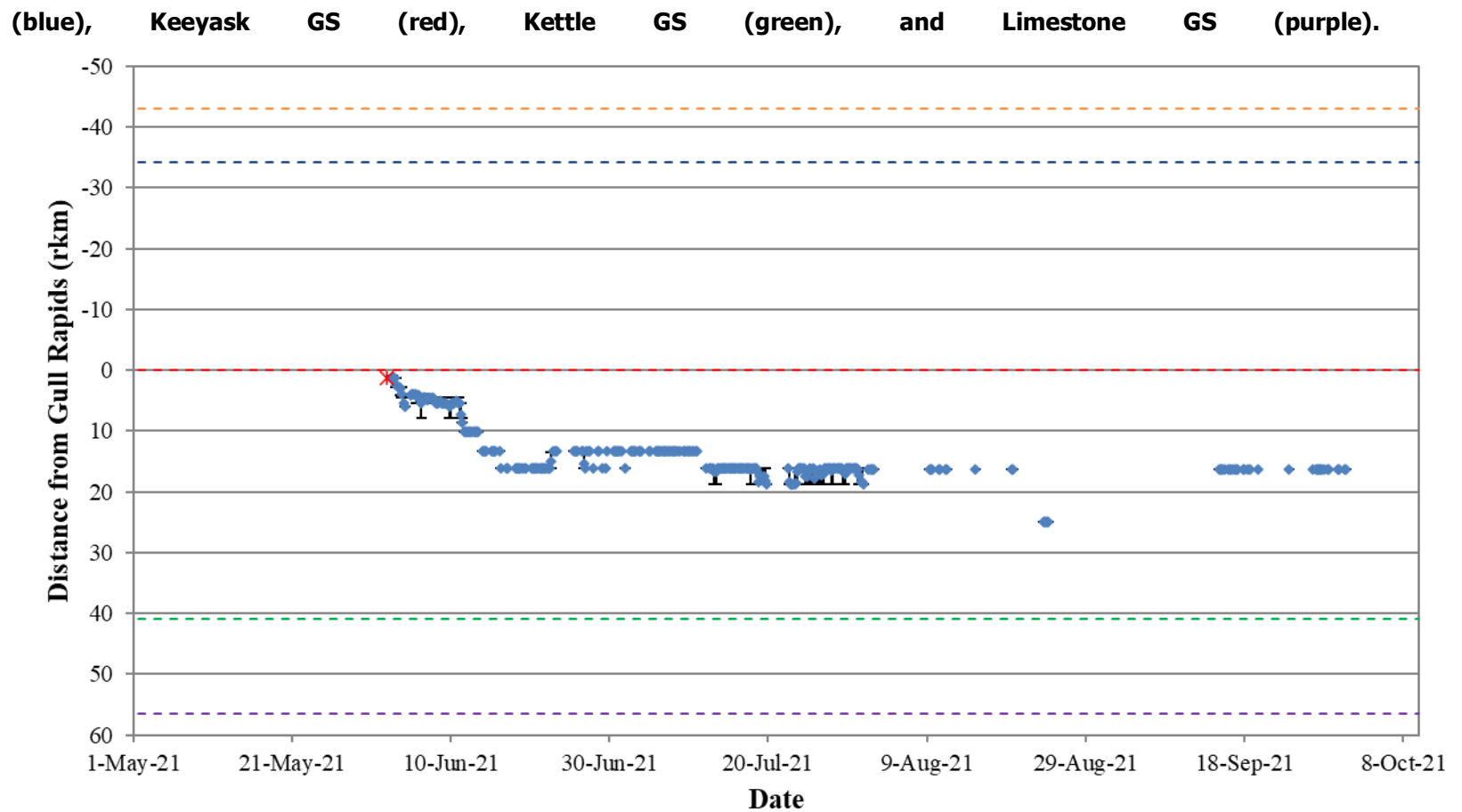


Figure A5-28: Position of a Walleye tagged with an acoustic transmitter (code #48318) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

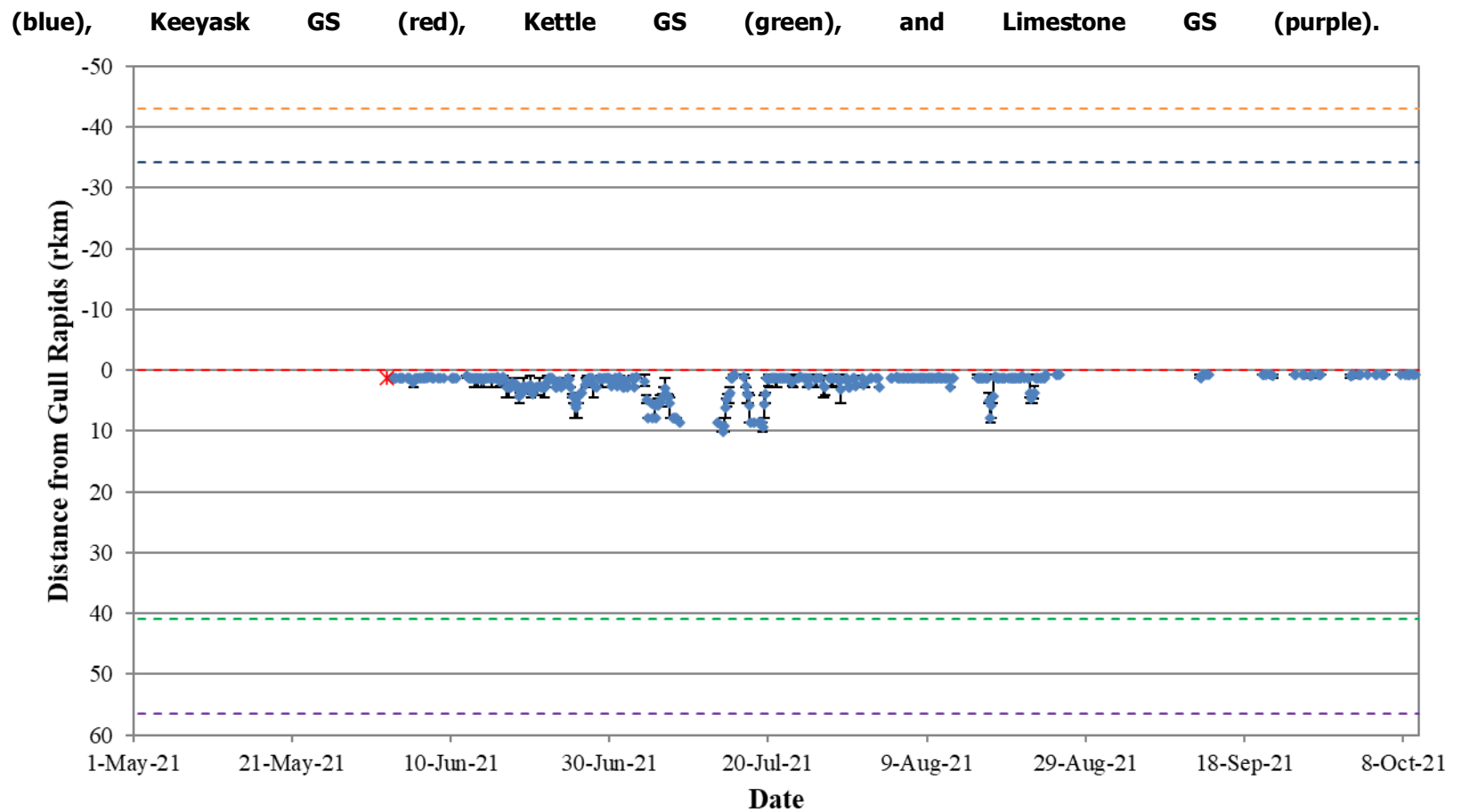


Figure A5-29: Position of a Walleye tagged with an acoustic transmitter (code #48324) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids

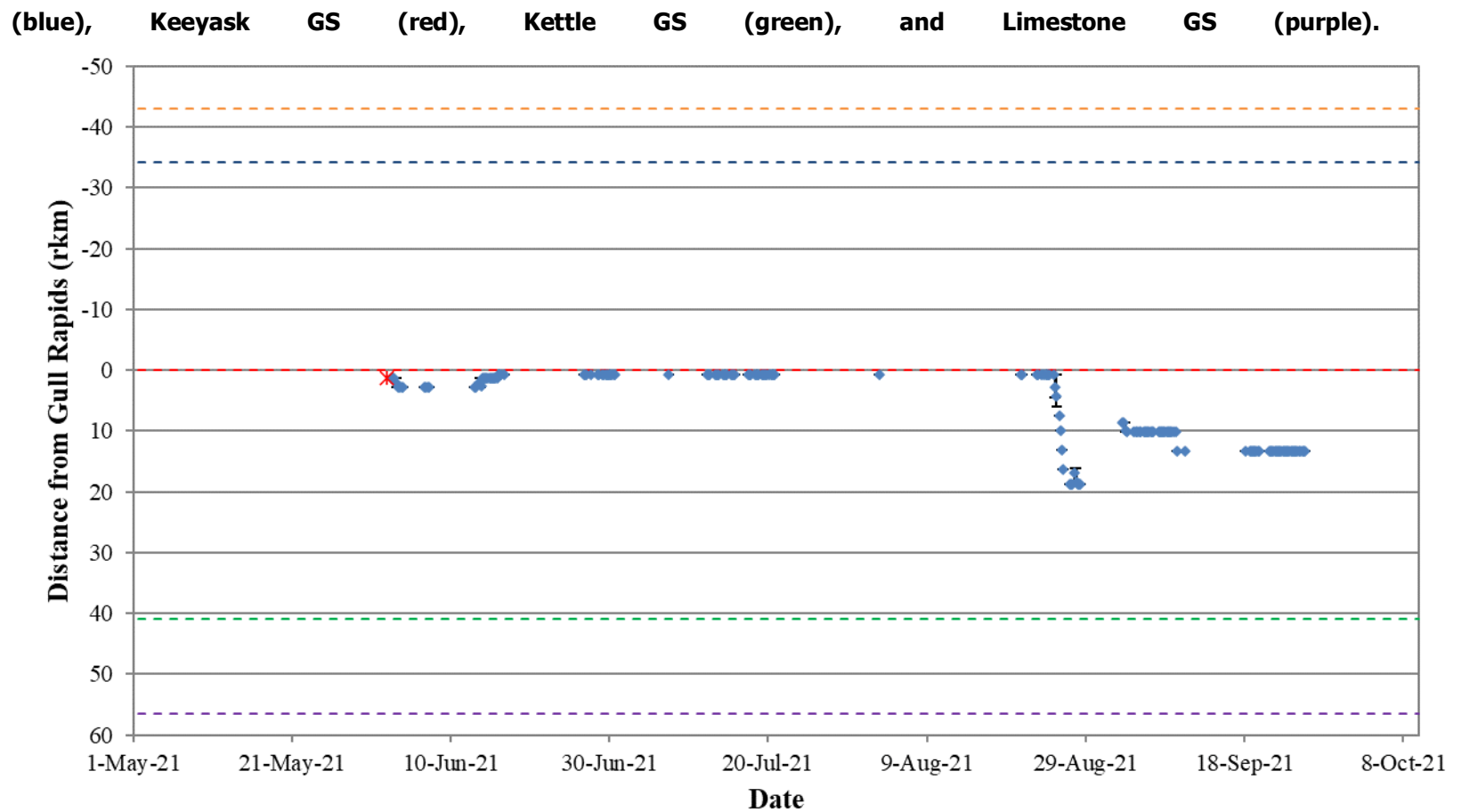


Figure A5-30: Position of a Walleye tagged with an acoustic transmitter (code #48325) in the Nelson River in Stephens Lake in relation to the Keeyask GS (rkm 0) from May 1 to October 10, 2021. Date and location of tagging is indicated by a star. Dotted horizontal lines indicate landmarks in the study area: entrance to Clark Lake (orange), Birthday Rapids (blue), Keeyask GS (red), Kettle GS (green), and Limestone GS (purple).

APPENDIX 6: BIOLOGICAL AND TAG INFORMATION FOR WALLEYE TAGGED UPSTREAM AND DOWNSTREAM OF THE KEEYASK GS

Table A6-1:	Tag and biological information for each Walleye acoustically tagged upstream of the Keeyask GS between 2018 and 2021.	233
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Table A6-1: Tag and biological information for each Walleye acoustically tagged upstream of the Keeyask GS between 2018 and 2021.

Acoustic Tag #	Floy Tag #	Tagging Date	Tag Life (days)	Expiry Date	Fork Length (mm)	Weight (g)
25739	109719	5-Jun-18	1735	6-Mar-23	410	800
25740	109718	5-Jun-18	1735	6-Mar-23	388	550
25742	109712	5-Jun-18	1735	6-Mar-23	320	400
25743	109713	5-Jun-18	1735	6-Mar-23	442	925
25744	109715	5-Jun-18	1735	6-Mar-23	525	1575
25745	109716	5-Jun-18	1735	6-Mar-23	438	850
25746	109717	5-Jun-18	1735	6-Mar-23	504	1750
25747	109704	28-May-18	1735	26-Feb-23	374	575
25748	109706	28-May-18	1735	26-Feb-23	398	525
25749	109705	28-May-18	1735	26-Feb-23	393	550
25750	109710	1-Jun-18	1735	2-Mar-23	403	725
25751	109711	5-Jun-18	1735	6-Mar-23	343	450
25752	109701	27-May-18	1735	25-Feb-23	404	700
25753	109702	27-May-18	1735	25-Feb-23	356	425
25754	109703	27-May-18	1735	25-Feb-23	367	550
25755	109708	1-Jun-18	1735	2-Mar-23	396	775
25756	109709	1-Jun-18	1735	2-Mar-23	452	1050
20147	114247	5-Jun-19	1492	6-Jul-23	523	1769
20148	114246	5-Jun-19	1492	6-Jul-23	383	590
20149	114245	6-Jun-19	1492	7-Jul-23	335	450
20150	114249	5-Jun-19	1492	6-Jul-23	500	1300
20151	114250	5-Jun-19	1492	6-Jul-23	485	1400
20153	114239	6-Jun-19	1492	7-Jul-23	498	1450
20154	114240	6-Jun-19	1492	7-Jul-23	415	800
20155	114241	6-Jun-19	1492	7-Jul-23	417	800
20156	114242	6-Jun-19	1492	7-Jul-23	299	300
20157	114243	6-Jun-19	1492	7-Jul-23	447	1000
20158	114244	6-Jun-19	1492	7-Jul-23	288	300
20159	114231	7-Jun-19	1492	8-Jul-23	500	1500
20160	114232	7-Jun-19	1492	8-Jul-23	415	800
20161	114226	7-Jun-19	1492	8-Jul-23	446	950
20162	114236	6-Jun-19	1492	7-Jul-23	300	300
20163	114237	6-Jun-19	1492	7-Jul-23	363	600
20164	114238	6-Jun-19	1492	7-Jul-23	343	500
20168	114775	7-Jun-19	1492	8-Jul-23	429	850
20169	114233	7-Jun-19	1492	8-Jul-23	391	550
20170	114235	6-Jun-19	1492	7-Jul-23	365	400
20171	114647	27-May-19	1492	27-Jun-23	386	600
20175	114642	29-May-19	1492	29-Jun-23	374	580
20176	114645	29-May-19	1492	29-Jun-23	419	900
20181	114644	29-May-19	1492	29-Jun-23	345	500
20182	-	25-May-19	1492	25-Jun-23	311	350
20186	114641	29-May-19	1492	29-Jun-23	350	450

Table A6-1: Tag and biological information for each Walleye acoustically tagged upstream of the Keeyask GS between 2018 and 2021 (continued)

Acoustic Tag #	Floy Tag #	Tagging Date	Tag Life (days)	Expiry Date	Fork Length (mm)	Weight (g)
20187	114649	23-May-19	1492	23-Jun-23	320	-
20188	114650	23-May-19	1492	23-Jun-23	380	-
48244	121601	3/Jun/21	1460	2-Jun-25	385	720
48258	121628	5/Jun/21	1460	4-Jun-25	438	920
48259	121627	5/Jun/21	1460	4-Jun-25	431	1000
48260	121626	5/Jun/21	1460	4-Jun-25	474	1220
48261	121520	7/Jun/21	1460	6-Jun-25	422	1050
48262	121513	10/Jun/21	1460	9-Jun-25	320	475
48263	121536	14/Jun/21	1460	13-Jun-25	392	710
48264	121614	5/Jun/21	1460	4-Jun-25	516	1870
48265	121619	5/Jun/21	1460	4-Jun-25	460	1270
48266	121624	5/Jun/21	1460	4-Jun-25	538	1700
48267	121625	5/Jun/21	1460	4-Jun-25	488	1440
48268	121623	5/Jun/21	1460	4-Jun-25	452	1160
48269	121622	5/Jun/21	1460	4-Jun-25	475	1280
48270	121612	5/Jun/21	1460	4-Jun-25	505	1700
48271	121613	5/Jun/21	1460	4-Jun-25	497	1500
48313	116422	31/May/21	1460	30-May-25	541	2100
48314	116425	31/May/21	1460	30-May-25	435	1000
48319	116419	31/May/21	1460	30-May-25	363	580
48320	116420	31/May/21	1460	30-May-25	386	740
48321	116423	31/May/21	1460	30-May-25	474	1350
48322	116424	31/May/21	1460	30-May-25	393	640
48323	116418	31/May/21	1460	30-May-25	327	490
48326	116417	31/May/21	1460	30-May-25	319	500
48327	122261	1/Jun/21	1460	31-May-25	350	500
48328	116421	31/May/21	1460	30-May-25	440	1250
48329	122266	1/Jun/21	1460	31-May-25	420	850
48330	122255	1/Jun/21	1460	31-May-25	360	570
48331	122254	1/Jun/21	1460	31-May-25	355	520
48332	122270	1/Jun/21	1460	31-May-25	398	770
48333	116416	31/May/21	1460	30-May-25	349	500

Table A6-2: Tag and biological information for each Walleye acoustically tagged upstream of the Keeyask GS between 2018 and 2021.

Acoustic Tag #	Floy Tag #	Tagging Date	Tag Life (days)	Expiry Date	Fork Length (mm)	Weight (g)
25732	90279	9-Jun-18	1735	10-Mar-23	415	525
25734	90277	7-Jun-18	1735	8-Mar-23	395	600
25735	109725	6-Jun-18	1735	7-Mar-23	468	1250
25736	90276	7-Jun-18	1735	8-Mar-23	482	1400
25737	109722	6-Jun-18	1735	7-Mar-23	390	650
25738	109721	6-Jun-18	1735	7-Mar-23	569	1725
25741	109720	6-Jun-18	1735	7-Mar-23	409	625
20129	114779	3-Jun-19	1492	4-Jul-23	363	500
20130	114785	1-Jun-19	1493	3-Jul-23	340	450
20131	114646	31-May-19	1494	3-Jul-23	530	1500
20132	114786	1-Jun-19	1495	5-Jul-23	320	400
20133	114796	31-May-19	1496	5-Jul-23	477	1200
20134	114795	31-May-19	1497	6-Jul-23	500	1450
20135	114783	1-Jun-19	1498	8-Jul-23	330	400
20136	114787	1-Jun-19	1499	9-Jul-23	472	1100
20137	114797	31-May-19	1500	9-Jul-23	482	1450
20138	114794	31-May-19	1501	10-Jul-23	451	1350
20139	114800	31-May-19	1502	11-Jul-23	439	900
20140	114799	31-May-19	1503	12-Jul-23	367	600
20141	114639	31-May-19	1504	13-Jul-23	433	850
20142	114798	31-May-19	1505	14-Jul-23	471	1300
20143	114792	1-Jun-19	1506	16-Jul-23	415	900
20144	114784	1-Jun-19	1507	17-Jul-23	367	550
20145	114782	1-Jun-19	1508	18-Jul-23	426	850
20152	114636	31-May-19	1509	18-Jul-23	479	1150
20165	117592	16-Sep-19	1510	4-Nov-23	465	1200
20167	117590	16-Sep-19	1511	5-Nov-23	420	800
20171	114647	27-May-19	1492	27-Jun-23	386	600
20172	114632	30-May-19	1512	20-Jul-23	470	1200
20173	114633	30-May-19	1513	21-Jul-23	470	1350
20174	114634	30-May-19	1514	22-Jul-23	502	1350
20177	114630	30-May-19	1515	23-Jul-23	460	1300
20178	114631	30-May-19	1516	24-Jul-23	499	1600
20179	114637	30-May-19	1517	25-Jul-23	453	1000
20180	114638	30-May-19	1518	26-Jul-23	520	1500
20183	114635	30-May-19	1519	27-Jul-23	455	850
20184	114628	30-May-19	1520	28-Jul-23	392	700
20185	114629	30-May-19	1521	29-Jul-23	390	650
48234	116450	2/Jun/21	1460	1-Jun-25	761	2550
48235	116449	2/Jun/21	1460	1-Jun-25	454	1070
48236	116448	2/Jun/21	1460	1-Jun-25	462	1320
48237	116447	2/Jun/21	1460	1-Jun-25	402	720
48238	116446	2/Jun/21	1460	1-Jun-25	348	490

Table A6-2: Tag and biological information for each Walleye acoustically tagged upstream of the Keeyask GS between 2018 and 2021 (continued).

Acoustic Tag #	Floy Tag #	Tagging Date	Tag Life (days)	Expiry Date	Fork Length (mm)	Weight (g)
48239	116445	2/Jun/21	1460	1-Jun-25	337	400
48240	116444	2/Jun/21	1460	1-Jun-25	428	1000
48241	116443	2/Jun/21	1460	1-Jun-25	370	600
48242	117975	2/Jun/21	1460	1-Jun-25	422	950
48243	117974	2/Jun/21	1460	1-Jun-25	397	840
48245	117971	4/Jun/21	1460	3-Jun-25	440	825
48246	122126	6/Jun/21	1460	5-Jun-25	422	750
48247	117970	5/Jun/21	1460	4-Jun-25	412	650
48248	122127	6/Jun/21	1460	5-Jun-25	340	450
48249	122046	6/Jun/21	1460	5-Jun-25	350	450
48250	122047	6/Jun/21	1460	5-Jun-25	481	1250
48251	116433	2/Jun/21	1460	1-Jun-25	365	600
48252	122147	6/Jun/21	1460	5-Jun-25	484	1350
48253	122150	6/Jun/21	1460	5-Jun-25	391	675
48254	122149	6/Jun/21	1460	5-Jun-25	430	1000
48255	122148	6/Jun/21	1460	5-Jun-25	460	950
48256	122045	6/Jun/21	1460	5-Jun-25	472	1100
48257	122128	6/Jun/21	1460	5-Jun-25	485	1300
48272	116435	2/Jun/21	1460	1-Jun-25	345	550
48273	116437	2/Jun/21	1460	1-Jun-25	380	580
48274	116434	2/Jun/21	1460	1-Jun-25	362	600
48275	116436	2/Jun/21	1460	1-Jun-25	433	810
48318	116431	2/Jun/21	1460	1-Jun-25	415	875
48324	116429	2/Jun/21	1460	1-Jun-25	353	500
48325	116432	2/Jun/21	1460	1-Jun-25	350	600