



Keeyask Generation Project Aquatic Effects Monitoring Plan

Walleye Movement Monitoring Report

AEMP-2016-03



KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING PLAN

REPORT #AEMP-2016-03

WALLEYE MOVEMENT MONITORING IN THE NELSON RIVER BETWEEN CLARK LAKE AND THE LONG SPRUCE GENERATING STATION, OCTOBER 2014 TO OCTOBER 2015: YEAR 2 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. During August and September, the flow in the north and central channels of Gull Rapids was blocked off and all the flow was diverted to the south channel. Cofferdams were constructed in the north and central channels and these channels were dewatered by fall (see construction site map below). The combination of high natural flows in the Nelson River and diversion of flow resulted in water levels on Gull Lake increasing about 1.3 m at the water level monitoring site at Caribou Island. The rise in water levels resulted in flooding along the shoreline and in low-lying areas. During the winter, a cofferdam was constructed extending into the south channel. During the spring of 2015, flows in the Nelson River decreased and water level on Gull Lake went down to pre-construction high water levels.

This report evaluates Walleye movement during the 2014/2015 ice on and 2015 open water period. It also provides a summary of what has been observed to date with respect to Walleye movement since the monitoring program was initiated in June 2013. 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 they are: of commercial and domestic importance; abundant in the Keeyask Area; known to pass through Gull Rapids in either direction; and resilient enough to survive the acoustic tagging procedure.

Results from monitoring will be used to better understand fish movements in the study area and to address the potential impacts of construction of the Keeyask GS on Walleye populations.

Why is the monitoring being done?

Monitoring is being done to address several questions:

How many of the Walleye that are near Gull Rapids move through the rapids each year and when are they moving?

Movement studies tell us how many Walleye are moving through Gull Rapids (upstream and downstream) between Gull and Stephens lakes, and when the fish are making these movements. Recording where fish move during construction tells us how close the fish are to construction activities, which is important because fish moving past the construction site may be harmed.

Do Walleye move up and down over Gull Rapids to reach habitat that they need to complete their life cycle?

If Walleye can't reach spawning sites because their movements are blocked by the GS, then it would harm their overall population. This study will help determine whether or not Walleye need to cross Gull Rapids to spawn.

Do Walleye stay near or move away from the construction area and, if so, how far?

If Walleye are in the river right where a cofferdam is being built, they could be harmed by higher than normal concentrations of mud in the water or trapped inside an area that will be drained. Another possibility is that Walleye could move away from the construction site and be lost from the local population.

What was done?

The 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 Long Spruce Generating Station (see study area map below). Each fish is given a transmitter that sends out a unique ping, and the pings can be detected up to 1 km away from a receiver. By looking at the pings recorded by different receivers, the movement of each fish can be tracked. The transmitters are powered by batteries with a three-year life-span. Eighty Walleye were tagged, 40 upstream and 40 downstream of Gull Rapids.



Walleye ready for acoustic tag implanting.

What was found?

How far, and where Walleye moved depended on the individual fish, whether they lived upstream of Gull Rapids (in Gull Lake) or downstream of Gull Rapids (in Stephens Lake), and the season.

Walleye tagged upstream of Gull Rapids tended to stay in open lake areas such as Gull Lake and Clark Lake instead of the more fast flowing environments of the Nelson River. Most Walleye either stayed primarily in Gull Lake or moved between Gull Lake and Clark Lake, spending various amounts of time at both locations. In terms of upstream movement, in 2014, one fish moved from Gull Lake, through Clark Lake and Split Lake, and was caught by a local angler in the Odei River, almost 100 km from its original release location. In terms of downstream movement, so far five of the fish tagged (2 in 2014; 3 in 2015) upstream of Gull Rapids have moved downstream through the rapids. In 2015, one of these moved downstream through Kettle GS and into the Long Spruce Reservoir.

Downstream of Gull Rapids, the majority of the tagged fish have remained in Stephens Lake. One moved upstream over Gull Rapids in late August through early September of 2013 and continued upstream through Gull Lake into Clark Lake. Another two survived passage downstream through the Kettle GS. Walleye are frequently detected by the receivers immediately downstream of Gull Rapids and in the upper 6 km of Stephens Lake.

What does it mean?

Based on the information collected so far and the fact that construction has just begun it is too early to know whether or not Walleye movements or habitat use have been affected by construction of the GS. After 2.5 years of study, we have seen that approximately 12% of Walleye tagged upstream of Gull Rapids have moved downstream past the place where the Keeyask GS will be built, and 2.5% of tagged Walleye in Stephens Lake have moved upstream. Movements of Walleye may change after the GS is built because Gull Lake will become part of a reservoir and suitable areas for Walleye to spawn might only be found where the river is still fast flowing.

What will be done next?

The tags that were implanted in 2013 will last until 2016 while those implanted in 2014 will last until 2017. New transmitters will be inserted in 2016 and 2017, providing movement monitoring information for the remainder of the construction phase of the GS. Tracking individual fish over this period of time will give us a better idea of what kinds of habitats these fish need to use over many years, including times when they are spawning and times when they are feeding. Tracking will also show where fish are relative to instream construction and if there is the potential that they could be at risk as a result of various construction activities.

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1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull 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, fish community, specifically Walleye (*Sander vitreus*) movement, for the construction and operation phases of the Project.

Pre-construction (baseline) movements of Walleye, Northern Pike (*Esox lucius*), and Lake Whitefish (*Coregonus clupeaformis*) were monitored from 2001 to 2005 (Barth *et al.* 2003; Murray *et al.* 2005; Murray and Barth 2007). Long-term acoustic telemetry studies were initiated in 2011 to assess adult Lake Sturgeon (*Acipenser fulvescens*) movements in the Keeyask Study Area (Hrenchuk and McDougall 2012; Hrenchuk and Barth 2013a). In that study, 60 adult Lake Sturgeon were tagged with 10-year acoustic transmitters to monitor their movements during the pre-construction, construction, and operation phases of the Keeyask GS Project. In 2013, 40 subadult Lake Sturgeon and 80 Walleye were tagged with acoustic transmitters to assess their frequency of movement through Gull Rapids and to monitor the potential impact construction of the Keeyask GS had on these movements (Hrenchuk and Barth 2014a,b). In fall 2014, 60 adult Lake Whitefish were tagged with three-year acoustic transmitters to provide information on the movements of this species in the Keeyask Study Area. Movements of these whitefish during fall 2014 (from September 25 to October 25) are provided in Hrenchuk and Barth (2015b), and their movements over a one-year period (from October 15, 2014 to October 11, 2015) are presented in this report.

Construction of the Project may affect Walleye movements in the main flow of the Nelson River near the construction site by blocking movements through the placement of cofferdams, altering flow patterns, and creating disturbances (e.g., blasting) that may increase emigration from the construction area. The broad objective of Walleye movement monitoring is to better understand their movements and habitat use in the Keeyask Study Area during generating station construction, with particular focus on movements in the vicinity of Gull Rapids. This report

provides results of Walleye movement monitoring from October 2014 to October 2015 and summarizes what has been observed since the program began in 2013.

As presented in the AEMP, the key questions to be answered about Walleye movement monitoring during construction of the Keeyask GS are:

- What is the number (or proportion) of tagged Walleye that move past the construction site?
- Are Walleye utilizing habitat in the vicinity of construction activities (particularly during spawning)?

2.0 THE KEEYASK STUDY SETTING

The study area encompasses an approximately 95 km long reach of the Nelson River from Clark Lake to the upstream end of the Long Spruce GS forebay. This section of river offers a diversity of physical habitat conditions, including a variety of substrate types, and variable water depths (ranging from 0 to 30 m) and velocities. Water velocities were classified as low (0.2–0.5 m/s), moderate (0.5–1.5 m/s), or high (>1.5 m/s), as described in the Keeyask AE SV.

Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of 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.

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

Gull Lake is a section of the Nelson River where the river widens, with moderate to low water velocity. Gull Lake is herein defined as the reach of the Nelson River beginning approximately 17 km upstream of Gull Rapids and 14 km downstream of Birthday Rapids, where the river widens to the north into a bay around a large point of land (Map 1), and extending to the downstream end of Caribou Island, approximately 3 km upstream of Gull Rapids. Gull Lake has three distinct basins, the first extending from the upstream end of the lake downstream approximately 6 km to a large island; the second extending from the large island to Morris Point (a constriction in the river immediately upstream of Caribou Island); and the third extending from Morris Point to the downstream end of Caribou Island (Map 1).

Gull Rapids is located approximately 3 km downstream of Caribou Island on the Nelson River (Map 1). Two large islands and several small islands occur within the rapids, prior to the river narrowing. The rapids are approximately 2 km in length, and the river elevation drops approximately 11 m along its 2 km length. This is the location where the Keeyask GS is currently under construction. For a summary of 2014/2015 construction activities, refer to Section 2.1.

Just below Gull Rapids, the Nelson River enters Stephens Lake. Stephens Lake was formed in 1971 by construction of the Kettle GS. Between Gull Rapids and Stephens Lake there is an approximately 6 km long reach of the Nelson River that, although affected by water regulation at the Kettle GS, remains riverine habitat with moderate velocity. 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 4). 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 Gull Rapids.

Long Spruce Forebay 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 Forebay, with both tributaries entering the Forebay on the south shore.

2.1 2014/2015 CONSTRUCTION SUMMARY

Construction of the Keeyask GS began in mid-July 2014 with the construction of the Quarry Cofferdam in the north channel of Gull Rapids. In August, the North Channel Rock Groin and North Channel Cofferdam were constructed to diverted flow from the north and central channels of Gull Rapids to the south channel. The north and central channels were gradually dewatered by late fall 2014. The Stage 1 Powerhouse Cofferdam was constructed in the fall to permit excavation of the powerhouse. Construction of the Central Dam Cofferdam rock groins began the fall of 2014 and was completed the summer of 2015. During the winter of 2014/15 high flows in the Nelson River and partial failure of the ice boom resulted in high water levels in Gull Rapids which required some cofferdams to be raised. The North Channel Rock Groin was extended into the south channel of Gull Rapids during the winter 2014/15 to raise the water level on Gull Lake to promote the formation of a stable ice cover. The groin extension was partially removed in 2015. Construction of the spillway cofferdam, which extends into the south channel of Gull Rapids, began in early winter 2015 and was completed by late summer. Dewatering of the spillway cofferdam occurred in summer/fall 2015. The configuration of cofferdams as of mid-summer 2015 is shown on Map 2.

During July and August 2015, additional ice booms were installed in Gull Lake so that a stable ice cover would develop upstream of the construction site (as noted above, the previous ice boom had partially failed during the winter of 2014/2015). Map 3 illustrates the location of the new ice booms, which are held in place by anchors drilled into the bedrock below the river bottom.

Due to high flows in the Nelson River (almost a 1:20 year flow event) and the construction of the North Channel Rock Groin, water levels in Gull Lake rose to between 155 m ASL and 156 m ASL during late summer 2014. This resulted in water levels above the existing environment 95th percentile water level for open-water (154.2 m ASL) until the following spring (Manitoba Hydro 2015). Open water levels on Gull Lake in the existing environment were as high as 155 m and surpassed 156 m during winter on occasion. The amount of land inundated during the 2014-2015 period is not known, but based on estimates of flooded areas expected in the later stages of construction (as presented in the Environmental Impact Statement), this area likely included

the nearshore areas of much of Gull Lake and some localized areas in and around Gull Rapids, as well as low-lying areas that extended further inland. Water levels during the open-water season of 2015 declined due to lower discharge in the Nelson River. Water levels on Gull Lake ranged from 154 m ASL to 155 m ASL in 2015, and inundated areas were likely confined to localized sections of low-lying areas around Gull Lake.

Blasting at quarries within the north channel cofferdam has been on-going throughout the construction period, with blasts occurring every one to two weeks.

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 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 is stored in the receiver.

3.1.1 ACOUSTIC TRANSMITTER APPLICATION

Acoustic transmitters (Vemco V13-1x, estimated 1141 day battery life) were first applied to 80 Walleye in 2013: 40 upstream, and 40 downstream of Gull Rapids (Table 1). By fall 2013 it was suspected that 11 fish either shed their tags, suffered mortality, or had been captured by local resource users and the tags were not returned or reported captured. In order to return the number of tagged fish to the original sample size, additional transmitters were applied to Walleye upstream of Gull Rapids ($n = 9$) and in Stephens Lake ($n = 2$) in June 2014 (Murray *et al.* 2015).

3.1.2 ACOUSTIC RECEIVERS AND DEPLOYMENT

During the 2013, 2014 and 2015 open-water seasons, 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 (see Hrenchuk and Barth 2014; Murray *et al.* 2015). At constrictions within the river channel, a series of receivers were deployed to create “gates” with the intent of recording any fish that passed by the river cross-section. In Stephens Lake, receivers were placed at locations within pre-flood river channels, based on the observation that fish tend to stay within channels, even in flooded environments.

The retrieval of receivers deployed during winter has proved challenging and several were lost in previous winters that were believed to have been moved by ice (Hrenchuk and Barth 2014; Murray *et al.* 2015). Because it appears that receivers will only remain safe from ice if deployed at depths > 10 m, the number of possible receiver locations during winter, especially in Gull Lake, is limited.

3.1.2.1 WINTER 2014/2015

Twenty stationary acoustic receivers (VEMCO model VR2 and VR2W, Shad Bay, Nova Scotia) were placed between Clark Lake and the Long Spruce GS during the winter 2014/2015 period (October 13, 2014 to April 30, 2015) (maps 4, 5, and 6). Four were set upstream of Gull Rapids, 15 throughout Stephens Lake, and one in the Long Spruce Forebay.

From January 14 to 21, acoustic tracking was conducted to assess the abundance of tagged fish in the vicinity of two potential ice blasting locations in Gull Lake (Manitoba Hydro 2015). Additional movement information acquired during this tracking event are provided in Section 4.0 and a full summary of results are provided in Hrenchuk and Barth (2016).

3.1.2.2 OPEN-WATER 2015

An array of 56 stationary receivers was used during the 2015 open-water period (May 1 to October 11, 2015). Twenty-five receivers were set between Clark Lake and Gull Rapids, 27 in Stephens Lake, and four in the Long Spruce Reservoir (maps 7, 8 and 9).

Receiver “gates” were deployed in several key areas: four between Clark Lake and Gull Rapids (44, 34, 19, and 10 rkms upstream of Gull Rapids), and two in Stephens Lake (4.5 and 40 rkms downstream of Gull Rapids) (maps 7 and 8). Receiver “gates” consisted of two or more acoustic receivers set parallel to flow to provide complete signal coverage of a river cross-section. Areas between the “gates” were referred to as river zones. The area upstream of Gull Rapids was divided into five zones (Map 7), while Stephens Lake was divided into two zones (Map 8). Gate locations were consistent with the 2013 and 2014 open-water study periods, and divided the river into the same zones. On October 11, 2015, the majority of receivers were removed and a subset ($n = 21$) were redeployed to monitor movements during winter 2015/2016.

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 a different behaviour or movement pattern for monitored fish.

Movements were described in terms of rkm distance, with the base of Gull Rapids representing a distance of 0 rkm. Detections in the area downstream of Gull Rapids (*i.e.*, Stephens Lake, Long Spruce Forebay) were given positive (+) distance values from Gull Rapids, while detections made in the area upstream (*i.e.*, Gull and Clark lakes) were given negative (-) distance values (Figures 1 and 2). The average rkm distance from Gull Rapids was calculated

over a 4-hour interval and plotted versus time for each fish. Total relocation ranges were calculated by subtracting the furthest downstream detection location from the location of the furthest upstream detection. Proportion of time all fish spent within each river zone was calculated and plotted.

4.0 RESULTS

Maps 4 through 9 and Figures 1 and 2 provide the locations of stationary receiver and the distance in river kilometers (rkm) of each receiver relative to Gull Rapids during both the 2014/2015 winter season and the 2015 open-water season. A detection summary for each tagged Walleye by season and year, including farthest upstream and downstream detection location are provided in Figures 3 to 6 and Appendix 1. Proportional distribution analyses, as well as seasonal movement summaries by tagging location (upstream or downstream of Gull Rapids), are provided in Figures 7 to 10. Individual movement summaries, which include the current reporting year and all relocation data for each fish since the study began in 2013, are provided for fish tagged upstream of Gull Rapids in appendices A2-1 through A2-49, and downstream of Gull Rapids in A3-1 through A3-42. Biological and tag information associated with each Walleye tagged upstream and downstream of Gull Rapids since study inception in 2013 are provided in Table A4-1 and A4-2, respectively.

4.1 WALLEYE TAGGED UPSTREAM OF GULL RAPIDS

4.1.1 JUNE 2013 TO OCTOBER 2014 RESULTS SUMMARY

In 2013, 40 Walleye were tagged upstream of the Keeyask GS. As reported in Murray *et al.* (2015), eight tags (#32864, #32865, #32866, #32867, #32870, #32871, #32876, and #32884) were considered missing prior to winter 2013/2014 given a lack of relocation data. These eight fish were not included in data analyses and are not discussed for the remainder of the report.

Two fish (#32880 and #32882) tagged upstream of the Keeyask GS moved downstream through Gull Rapids into Stephens Lake in 2014 (appendices A2-30 and A2-32).

One fish tagged in Stephens Lake moved upstream through Gull Rapids into Clark Lake in 2013: #32843 was tagged in Stephens Lake on 27 June, 2013, and moved upstream through Gull Rapids between 28 August, 2013 (detected at rkm 0.5) and 12 September, 2013 (detected at rkm -5.8). It continued to move upstream and was detected at the inlet to Clark Lake (rkm -48.2) in September 2013 and was last detected in the same location on 24 July, 2014 (Appendix A3-31).

Nine additional acoustic tags were applied to Walleye upstream of Gull Rapids between 17 and 21 June, 2014.

Therefore, accounting for the 40 Walleye originally tagged, the eight missing tags, the addition of one that moved upstream from Stephens Lake, the loss of two that moved downstream into Stephens Lake, and the nine additional tags applied, 40 fish were available to be detected upstream of Gull Rapids as of the end of the open-water period of (October) 2014. Of these, six were last detected in Clark Lake and 34 were last located in Gull Lake.

4.1.2 WINTER 2014/2015

Two of the four acoustic receivers deployed in the Nelson River between Clark Lake and Gull Rapids during winter 2014/2015 were retrieved (Map 4). The acoustic receivers deployed at rkm -29.4 and rkm -9.9 could not be located and were likely moved by ice during the winter, leaving receivers at rkm -48.2 and rkm -12.9. Only 10 of the 40 tagged Walleye thought to be upstream of Gull Rapids were detected during the winter period.

Eight of the ten fish (#32813, #32883, #6418, #6419, #6421, #6422, #6423, and #6426) were detected exclusively at rkm -12.9 for 1 to 137 days of the 200 day study period (0.5 to 69% of the winter period) (appendices A2-1, A2-33, A3-42, A2-43, A2-45, A2-46, A2-47, and A2-49).

The two remaining fish (#32873 and #32888) were detected exclusively at rkm -48.2, at the upstream end of Clark Lake:

- #32873 moved downstream from Clark Lake to Gull Lake in the spring of 2014 and returned upstream to Clark Lake in the fall (between 11 and 26 September, 2014). It was located in Clark Lake on a single day (8 January, 2015) during winter 2014/2015 (Appendix A2-23).
- #32888 moved between Clark Lake and Gull Lake during open-water 2014. It was detected in Clark Lake for 16 days between 16 October, 2014, and 30 April, 2015 (Appendix A2-38).

Additional information was collected during acoustic tracking between rkm -9.5 and -5.8 in Gull Lake in January 2015. Two Walleye (#6426, and #32870) were detected. Walleye #32870 was previously thought to be a tagging mortality, and was detected for the first time since June, 2013. Walleye #6426 was located in Gull Lake where it was found to have spent most of open-water 2015. For a complete summary of methods and results of winter acoustic tracking see Hrenchuk and Barth (2016).

4.1.3 OPEN-WATER 2015

4.1.3.1 ACOUSTIC RECEIVER RETRIEVAL

All 25 stationary acoustic receivers deployed upstream of Gull Rapids were downloaded throughout the open-water period, and were successfully retrieved at the end of open-water 2015 (Map 7).

4.1.3.2 WALLEYE MOVEMENTS

As previously discussed, a total of 40 fish were available for detection upstream of Gull Rapids during open-water 2015. However, Walleye #32884 was detected in 2015 after having gone undetected since 1 September, 2013. This fish was previously considered to be a mortality.

Movements of this fish will be included in the Gull Lake results bringing the total number of fish available for detection to 41 (Section 4.1.3.2.1).

Of the 41 fish available, 31 were detected. From these, 388,920 detections were logged, ranging from 18–71,088 detections per individual (Appendix A1-1). Fish were detected for an average of 73 days of the 164 day open-water season (45%; StDev = 44 days; range: 4–134 days). The mean total movement range was 12.5 rkm (StDev = 15 rkm; range: 0.0–60.9 rkm).

4.1.3.2.1 GULL LAKE

Thirty-one of 41 fish were detected during the open-water season. Of the 10 missing fish:

- Seven (#32846, #32853, #32856, #32863, #32875, #32885, and #32887) have not been detected since open-water 2013 (appendices A2-3, A2-7, A2-8, A2-13, A2-25, A2-35 and A2-37); and
- Three (#32869, #32874, and #6420) have not been detected since open-water 2014 (appendices A2-19, A2-24, and A2-44).

Of the 31 fish detected in open-water 2015, 20 were located primarily within Gull Lake:

Three (#32833, #32884 and #32889) Walleye initially located in Gull Lake moved downstream over Gull Rapids and into Stephens Lake during the 2015 open-water period:

- #32833 displayed the largest total movement range during open-water 2015 (60.9 rkms). This fish was detected in Gull Lake between rkm -17.4 and rkm -9.9 from 31 May to 10 June, 2015. It was next detected downstream of Gull Rapids on 27 June, 2015. It remained in Stephens Lake, moving between rkm 2.2 and 19.0 until 22 July, 2015. It was then located immediately downstream of Kettle GS (rkm 42.7) on 26 July, 2015, and likely passed through the GS on this date. It was detected 277 times in the Long Spruce Reservoir (rkm 42.7 to 43.5) until 27 July, 2015 (Appendix A2-2). This fish survived passage through the GS, as it made upstream movements in the reservoir after passage through the GS (between rkm 42.7 and 43.5).
- #32884 was previously considered a mortality, having only been detected in the first 2 days immediately after being tagged (section 4.1.1). It was then located for the first time in two years in Stephens Lake between rkm 2.2 and 2.9 from 3 June to 31 August, 2015, for a total of 18 detection days (292 detections). The date and time of the movement downstream through Gull Rapids and into Stephens Lake is unknown (appendix A2-39).
- #32889 was last detected in Gull Lake in 2013, but went undetected in 2014 (Murray *et al.* 2015). The fish was then briefly located downstream of Gull Rapids at rkm 2.2 on 27 June, 2015, and again between 19 and 21 July, 2015, for a total of 4 detection days (18 detections). The fish was not detected again in 2015 after the 21st of July (appendix A2-34). Similar to the fish described above, the timing of movement through Gull Rapids for this fish is also unknown.

Fifteen fish were detected primarily in Zone 4, the upstream end of Gull Lake (rkms -19.6 to -9.9):

- Three (#6425, #32847, and #32886) were detected exclusively in the upstream end of Zone 4 between rkms -19.5 and -14.8 (appendices A2-48, A2-4, and A2-36)
- Nine (#6418, #6419, #6421, #6423, #6426, #32858, #32861, #32872, and #32883) moved throughout Zone 4 (rkm -19.5 to -9.9) and were detected between 9 and 131 days of the open-water season (appendices A2-42, A2-43, A2-45, A2-47, A2-49, A2-10, A2-11, A2-22, and A2-33):
- Three (#6422, #32877, and #32879) were initially detected in the riverine area between Clark Lake and Gull Lake near the base of Birthday Rapids (from rkm -33.8 to -34.3). Each fish was detected near Birthday Rapids for one to three days between 7 and 15 June, 2015. They then moved downstream and were detected in Gull Lake (between rkm -9.9 and -19.5) where they were located frequently throughout open-water 2015 (appendices A2-46, A2-27, and A2-29).

A single Walleye (#32878) was detected exclusively within the lower portion of Gull Lake (Zone 5; rkm -9.3 to -5.8), and had a total movement range of 3.5 rkms (Table A1-1; Figure 5; Appendix A2-28).

One fish (#32862) moved between the riverine area downstream of Clark Lake (Zone 2) and Gull Lake (rkm -11.8) from 25 June to 11 July, 2015. It had a total movement range of 22.5 rkms (Table A1-1; Figure 5; Appendix A2-12).

The eleven remaining fish are described in section 4.1.3.2.2 below.

4.1.3.2.2 MOVEMENT BETWEEN GULL LAKE AND CLARK LAKE

Of the eleven fish known to have moved between Gull Lake and Clark Lake at least once:

- One (#32843) was located exclusively within Clark Lake in 2015 for a total of 187 detections over 10 days (Appendix A3-31).
- Five (#32852, #6417, #32873, #32868, and #32888) moved from Clark Lake to Gull Lake:
 - #32851 was last detected in Clark Lake on 10 October, 2014 but in 2015 was detected exclusively within Gull Lake (Zone 4) (Map 7; Appendix A2-5).
 - #6417 was detected in Clark Lake on May 2, 2015. It then moved downstream and remained between rkm -19.4 and -33.8 (zones 2, 3, and 4) in Gull Lake for the rest of the open-water period. It was last detected at rkm -29.4 on September 16, 2015 (Appendix A2-41).
 - #32873 was last detected in Clark Lake on May 1, 2015. It was then located in the upper basin of Gull Lake (rkm -19.5 to -12.9) from June 18 to August 24, 2015, and subsequently moved back upstream into Clark Lake where it was last detected (rkm -48.2) on 14 September, 2015 (Appendix A2-23).

- #32868 moved from the outlet of Clark Lake (rkm -44.3) into Gull Lake on 20 July, 2015 and remained between rkm -17.4 and -19.4 until 24 August, 2015. It was last detected in the riverine area downstream of Clark Lake (rkm -34.3; Zone 2) on 28 August, 2015 (Appendix A2-18).
- #32888 was detected at the inlet of Clark Lake (rkm -48.2) from 1 May to 2 June, 2015. It was next detected in Gull Lake (rkm -12.9; Zone 4) on 5 June, 2015. It was located within the upper basin of Gull Lake between rkm -19.4 and -12.9 for the remainder of the 2015 open-water season (Appendix A2-38).

Five fish moved between Clark and Gull lakes:

- Three (#32852, #32857, and #32881) were initially detected in Clark Lake (between 5 June and 1 July) and moved downstream to the upstream end of Gull Lake (rkm -19.5 to -11.8) between June 7 and October 14, 2015 (appendices A2-6, A2-9, and A2-31).
- One (#32813) was first located in Gull Lake at rkm -12.9 between 4 and 16 May, 2015. It then moved upstream and was detected in Clark Lake on 1 June, 2015. It moved between Clark Lake (rkm -48.2) and rkm -26.5 for the remainder of the study period. This included one downstream and two upstream movements through Birthday Rapids (rkm -34.0) (Appendix A2-1).
- One (#32890) was initially detected in the riverine area between Clark Lake and Gull Lake (rkm -32.3) and moved downstream into Gull Lake on June 23, 2015 (rkm -19.4 to -9.9). It then moved upstream on August 21, 2015, and was last detected at rkm -44.3 in Clark Lake on September 1, 2015 (Appendix A2-40).

4.1.3.3 PROPORTIONAL DISTRIBUTION

Tagged Walleye spent the majority of the 2015 open-water period in Zone 4 (Gull Lake), spending 72% (StDev = 35%; range: 0–100%) of their time there. The remaining 28% was divided between zones 1, 2, 3, and 5 (10%, 4%, 7%, and 7% respectively) (Figures 7 and 8). Although a large proportion of the Walleye tagged upstream of Gull Rapids use Zone 4 throughout the open-water season, use was the highest in July and August (Figure 7). Conversely, Zone 1 (Clark Lake) was used more in the spring and fall. Of the tags applied to date, approximately 27% of the tagged fish have moved between Clark and Gull lakes. Walleye in open-water 2015 spent more time in Clark Lake than they did in 2014. As a result, less time was spent in Zone 4 (Gull Lake) throughout the 2015 open-water season relative to 2014.

4.2 WALLEYE TAGGED IN STEPHENS LAKE

4.2.1 JUNE 2013 TO OCTOBER 2014 RESULTS SUMMARY

Forty fish were initially tagged in Stephens Lake downstream of Gull Rapids in 2013 (at rkm 1.7), however, two (#32820 and #32842) displayed rapid downstream movements following tagging and were considered mortalities (Hrenchuk and Barth 2014) (appendices A3-9 and A3-30, respectively).

As discussed in section 4.1.1, three additional fish moved through Gull Rapids prior to open-water 2015:

- #32843 moved upstream from Stephens Lake to Clark Lake in 2013 (Appendix A3-31).
- #32880 and #32882 moved downstream from Gull Lake to Stephens Lake in 2014 (Appendix A3-30 and A3-32).

Walleye #32811 moved downstream past Kettle GS into the Long Spruce Reservoir in 2014 (Appendix A3-1).

Two additional tags were applied to Walleye in Stephens Lake on 11 June, 2014 (Murray *et al.* 2015).

Therefore, accounting for the 40 originally tagged fish, the two missing tags, the movement of one upstream into Gull Lake, the movement of one downstream into the Long Spruce Reservoir, the addition of two that moved downstream from Gull Lake in 2014, and the two additional tags applied in 2014, 40 fish were available to be detected downstream of Gull Rapids during winter 2014/2015.

4.2.2 WINTER 2014/2015

Twelve of the fifteen acoustic receivers deployed in Stephens Lake to monitor fish movements during winter 2014/2015 were retrieved (Map 5). Receivers deployed at rkms 6.1, 6.3, and 40.8 were not retrieved (Figure 5). The two receivers located closest to Gull Rapids could not be located and were likely moved by ice. A single receiver located upstream of Kettle GS (rkm 40.8) was tangled with debris and could not be pulled out.

Fifteen of the 40 tagged Walleye were located, logging a total of 60,289 detections (range: 29–12,042) (Appendix A1-2). Fish were detected on 4–113 days of the 200 day study period (2–57% of the time) (Appendix A1-2). Nine fish (60%) were detected as far upstream as rkm 7.7, and a single fish was located as far downstream as rkm 21. The overall movement range was 2.5 rkm (StDev = 1.6; range: 0.0–7.2 rkm) (Table A1-2; Figure 11).

Eleven were detected exclusively within the southern portion of Stephens Lake:

- Eight (#32812, #32817, #32826, #32827, #32830, #32834, #32838, and #32848) were detected exclusively between rkm 7.7 and 10.2 (appendices A3-2, A3-6, A3-15, A3-16, A3-19, A3-22, A3-26, and A3-34).
- Two fish (#32829 and #32845) located primarily in lower Stephens Lake throughout the winter (appendices A3-18 and A3-33):
- Fish #32841 was detected for 36 days, 35 of which were exclusively at rkm 14.9 (Appendix A3-29).

Four fish (#32822, #32824, #32840, and #32844) were detected exclusively by receivers corresponding to the former channel of the Moosenose River (#114227, #7778, #4638; Map 5) in the upper reaches of Stephens Lake (appendices A3-11, A3-13, A3-28, and A3-32).

4.2.3 OPEN-WATER 2015

4.2.3.1 ACOUSTIC RECEIVER RETRIEVAL

Two of the 27 receivers deployed in Stephens Lake (#122778 at rkm 28.3, and #108003 at rkm 39.9) were caught on submerged trees and could not be retrieved during the last download on 11 October, 2015 (Figure 6).

4.2.3.2 WALLEYE MOVEMENTS

Of the 40 fish available to be detected in Stephens Lake (section 4.2.2), 27 were detected between 5 and 28,553 times (total of 101,276 detections), for 1–123 days of the 164 day study period (0.6–75% of the time) (Appendix A1-2). The mean movement range was 4.6 rkm (StDev = 4.6 rkm; range: 0.0–16.1 rkm) (Appendix A1-2; Figure 13).

Thirteen fish were not detected during the 2015 open-water period:

- Three tags (#32832, #32836, and #32837) were returned by a local resource user in 2015. The time and location of capture of the three fish is unknown (appendices A3-21, A3-24, and A3-25)
- Two (#32823 and #32835) have not been detected since open-water 2013 (appendices A3-12 and A3-23).
- Six (#32814, #32821, #32925, #32850, #32855, and #6427) have not been detected since open-water 2014 (appendices A3-3, A3-10, A3-14, A3-36, A3-38, and A3-42).
- Two (#32830 and #32840) were detected over winter 2014/2015 but not in open-water 2015 (appendices A3-19 and A3-28):

Twenty-four fish were detected exclusively within the upper 10.5 rkms of Stephens Lake:

- Nine (#32812, #32815, #32819, #32824, #32828, #32831, #32834, 32839, and #32860) were detected infrequently (between 1 and 12 days) (appendices A3-2, A3-4, A3-8, A3-13, A3-17, A3-20, A3-22, A3-27, and A3-40).
- Nine (#6424, #32817, #32822, #32826, #32827, #32829, #32838, #32848, and #32859) moved throughout the upper 10.5 rkms of Stephens Lake and had total movement ranges between 1.3 and 10.5 rkm (appendices A3-41, A3-6, A3-11, A3-15, A3-16, A3-18, A3-26, A3-34, and A3-39).
- The remaining six (#32816, #32818, #32838, #32844, #32849, and #32880) made shorter movements within the upper portion of Stephens Lake (movement ranges of 0.5 to 4.5 rkms) and were detected between 15 and 100 days (appendices A3-5, A3-7, A3-26, A3-32, A3-35, and A2-30).

Three fish were detected throughout Stephens Lake:

- #32841 moved upstream in May from rkm 10.2 and 14.9, respectively, to the base of Gull Rapids (total movement range 1.3–14.9 rkm). It remained near the base of Gull Rapids (rkm 1.3 to 2.9) for the remainder of open-water 2015. This fish moves yearly to the base of Gull Rapids each spring and back to lower Stephens Lake in the fall (Appendix A3-29).
- #32845 made two separate movements lasting between 9 and 47 days (2.9 to 21 rkm) from the lower reach of Stephens Lake in Zone 2 (rkm 21.0) to within 2.9 km of Gull Rapids. This fish moved between rkms 2.9 and 21 in both the spring and fall in two consecutive years (Appendix A3-33).
- #32854 was initially detected at rkm 2.2 on 21 July, 2015, but moved downstream into the lower part of Stephens Lake over the course of 15 days (2.2–17.4 rkm). This fish moves yearly to the base of Gull Rapids in July and returns downstream for the remainder of the open water period (Appendix A3-37).

Overall, 23 of 27 Walleye were detected for at least one day by one of the two receivers set closest to the downstream end of Gull Rapids (receivers #127084 [rkm 1.3] and #107999 [rkm 2.2]) (Map 8). All of these fish were detected here in the spring (May to June).

4.2.3.3 PROPORTIONAL DISTRIBUTION

In 2014/2015, Walleye were found to use Zone 1 more than Zone 2, spending 77% (StDev = 33%; range: 6–100%) and 23% (StDev = 33%; range: 0–94%) of the study period in each zone, respectively (Figures 9 and 10). Use of Zone 2 gradually increased during the open water season peaking at approximately 36% in September 2015. It appears the use of Zone 1 was higher in 2015 when compared with 2014. An increase in the use of Zone 2 as the season progresses is still evident in both years although the increase is not as prevalent in 2015.

4.3 WALLEYE MOVEMENT IN THE LONG SPRUCE RESERVOIR

4.3.1 WINTER 2014/2015

The single receiver set in the Long Spruce Reservoir was successfully retrieved (Map 6). No fish were detected in Long Spruce Reservoir during winter 2014/2015.

4.3.2 OPEN-WATER 2015

All four receivers deployed in the Long Spruce Reservoir were retrieved at the end of the open-water study period (Map 9).

Walleye #32811 that moved down through Kettle GS into the Long Spruce Reservoir in 2014 was not detected in 2015 (Appendix A3-1).

Movements of the single Walleye (#32833) that moved into the Long Spruce Reservoir in open-water 2015 are discussed in section 4.1.3.2.1.

5.0 DISCUSSION

This report presents the annual results of the Walleye movement study to monitor the effects of construction on fish movements between October 2014 to October 2015 and compares the results to what has been observed to date.

5.1 EVALUATION OF METHODOLOGY

Acoustic telemetry has proven effective for monitoring movements of Walleye in the Keeyask Study Area (Murray *et al.* 2015; Hrenchuk and Barth 2014); however, relative to similar studies on adult and juvenile Lake Sturgeon, the results are more difficult to interpret. Similar to open-water 2014, a large proportion of tagged Walleye were not detected during the 2015 open-water season. In Stephens Lake, 13 of 40 (33%), and in Gull Lake, 10 of the 41 (24%) tagged Walleye were not detected in the open-water period in 2015.

The finding that some Walleye were not detected for extended periods was anticipated during the planning stages of the study because, unlike Lake Sturgeon that predominantly use the thalweg of the Nelson River, Walleye may move into tributaries, use habitat in off-current embayments or shallow near-shore habitats where acoustic signal attenuation is poor, and/or use areas such as the north arm of Stephens Lake where there is no receiver coverage. Each of these factors may limit the number of detections and allow Walleye to move past receiver “gates” undetected.

To improve the detection frequency of Walleye in 2016, additional tags (to account for potential mortality) and receivers will be added. Receivers will be placed at the mouths of tributaries and in the northern arm of Stephens Lake to account for fish that may be leaving the study area.

5.2 MOVEMENTS OF WALLEYE TAGGED IN GULL LAKE

Few Walleye were detected during winter 2014/2015, due partially to poor receiver coverage and the loss of two receivers. Although limited, data indicate that Walleye overwinter in both Gull and Clark lakes.

During the open-water period in 2015, of the 31 fish detected, fifteen (48%) were located primarily within Zone 4 (Map 7), and overall, Walleye were found to use Zone 4 more frequently than the other four zones. This is consistent with what was observed in 2014, indicating that a high proportion of the tagged Walleye congregate at the upstream end of Gull Lake (Zone 4) during the open-water period.

Ten tagged Walleye moved between Clark Lake and Gull Lake at least once during the 2015 open-water period and seven of these likely over-wintered in Clark Lake as this is where they were initially located at the start of open-water 2015. Downstream movement into Gull Lake

appears to occur as the open-water season progresses, followed by upstream movement during fall. These movements likely relate to spawning, and suggest that a portion of Gull Lake Walleye spawn somewhere in Clark Lake or in the Assen River.

A single fish was detected in the lower portion of Gull Lake in 2015. This is consistent with what has been observed since 2013, where only 7% ($n = 3$) of the tagged Walleye were observed to frequent this area. This continues to suggest that Walleye upstream of Gull Rapids are unlikely to be affected during construction of the GS.

Three fish were detected in 2015 that passed through Gull Rapids. One moved through the rapids during 2015 and the other 2 moved through at some point between 2013 and 2015 (they were last detected upstream in 2013). To date, 4 of 41 tagged fish (10%) have now moved downstream, while 1 of 40 tagged fish (3%) have moved upstream through Gull Rapids since June 2013.

5.3 MOVEMENTS OF WALLEYE TAGGED IN STEPHENS LAKE

The majority of the 27 Walleye detected ($n = 24$; 89%) in 2015 were found within upper Stephens Lake (Zone 1), which is similar to what was found during the open water period of 2014. The remaining three fish moved throughout Stephens Lake and spent time in both zones. It appears the use of Zone 1 was higher in 2015 when compared with 2014. An increase in the use of Zone 2 as the season progresses is still evident in both years although the increase is not as prevalent in 2015.

A single Walleye was detected at the base of Gull Rapids for the entire open water season in 2015, while 23 fish were located here for at least one day. During 2014, nine Stephens Lake fish frequented the base of Gull Rapids and frequently utilize the channel immediately downstream of the rapids. At this location, they may be influenced by construction related activities such as noise, blasting, increased TSS levels, etc.

5.4 KEY QUESTIONS

In the discussion below, the key questions/objectives of Walleye movement monitoring during construction, as described in the AEMP, and presented in the introduction of this report, are addressed:

To quantify the number (or the proportion) of tagged Walleye that move past the construction site

To date, five of 41 tagged fish (12%) have now moved downstream through Gull Rapids since June 2013. The timing associated with the movement of three of these (#32880, #32884 and #32889) is unknown as they were not detected for one-year prior to being detected in Stephens Lake. The remaining two moved downstream in August 2014 (#32882) and June 2015

(#32833). Interestingly, the Walleye that moved downstream through Gull Rapids in June 2015 (#32833) subsequently moved downstream through the Long Spruce GS in July 2015.

As of October 2015, one tagged Walleye has moved upstream through Gull Rapids. This fish moved upstream in September 2013 and moved as far upstream as Clark Lake.

To determine if fish are utilizing habitat in the vicinity of construction activities, particularly during spawning

Upstream of Gull Rapids, tagged Walleye were rarely detected in Zone 5, the downstream section of Gull Lake proximal to the construction site.

In Stephens Lake, a high proportion of the Walleye population utilizes habitat in the vicinity of the Keeyask GS construction site. For example, during the open-water period of 2015, 23 of 27 Walleye were detected for at least one day by one of the two receivers set closest to the downstream end of Gull Rapids (receivers #127084 and #107999) (Map 8). Walleye use of this area was high during spring suggesting that these fish were spawning in or at the base of Gull Rapids, which has been documented during previous studies (Murray and Barth 2007; Pisiak 2005a; Pisiak 2005b).

6.0 SUMMARY AND CONCLUSIONS

- Qualitatively, there has been little observable change in the movement patterns of Walleye since the study began. Walleye tagged in Gull Lake continued to display two general movement patterns, either remaining in Gull Lake (largely within the upper basin), or moving between Gull and Clark lakes.
- In Stephens Lake, the majority of tagged Walleye remain exclusively within the upper 10.5 rkm of Stephens Lake during the open-water period. Fewer fish made movements throughout the Lake.
- The key questions, as described in the AEMP, for Walleye movement monitoring during construction of the Keeyask GS are as follows:

- *What is the number (or the proportion) of tagged Walleye that move past the construction site?*

In total, five Walleye (5 of 41; 12%) tagged upstream of Gull Rapids have moved downstream into Stephens Lake; and one Walleye (1 of 40; 2.5%) has moved upstream from Stephens Lake over Gull Rapids, since the study began in June, 2013. An additional two fish have moved downstream through the Kettle GS. It is unclear how many fish have moved upstream past Clark Lake, however, a single fish was captured as far upstream as the Odei River.

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

Similar to results in 2014, Walleye tagged in Gull Lake did not use habitat directly upstream of Gull Rapids and are therefore less likely to be affected directly by construction-related activities such as blasting. In contrast, the majority of Walleye tagged in Stephens Lake frequent the base of Gull Rapids throughout the open-water period, including the spawning period.

- Additional tags (to account for mortality) and receivers (to extend the coverage area) will be added in 2016.

7.0 LITERATURE CITED

- Hrenchuk, C.L., and Barth, C.C. 2014. Results of Walleye movement monitoring in the Nelson River between Clark Lake and the Long Spruce Generating Station, June to October, 2013. A report prepared for Manitoba Hydro by North/South Consultants Inc. X +139 pp.
- Hrenchuk, C.L. and C.C. Barth. 2016. Adult Lake Sturgeon movement monitoring in the Nelson River between Clark Lake and the Long Spruce Generating Station, October 2014 to October 2015: Year 2 Construction. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2016-04. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2016, 147 pp.
- Manitoba Hydro. 2015. Annual Monitoring Report July 2014 – March 2015. Keeyask Generation Project Environmental Protection Plan Report #EnvPP-2015-01. June 2015, Winnipeg, Manitoba, 63 pp.
- Manitoba Hydro Public Affairs. December 1999. Long Spruce Generating Station. Brochure.
- Murray, L. and Barth, C.C. 2007. Movements of radio- and acoustic-tagged Northern Pike, Walleye, and Lake Whitefish in the Keeyask study area: May 2003 to October 2004 and a summary of findings from 2001-2005. A draft report prepared for Manitoba Hydro by North/South Consultants Inc. III + 95 pp.
- Murray, L., Hrenchuk, C.L., and Barth C.C. 2015. Walleye movement monitoring in the Nelson River between Clark Lake and the Long Spruce Generating Station, October 2013 to October 2014. Keeyask Generation Project Aquatic Effects Monitoring Report #AEMP-2015-04. A report prepared for Manitoba Hydro by North/South Consultants Inc., June 2015, 159 pp.
- Pincock, D.G. 2012. False detections: what they are and how to remove them from detection data. VEMCO, DOC-004691, Bedford, Nova Scotia. Available: [www.vemco.com/pdf/false detections.pdf](http://www.vemco.com/pdf/false%20detections.pdf). (April 2013).
- Pisiak, D.J. 2005a. Results of summer index gillnetting studies in Stephens Lake, Manitoba, and seasonal investigations of adult and larval fish communities in the reach of the Nelson River between Gull Rapids and Stephens Lake, 2002. Report #02-16. A draft report prepared for Manitoba Hydro by North/South Consultants Inc. XV +159 pp.
- Pisiak, D.J. 2005b. Results of summer index gillnetting studies in Stephens Lake, Manitoba, and seasonal investigations of fish communities in the reach of the Nelson River between Gull Rapids and Stephens Lake, 2003, Year 3. Report #03-14. A draft report prepared for Manitoba Hydro by North/South Consultants Inc. XXI +289 pp.

TABLES

Table 1: Number of acoustic tags applied to Walleye in the Keeyask Study Area (upstream of Gull Rapids and in Stephens Lake) between June 2013 and October 2015.

Year	Upstream GR	Stephens Lake	Total
2013	40	40	80
2014	9	2	11
2015	0	0	0

FIGURES

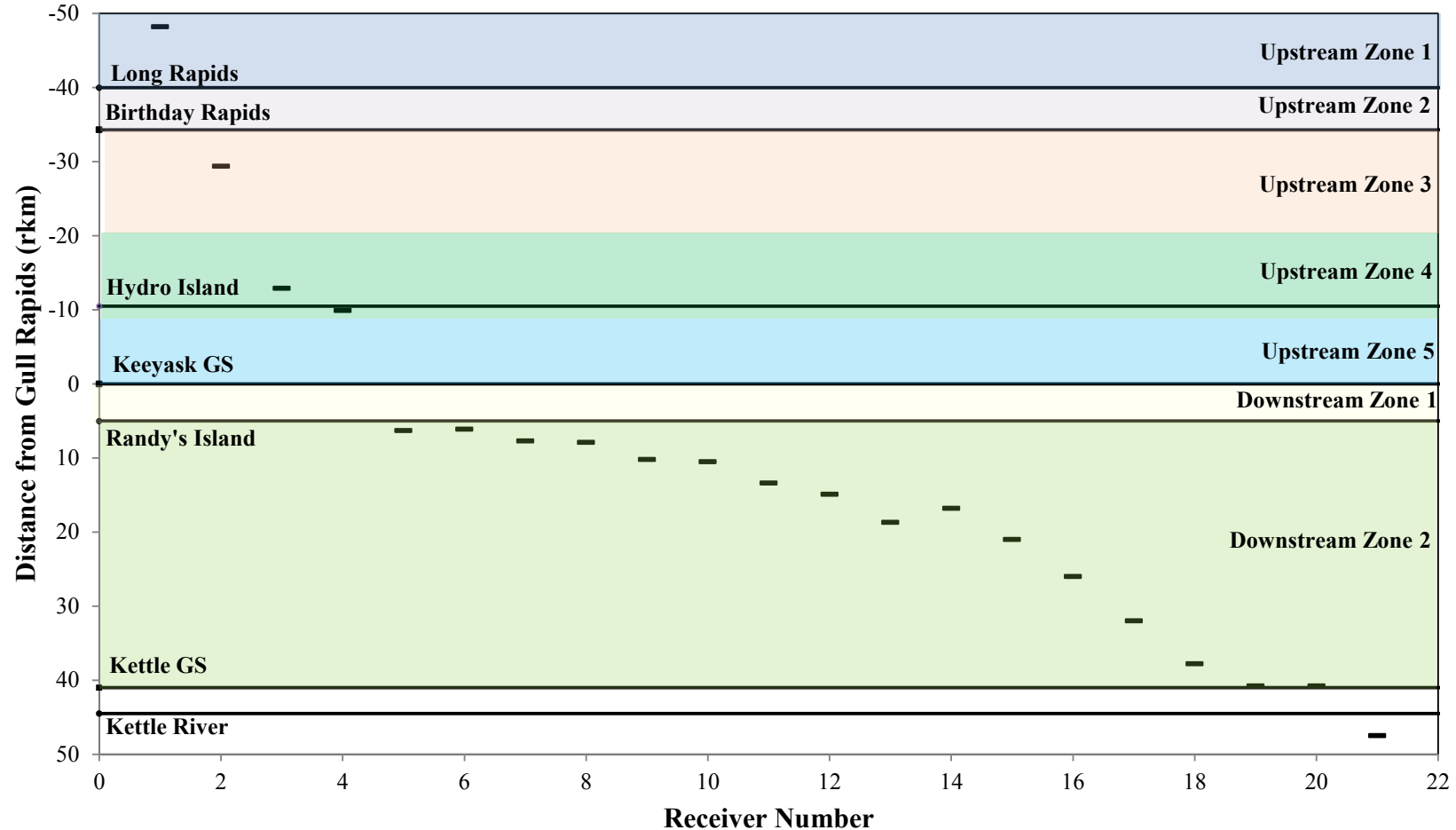


Figure 1: Locations of stationary acoustic receivers (dashes) in relation to the base of Gull Rapids (*i.e.*, the Keeyask GS construction site) (rkm 0) and other major landmarks (lines) in the Nelson River between Clark Lake and the Long Spruce GS from 15 October, 2014 to 01 May, 2015. River zones upstream and downstream of Gull Rapids are indicated by shading.

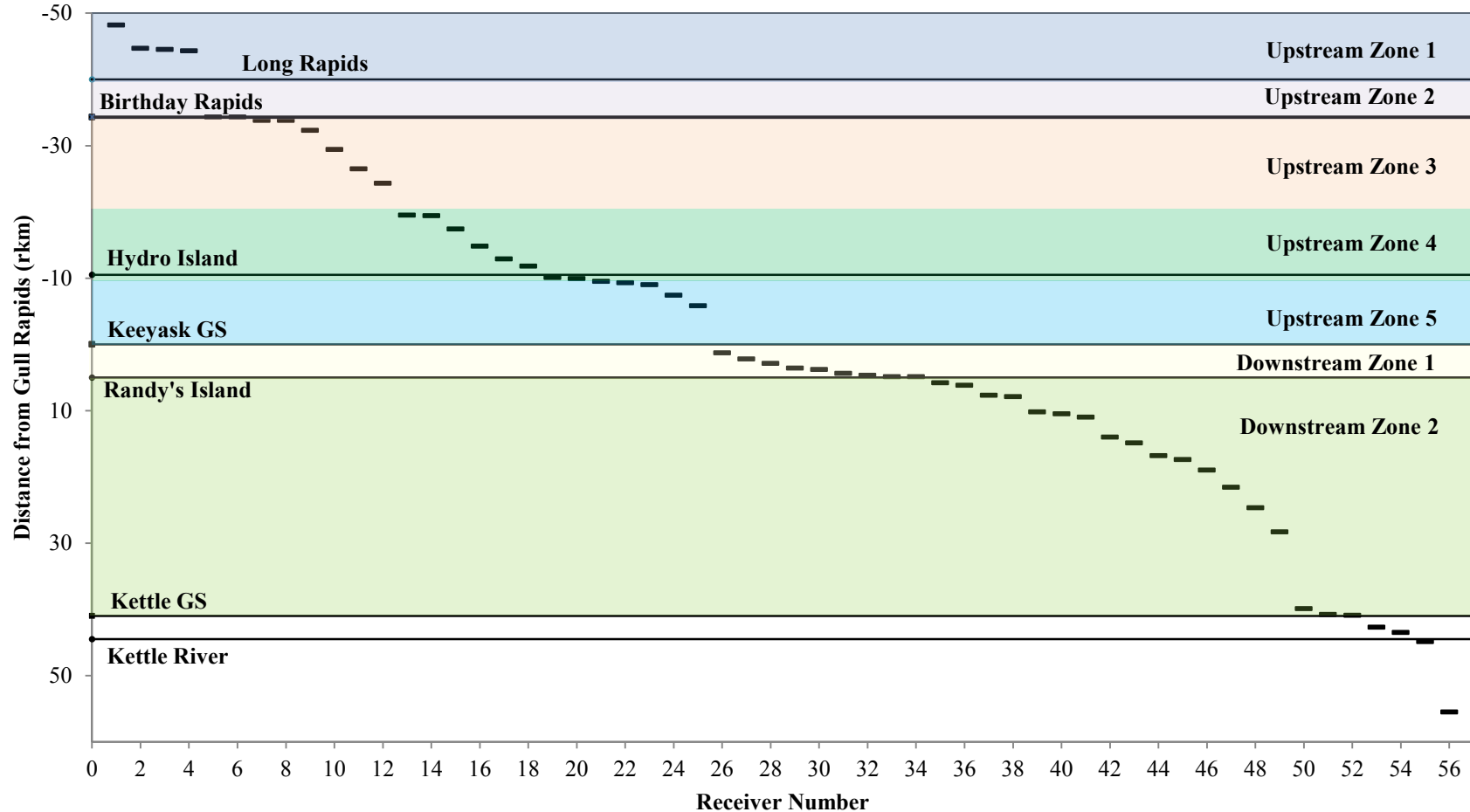


Figure 2: Locations of stationary acoustic receivers (dashes) in relation to the base of Gull Rapids (*i.e.*, the Keeyask GS construction site) (rkm 0) and other major landmarks (lines) in the Nelson River between Clark Lake and the Long Spruce GS from June to October, 2015. River zones upstream and downstream of Gull Rapids are indicated by shading.

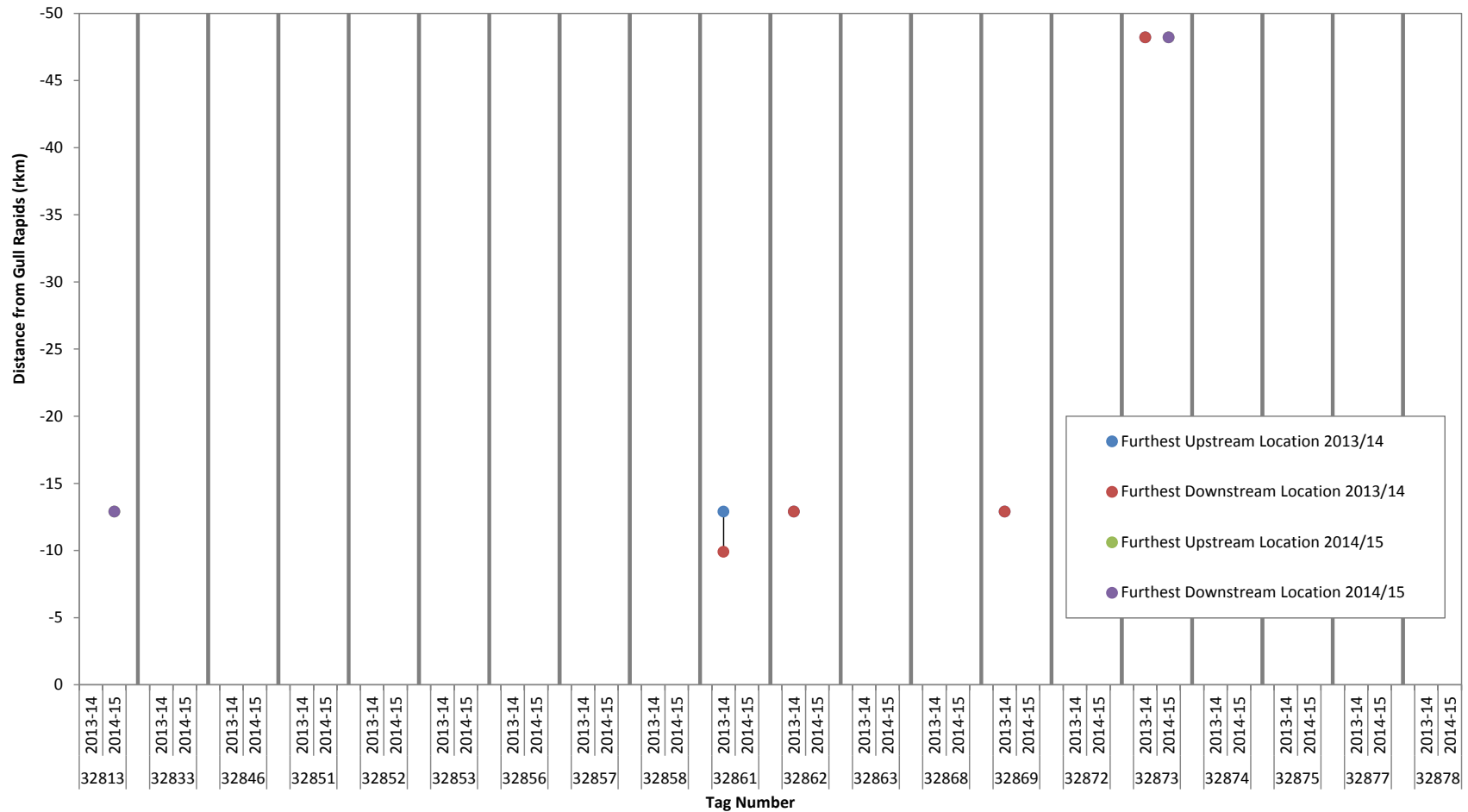


Figure 3: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of Gull Rapids during the 2013/2014 and 2014/2015 winter periods (October to May).

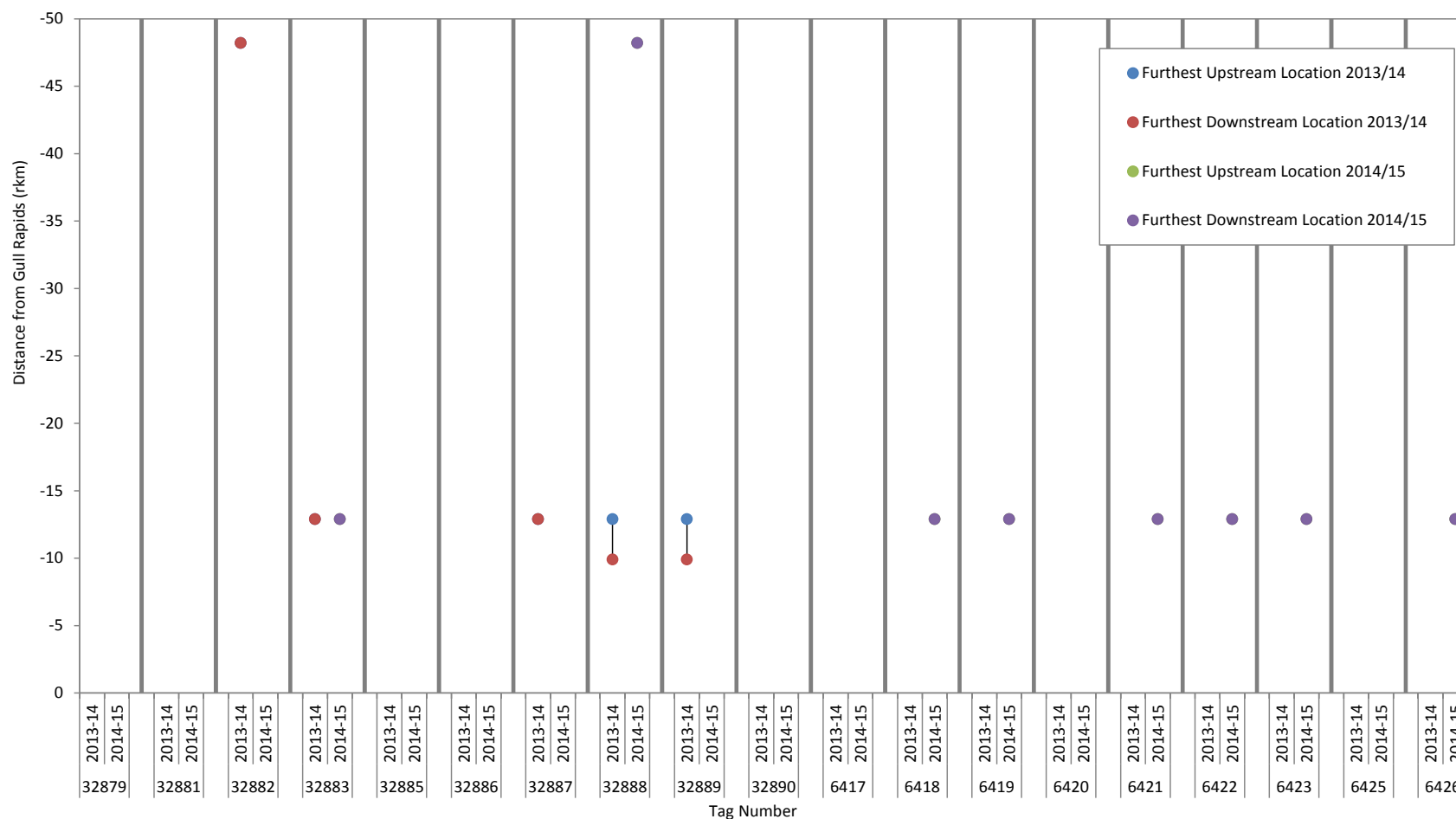


Figure 3: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of Gull Rapids during the 2013/2014 and 2014/2015 winter periods (October to May) (continued).

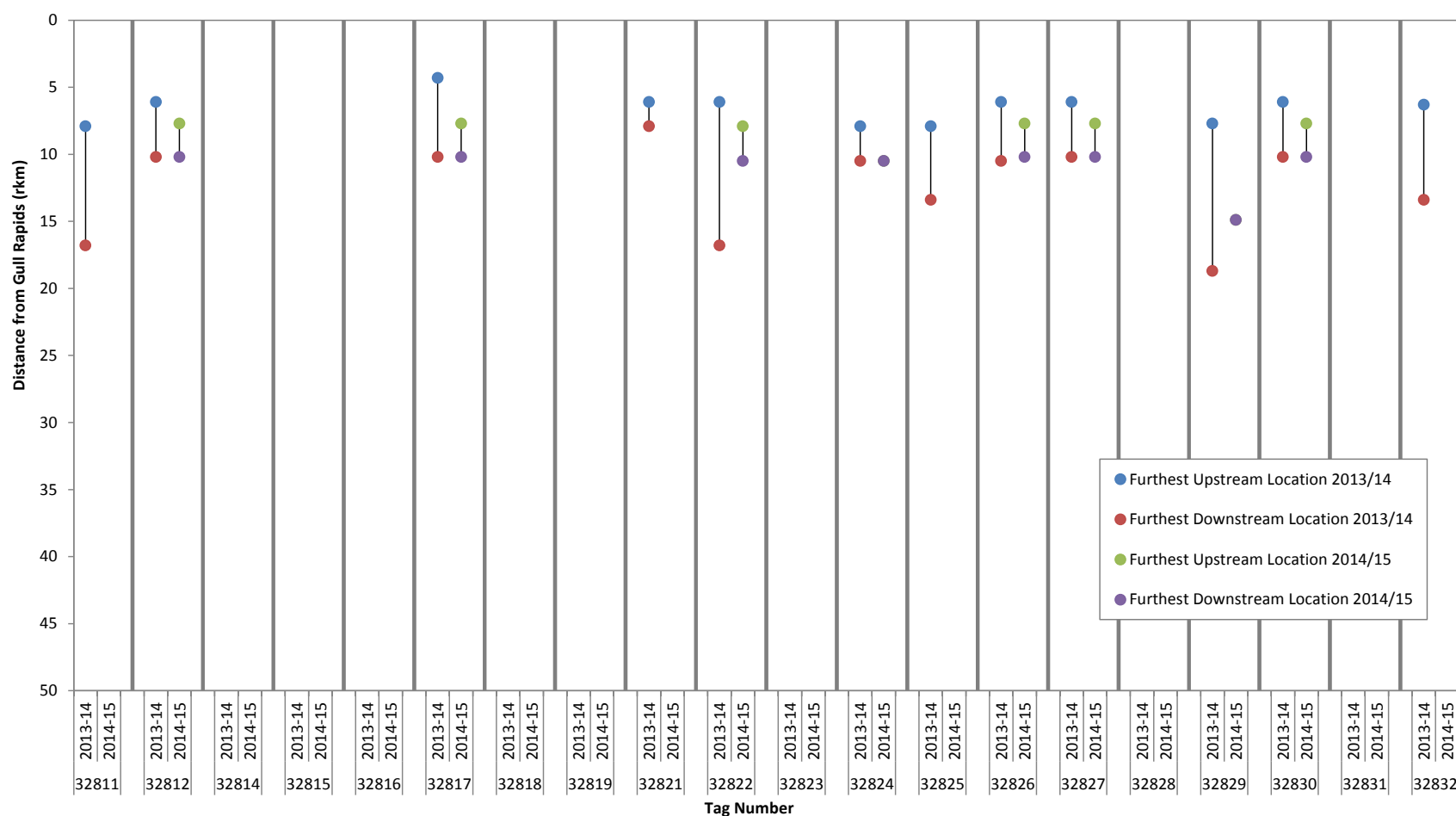


Figure 4: Detection ranges for individual Walleye tagged with acoustic transmitters in Stephens Lake during the 2013/2014 and 2014/2015 winter periods (October to May).

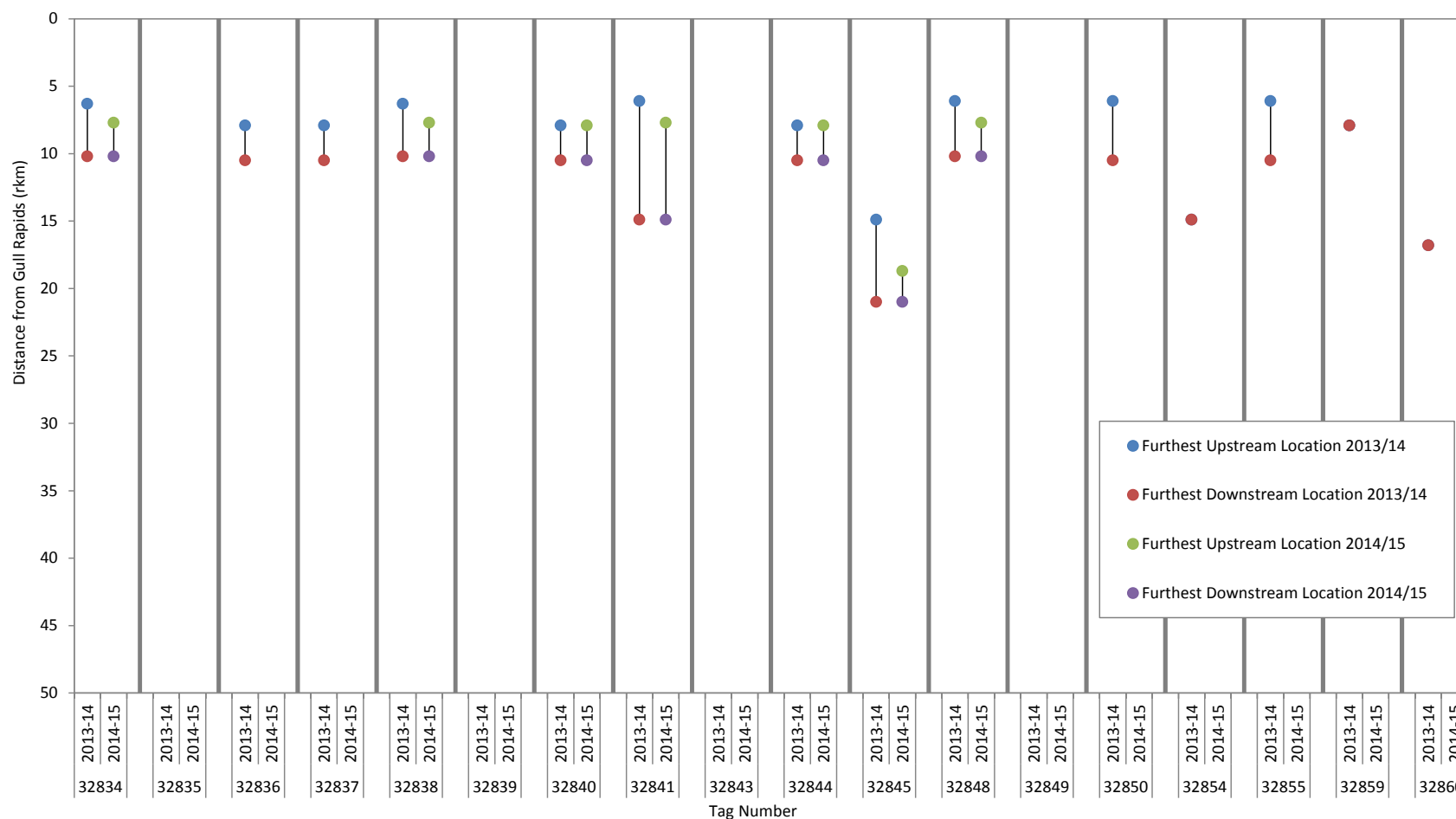


Figure 4: Detection ranges for individual Walleye tagged with acoustic transmitters in Stephens Lake during the 2013/2014 and 2014/2015 winter periods (October to May) (continued).

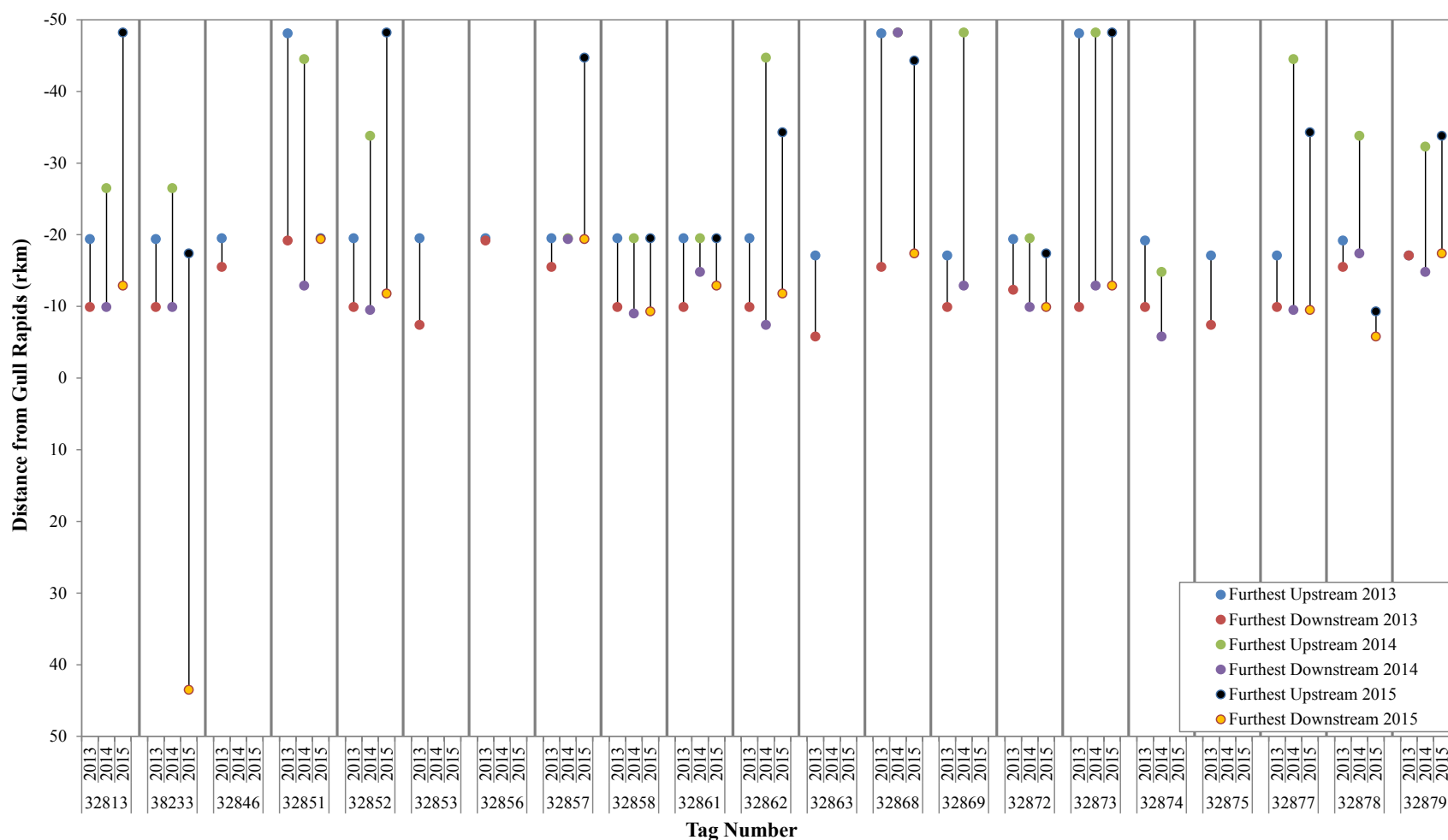


Figure 5: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of Gull Rapids during the 2013, 2014, and 2015 open-water periods (May to October).

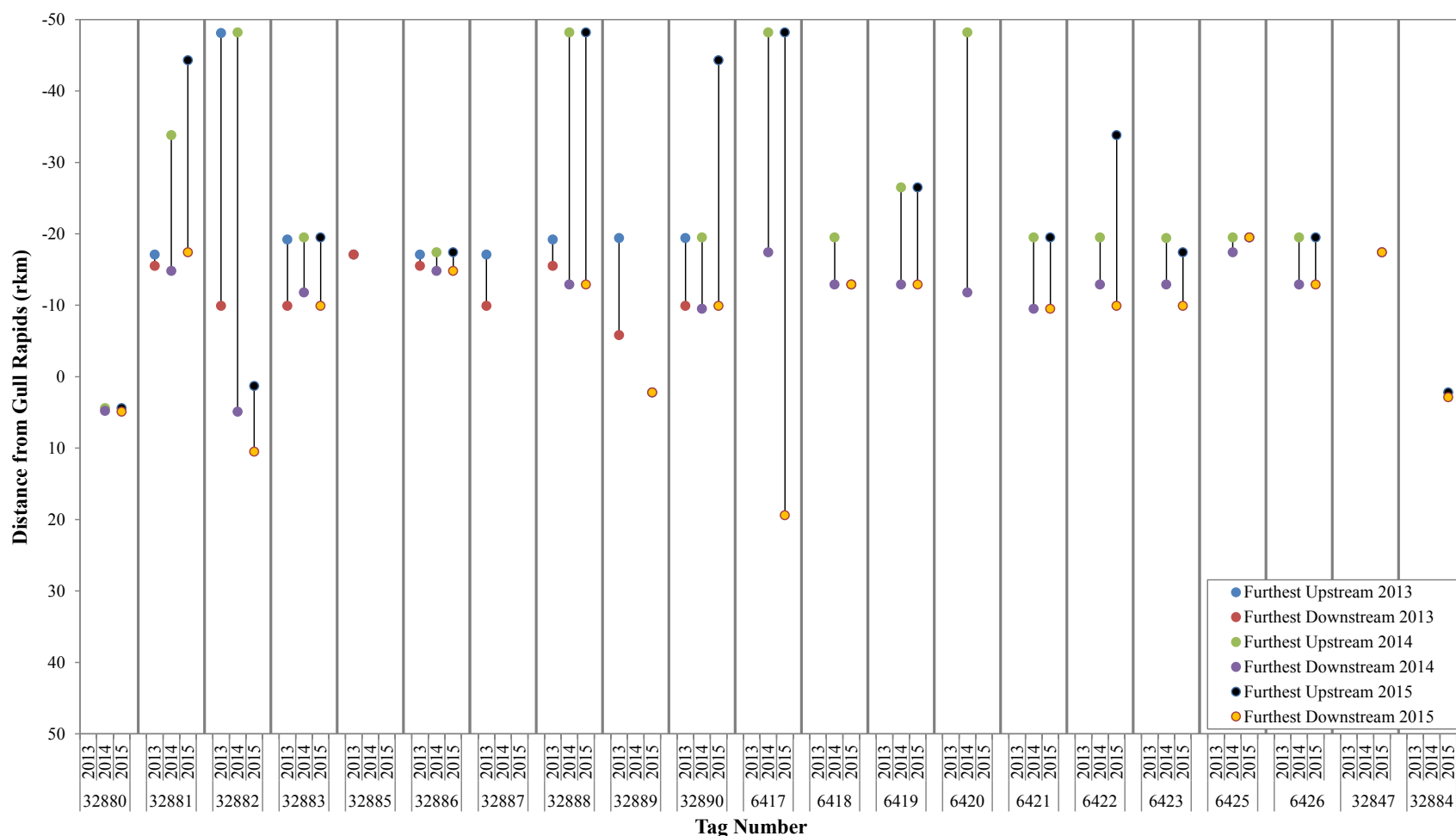


Figure 5: Detection ranges for individual Walleye tagged with acoustic transmitters upstream of Gull Rapids during the 2013, 2014, and 2015 open-water periods (May to October) (continued).

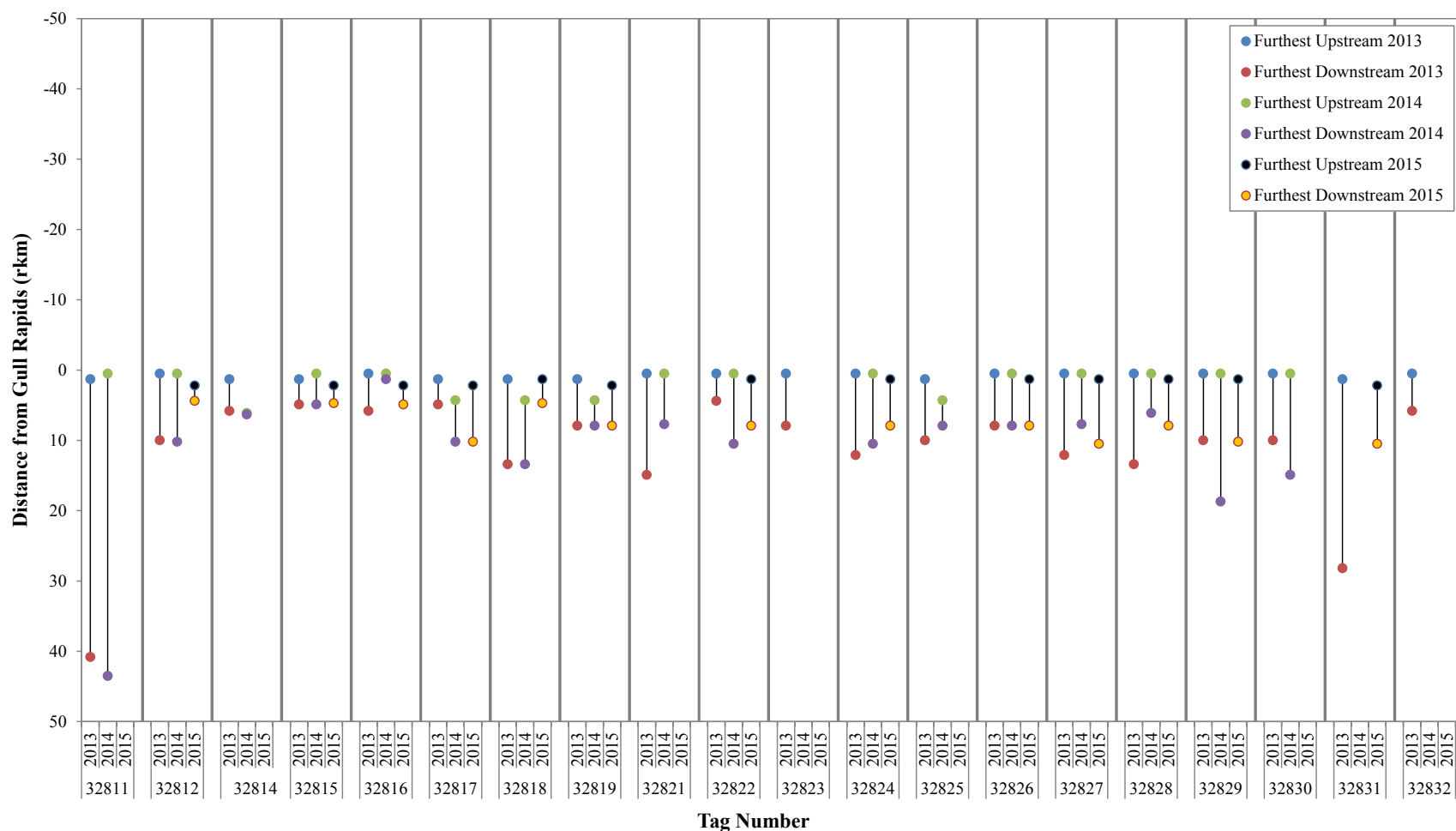


Figure 6: Detection ranges for individual Walleye tagged with acoustic transmitters downstream of Gull Rapids during the 2013, 2014, and 2015 open-water periods (May to October).

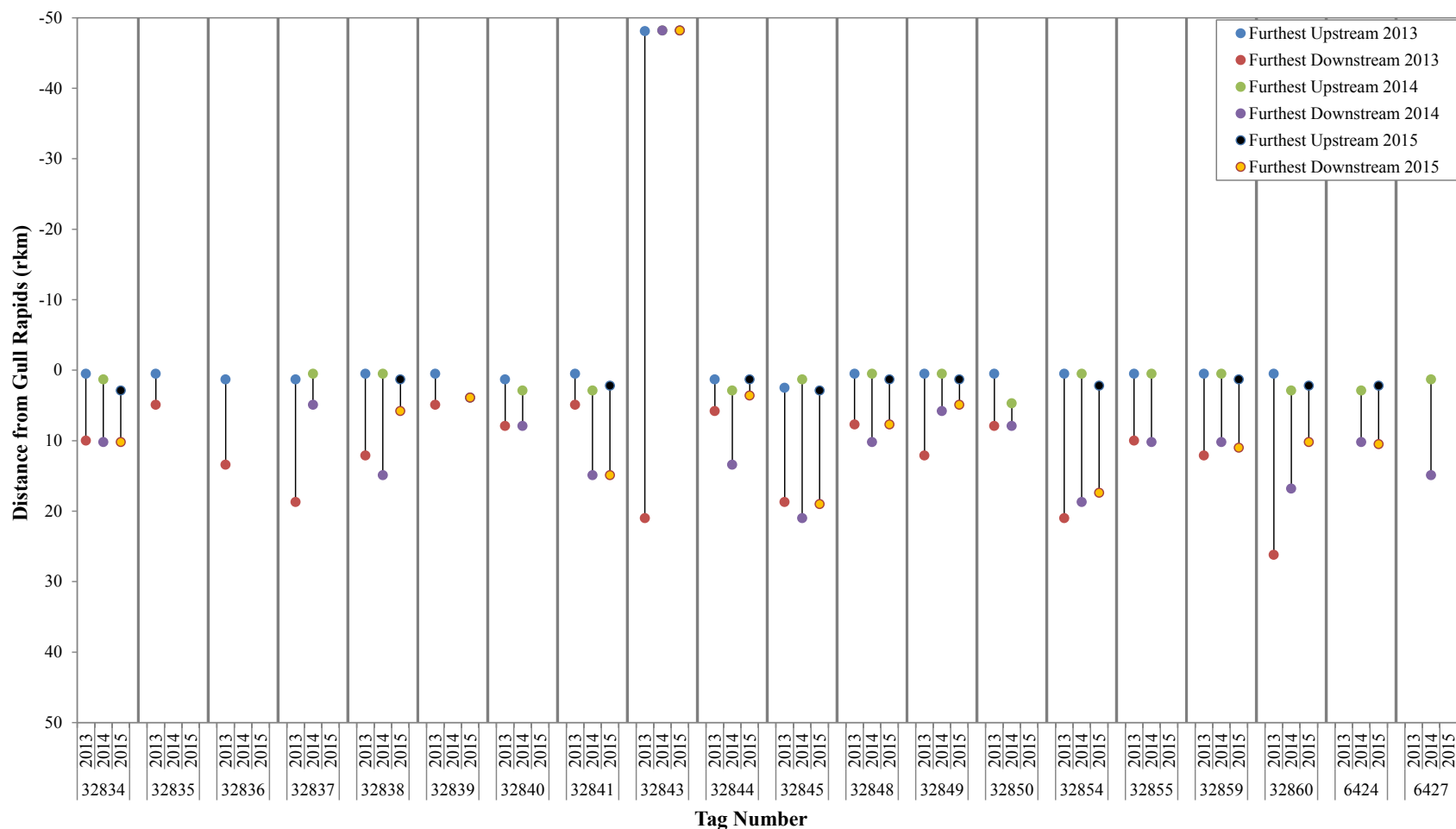


Figure 6: Detection ranges for individual Walleye tagged with acoustic transmitters downstream of Gull Rapids during the 2013, 2014, and 2015 open-water periods (May to October) (continued).

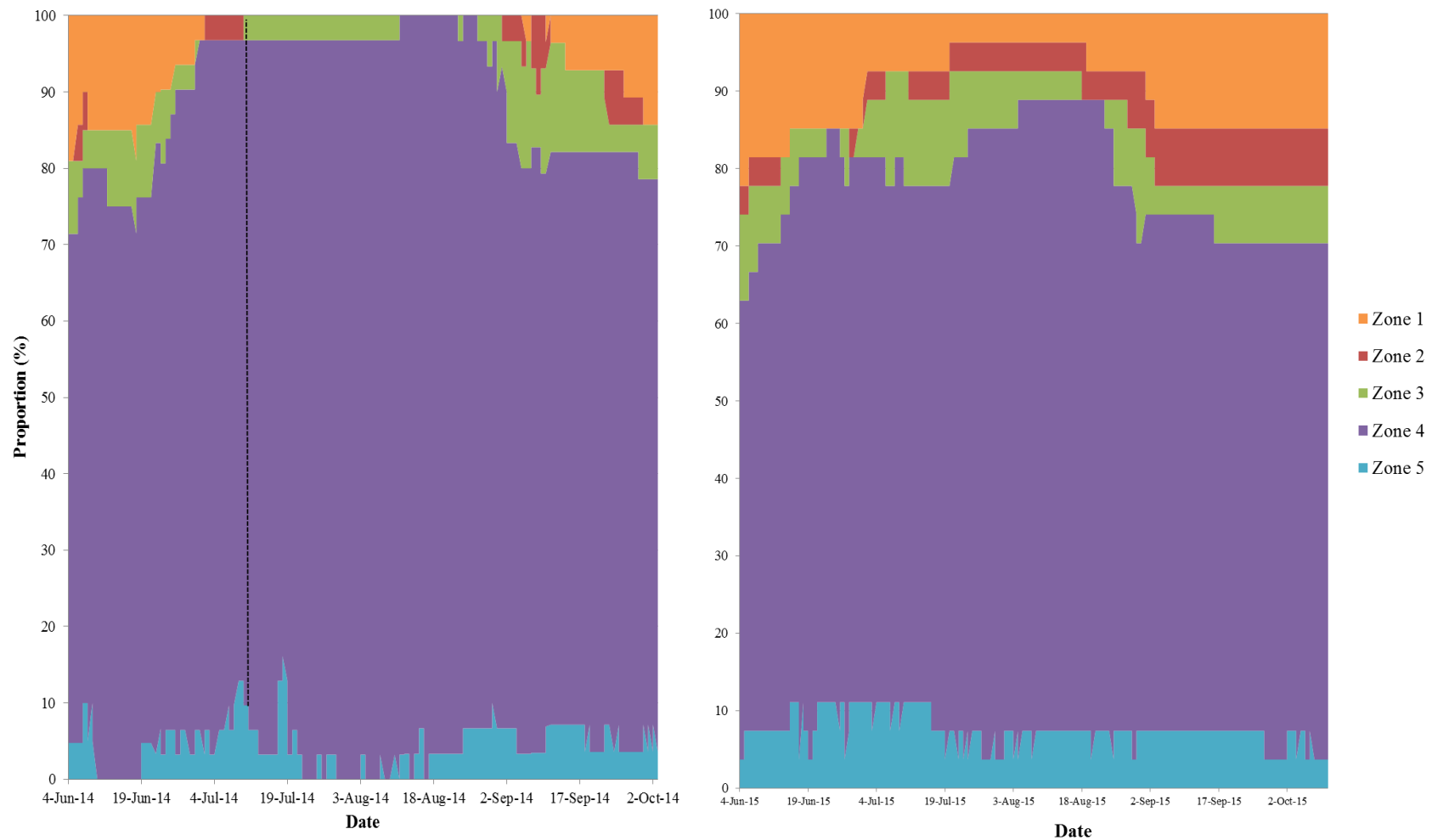


Figure 7: Proportional distribution of acoustic tagged Walleye within five river zones between Clark Lake and Gull Rapids in the 2014 and 2015 (4 June to 2 October) open-water periods. Dotted line indicates start of Keeyask construction.

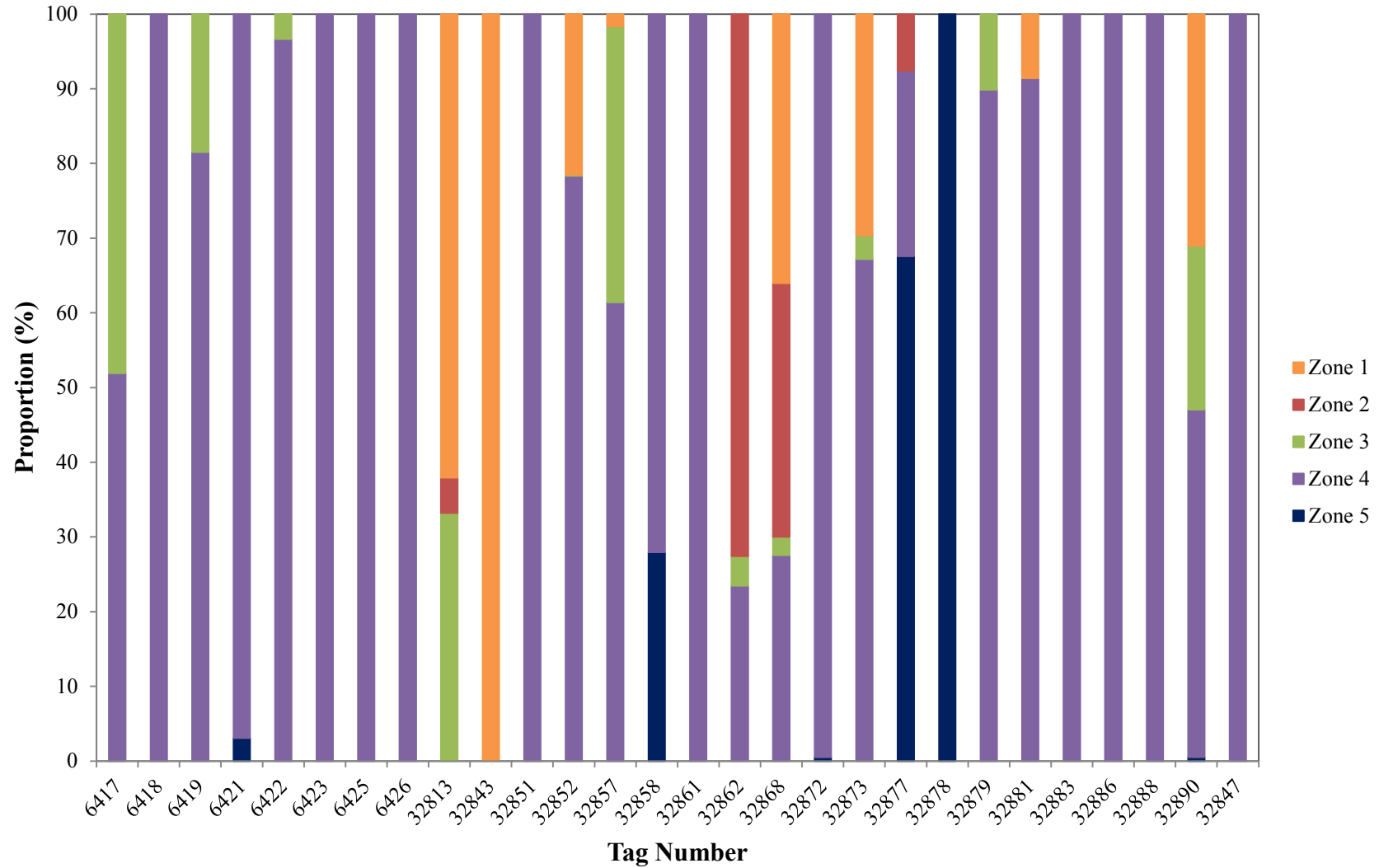


Figure 8: Proportion of time spent within five river zones between Clark Lake and Gull Rapids by individual acoustic tagged Walleye between 4 June and 11 October, 2015.

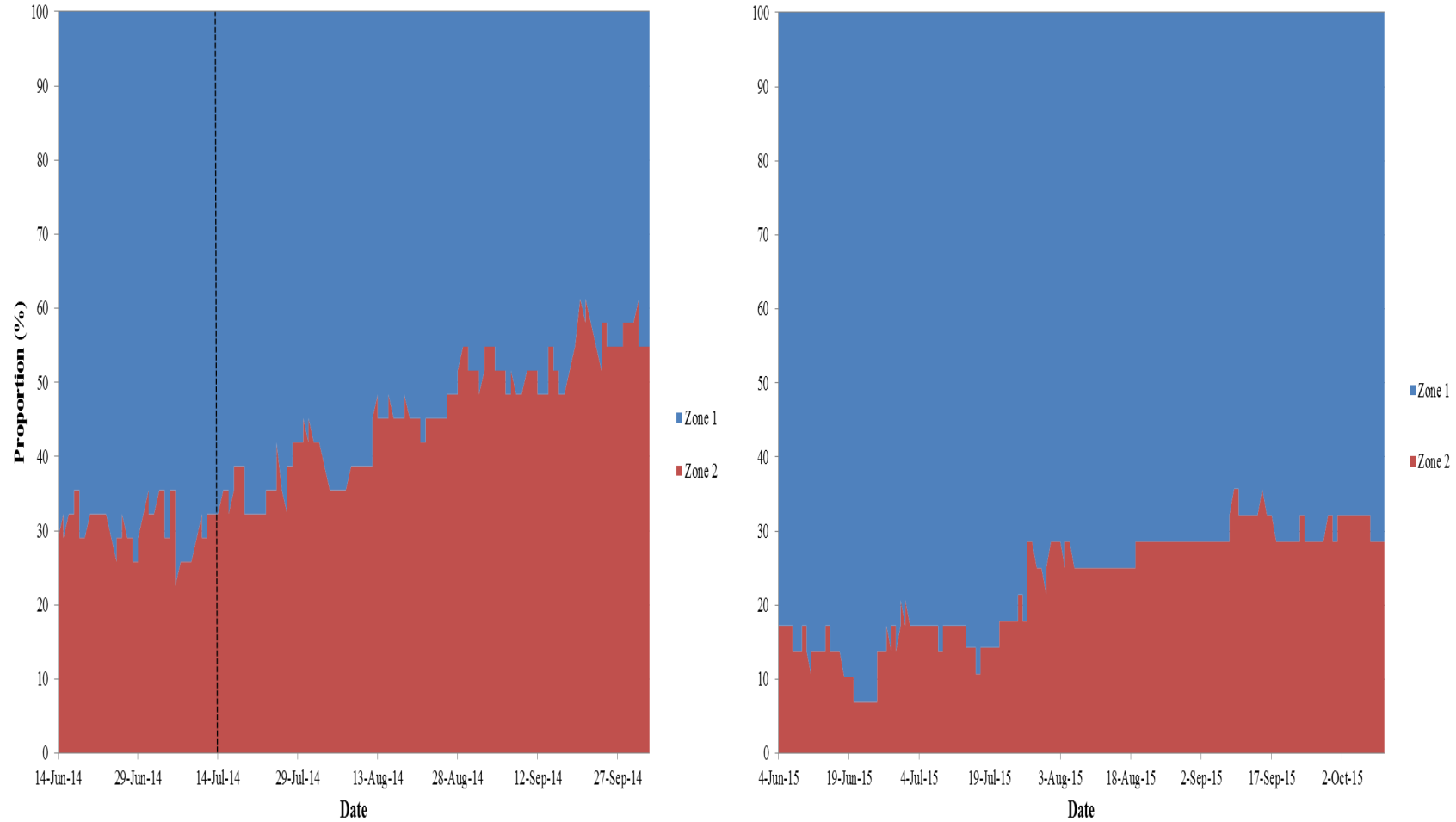


Figure 9: Proportional distribution of acoustic tagged Walleye within two zones between Gull Rapids and Kettle GS in the 2014 and 2015 open-water periods (June to October). Dotted line indicates start of Keeyask construction.

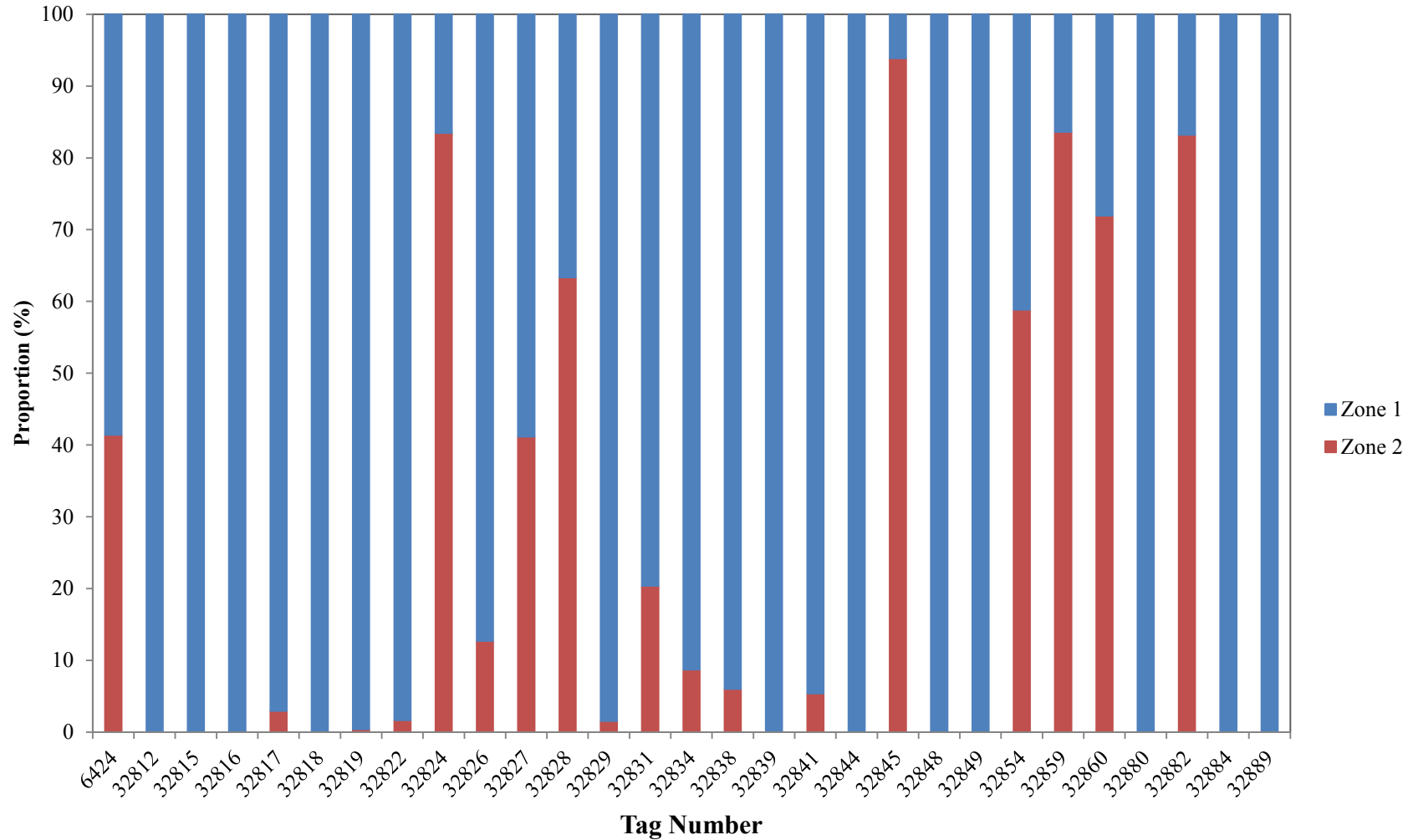
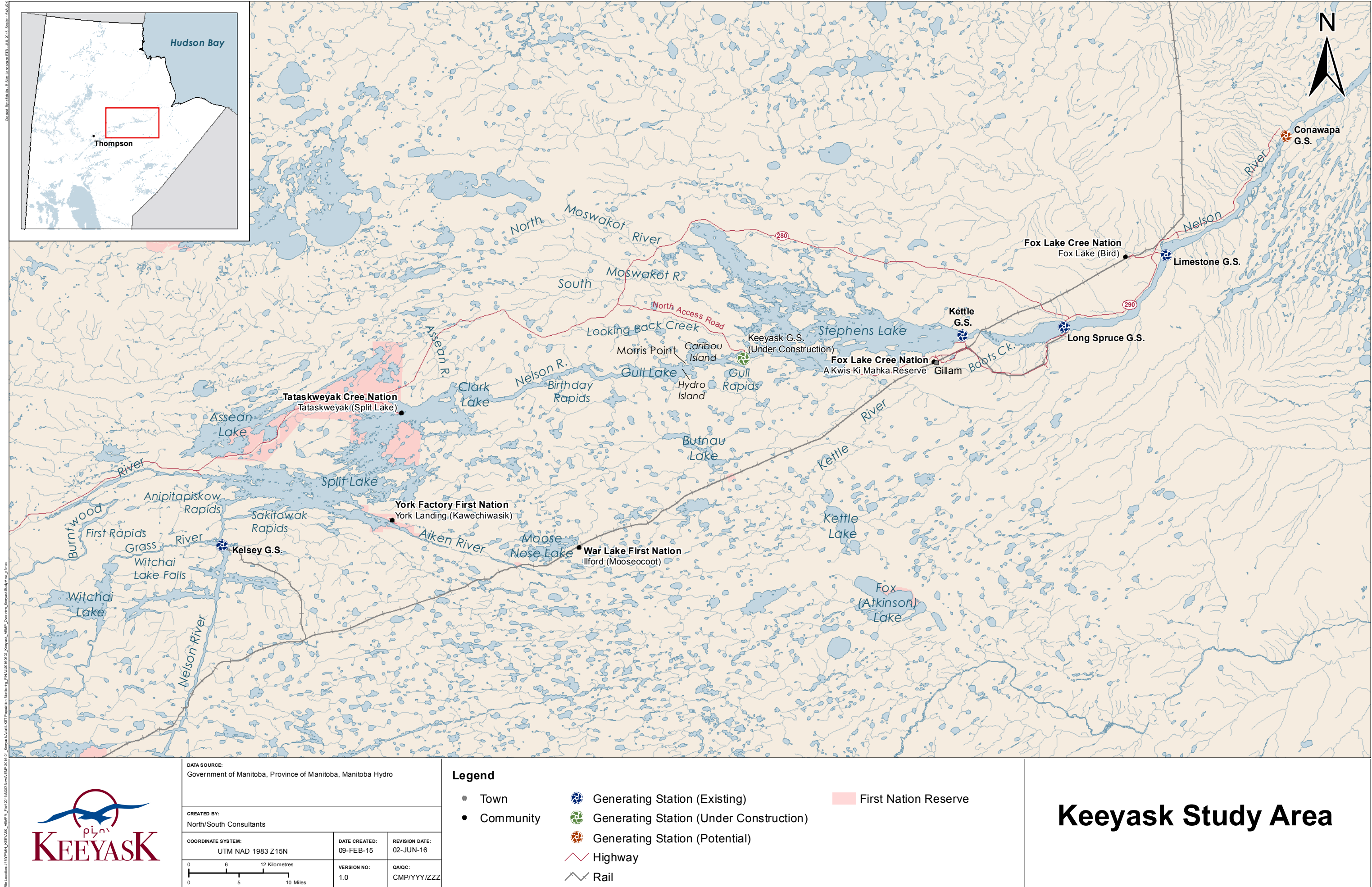


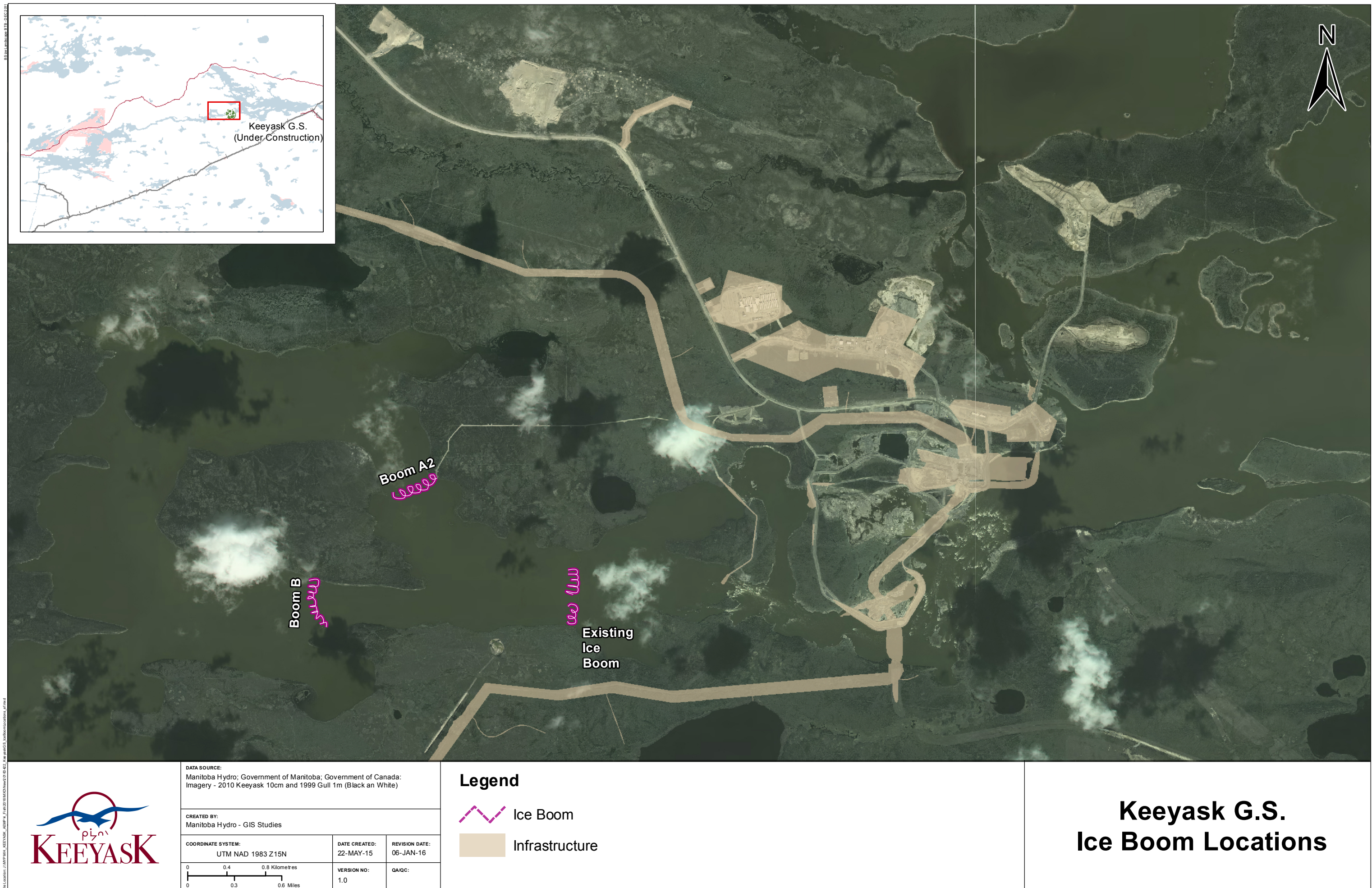
Figure 10: Proportion of time spent within two river zones between Gull Rapids and Kettle GS by individual acoustic tagged Walleye between 4 June and 11 October, 2015.

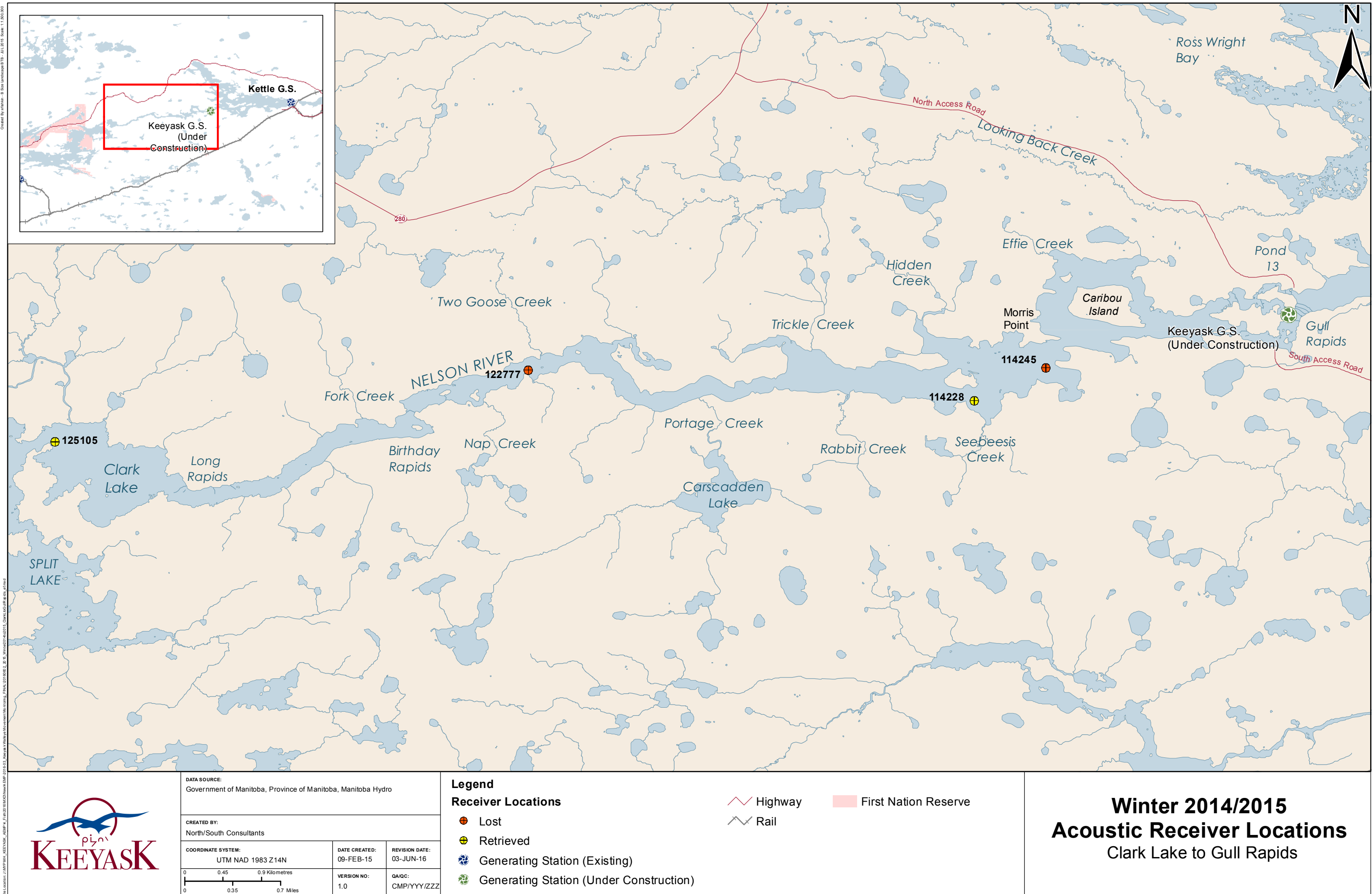
MAPS





Map 2: Map of instream structures at the Keeyask Generating Station site, June 2015.





Created by eSri Inc. © Sri Landmap B.T.B. - JUL 2015 Scale 1:53,900





DATA SOURCE: Government of Manitoba, Province of Manitoba, Manitoba Hydro		
CREATED BY: North/South Consultants		
COORDINATE SYSTEM: UTM NAD 1983 Z14N	DATE CREATED: 09-FEB-15	REVISION DATE: 09-JUN-16
0 0.45 0.9 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend
Receiver Locations

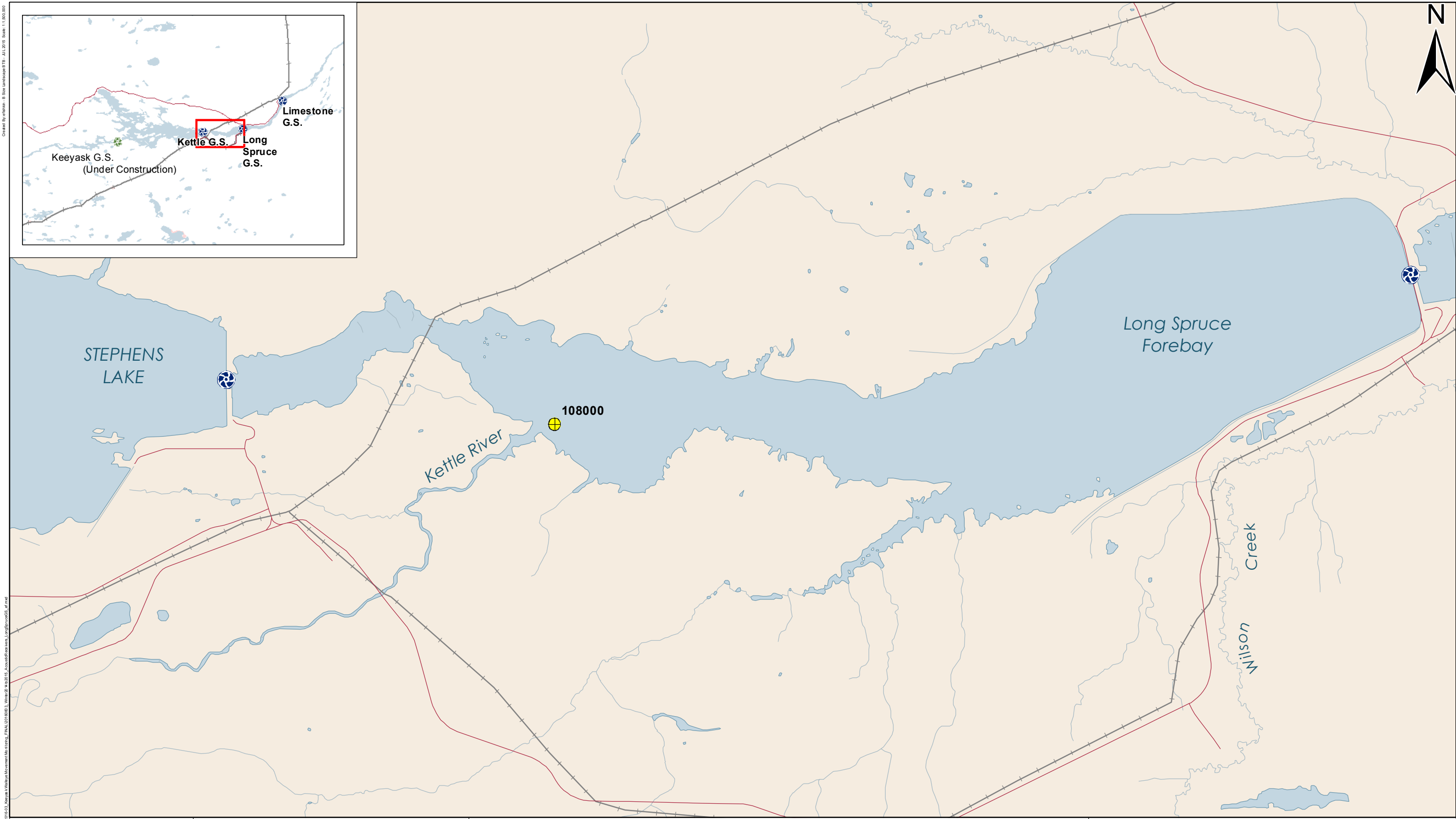
- Lost
- Retrieved
- Generating Station (Existing)
- Generating Station (Under Construction)

- Highway
- Rail
- First Nation Reserve

**Winter 2014/2015
Acoustic Receiver Locations
Stephens Lake**

Map 5: Locations of stationary receivers set in Stephens Lake from Gull Rapids to Kettle GS between October 2014 and June 2015. The former (pre-impoundment) river channel is shown in light blue.

Created By: mshahin - 8 Size Landscape B118 - JUL 2016 Scale 1:1,500,000



File Location: J:\PROJECTS\KEEYASK\KMP_F\1012015\KMP\KMP_1012015\KMP_1012015_AcousticReceiverLocations.mxd, FINAL 20160603, Winter 2014/2015, AcousticReceiverLocations.mxd

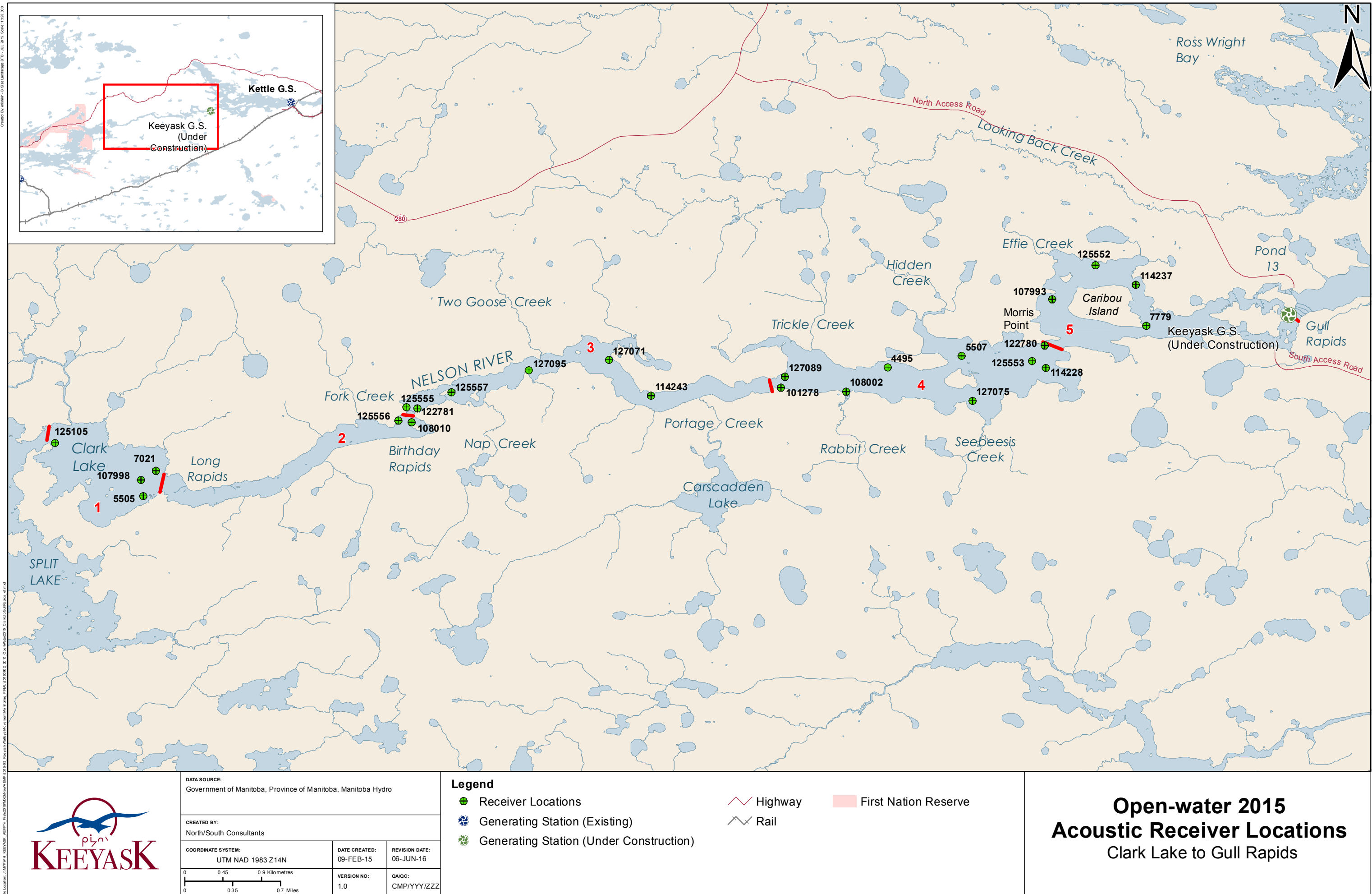


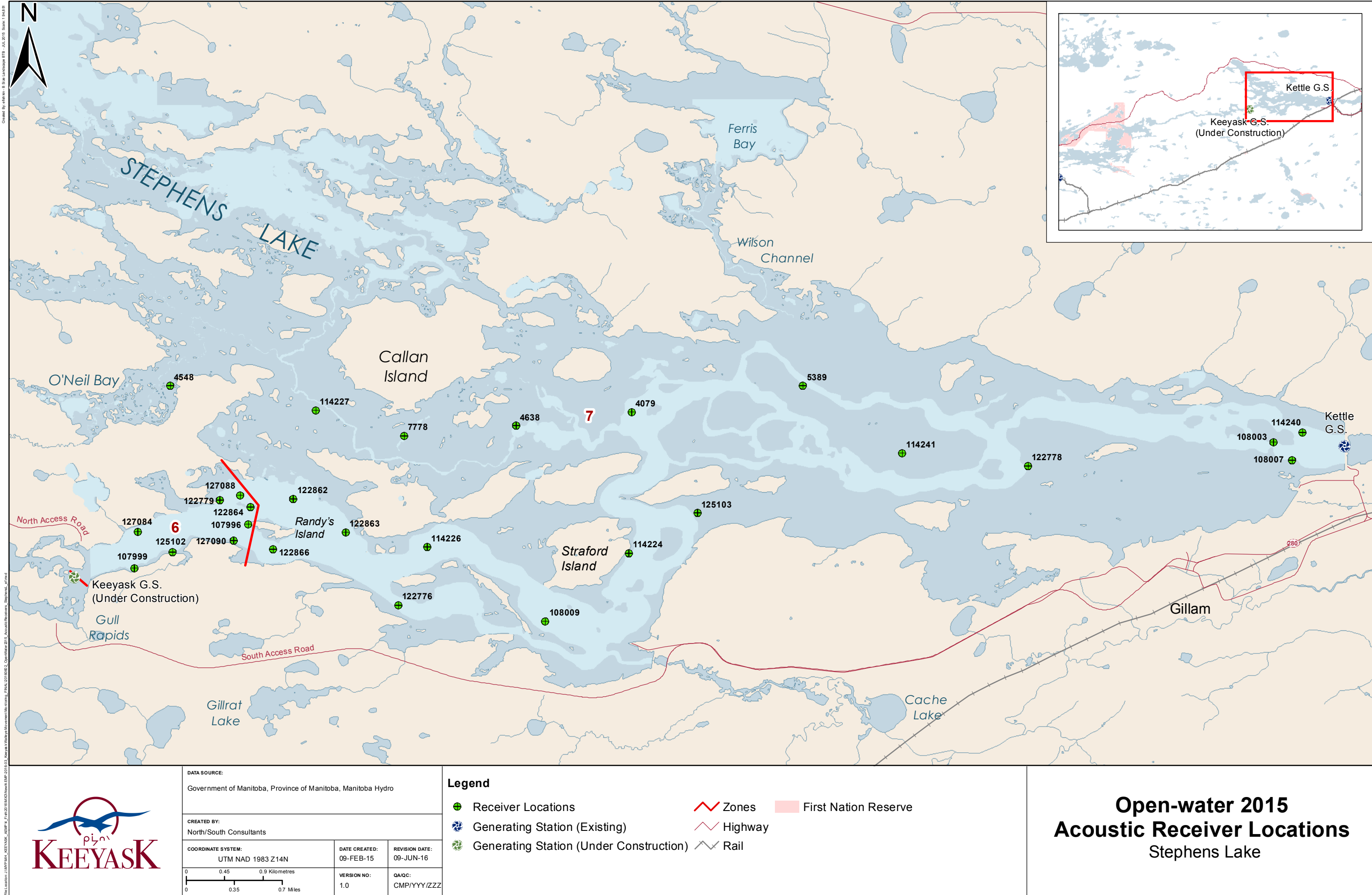
DATA SOURCE: Government of Manitoba, Province of Manitoba, Manitoba Hydro		
CREATED BY: North/South Consultants		
COORDINATE SYSTEM: UTM NAD 1983 Z14N	DATE CREATED: 09-FEB-15	REVISION DATE: 03-JUN-16
0 0.45 0.9 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

- Legend**
- Receiver Locations
 - Generating Station (Existing)
 - Generating Station (Under Construction)
 - Highway
 - Rail
 - First Nation Reserve

**Winter 2014/2015
Acoustic Receiver Locations**
Long Spruce G.S. Reservoir

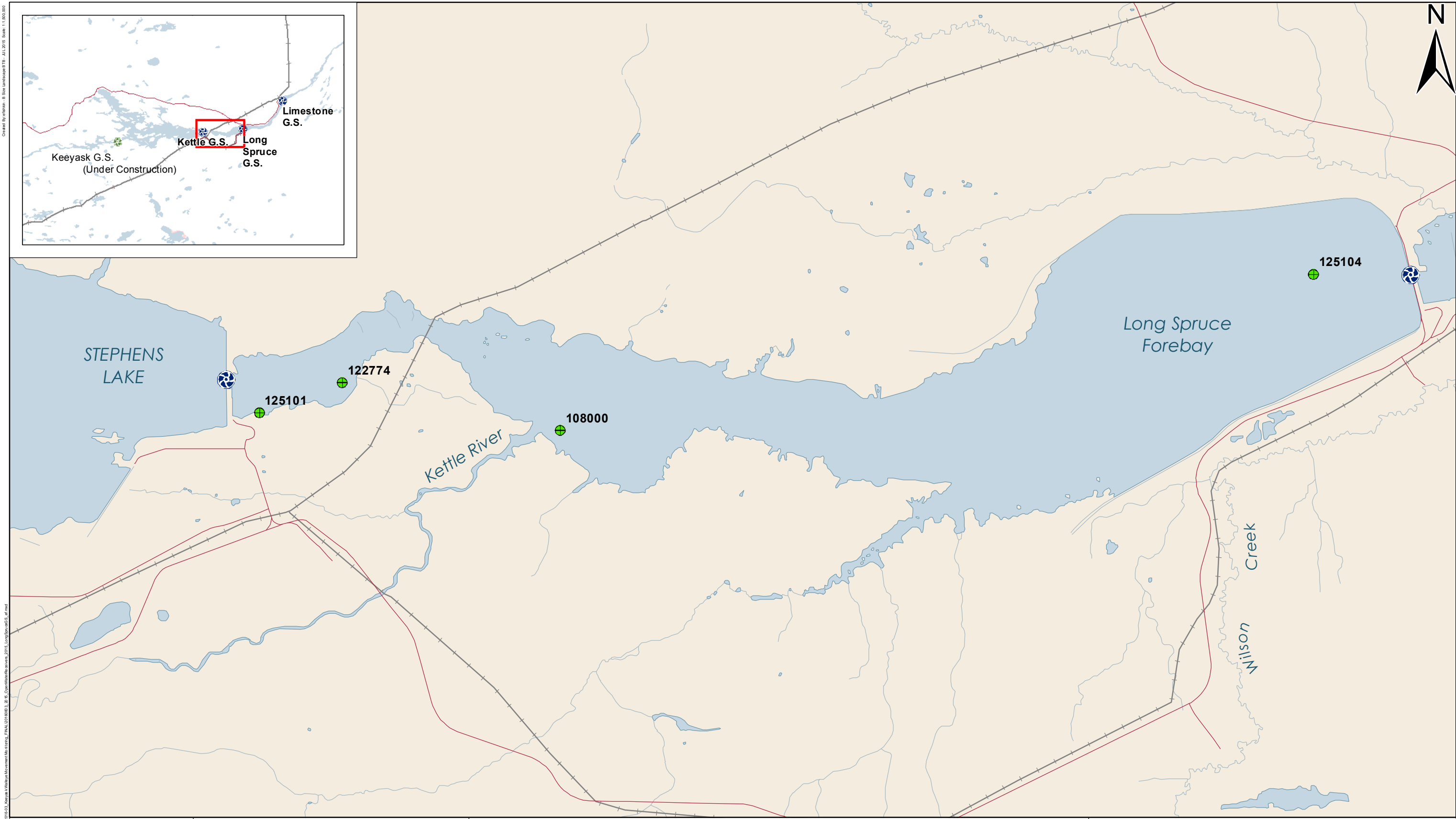
Map 6: Locations of stationary receivers set in the Long Spruce Forebay between October 2014 and June 2015.





Map 8: Locations of stationary receivers set in Stephens Lake from Gull Rapids to Kettle GS between May and October 2015. The river is divided into two "zones" based on placement of receiver "gates". The pre-impoundment river channel is shown in light blue.

Created By: nishan - B Size Landscape R119 - JUL 2016 Scale 1:1,500,000



File Location: J:\PROJECTS\KEEYASK\KMP_F\1503\1503\1503\Map_9_Open-water 2015_Acoustic Receivers_2015_Long Spruce G.S. and



DATA SOURCE: Government of Manitoba, Province of Manitoba, Manitoba Hydro		
CREATED BY: North/South Consultants		
COORDINATE SYSTEM: UTM NAD 1983 Z14N	DATE CREATED: 09-FEB-15	REVISION DATE: 03-JUN-16
0 0.45 0.9 Kilometres 0 0.35 0.7 Miles	VERSION NO: 1.0	QA/QC: CMP/YYY/ZZZ

Legend		
Receiver Locations	Highway	First Nation Reserve
Generating Station (Existing)	Rail	
Generating Station (Under Construction)		

Open-water 2015 Acoustic Receiver Locations Long Spruce G.S. Reservoir

Map 9: Locations of stationary receivers set in the Long Spruce Forebay between May and October 2015.

APPENDICES

APPENDIX 1: DETECTION SUMMARIES FOR WALLEYE TAGGED AND MONITORED IN THE KEEYASK STUDY AREA BETWEEN 2013 AND 2014

Table A1-1:	Detection summary for Walleye tagged upstream of the GS from June, 2014 to October 2015.	52
Table A1-2:	Detection summary for Walleye tagged downstream of the GS from June, 2014 to October 2015.	55

Table A1-1: Detection summary for Walleye tagged upstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, and those that moved downstream over Gull Rapids in blue.

Tag ID	Open-water 2014					Winter 2014/ 2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
32813	1130	-26.5	-9.9	16.6	35	7981	-12.9	-12.9	0.0	47	4847	-48.2	-12.9	35.3	49
32833	5458	-19.5	-7.4	12.1	87	0	-	-	-	0	2788	-17.4	43.5	60.9	35
32846	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32847	56438	-17.4	-17.4	0	130	0	-	-	-	0	67288	-17.4	-17.4	0.0	134
32851	6405	-44.5	-12.9	31.6	104	0	-	-	-	0	4341	-19.5	-19.4	0.1	31
32852	5620	-33.8	-9.5	24.3	95	0	-	-	-	0	7786	-48.2	-11.8	36.4	59
32853	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32856	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32857	11327	-19.5	-19.4	0.1	74	0	-	-	-	0	7116	-44.7	-19.4	25.3	68
32858	7307	-19.5	-9	10.5	115	0	-	-	-	0	8375	-19.5	-9.3	10.2	113
32861	9424	-19.5	-14.8	4.7	118	0	-	-	-	0	1262	-19.5	-12.9	6.6	18
32862	7216	-44.7	-7.4	37.3	84	0	-	-	-	0	1529	-34.3	-11.8	22.5	29
32863	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32864	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32865	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32866	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32867	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32868	156	-48.2	-48.2	0	9	0	-	-	-	0	741	-44.3	-17.4	26.9	37
32869	8500	-48.2	-12.9	35.3	103	0	-	-	-	0	0	-	-	-	0.0

Table A1-1: Detection summary for Walleye tagged upstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, and those that moved downstream over Gull Rapids in blue (continued).

Tag ID	Open-water 2014					Winter 2014/ 2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
32870	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32871	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32872	26481	-19.5	-9.9	9.6	124	0	-	-	-	0	13898	-17.4	-9.9	7.5	116
32873	2570	-48.2	-12.9	35.3	70	64	-48.2	-48.2	0.0	1	1647	-48.2	-12.9	35.3	35
32874	4414	-14.8	-5.8	9	77	0	-	-	-	0	0	-	-	-	0.0
32875	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32876	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32877	3647	-44.5	-9.5	35	68	0	-	-	-	0	9619	-34.3	-9.5	24.8	93
32878	6883	-33.8	-17.4	16.4	84	0	-	-	-	0	2039	-9.3	-5.8	3.5	26
32879	27102	-32.3	-14.8	17.5	105	0	-	-	-	0	14994	-33.8	-17.4	16.4	104
32880	158	4.4	4.8	0.4	8	0	-	-	-	0	0	-	-	-	0.0
32881	14741	-33.8	-14.8	19	96	0	-	-	-	0	14884	-44.3	-17.4	26.9	119
32882	512	-48.2	4.9	53.1	6	0	-	-	-	0	0	-	-	-	0.0
32883	18889	-19.5	-11.8	7.7	122	50	-12.9	-12.9	0.0	4	13035	-19.5	-9.9	9.6	131
32884	0	-	-	-	0	0	-	-	-	0	292	2.2	2.9	0.7	18
32885	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32886	37512	-17.4	-14.8	2.6	127	0	-	-	-	0	13474	-17.4	-14.8	2.6	124
32887	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0.0
32888	1896	-48.2	-12.9	35.3	45	1270	-48.2	-48.2	0.0	16	10557	-48.2	-12.9	35.3	63
32889	0	-	-	-	0	0	-	-	-	0	18	2.2	2.2	0.0	4
32890	2794	-19.5	-9.5	10	57	0	-	-	-	0	1301	-44.3	-9.9	34.4	45

Table A1-1: Detection summary for Walleye tagged upstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, and those that moved downstream over Gull Rapids in blue (continued).

Tag ID	Open-water 2014					Winter 2014/ 2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
6417	9504	-48.2	-17.4	30.8	71	0	-	-	-	0	7788	-48.2	-19.4	28.8	72
6418	20683	-19.5	-12.9	6.6	114	15880	-12.9	-12.9	0.0	81	573	-12.9	-12.9	0.0	9
6419	11490	-26.5	-12.9	13.6	82	10362	-12.9	-12.9	0.0	124	10593	-26.5	-12.9	13.6	124
6420	8224	-48.2	-11.8	36.4	66	0	-	-	-	0	0	-	-	-	0.0
6421	15291	-19.5	-9.5	10	111	8	-12.9	-12.9	0.0	1	34330	-19.5	-9.5	10.0	121
6422	20831	-19.5	-12.9	6.6	111	37506	-12.9	-12.9	0.0	137	28087	-33.8	-9.9	23.9	125
6423	3044	-19.4	-12.9	6.5	62	4150	-12.9	-12.9	0.0	58	6058	-17.4	-9.9	7.5	109
6425	58854	-19.5	-17.4	2.1	110	0	-	-	-	0	71088	-19.5	-19.5	0.0	134
6426	22404	-19.5	-12.9	6.6	109	5971	-12.9	-12.9	0.0	27	28385	-19.5	-12.9	6.6	96

Table A1-2: Detection summary for Walleye tagged downstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, those that moved downstream over Kettle GS in grey, those that moved upstream over Gull Rapids in blue, and those confirmed as mortalities in green.

Tag ID	Open-water 2014					Winter 2014/2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
32811	4201	0.5	43.5	43	29	0	-	-	-	0	0	-	-	-	0
32812	6015	0.5	10.2	9.7	79	5288	7.7	10.2	2.5	44	348	2.2	4.4	2.2	8
32814	2	6.1	6.3	0.2	1	0	-	-	-	0	0	-	-	-	0
32815	33	0.5	4.9	4.4	2	0	-	-	-	0	29	2.2	4.7	2.5	5
32816	230	0.5	1.3	0.8	7	0	-	-	-	0	781	2.2	4.9	2.7	15
32817	863	4.3	10.2	5.9	13	560	7.7	10.2	2.5	12	813	2.2	10.2	8.0	17
32818	77	4.3	13.4	9.1	2	0	-	-	-	0	433	1.3	4.7	3.4	22
32819	29	4.3	7.9	3.6	3	0	-	-	-	0	203	2.2	7.9	5.7	7
32821	1516	0.5	7.7	7.2	17	0	-	-	-	0	0	-	-	-	0
32820	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32822	402	0.5	10.5	10	13	29	7.9	10.5	2.6	1	2226	1.3	7.9	6.6	34
32823	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32824	3052	0.5	10.5	10	33	209	10.5	10.5	0.0	16	321	1.3	7.9	6.6	11
32825	91	4.3	7.9	3.6	4	0	-	-	-	0	0	-	-	-	0
32826	3175	0.5	7.9	7.4	28	465	7.7	10.2	2.5	7	1609	1.3	7.9	6.6	36
32827	15945	0.5	7.7	7.2	112	7958	7.7	10.2	2.5	68	5803	1.3	10.5	9.2	90
32828	1729	0.5	6.1	5.6	25	0	-	-	-	0	460	1.3	7.9	6.6	11
32829	8433	0.5	18.7	18.2	83	105	14.9	14.9	0.0	9	15166	1.3	10.2	8.9	123

Table A1-2: Detection summary for Walleye tagged downstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, those that moved downstream over Kettle GS in green, those that moved upstream over Gull Rapids in blue, and those confirmed as mortalities in brown (continued).

Tag ID	Open-water 2014					Winter 2014/2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
32830	22064	0.5	14.9	14.4	106	1864	7.7	10.2	2.5	0	0	-	-	-	0
32831	0	-	-	-	0	0	-	-	-	0	76	2.2	10.5	8.3	10
32832	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32834	4633	1.3	10.2	8.9	35	12042	7.7	10.2	2.5	74	59	2.9	10.2	7.3	6
32835	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32836	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32837	20	0.5	4.9	4.4	1	0	-	-	-	0	0	-	-	-	0
32838	14365	0.5	14.9	14.4	97	1234	7.7	10.2	2.5	38	3356	1.3	5.8	4.5	52
32839	0	-	-	-	0	0	-	-	-	0	5	3.9	3.9	-	1
32840	669	2.9	7.9	5	22	875	7.9	10.5	2.6	4	0	-	-	-	0
32841	1284	2.9	14.9	12	17	4389	7.7	14.9	7.2	36	17150	2.2	14.9	12.7	121
32842	0	-	-	-	0	0	-	-	-	0	0	-	-	-	0
32843	28	-48.2	-48.2	0	5	0	-	-	-	0	0	-	-	-	0
32844	631	2.9	13.4	10.5	8	8877	7.9	10.5	2.6	65	304	1.3	3.6	2.3	16
32845	4509	1.3	21	19.7	59	10656	18.7	21.0	2.3	113	3323	2.9	19.0	16.1	34
32848	2297	0.5	10.2	9.7	30	5738	7.7	10.2	2.5	56	7314	1.3	7.7	6.4	92
32849	15784	0.5	5.8	5.3	89	0	-	-	-	0	28553	1.3	4.9	3.6	100
32850	284	4.7	7.9	3.2	2	0	-	-	-	0	0	-	-	-	0
32854	5003	0.5	18.7	18.2	47	0	-	-	-	0	938	2.2	17.4	15.2	11
32855	5724	0.5	10.2	9.7	33	0	-	-	-	0	0	-	-	-	0

Table A1-2: Detection summary for Walleye tagged downstream of the GS from June, 2014 to October 2015. Movements of fish not detected since being tagged are highlighted in yellow, those not detected in open-water 2015 in red, those that moved downstream over Kettle GS in green, those that moved upstream over Gull Rapids in blue, and those confirmed as mortalities in brown (continued).

Tag ID	Open-water 2014					Winter 2014/2015					Open-water 2015				
	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days	# of Detections	Farthest U/S (rkm)	Farthest D/S (rkm)	Movement Range (rkm)	# of Detection Days
32859	5184	0.5	10.2	9.7	88	0	-	-	-	0	6045	1.3	11.0	9.7	95
32860	180	2.9	16.8	13.9	12	0	-	-	-	0	168	2.2	10.2	8.0	12
6424	4389	2.9	10.2	7.3	46	0	-	-	-	0	443	2.2	10.5	8.3	21
6427	2259	1.3	14.9	13.6	21	0	-	-	-	0	0	-	-	-	0

APPENDIX 2:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE, CLARK LAKE TO GULL RAPIDS, JUNE 2013 TO OCTOBER 2015

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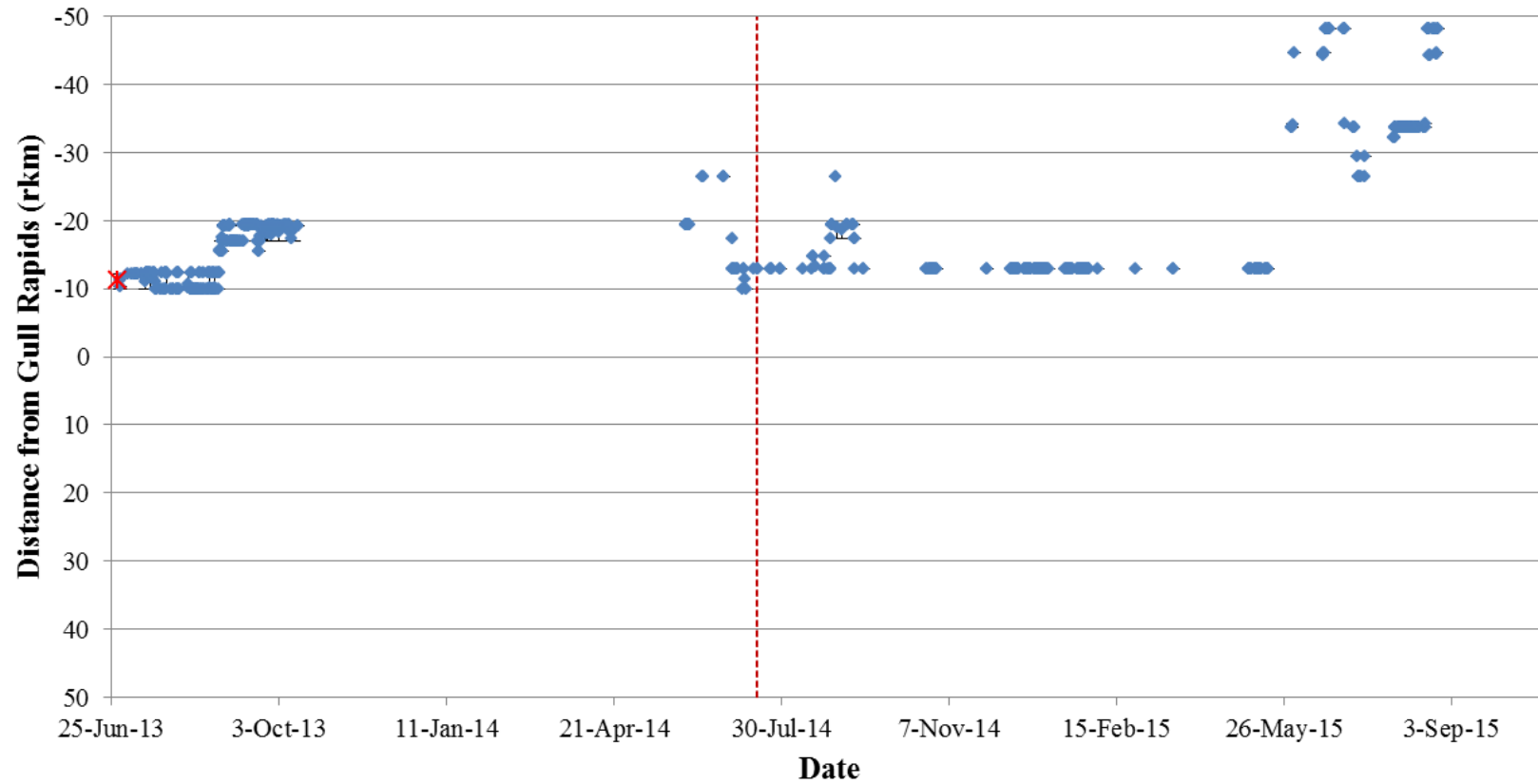


Figure A2-1: Position of a Walleye tagged with an acoustic transmitter (code #32813) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

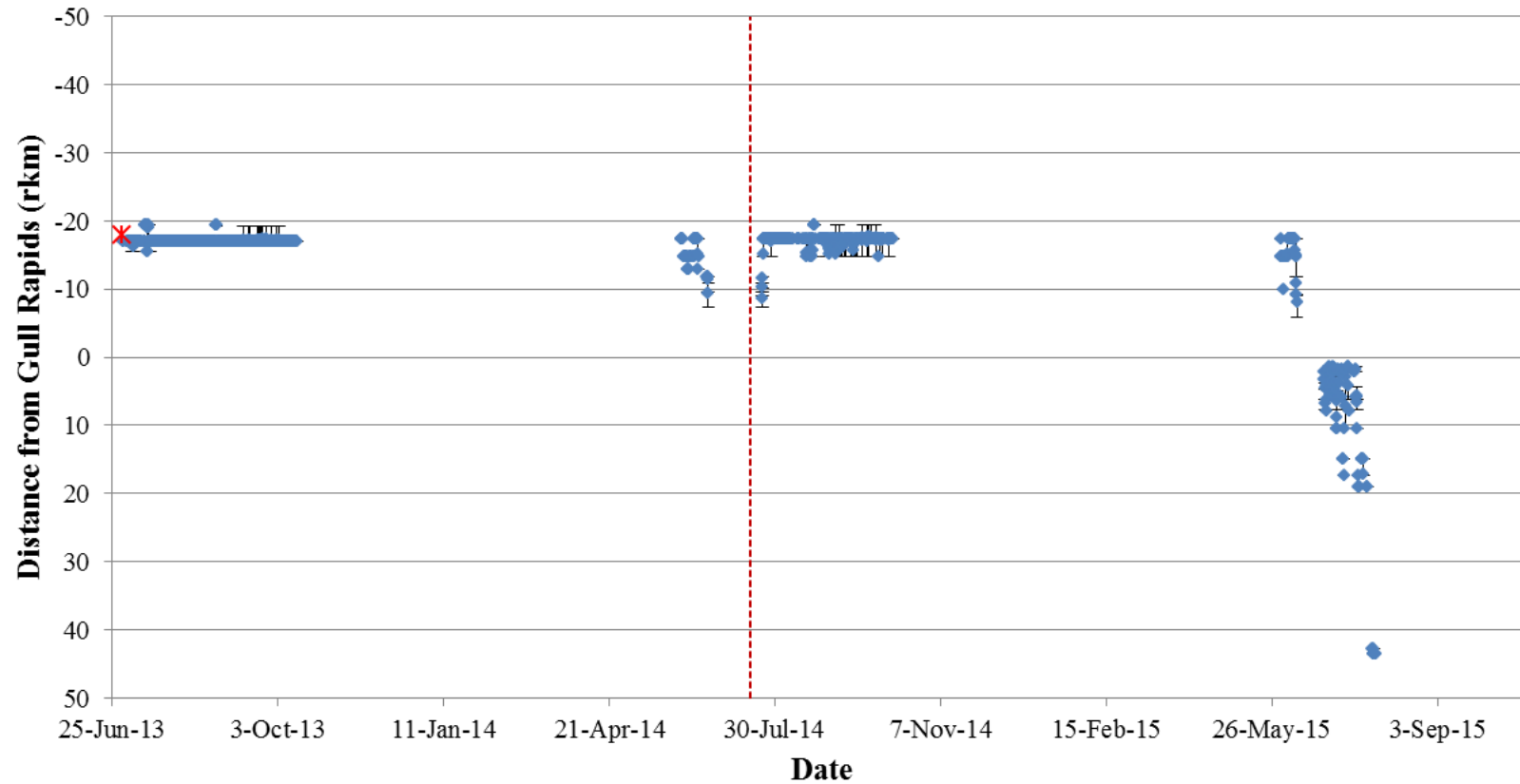


Figure A2-2: Position of a Walleye tagged with an acoustic transmitter (code #32833) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

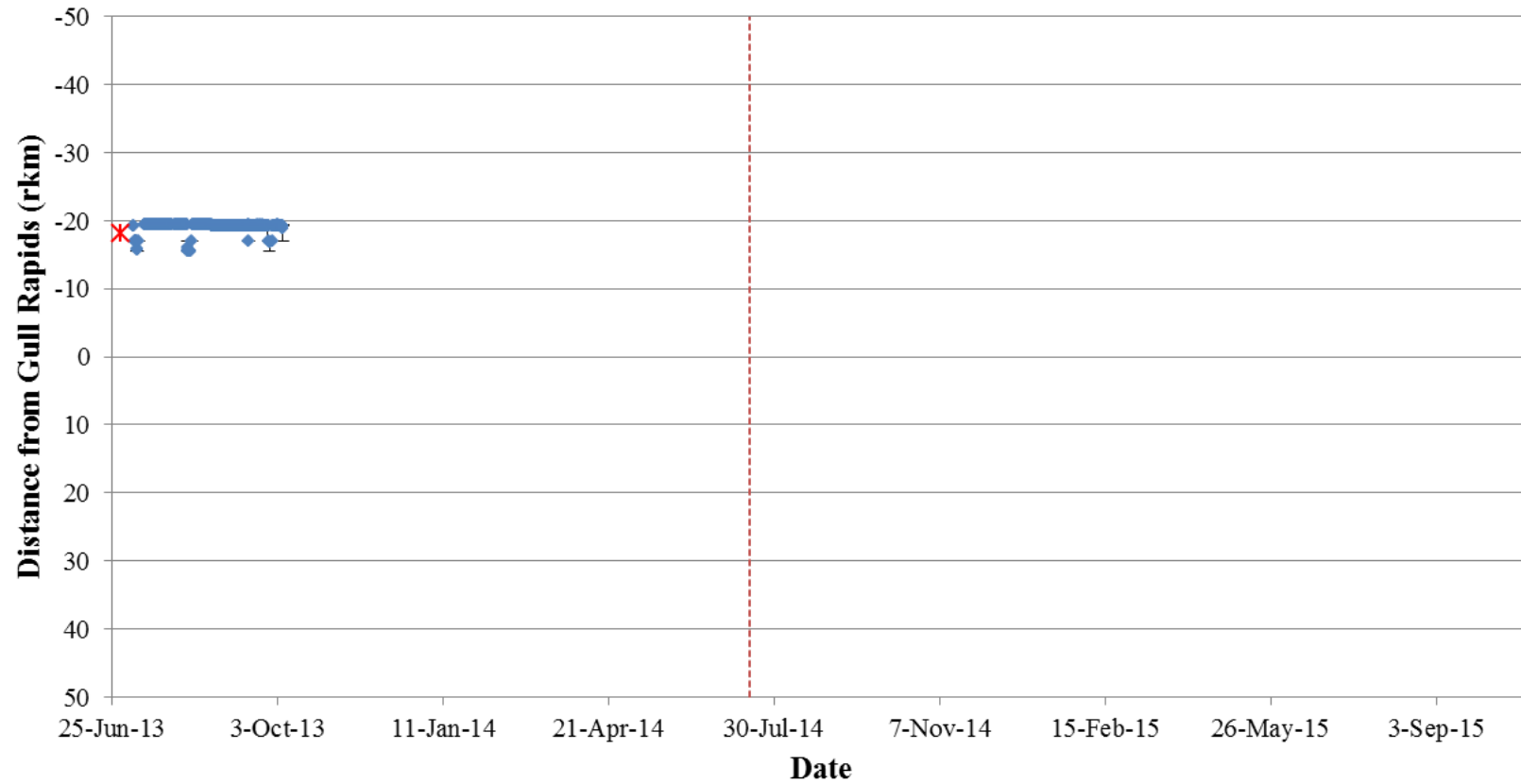


Figure A2-3: Position of a Walleye tagged with an acoustic transmitter (code #32846) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

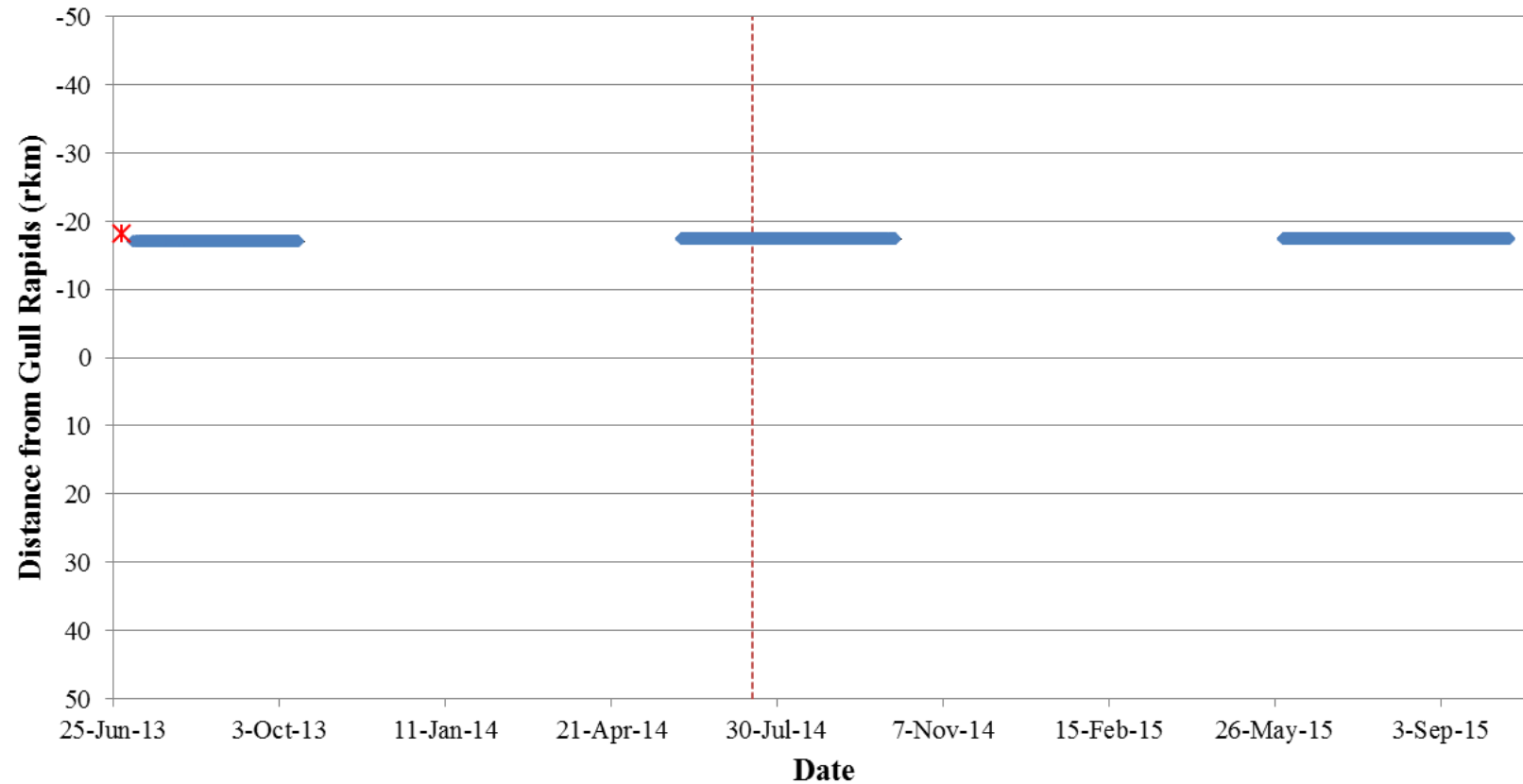


Figure A2-4: Position of a Walleye tagged with an acoustic transmitter (code #32847) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line. Note: this fish is considered dead.

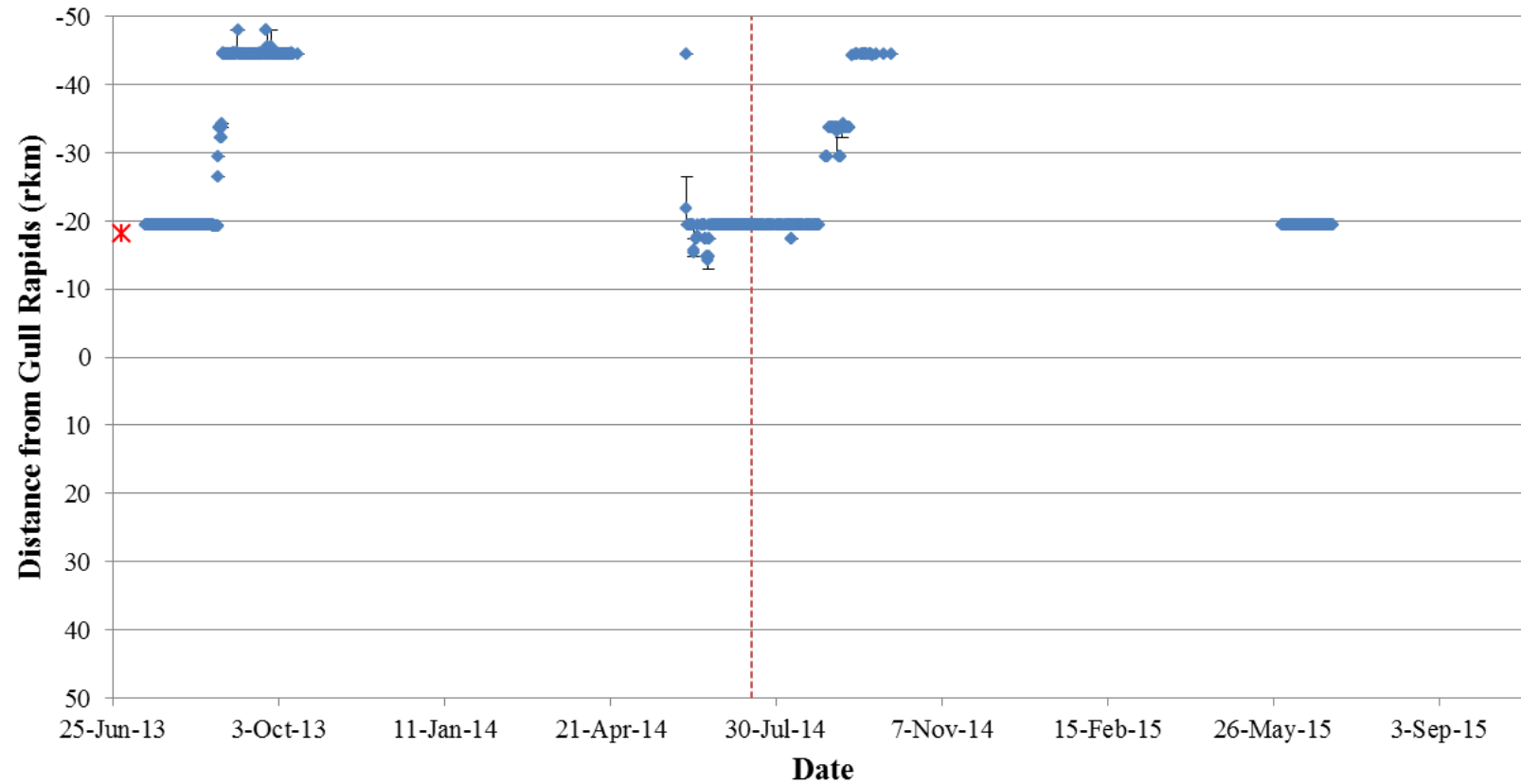


Figure A2-5: Position of a Walleye tagged with an acoustic transmitter (code #32851) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

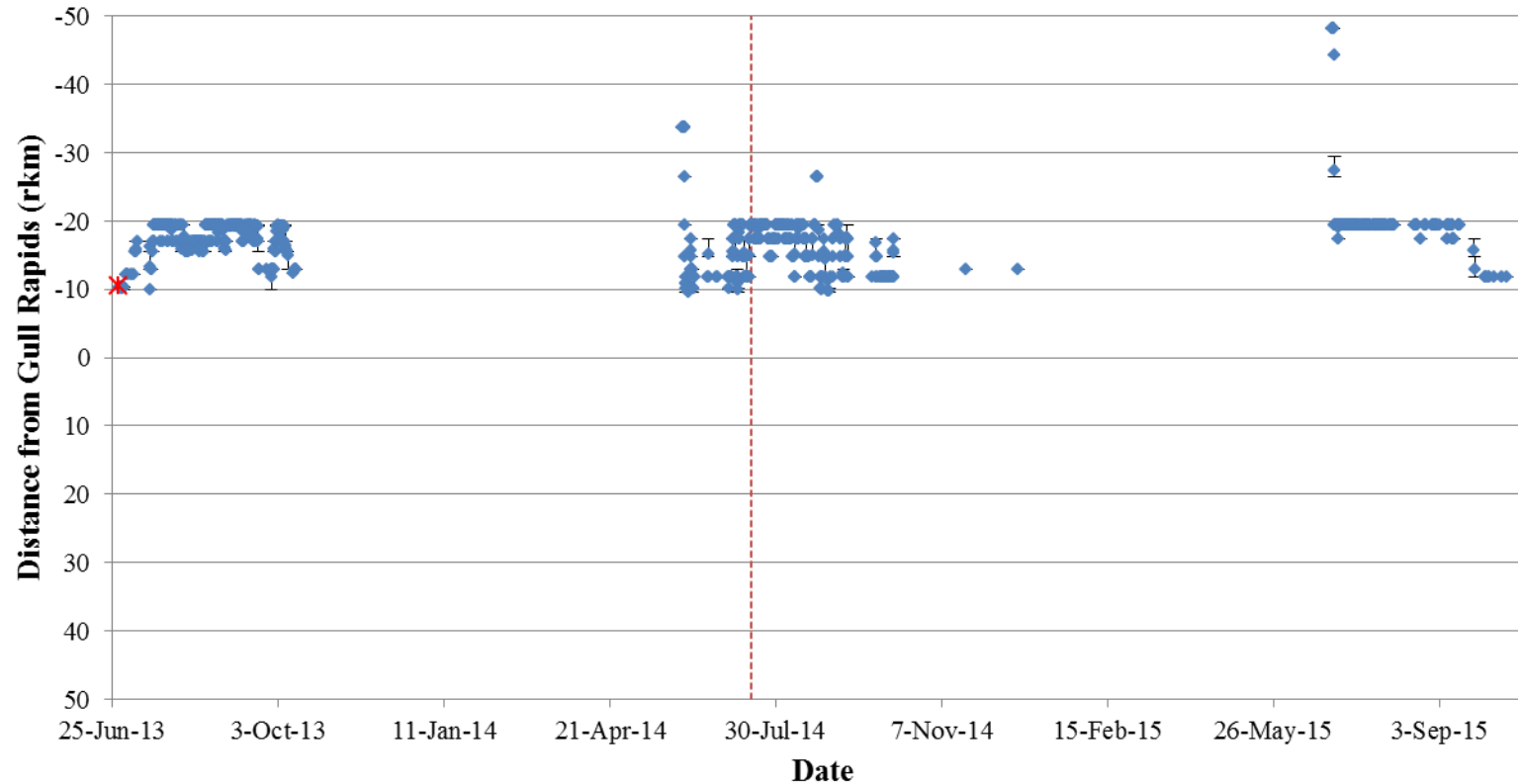


Figure A2-6: Position of a Walleye tagged with an acoustic transmitter (code #32852) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

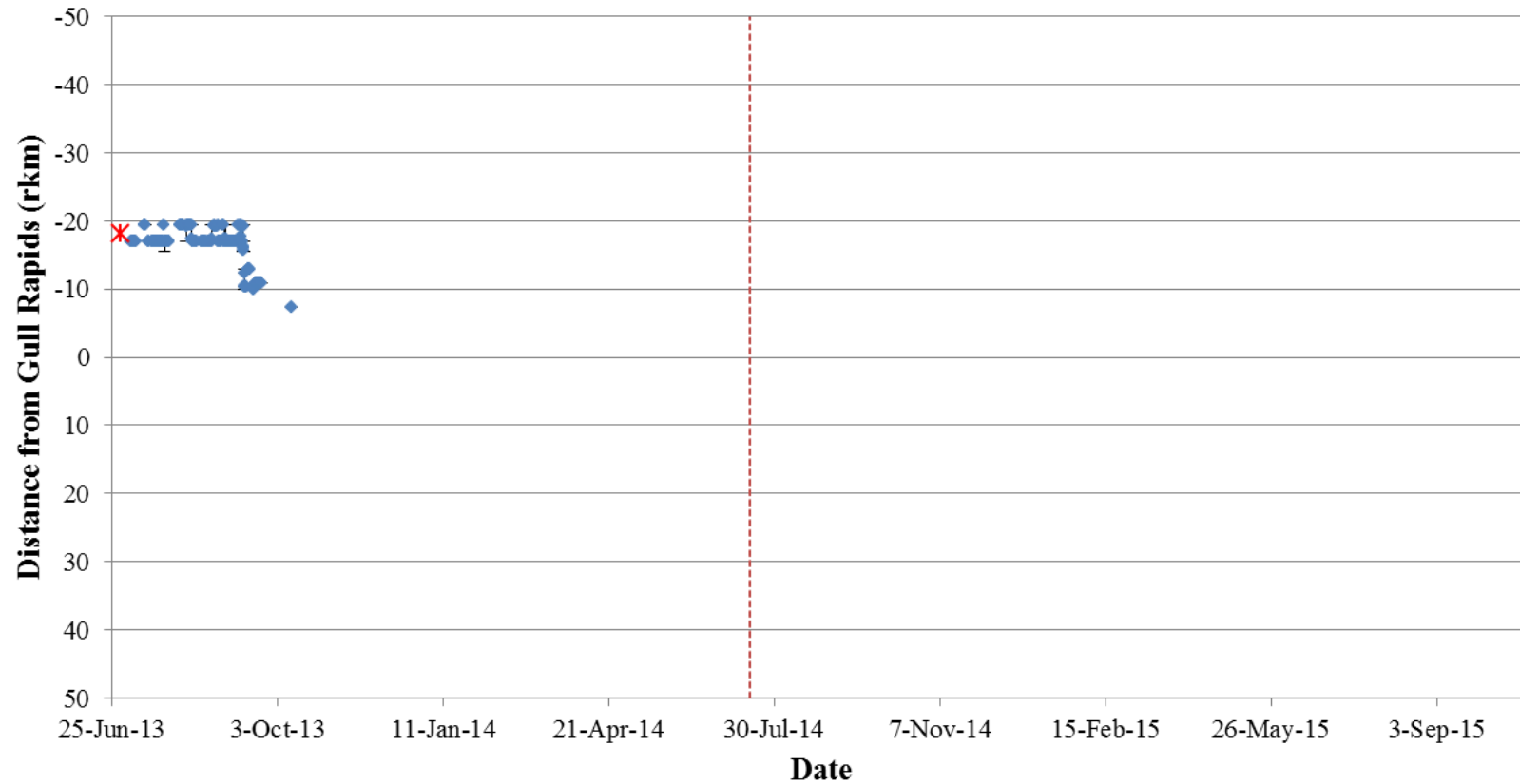


Figure A2-7: Position of a Walleye tagged with an acoustic transmitter (code #32853) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

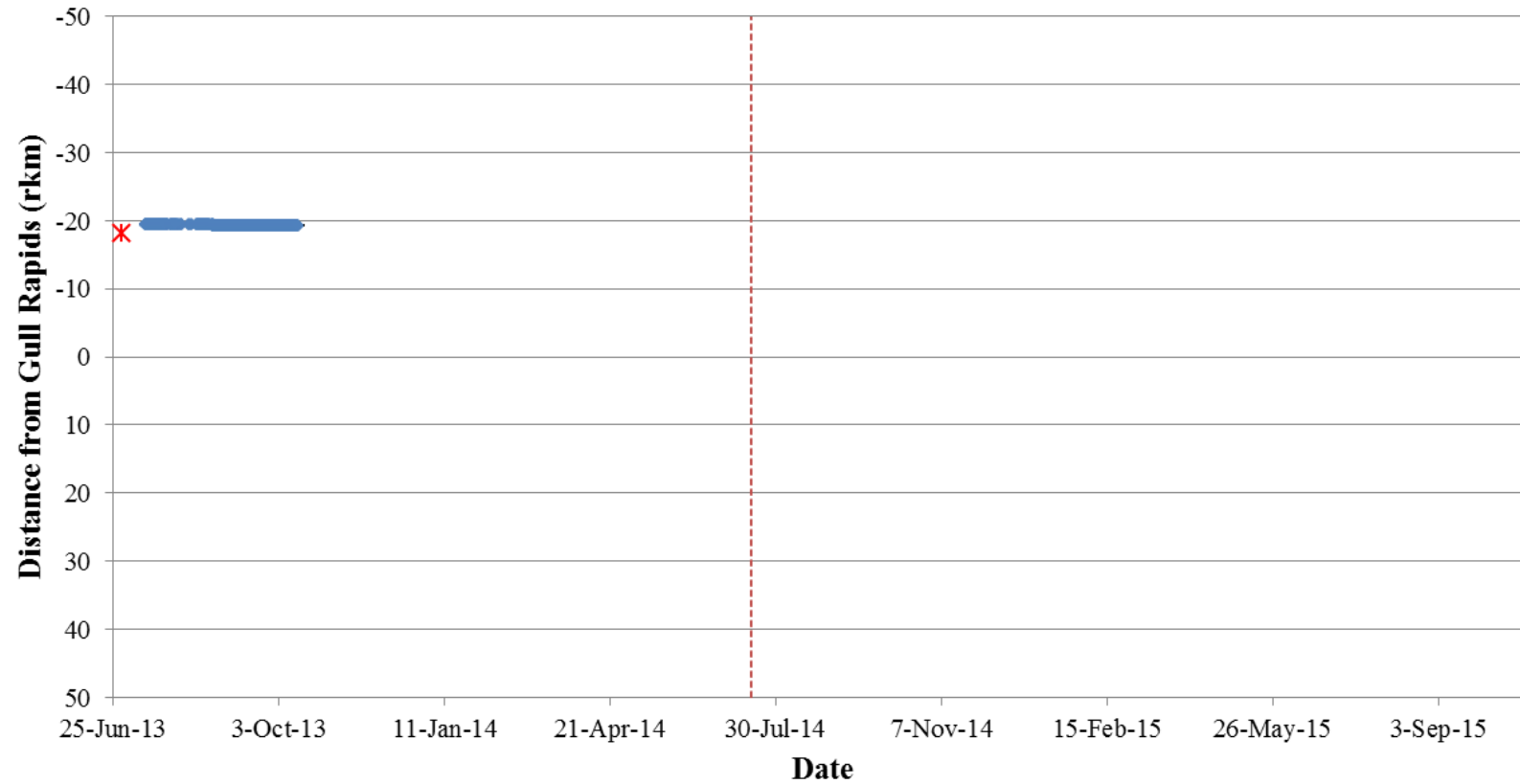


Figure A2-8: Position of a Walleye tagged with an acoustic transmitter (code #32856) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2014. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

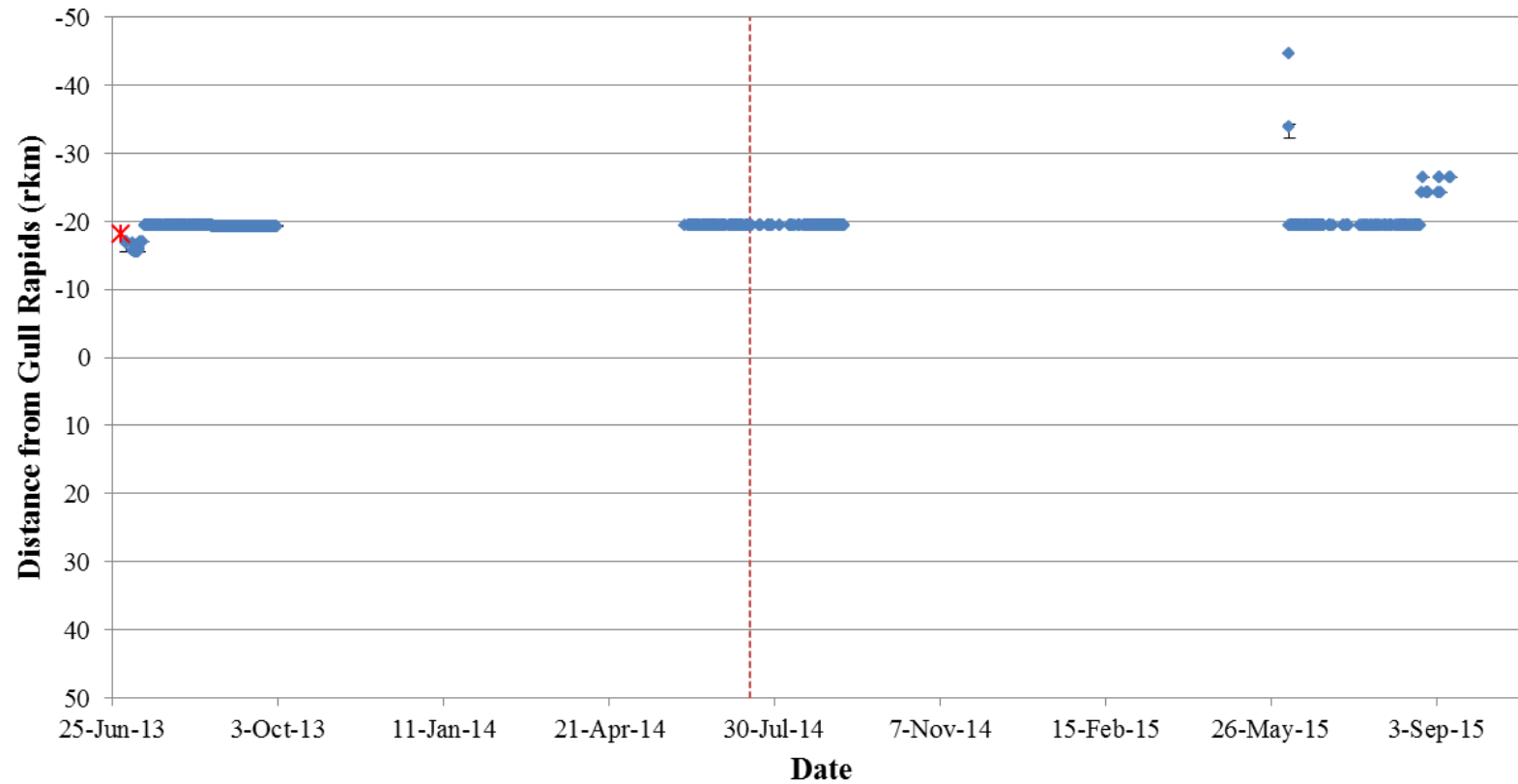


Figure A2-9: Position of a Walleye tagged with an acoustic transmitter (code #32857) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

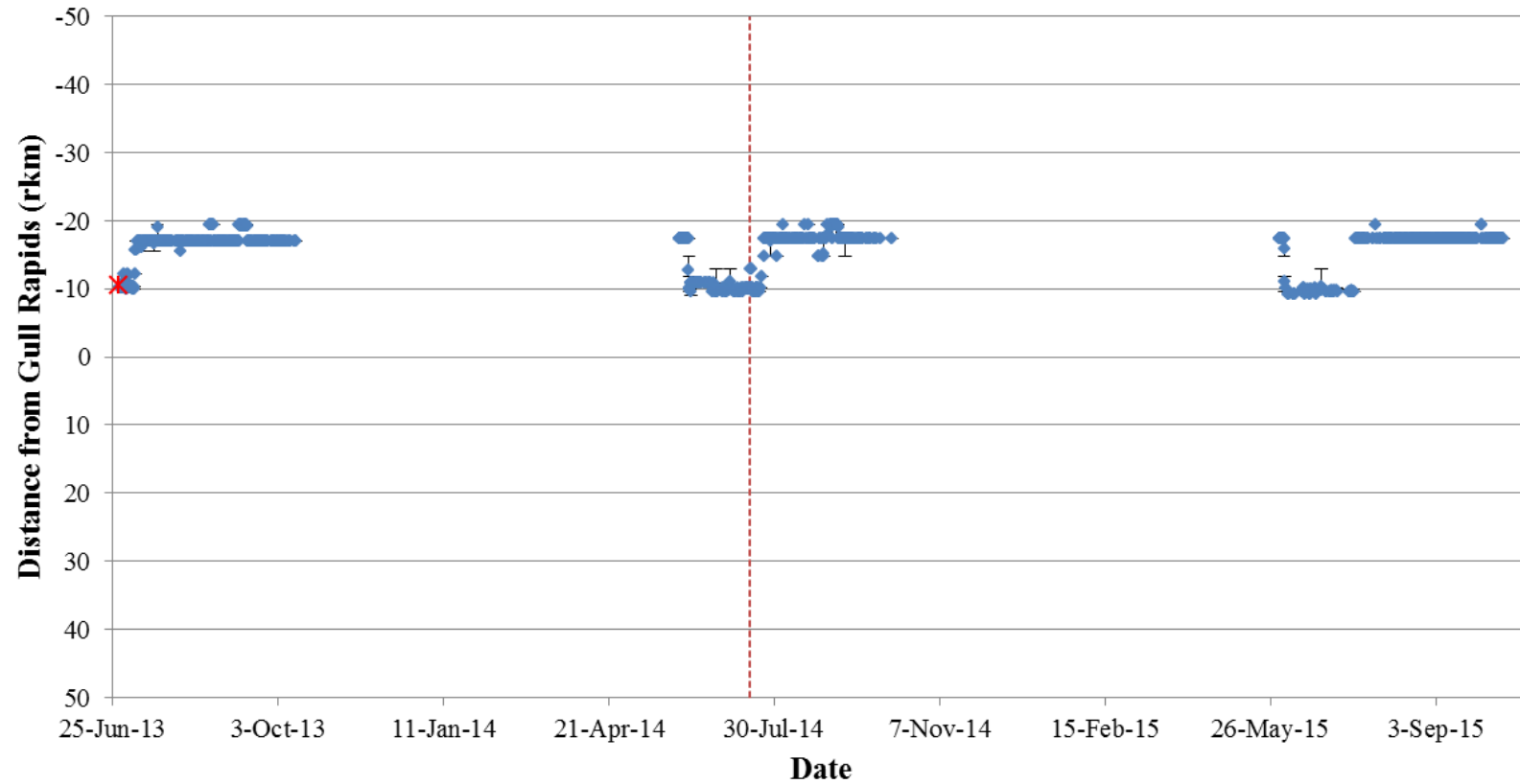


Figure A2-10: Position of a Walleye tagged with an acoustic transmitter (code #32858) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

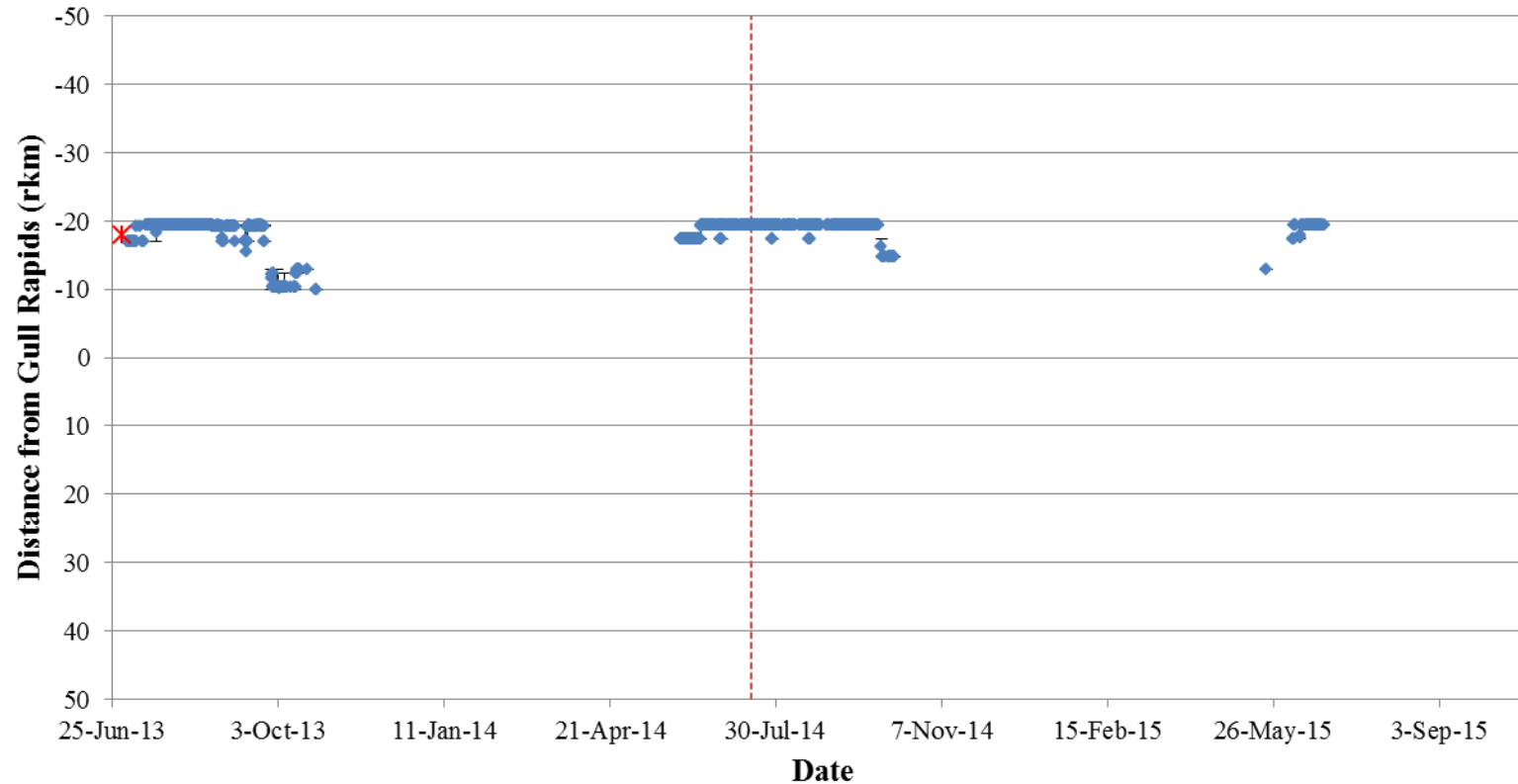
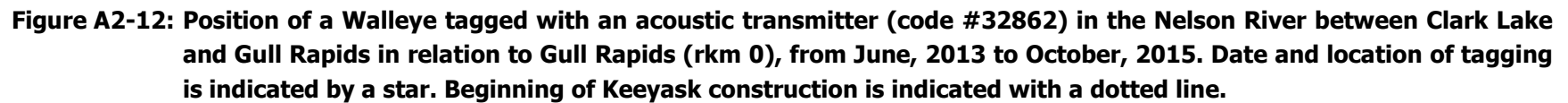


Figure A2-11: Position of a Walleye tagged with an acoustic transmitter (code #32861) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



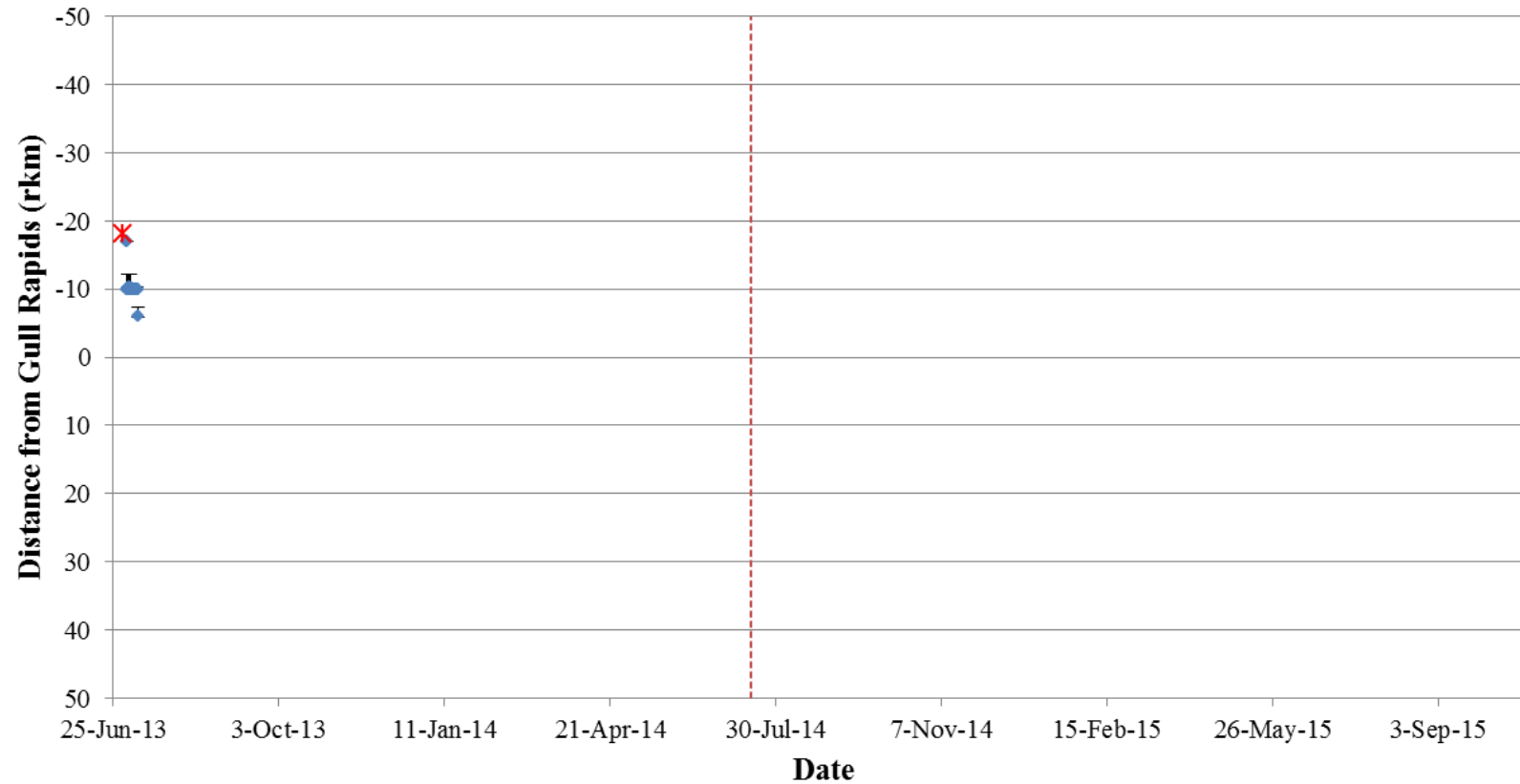


Figure A2-13: Position of a Walleye tagged with an acoustic transmitter (code #32863) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

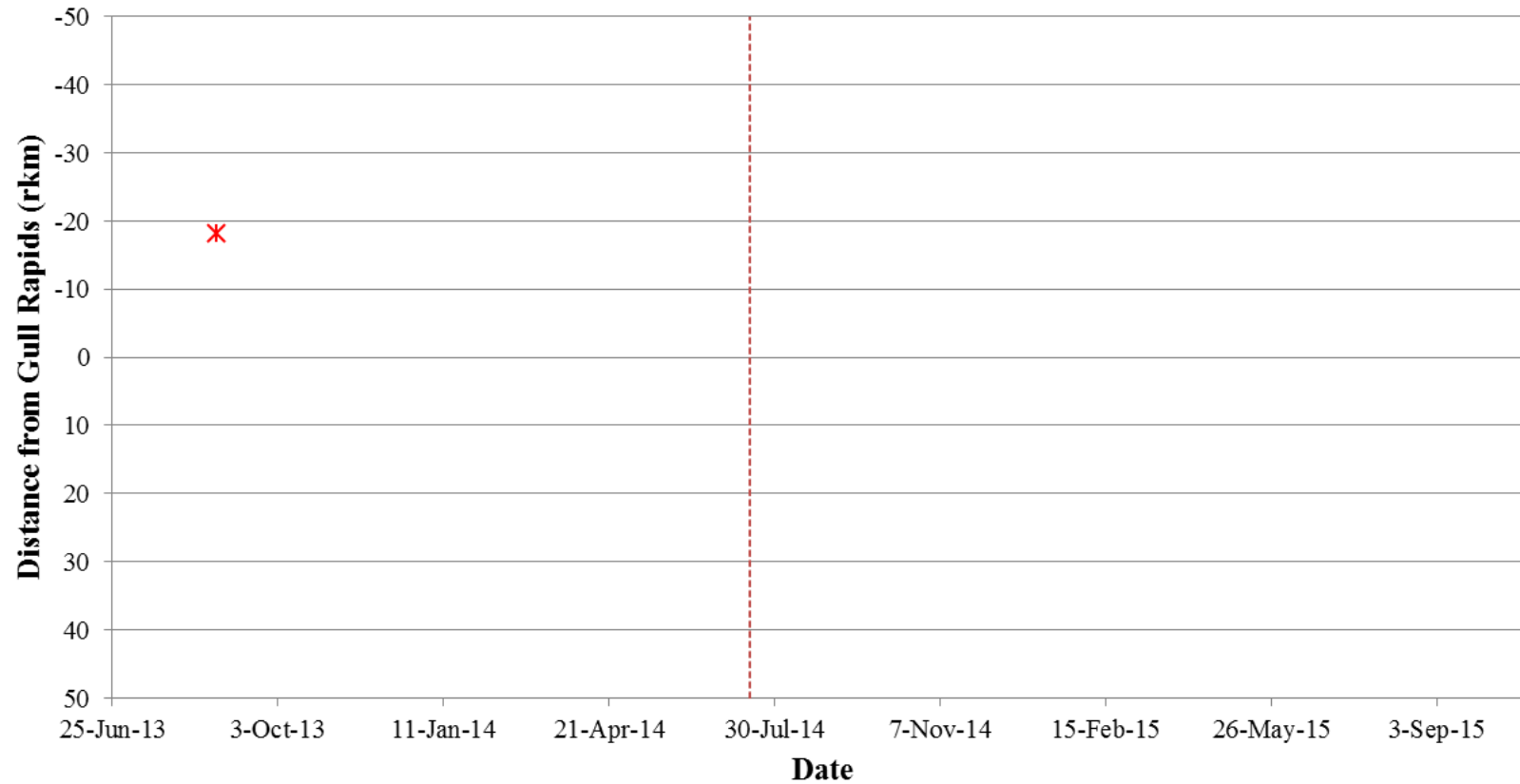


Figure A2-14: Position of a Walleye tagged with an acoustic transmitter (code #32864) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

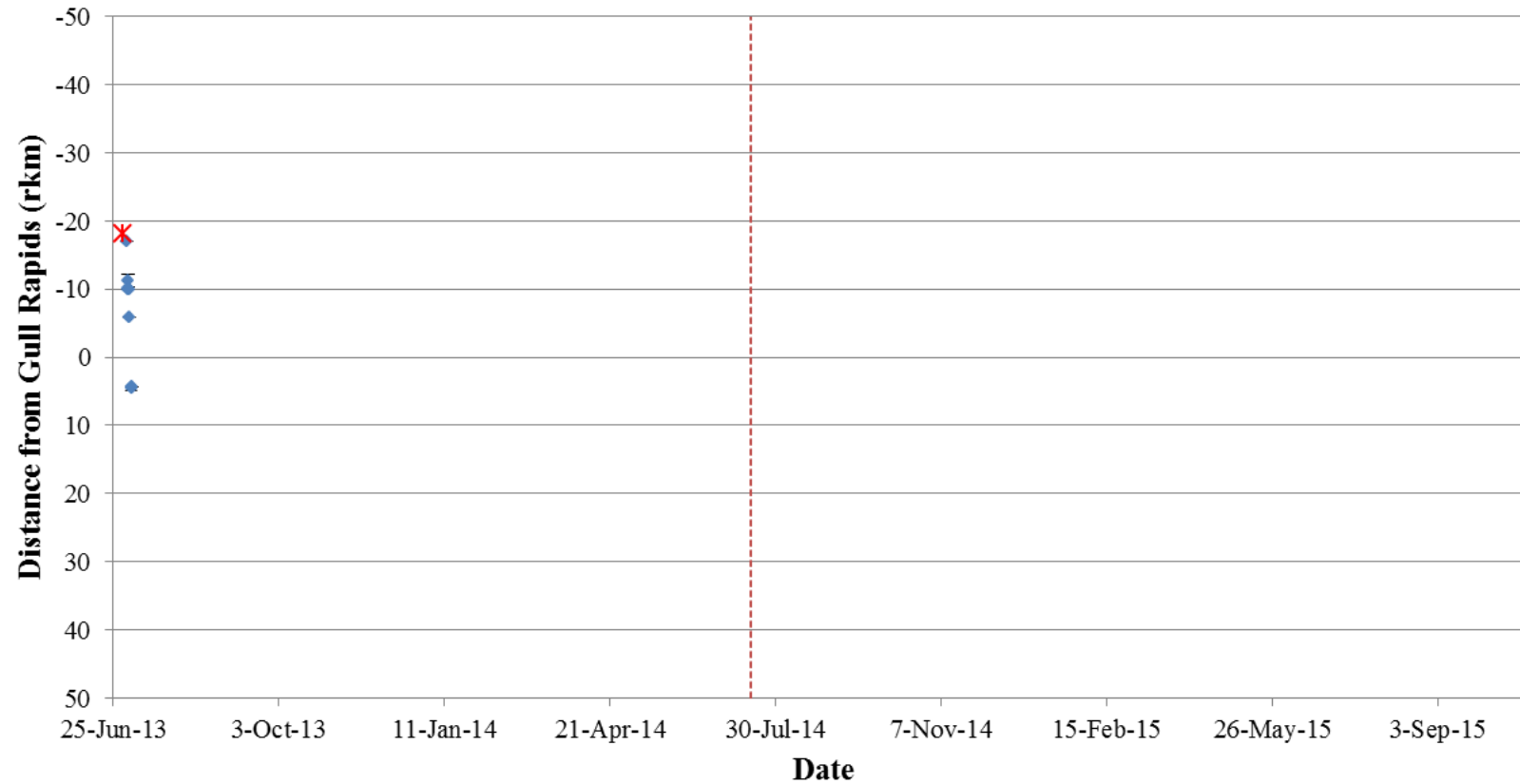


Figure A2-15: Position of a Walleye tagged with an acoustic transmitter (code #32865) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

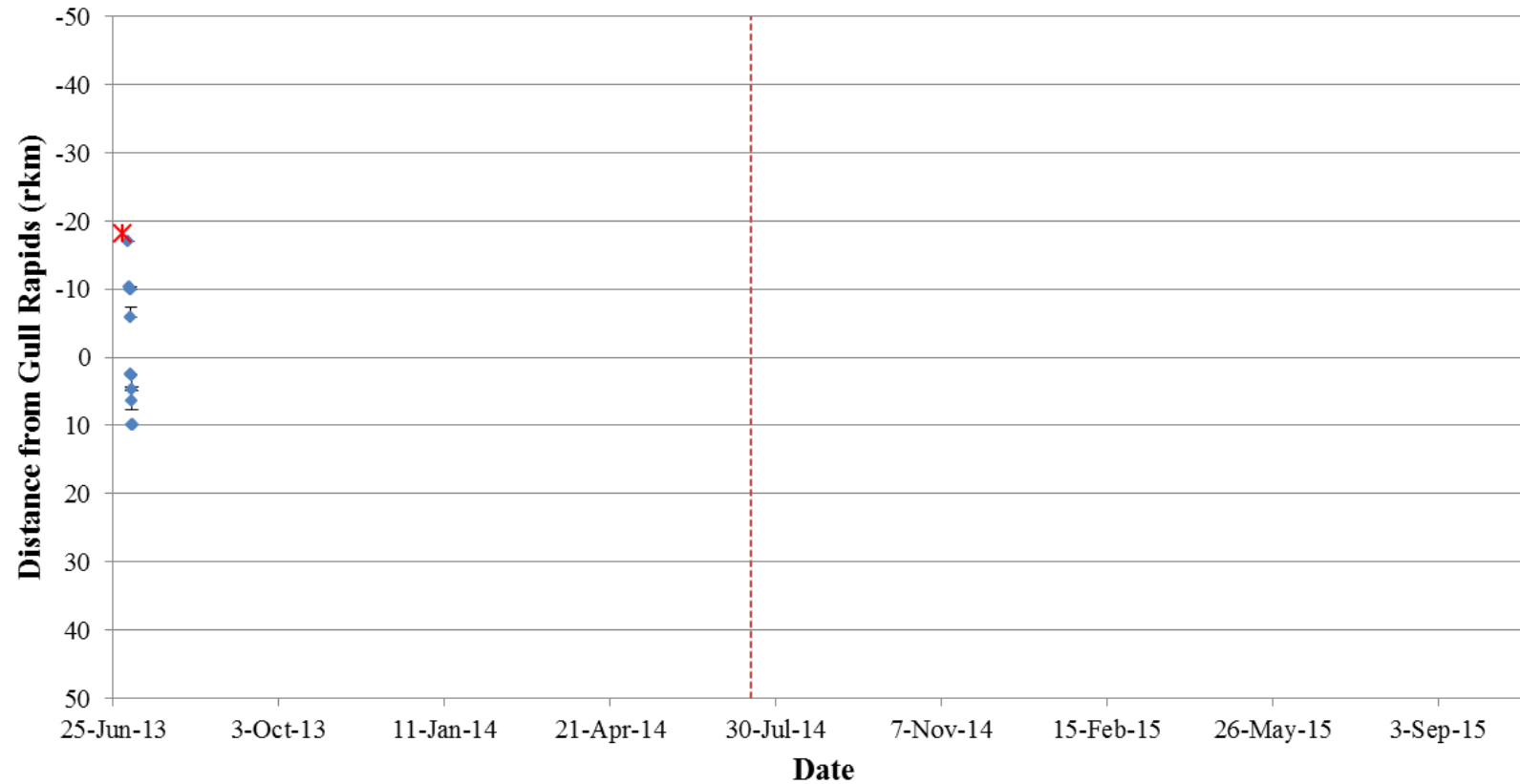


Figure A2-16: Position of a Walleye tagged with an acoustic transmitter (code #32866) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

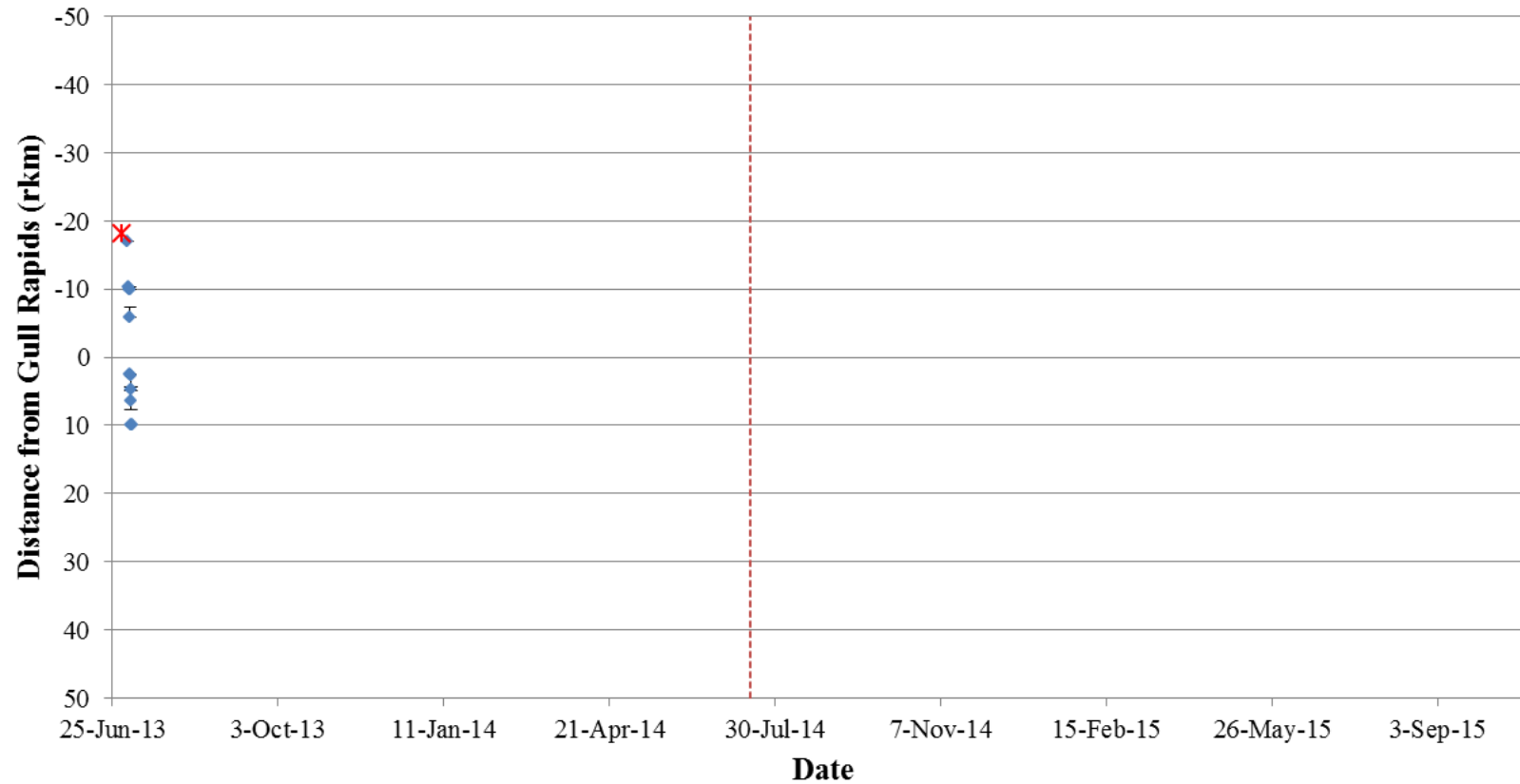


Figure A2-17: Position of a Walleye tagged with an acoustic transmitter (code #32867) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

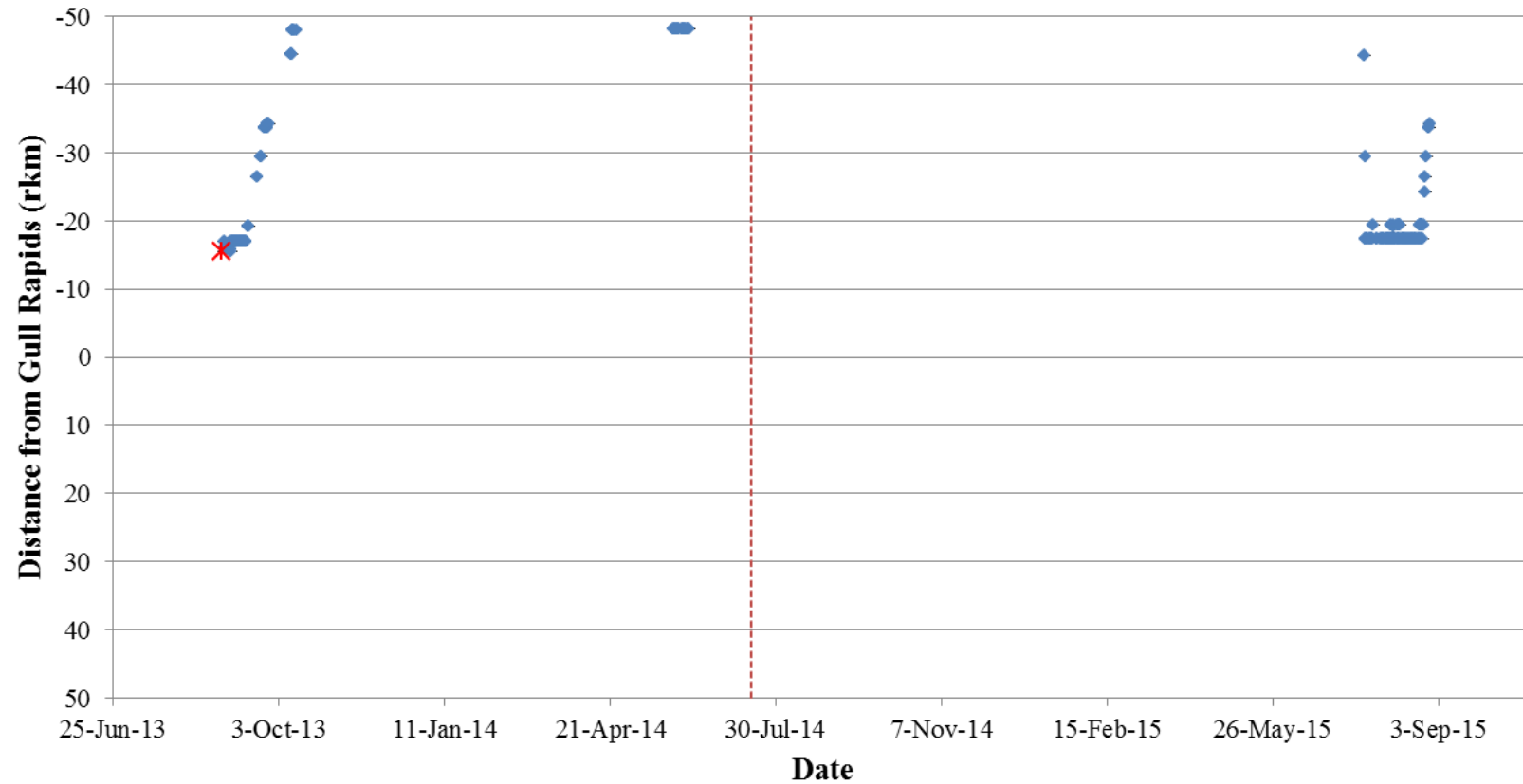


Figure A2-18: Position of a Walleye tagged with an acoustic transmitter (code #32868) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

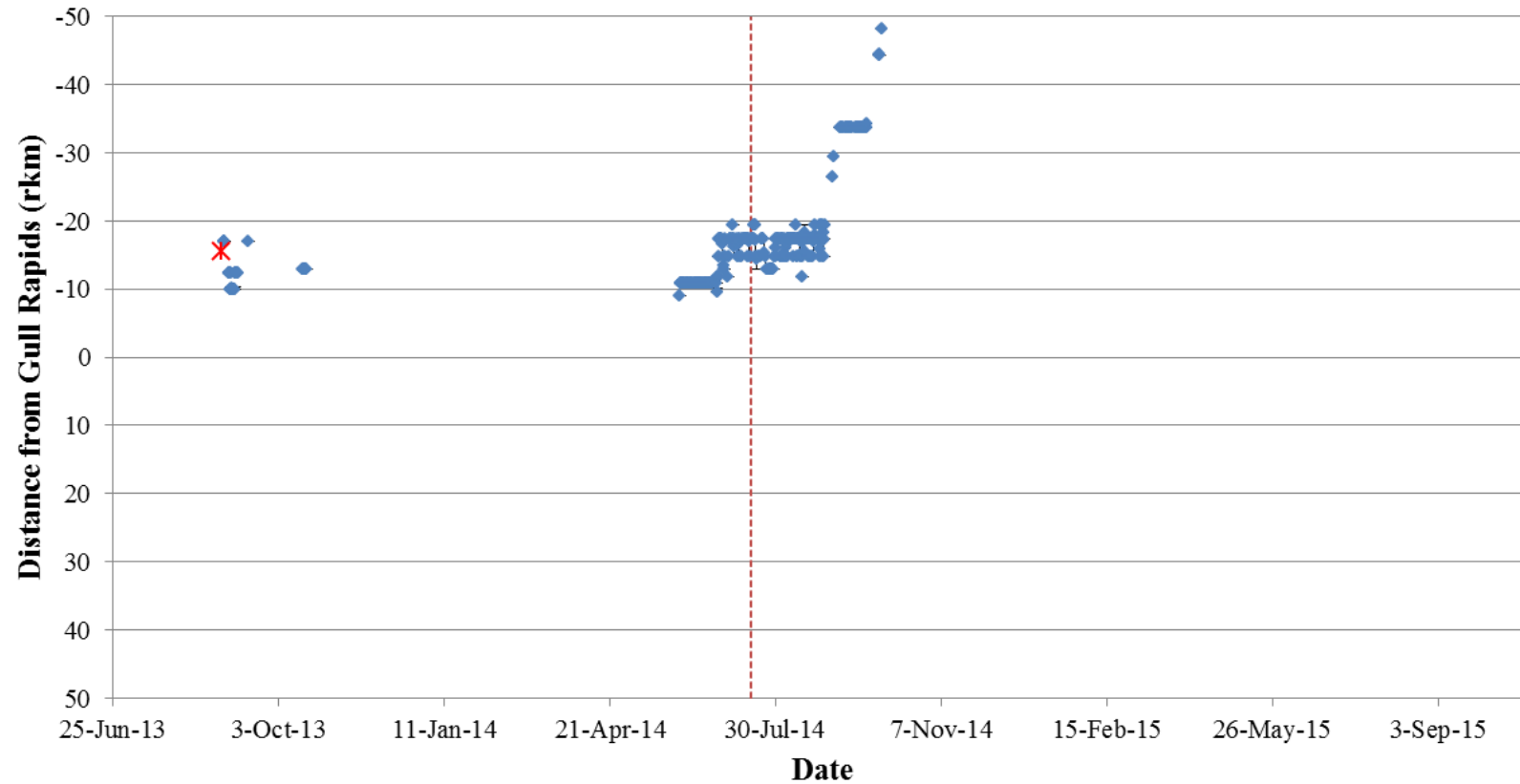


Figure A2-19: Position of a Walleye tagged with an acoustic transmitter (code #32869) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

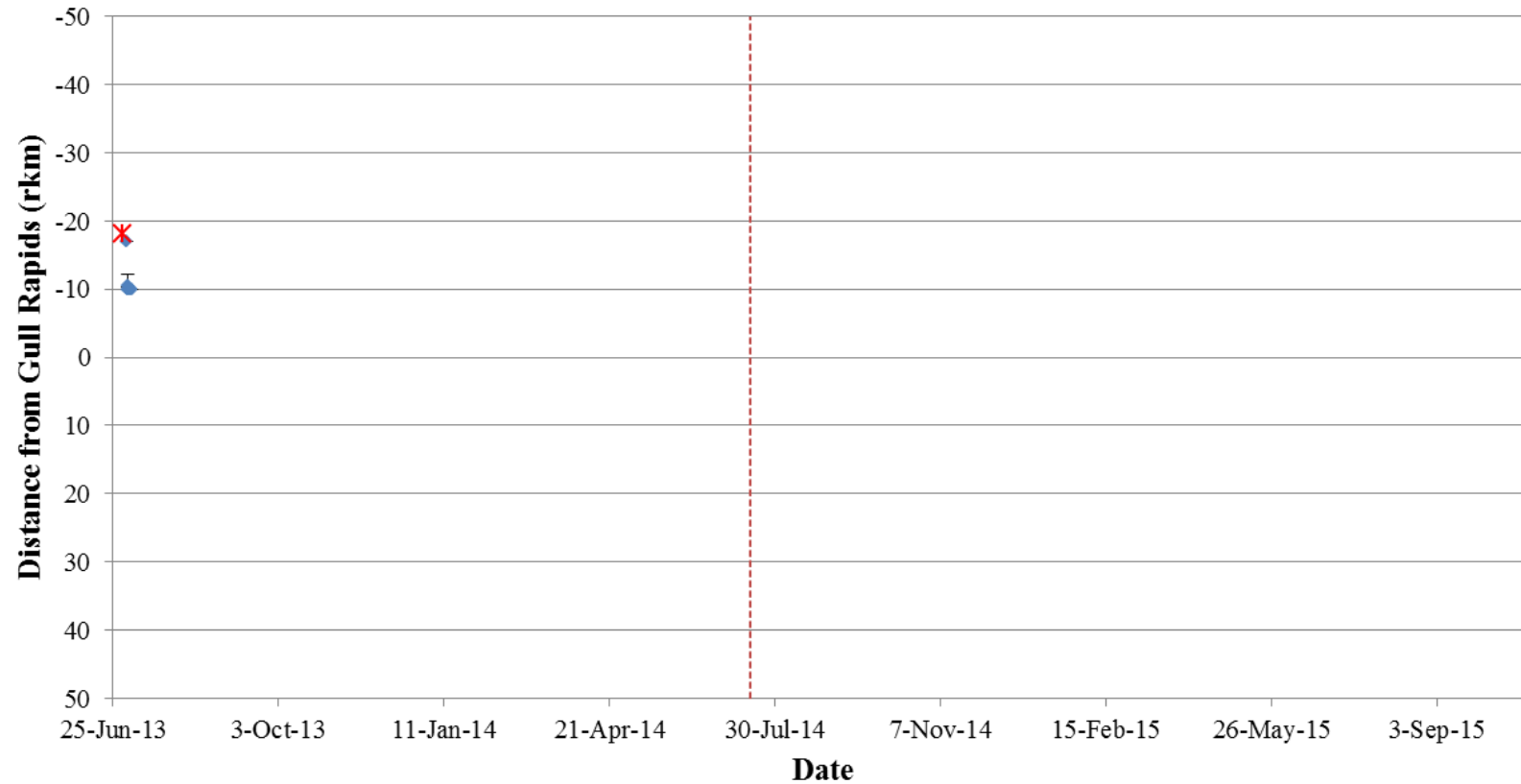


Figure A2-20: Position of a Walleye tagged with an acoustic transmitter (code #32870) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2014. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

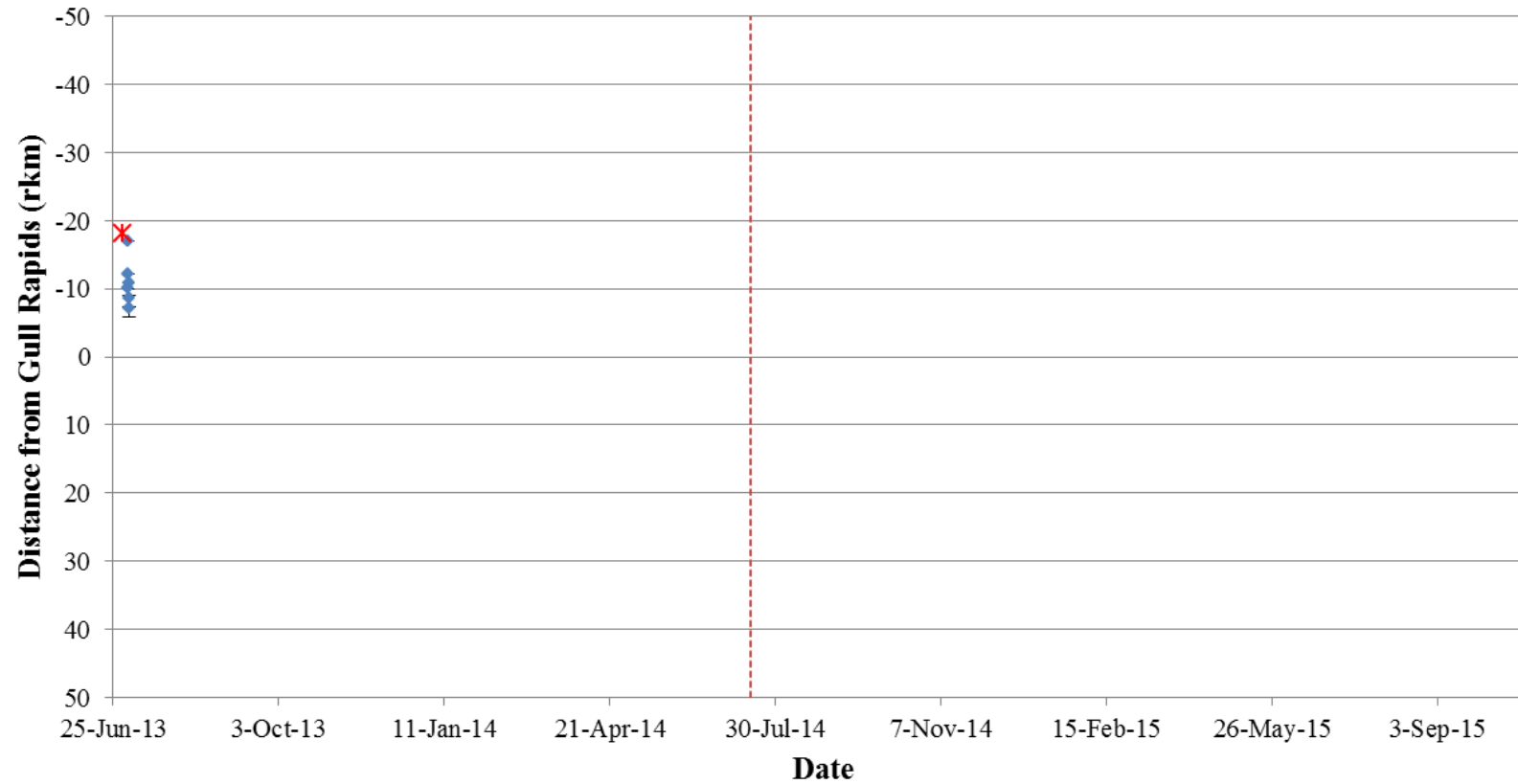


Figure A2-21: Position of a Walleye tagged with an acoustic transmitter (code #32871) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

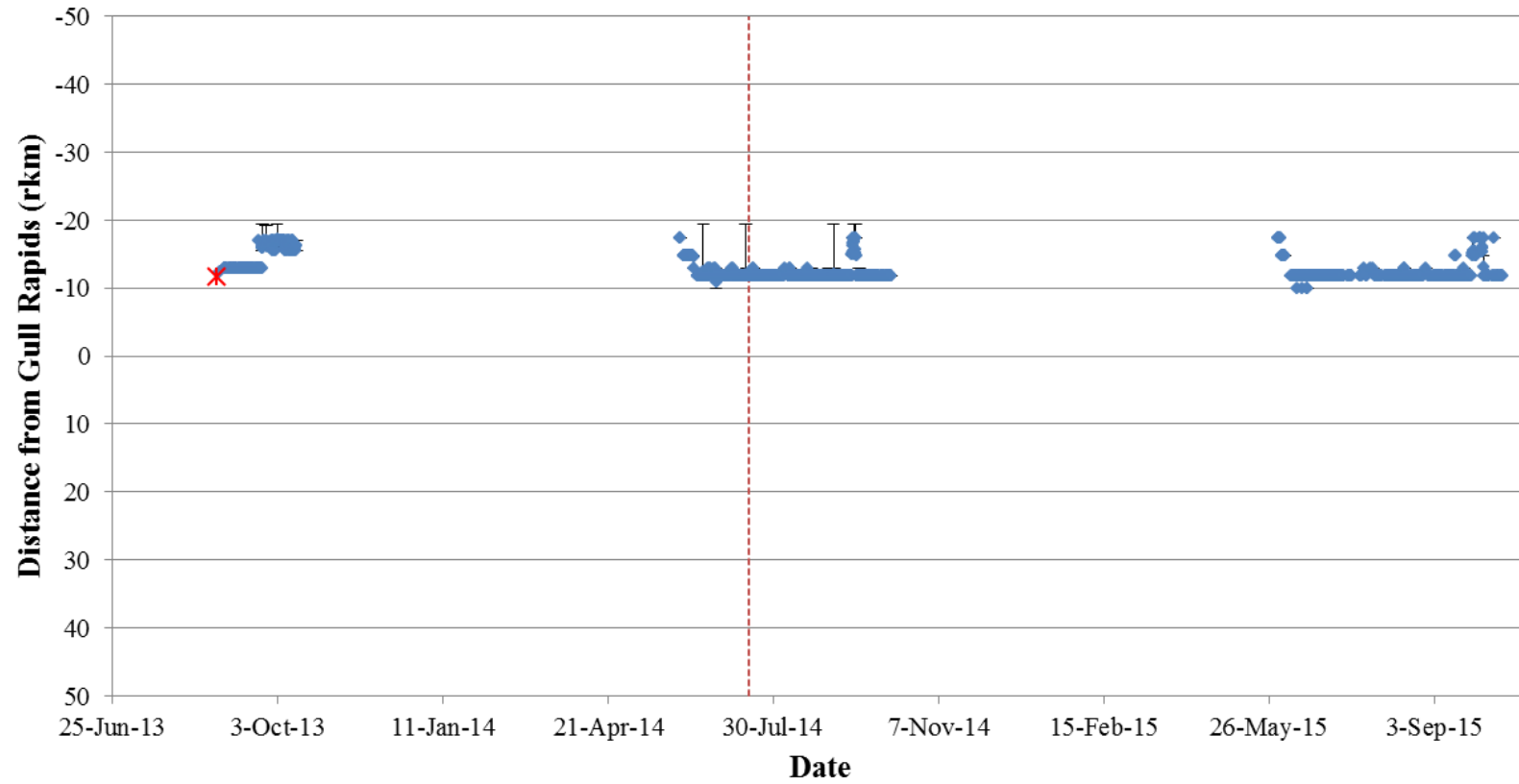


Figure A2-22: Position of a Walleye tagged with an acoustic transmitter (code #32872) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

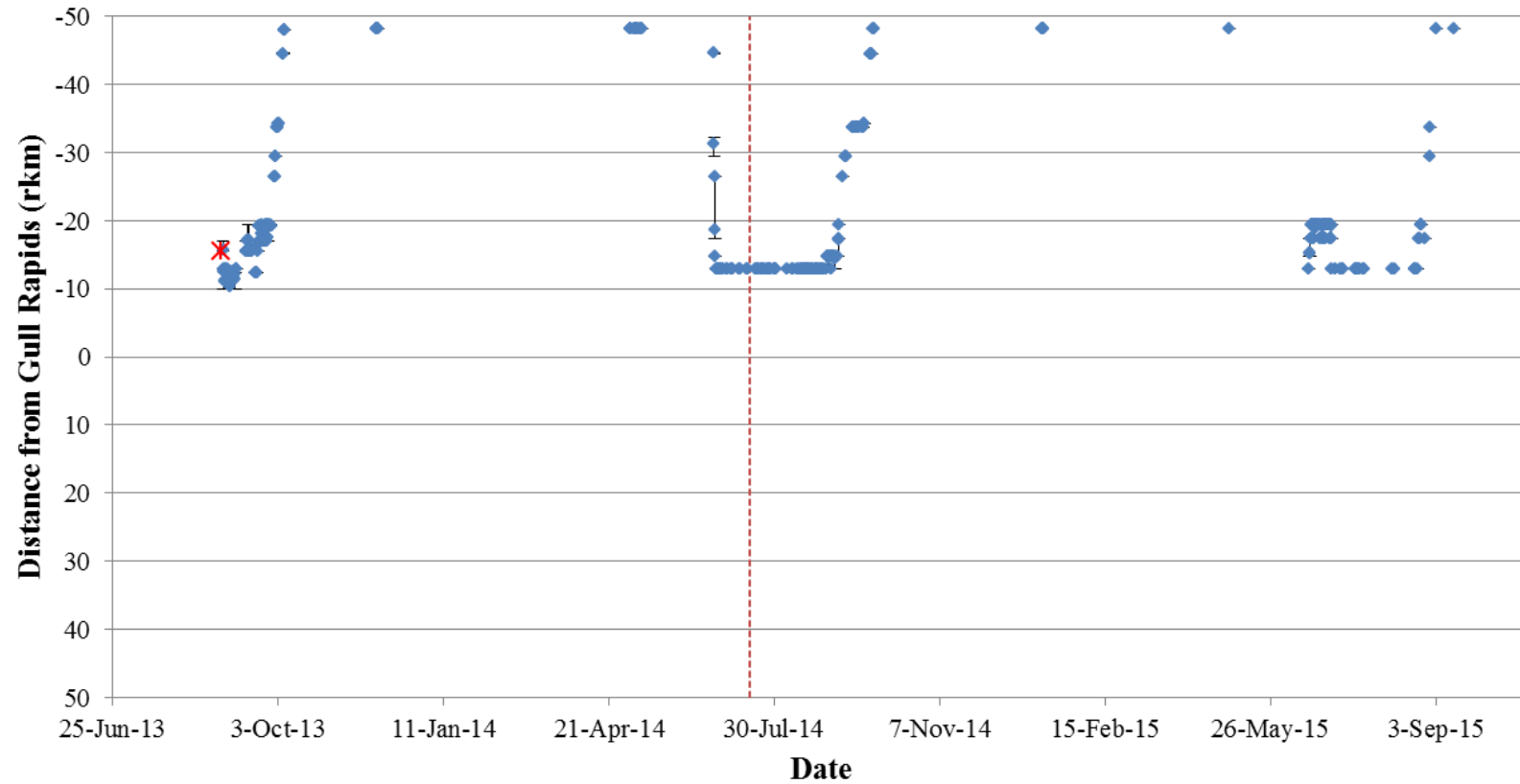


Figure A2-23: Position of a Walleye tagged with an acoustic transmitter (code #32873) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

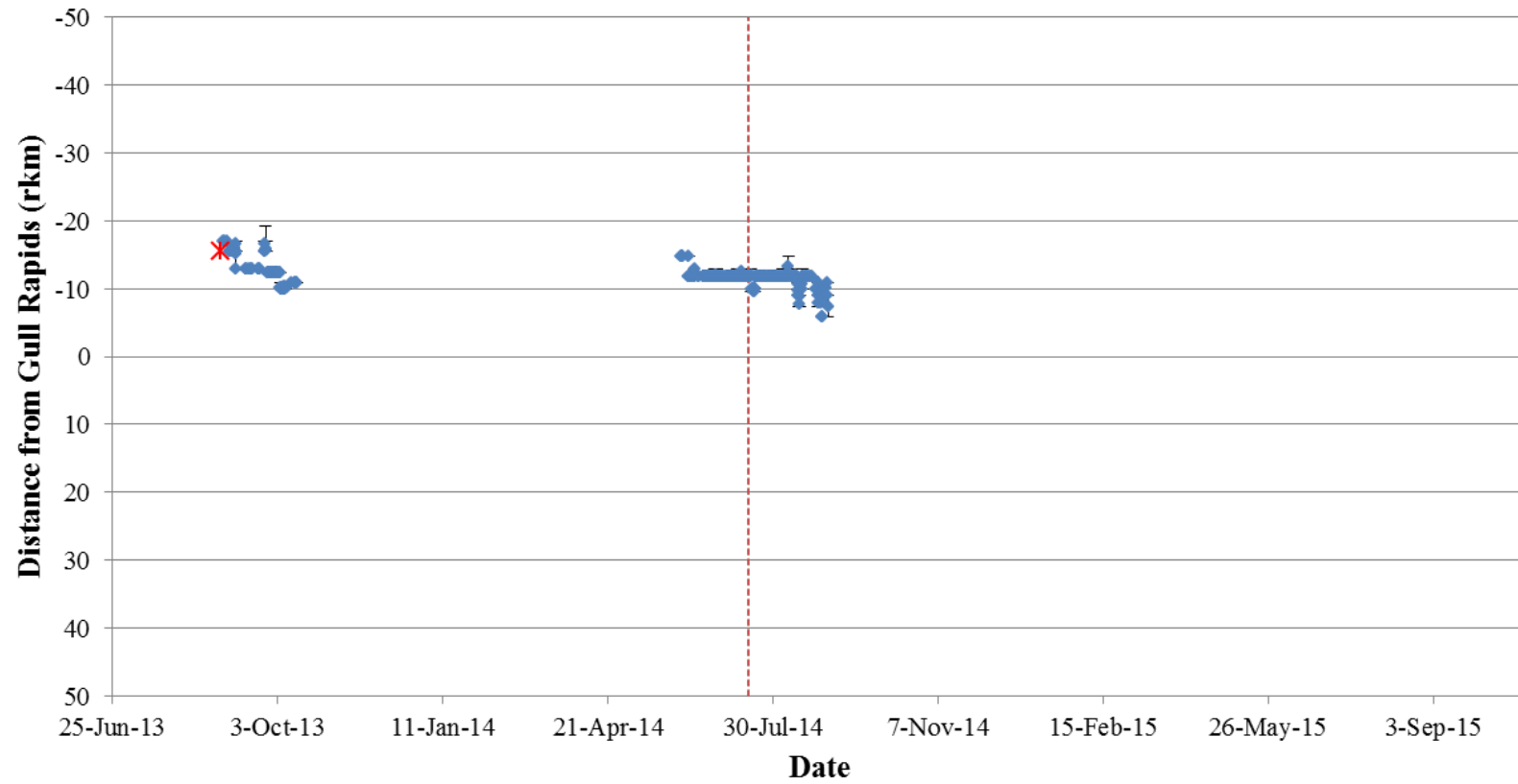


Figure A2-24: Position of a Walleye tagged with an acoustic transmitter (code #32874) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

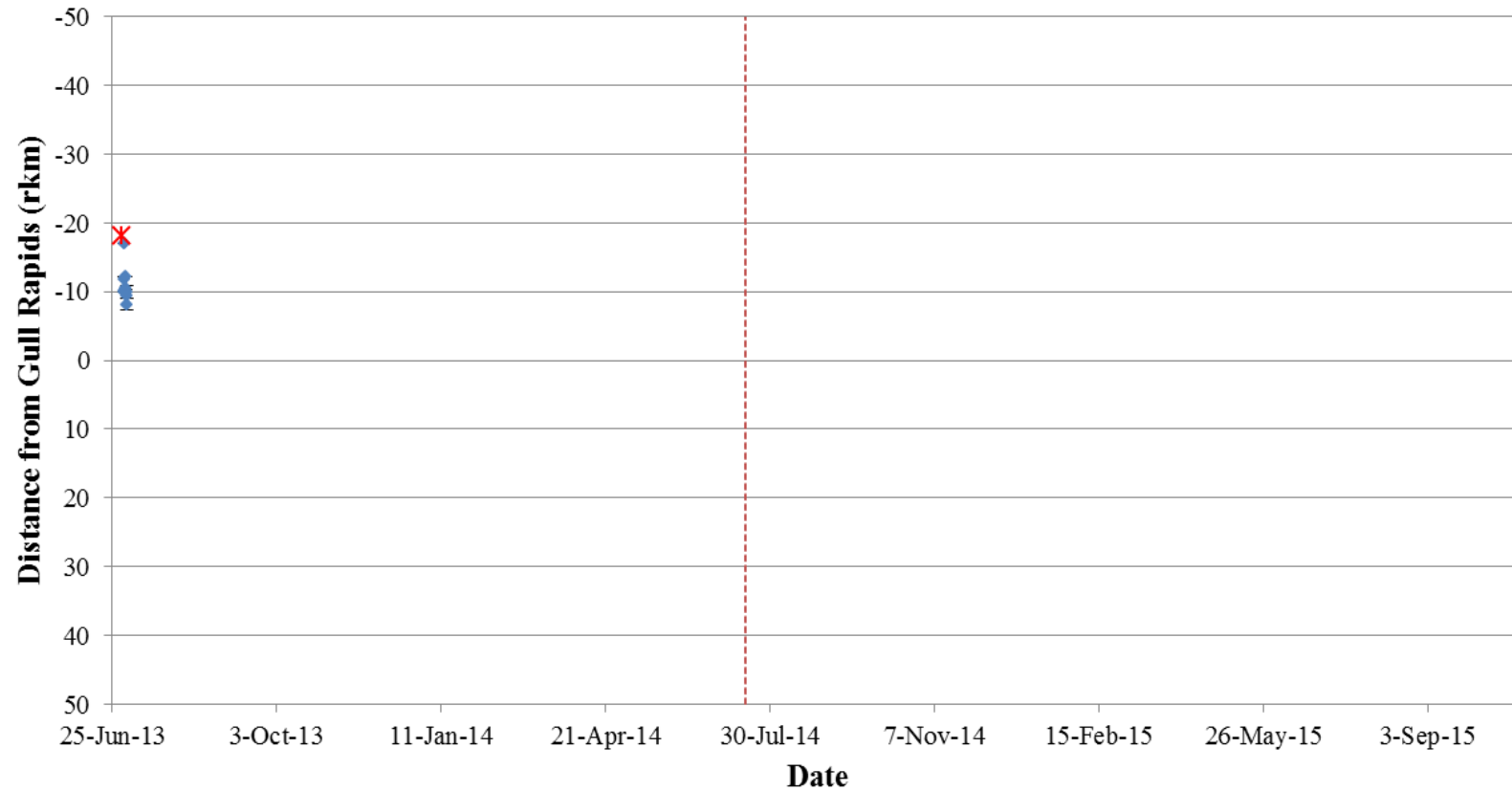


Figure A2-25: Position of a Walleye tagged with an acoustic transmitter (code #32875) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

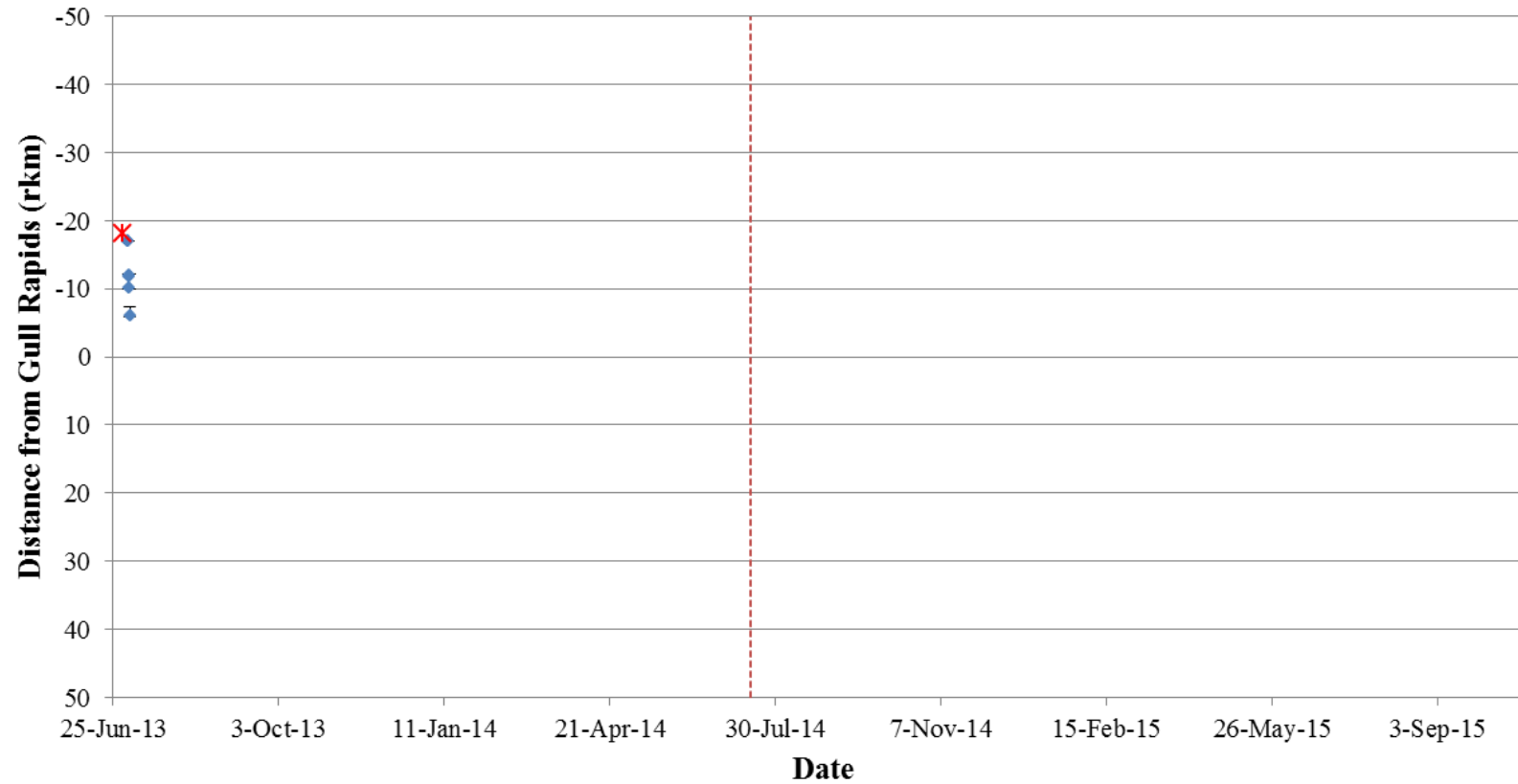


Figure A2-26: Position of a Walleye tagged with an acoustic transmitter (code #32876) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

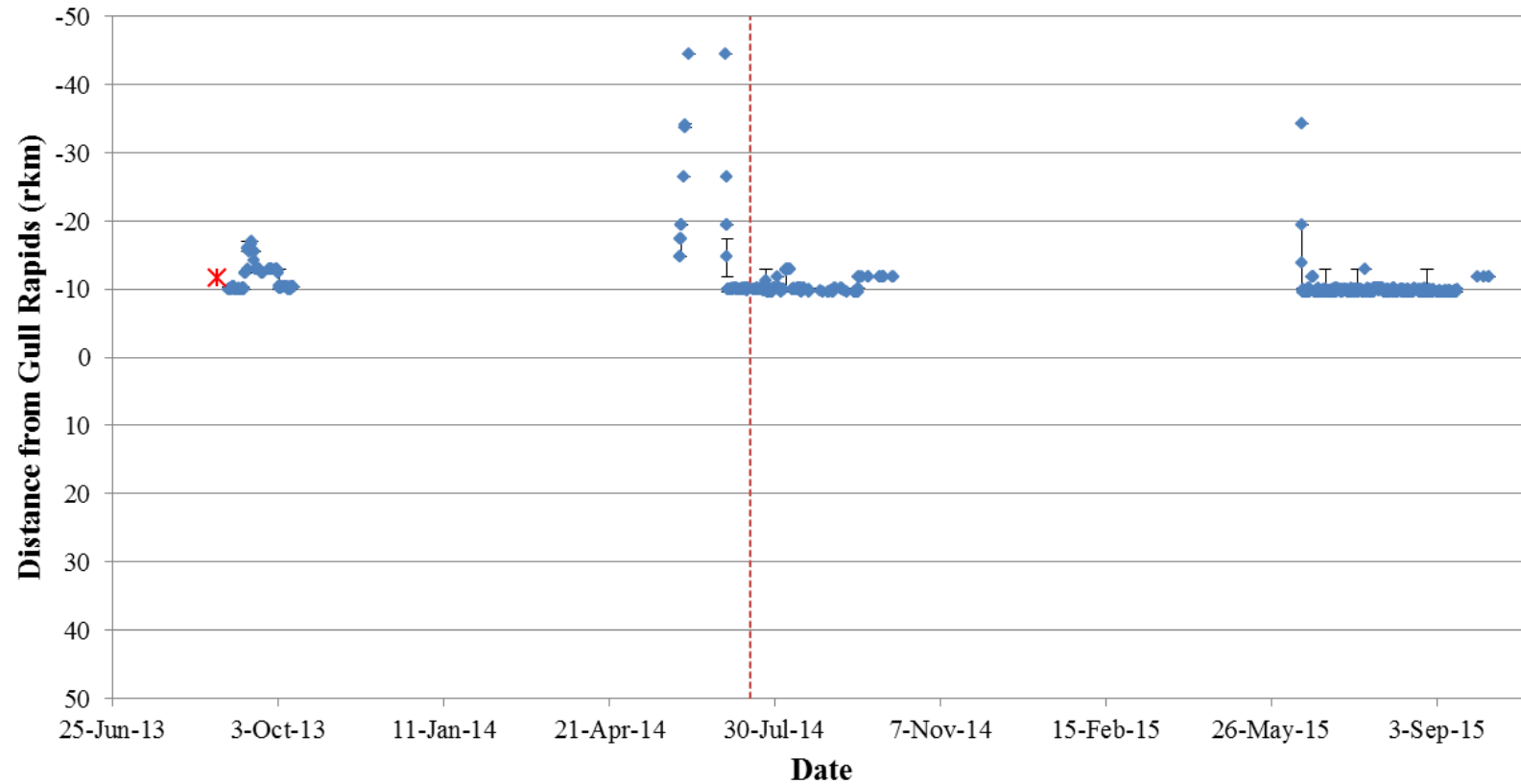


Figure A2-27: Position of a Walleye tagged with an acoustic transmitter (code #32877) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

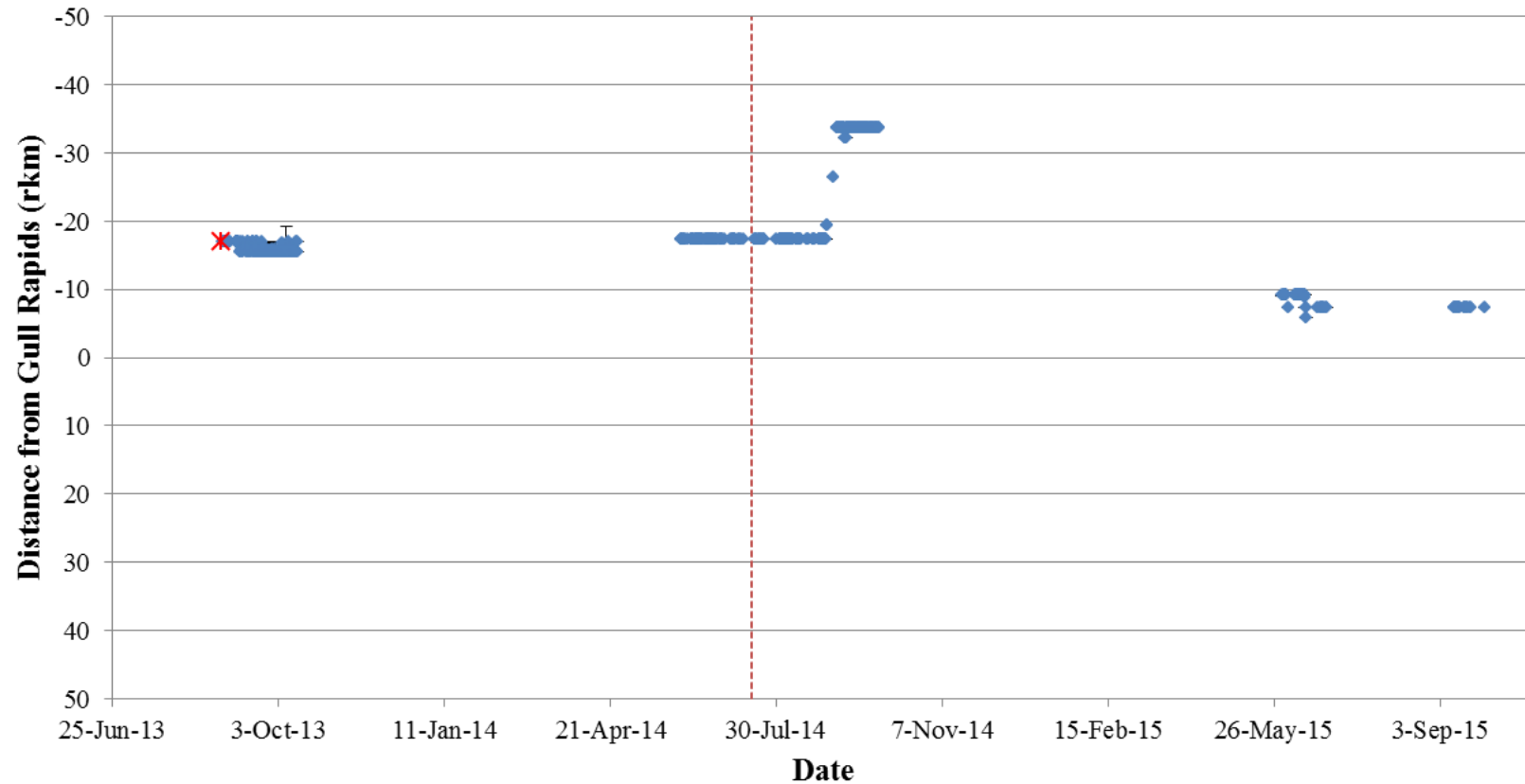


Figure A2-28: Position of a Walleye tagged with an acoustic transmitter (code #32878) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

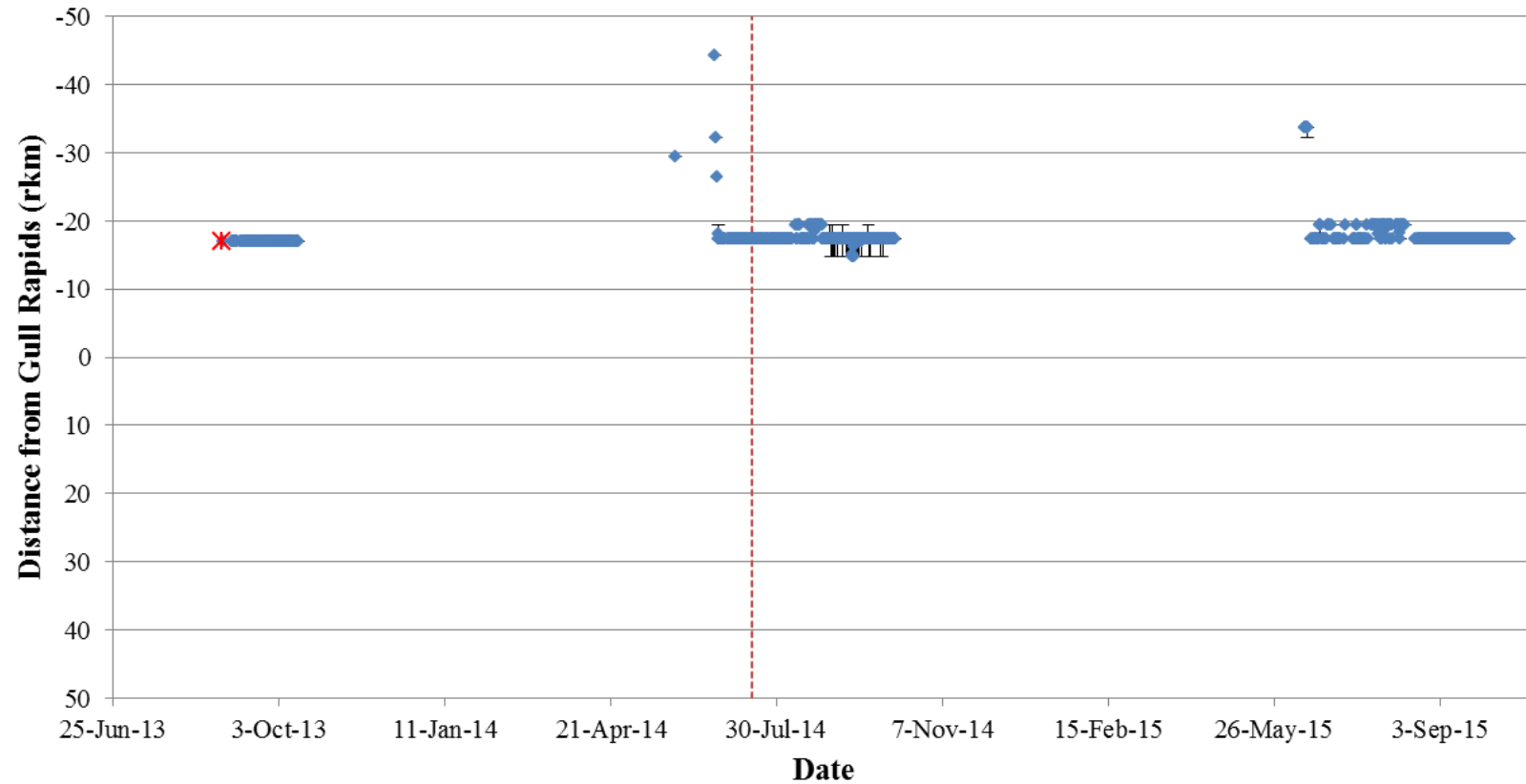


Figure A2-29: Position of a Walleye tagged with an acoustic transmitter (code #32879) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

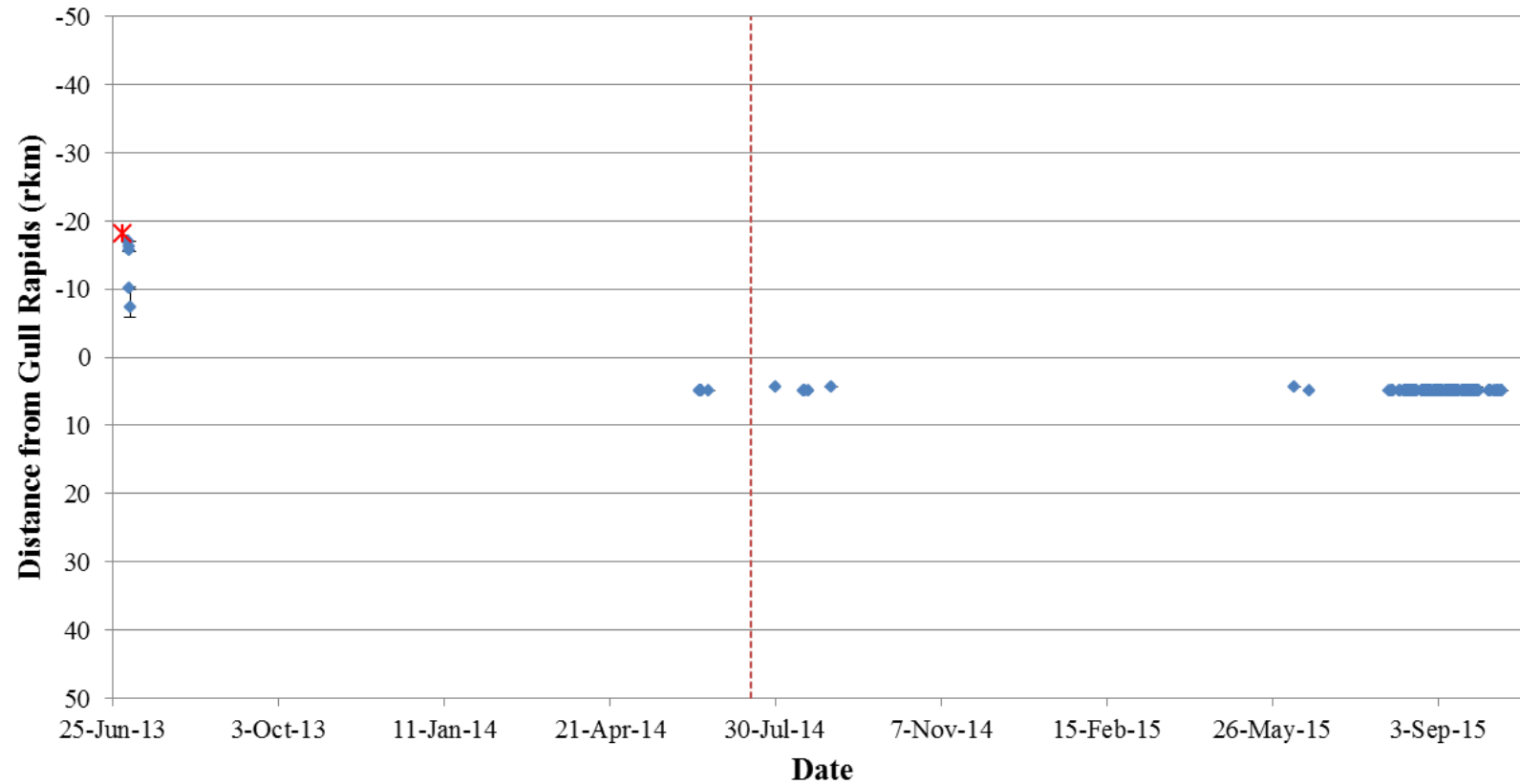


Figure A2-30: Position of a Walleye tagged with an acoustic transmitter (code #32880) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

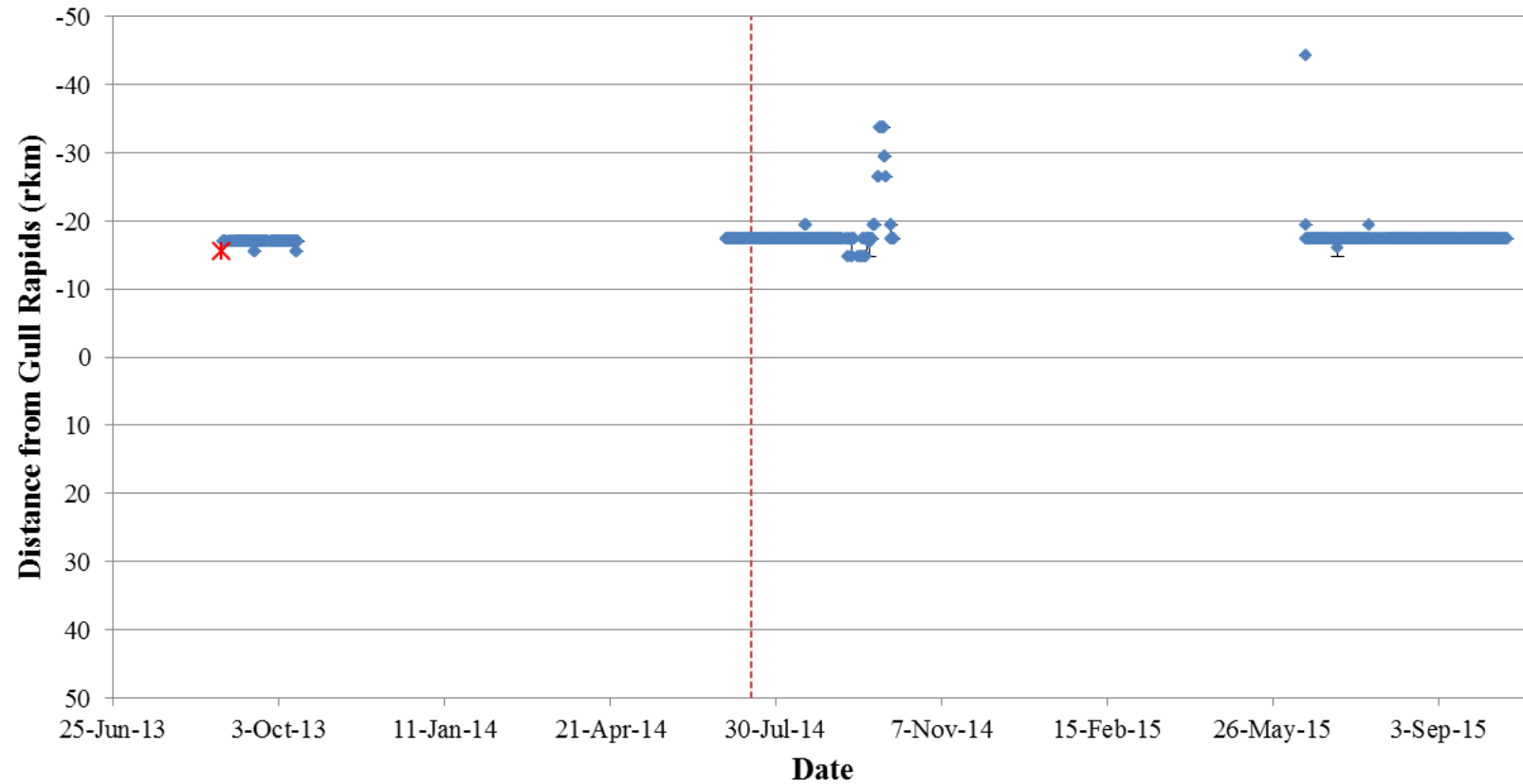


Figure A2-31: Position of a Walleye tagged with an acoustic transmitter (code #32881) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2014. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

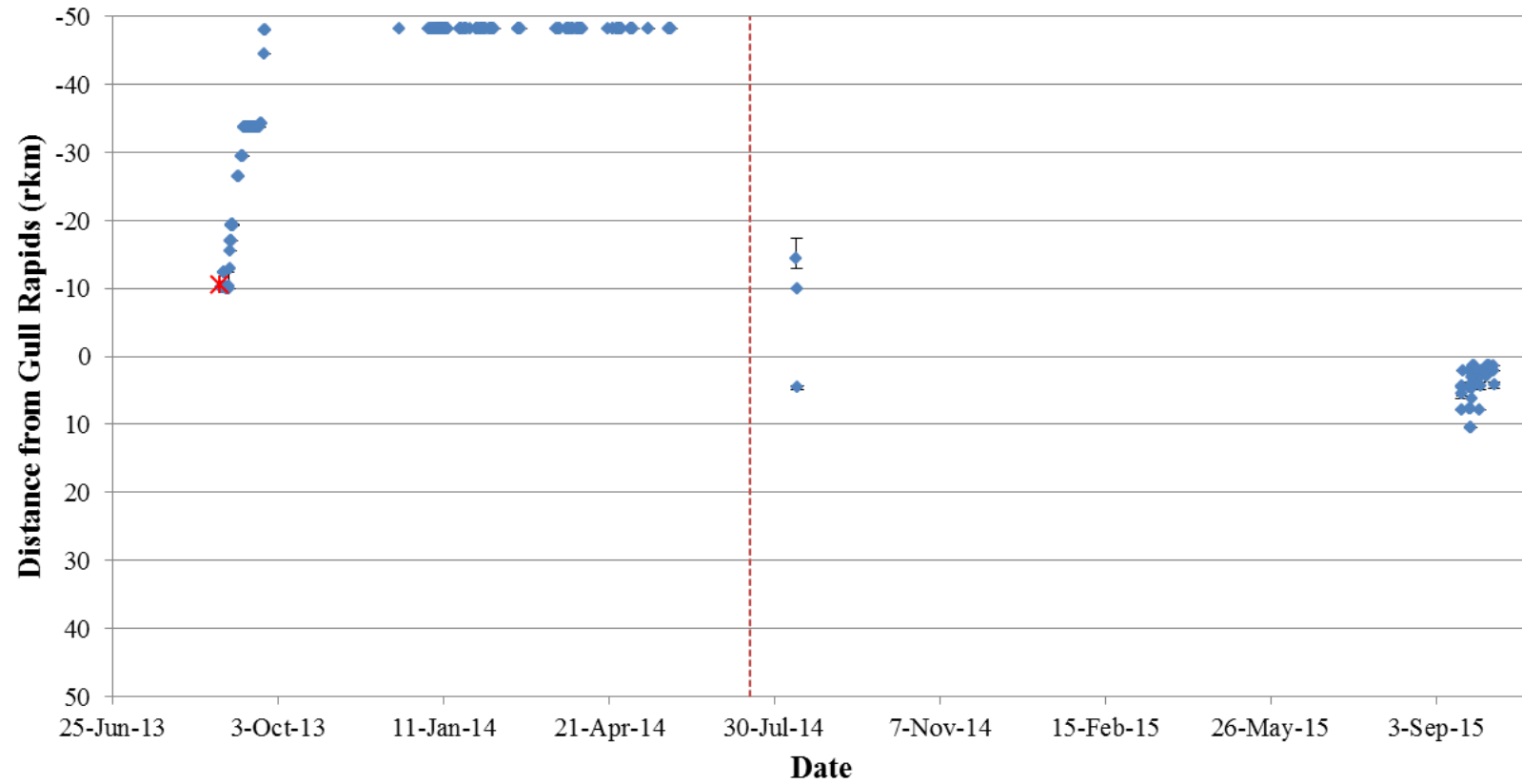


Figure A2-32: Position of a Walleye tagged with an acoustic transmitter (code #32882) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

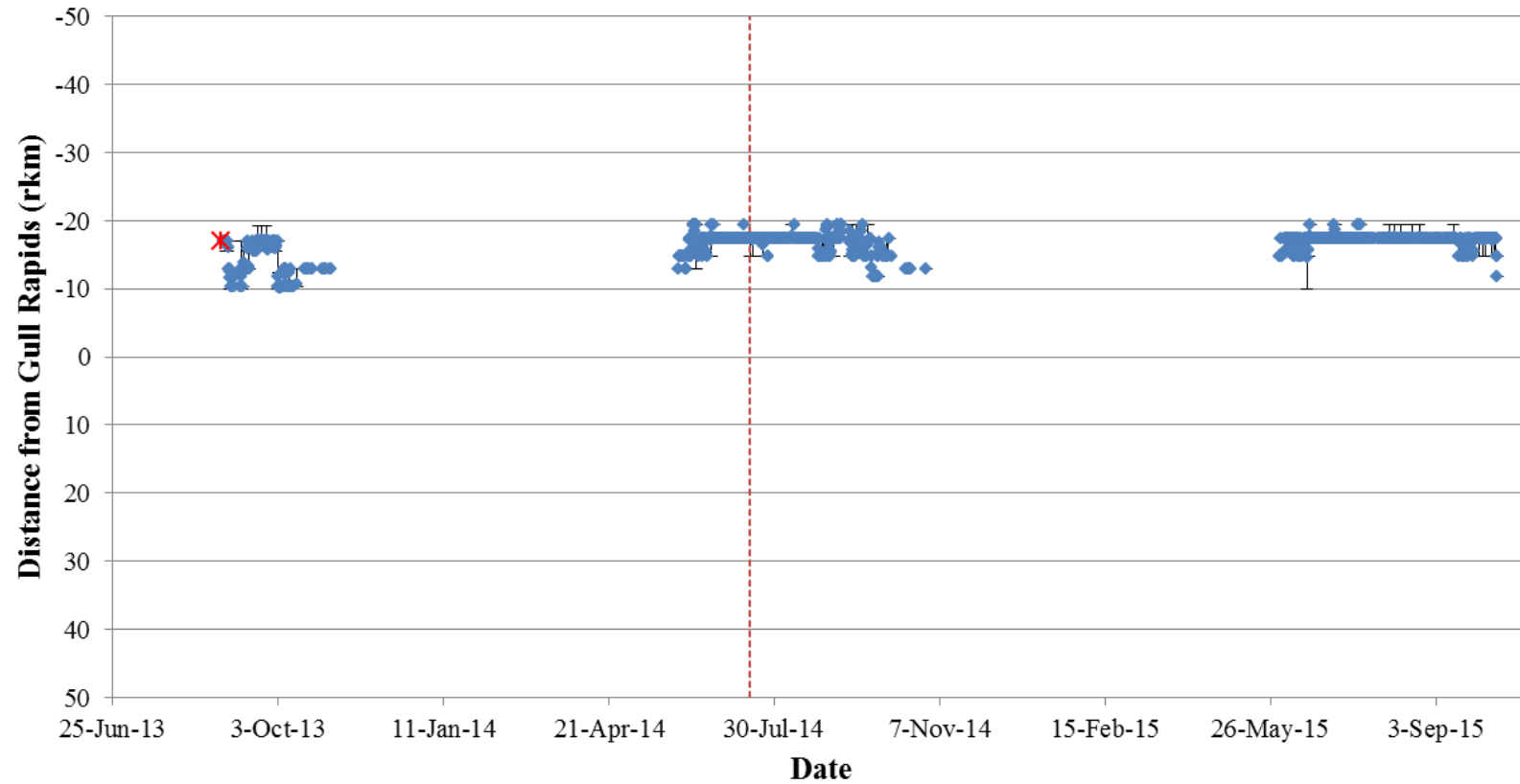


Figure A2-33: Position of a Walleye tagged with an acoustic transmitter (code #32883) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

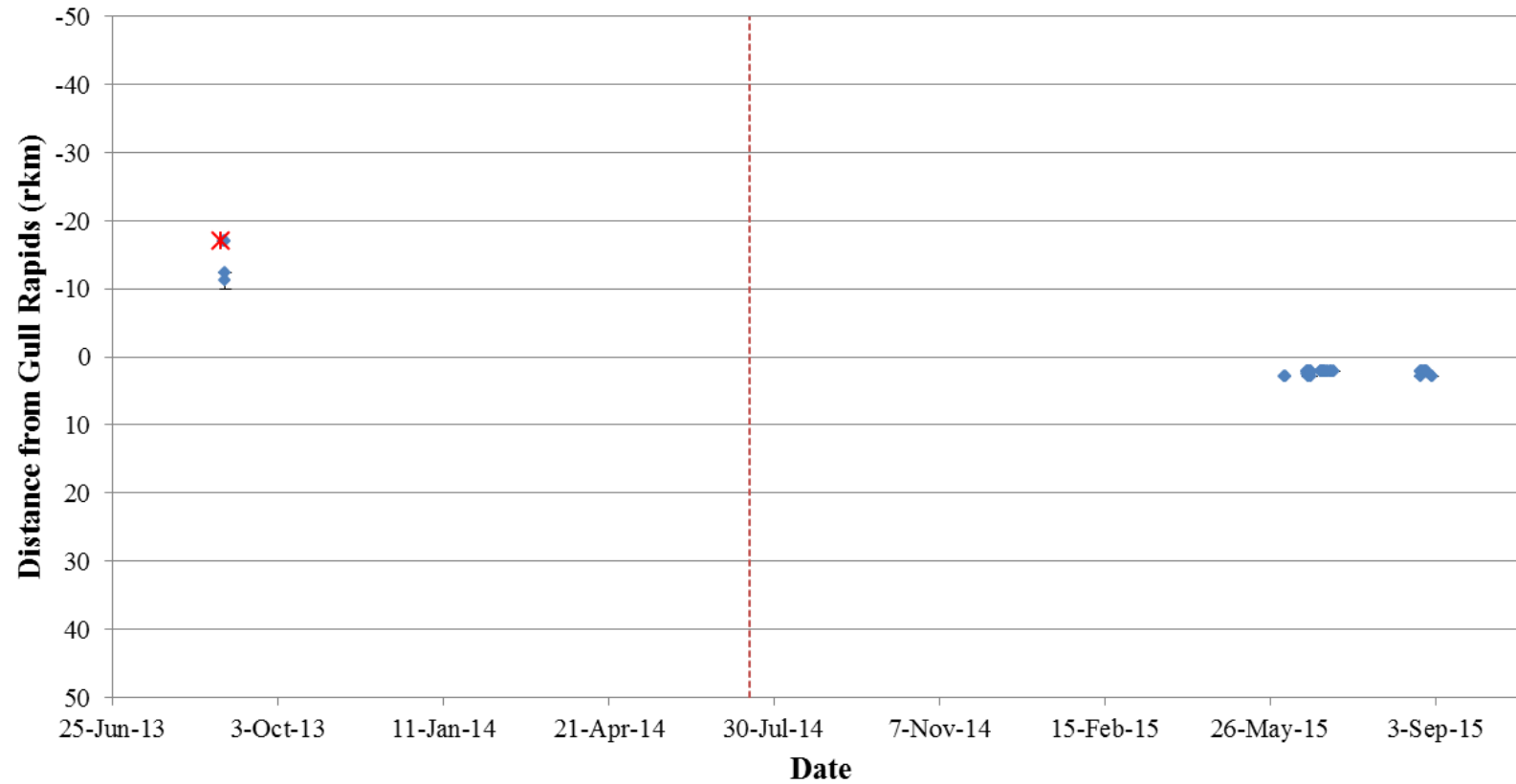


Figure A2-34: Position of a Walleye tagged with an acoustic transmitter (code #32884) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

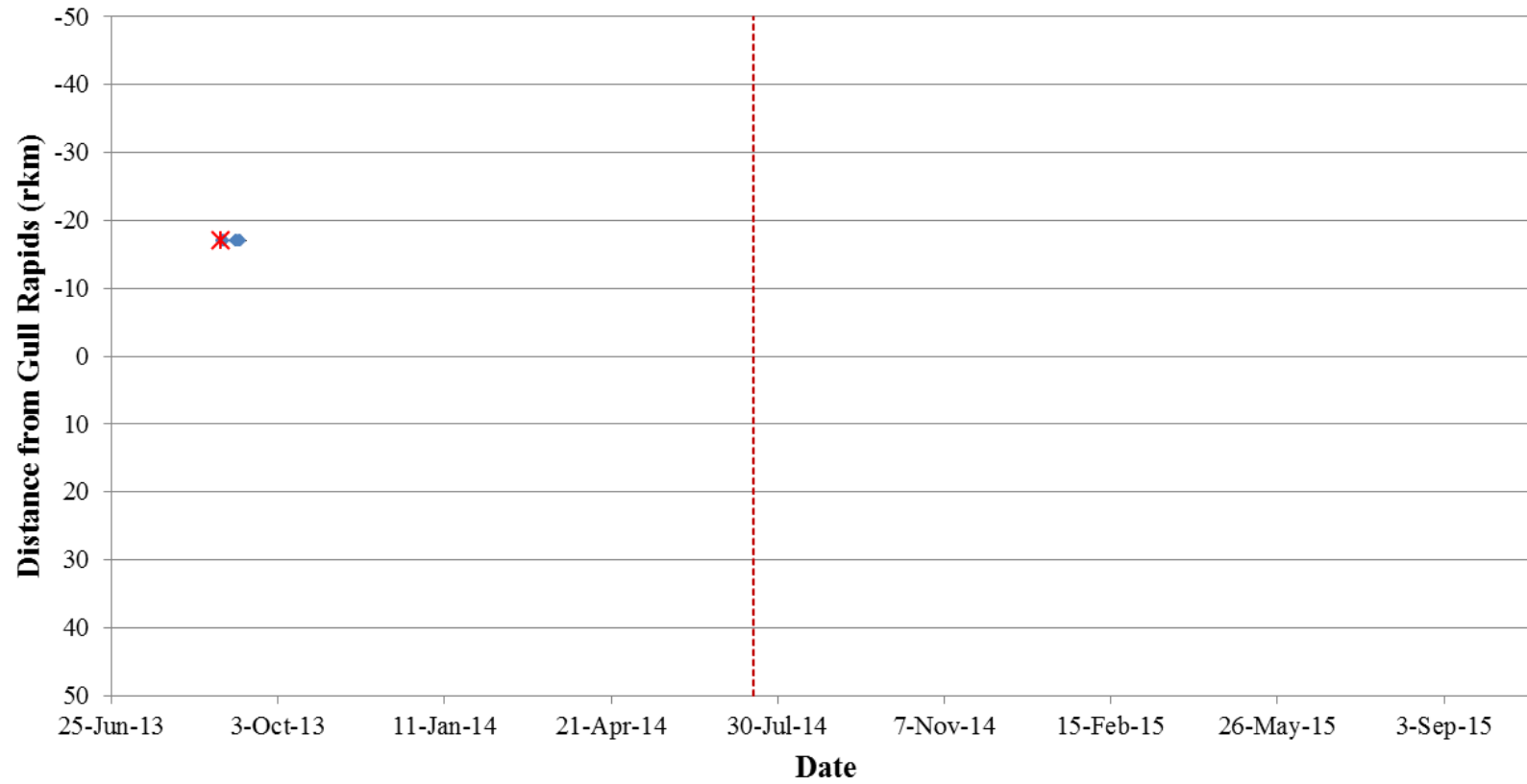


Figure A2-35: Position of a Walleye tagged with an acoustic transmitter (code #32885) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

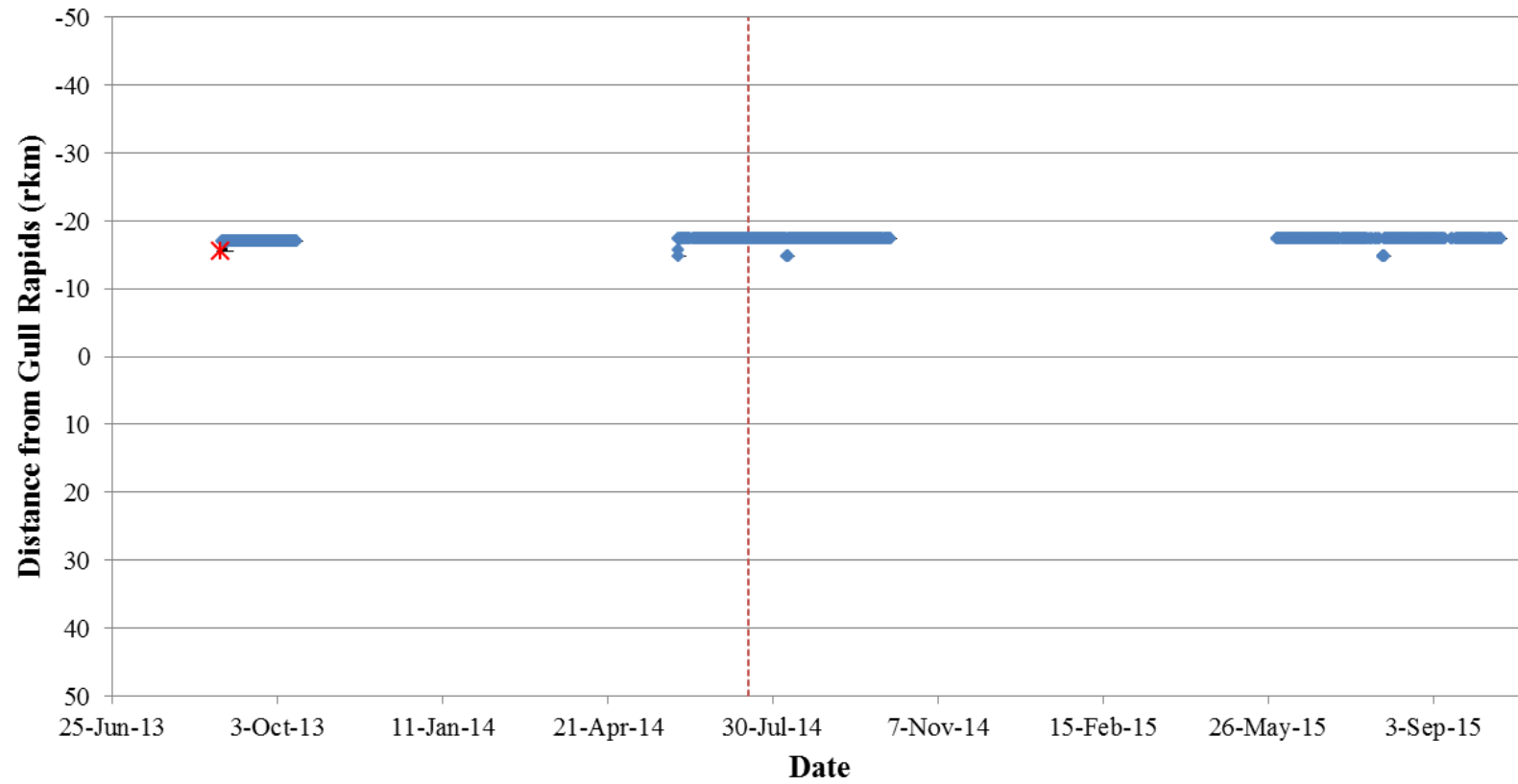


Figure A2-36: Position of a Walleye tagged with an acoustic transmitter (code #32886) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

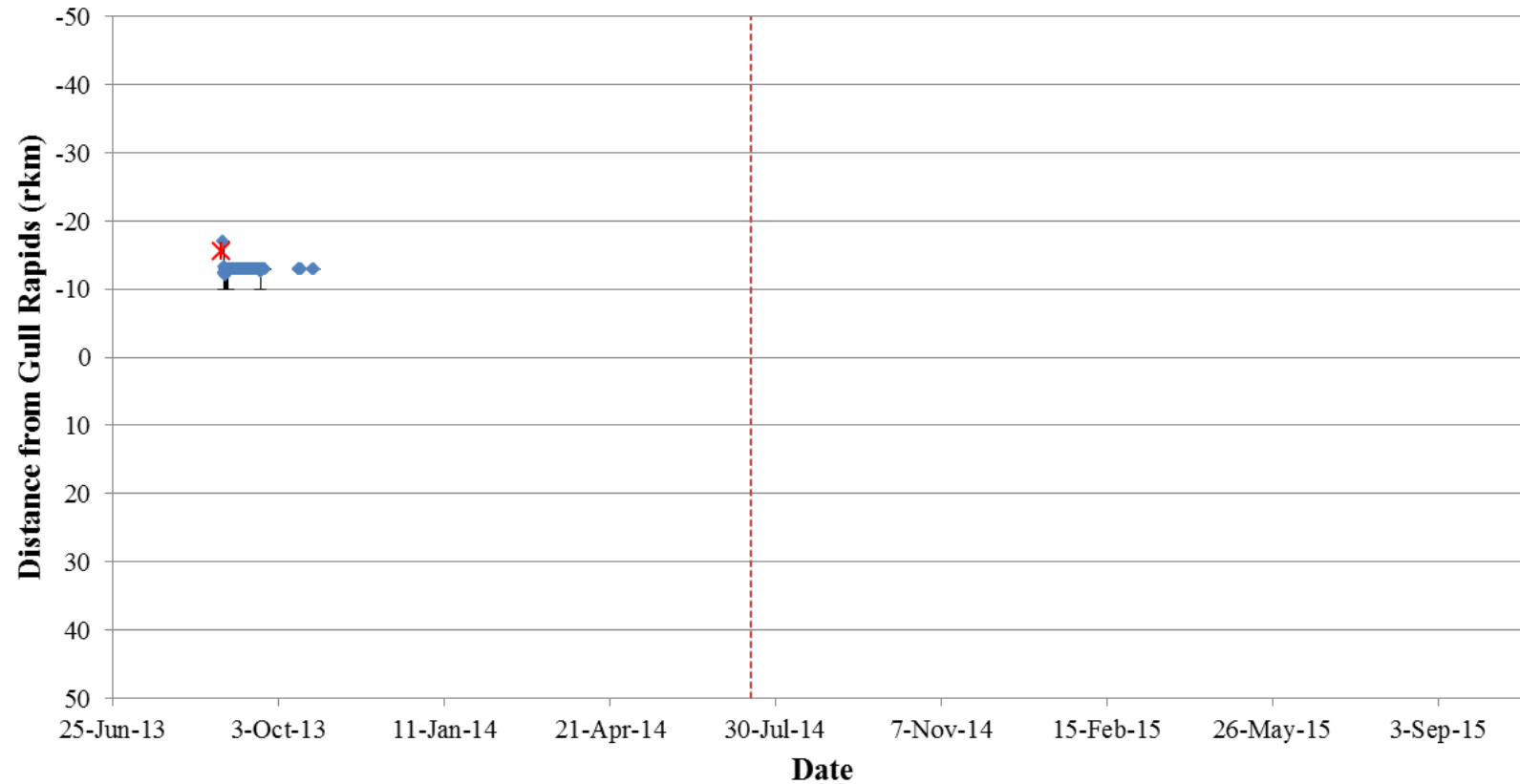


Figure A2-37: Position of a Walleye tagged with an acoustic transmitter (code #32887) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

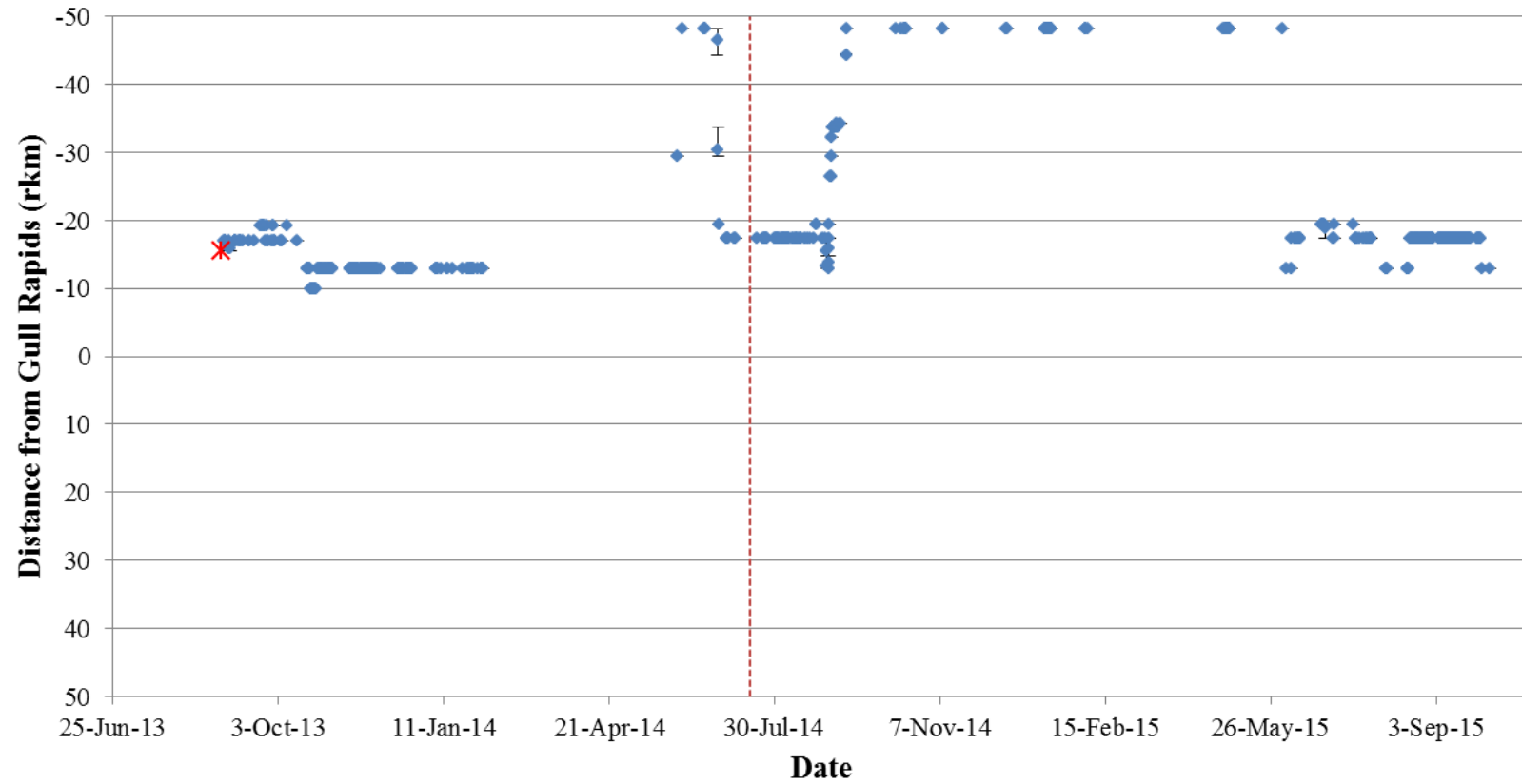
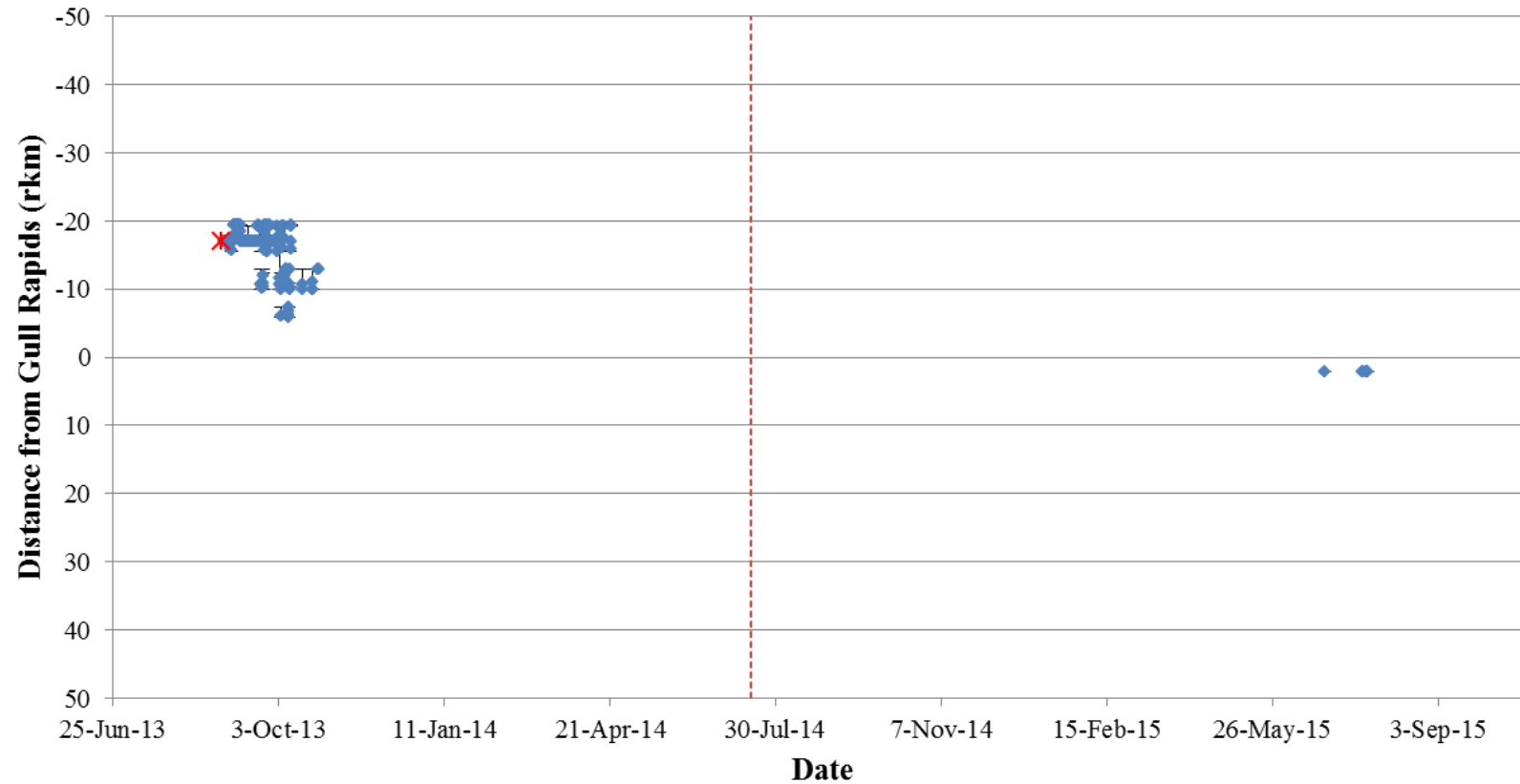


Figure A2-38: Position of a Walleye tagged with an acoustic transmitter (code #32888) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



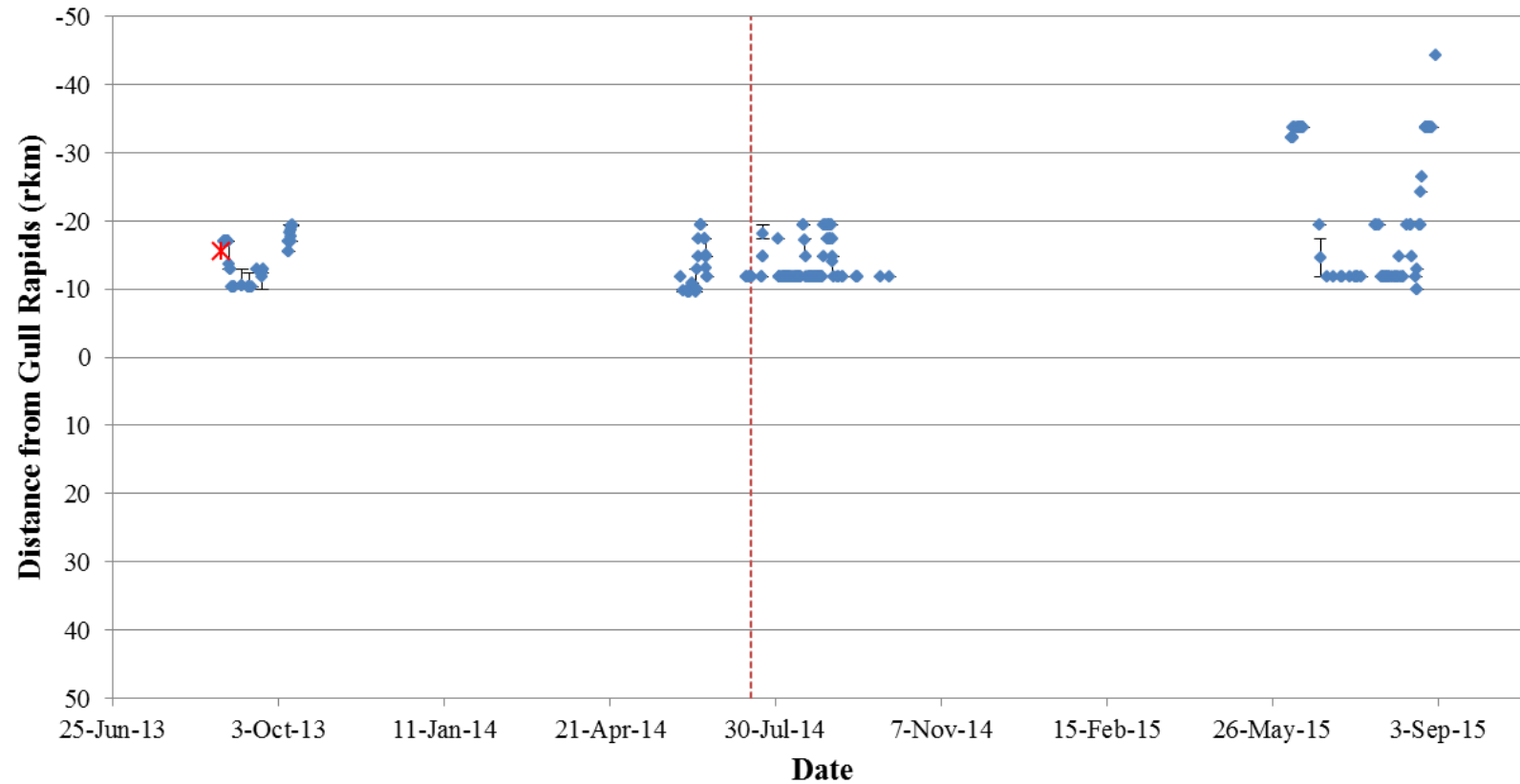


Figure A2-40: Position of a Walleye tagged with an acoustic transmitter (code #32890) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

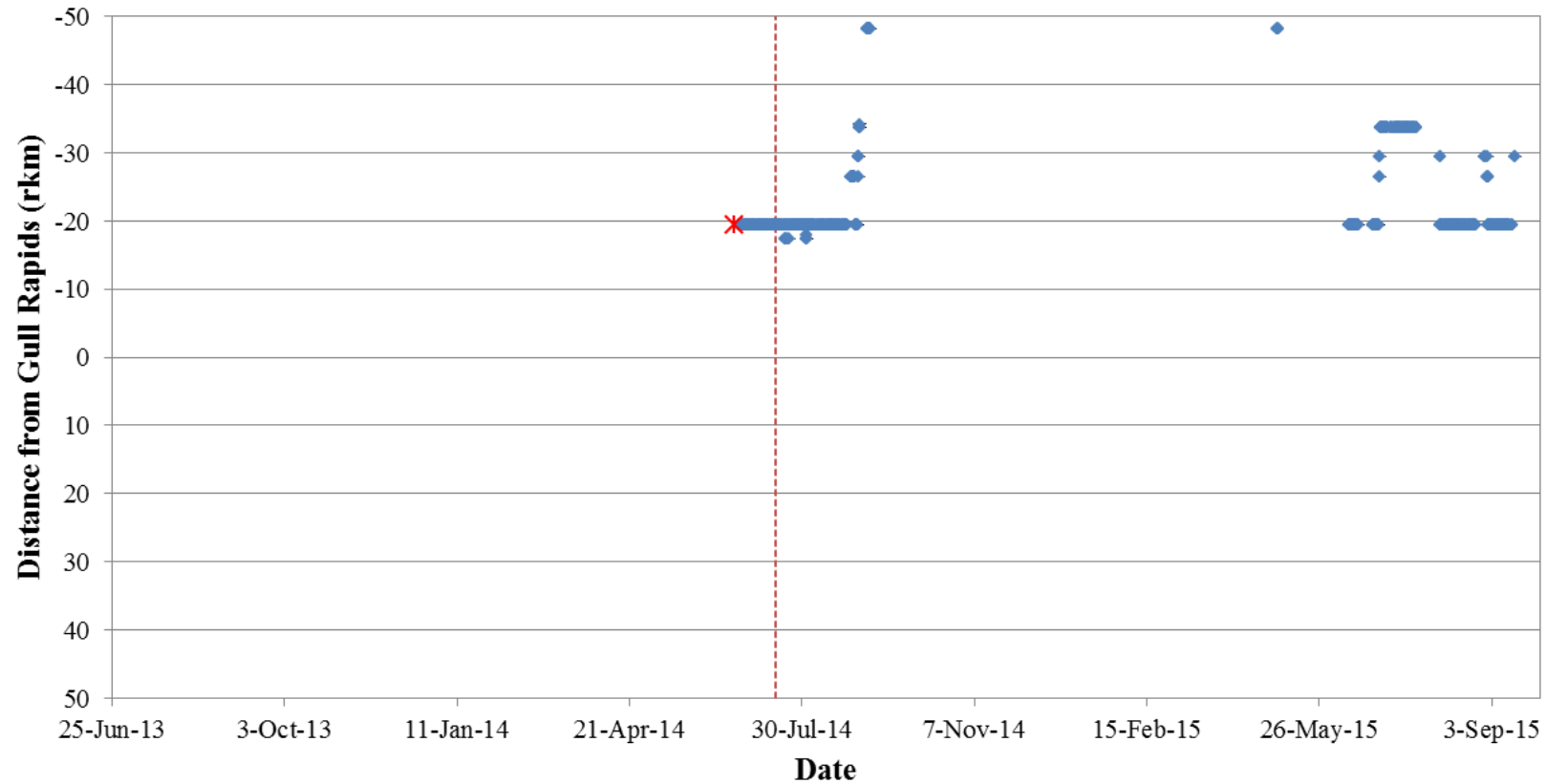


Figure A2-41: Position of a Walleye tagged with an acoustic transmitter (code #6417) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

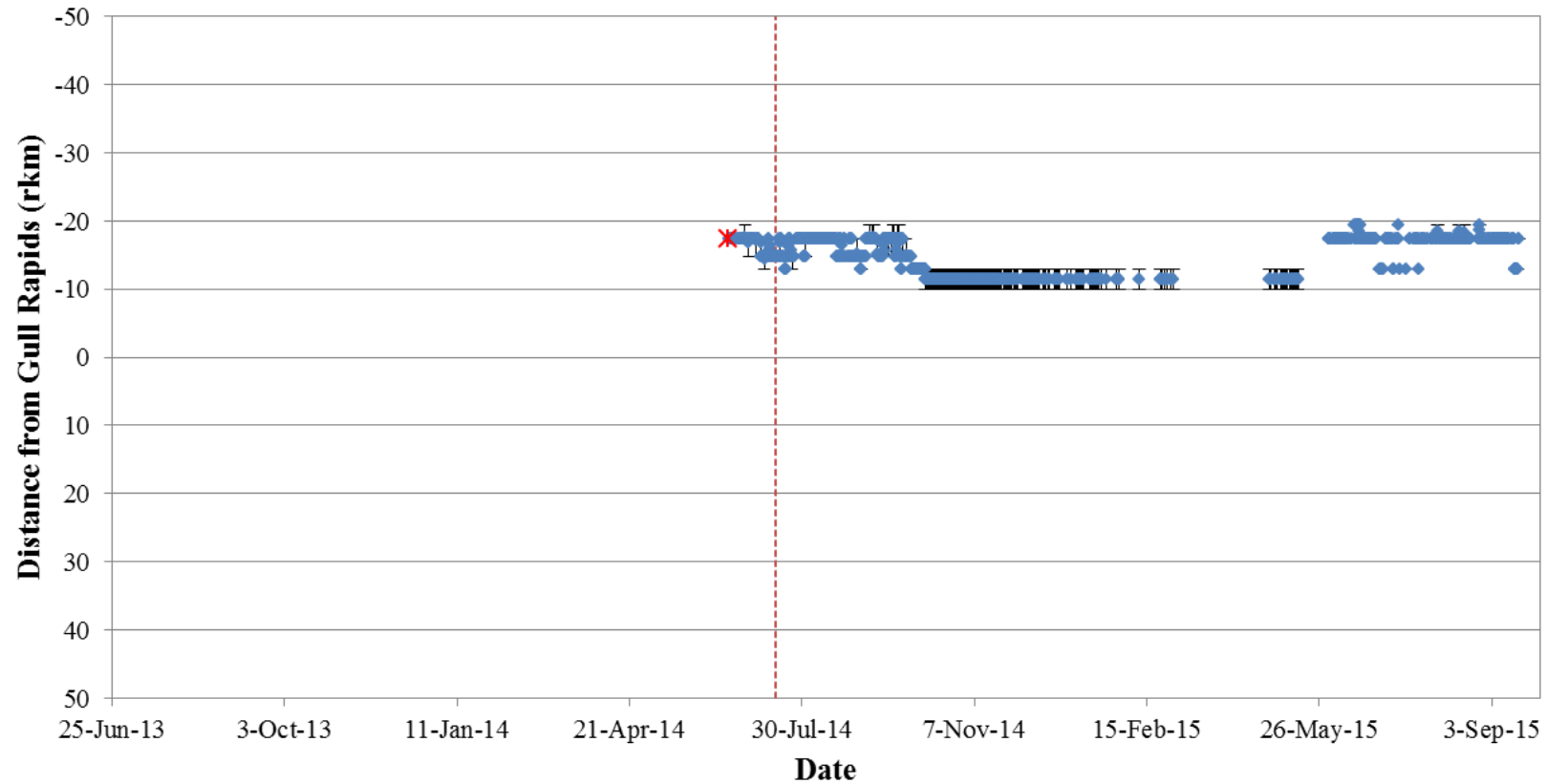


Figure A2-42: Position of a Walleye tagged with an acoustic transmitter (code #6418) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

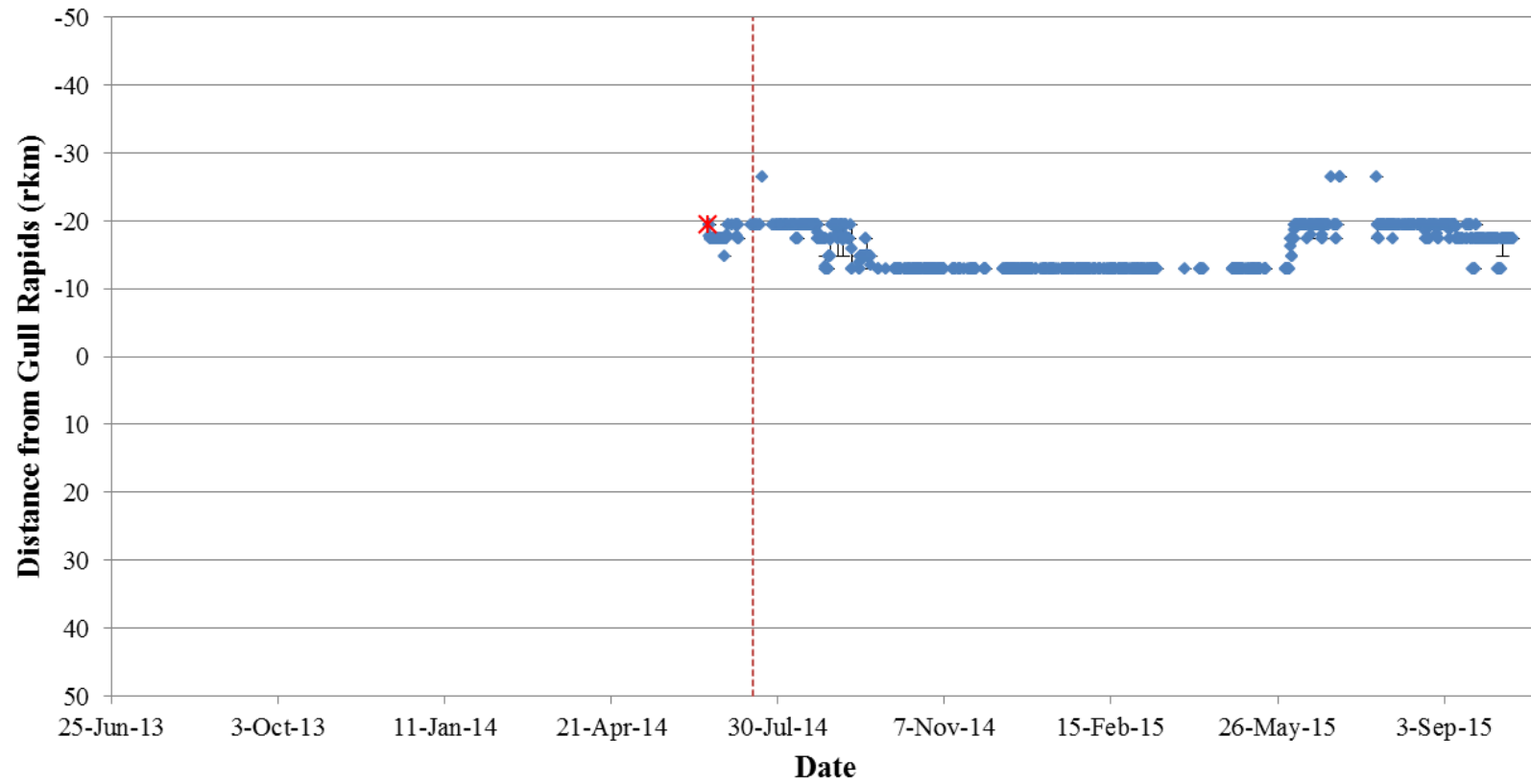


Figure A2-43: Position of a Walleye tagged with an acoustic transmitter (code #6419) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

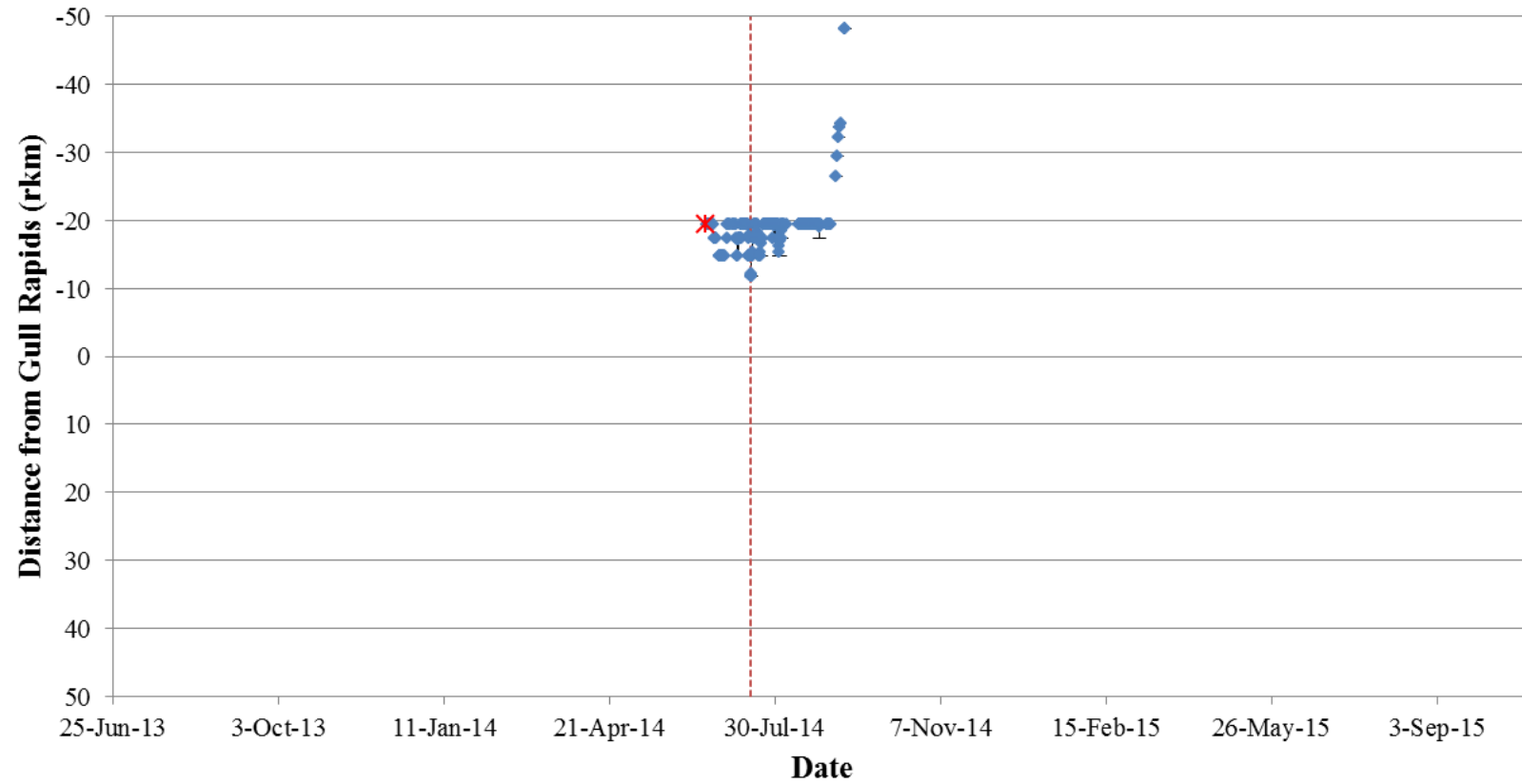


Figure A2-44: Position of a Walleye tagged with an acoustic transmitter (code #6420) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

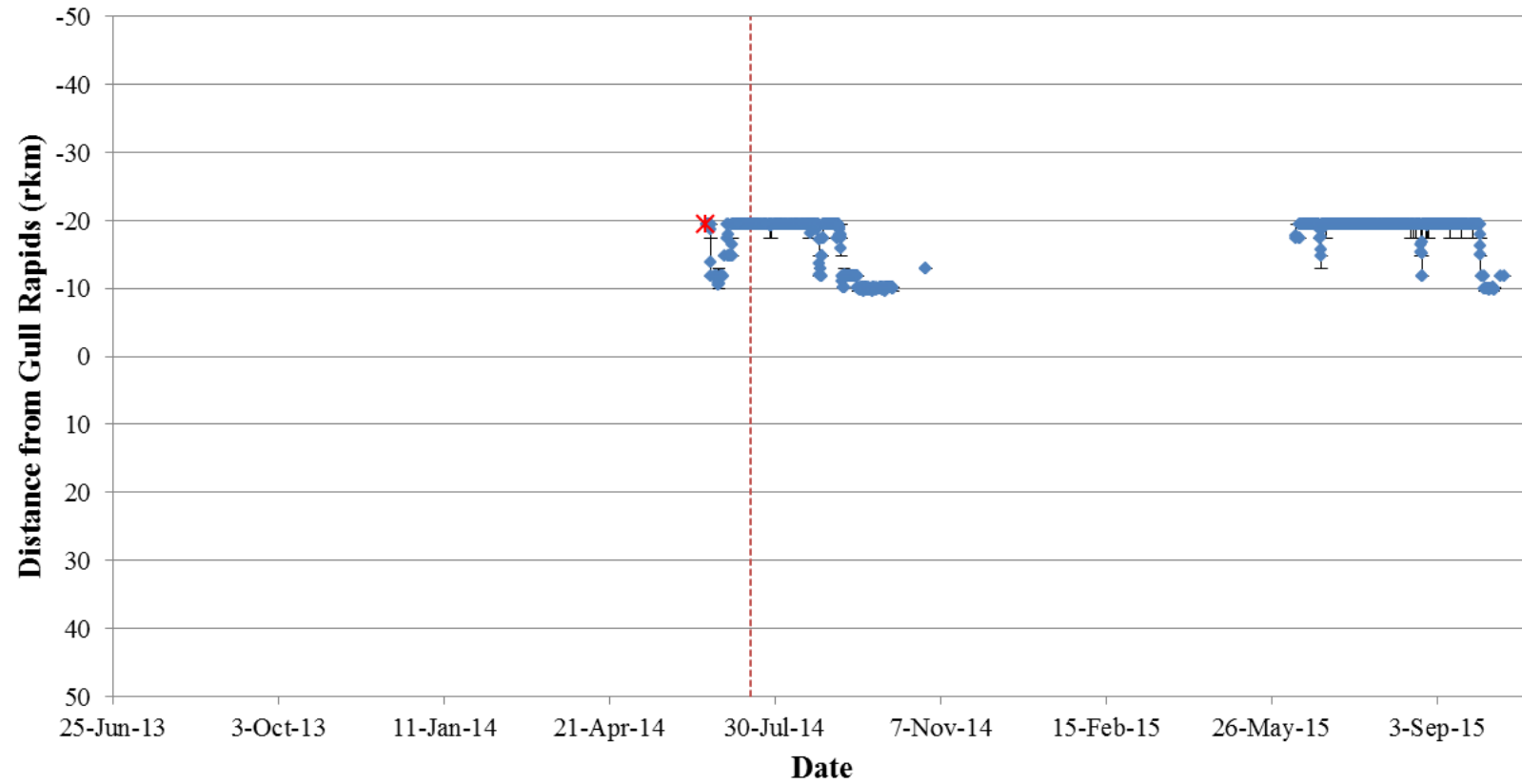
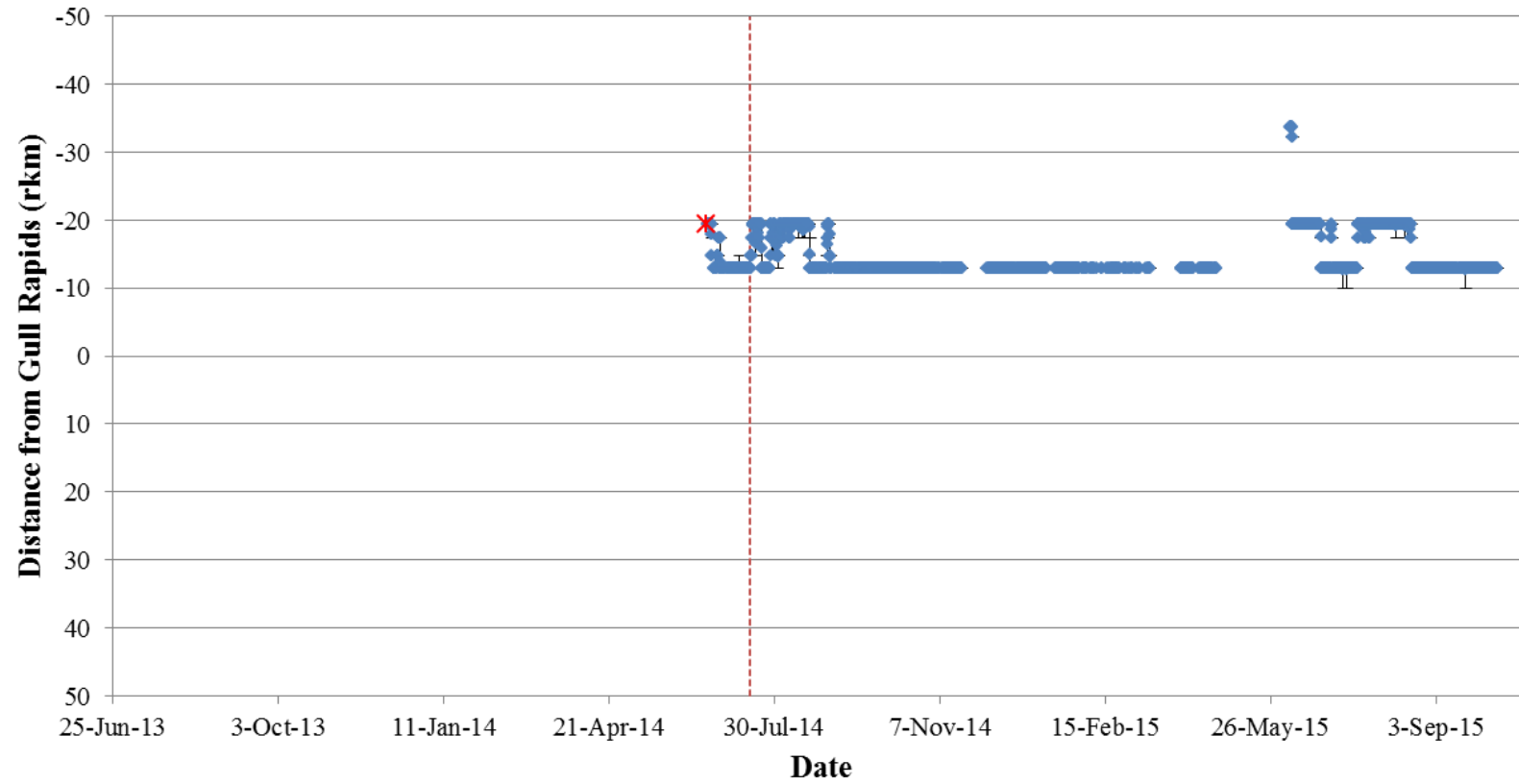


Figure A2-45: Position of a Walleye tagged with an acoustic transmitter (code #6421) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



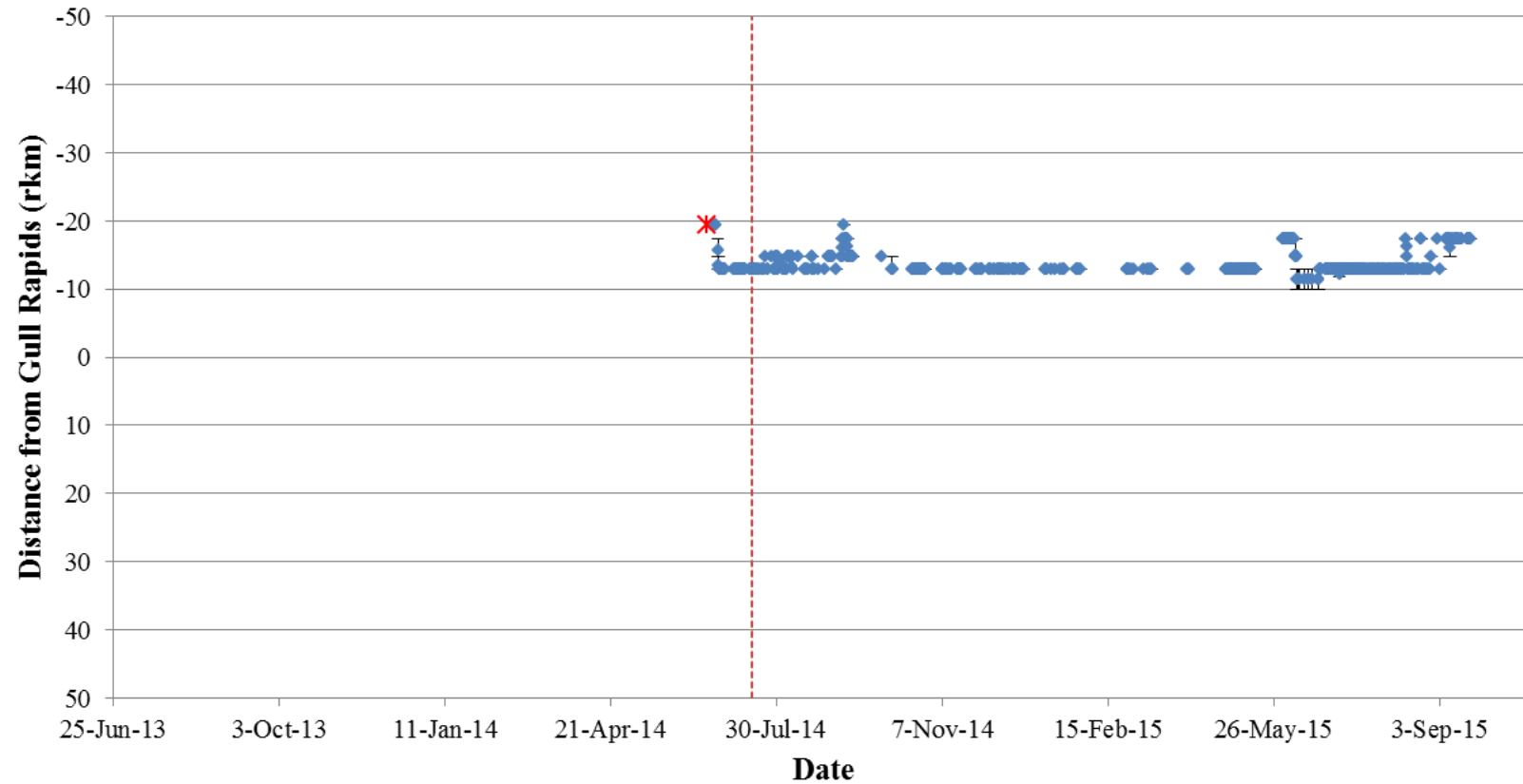


Figure A2-47: Position of a Walleye tagged with an acoustic transmitter (code #6423) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

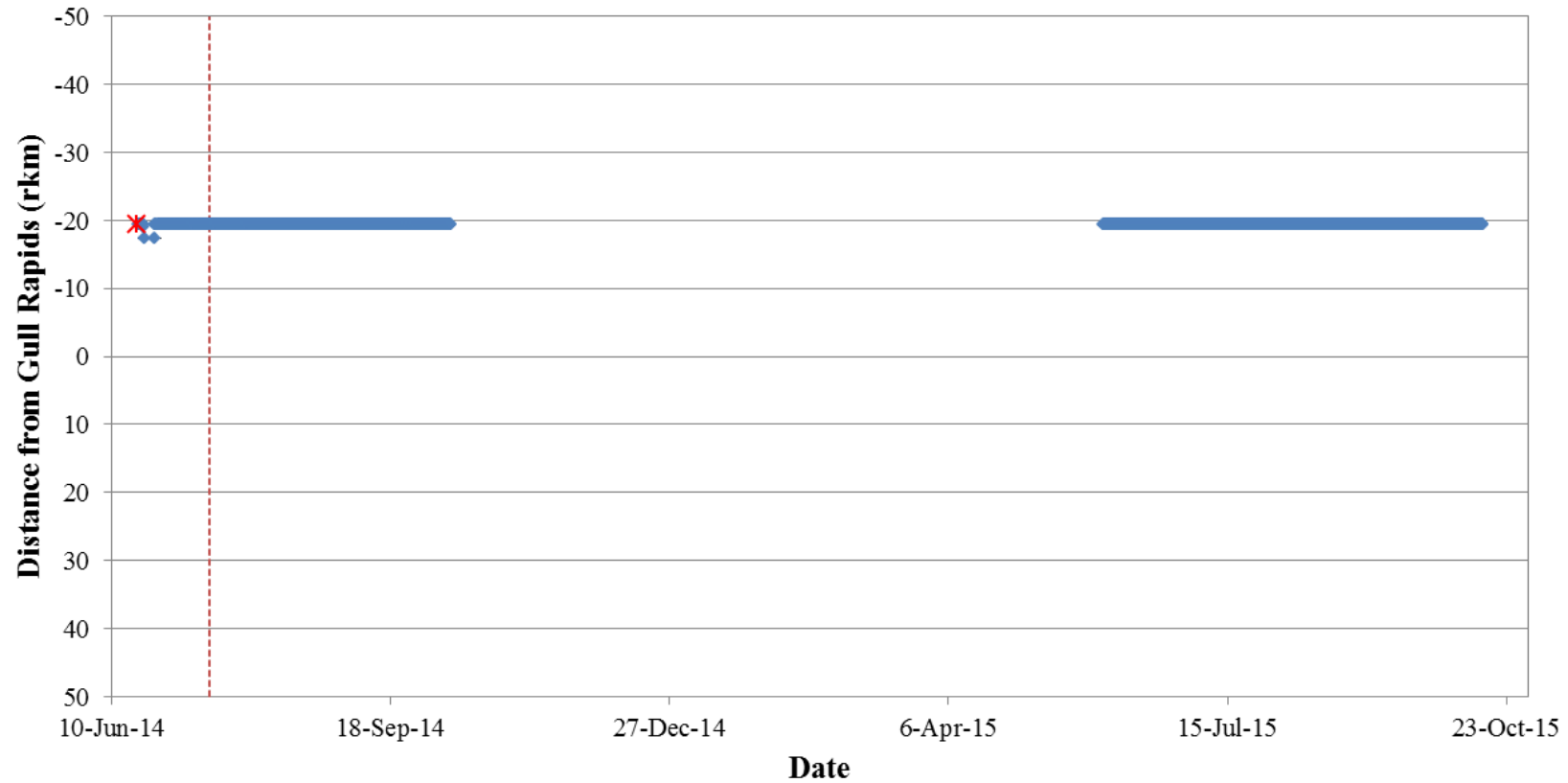
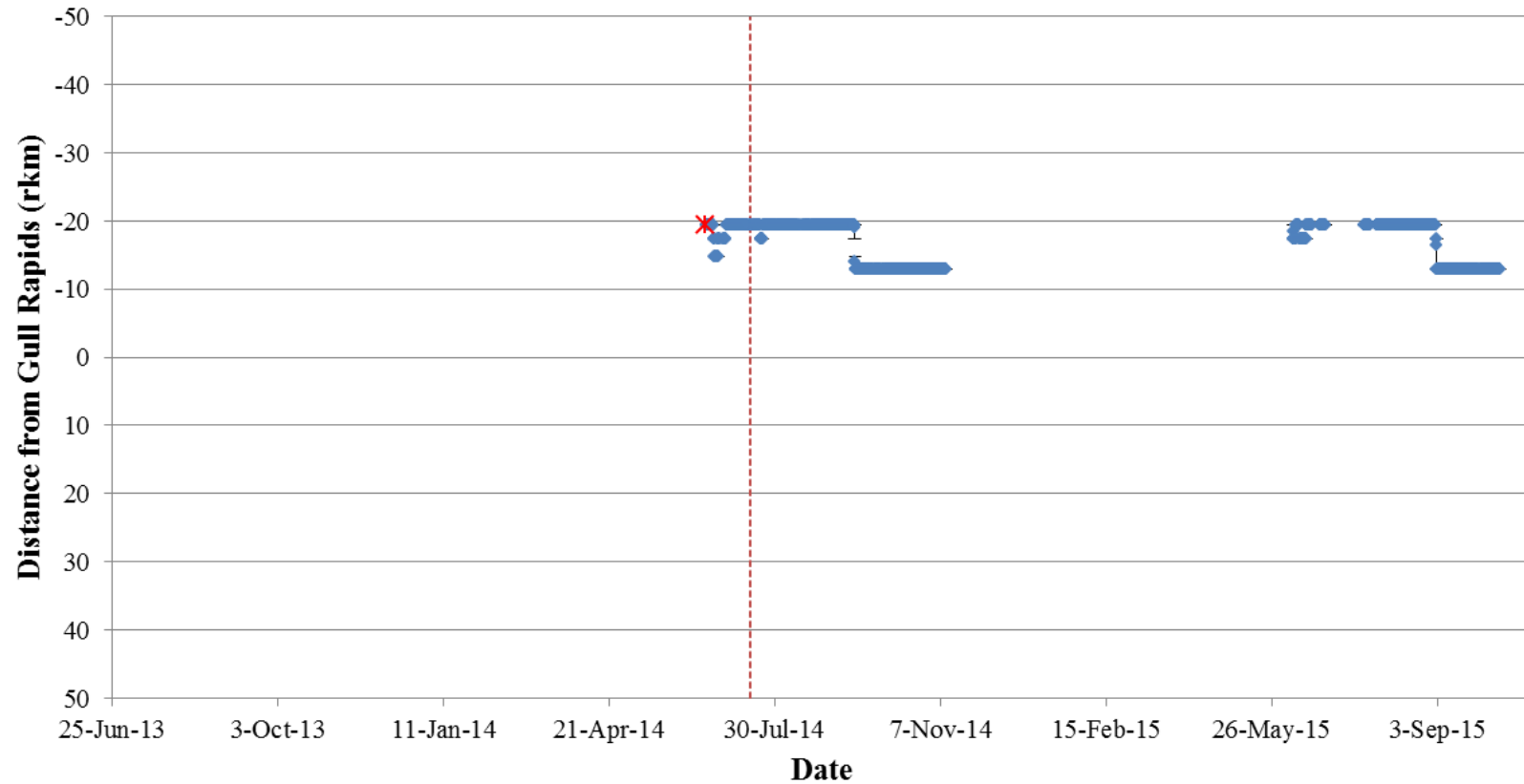


Figure A2-48: Position of a Walleye tagged with an acoustic transmitter (code #6425) in the Nelson River between Clark Lake and Gull Rapids in relation to Gull Rapids (rkm 0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



APPENDIX 3:

LOCATION SUMMARY FOR INDIVIDUAL ACOUSTIC TAGGED WALLEYE IN STEPHENS LAKE, JUNE 2013 TO OCTOBER 2015

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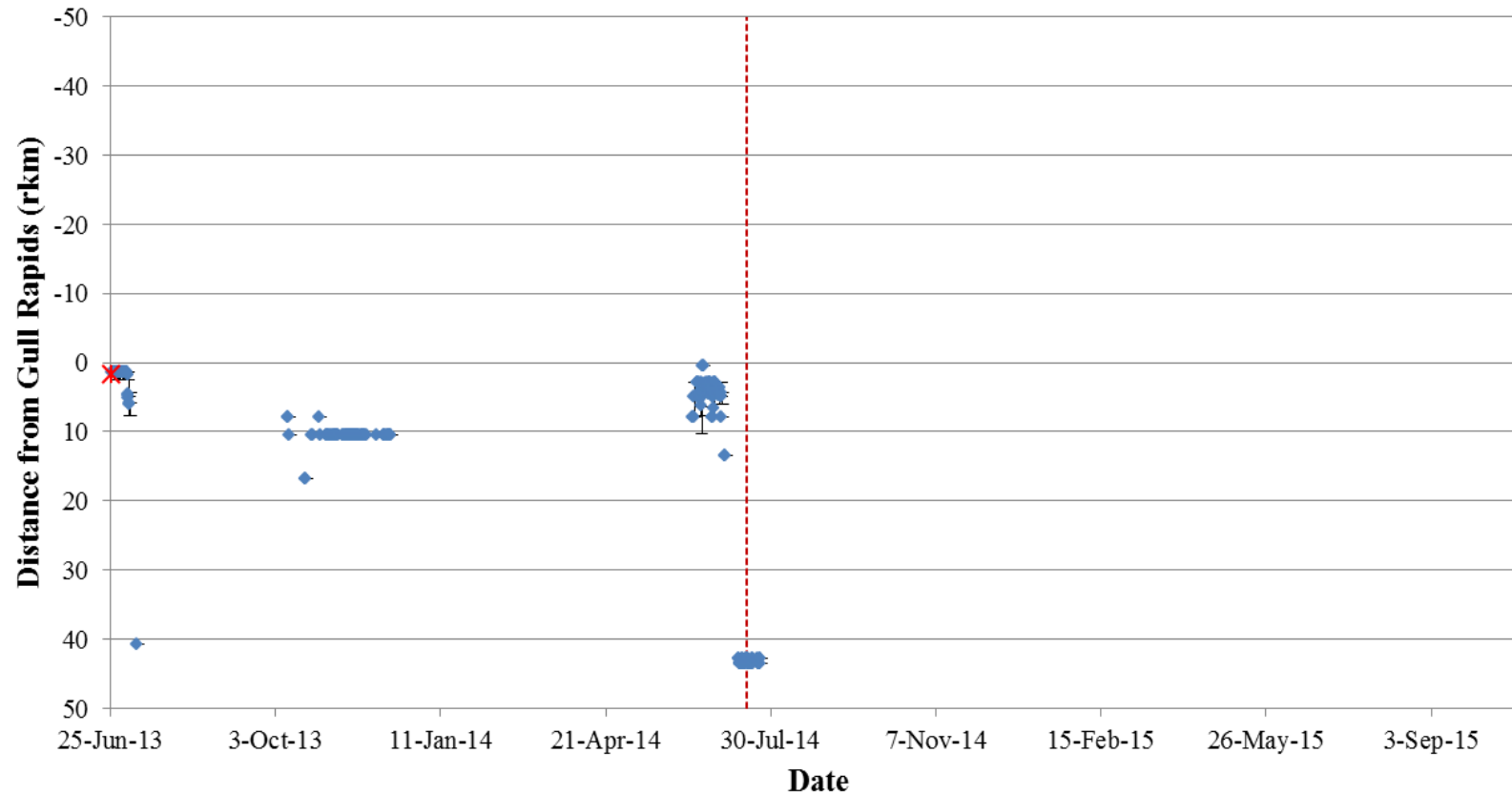


Figure A3-1: Position of a Walleye tagged with an acoustic transmitter (code #32811) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

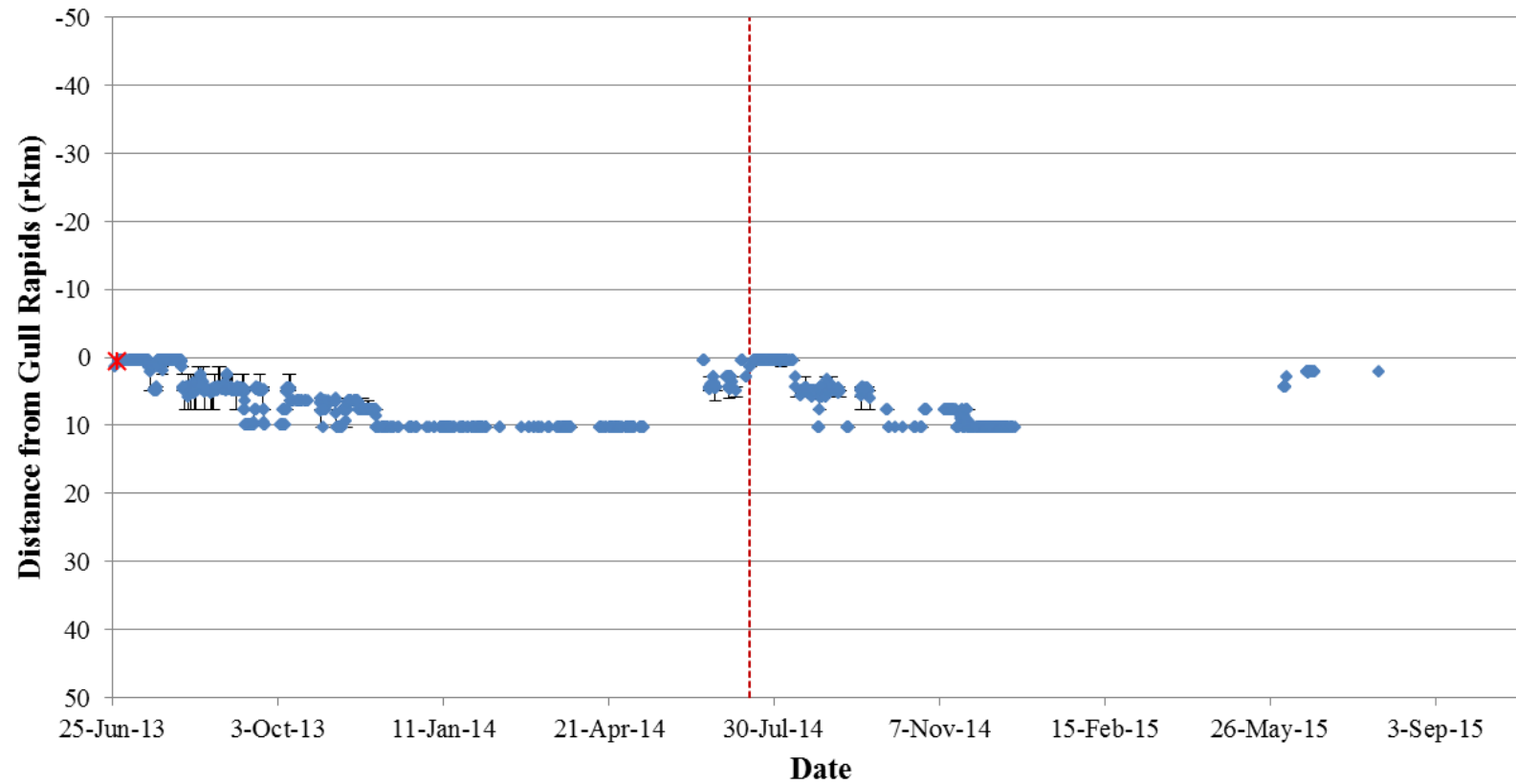


Figure A3-2: Position of a Walleye tagged with an acoustic transmitter (code #32812) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



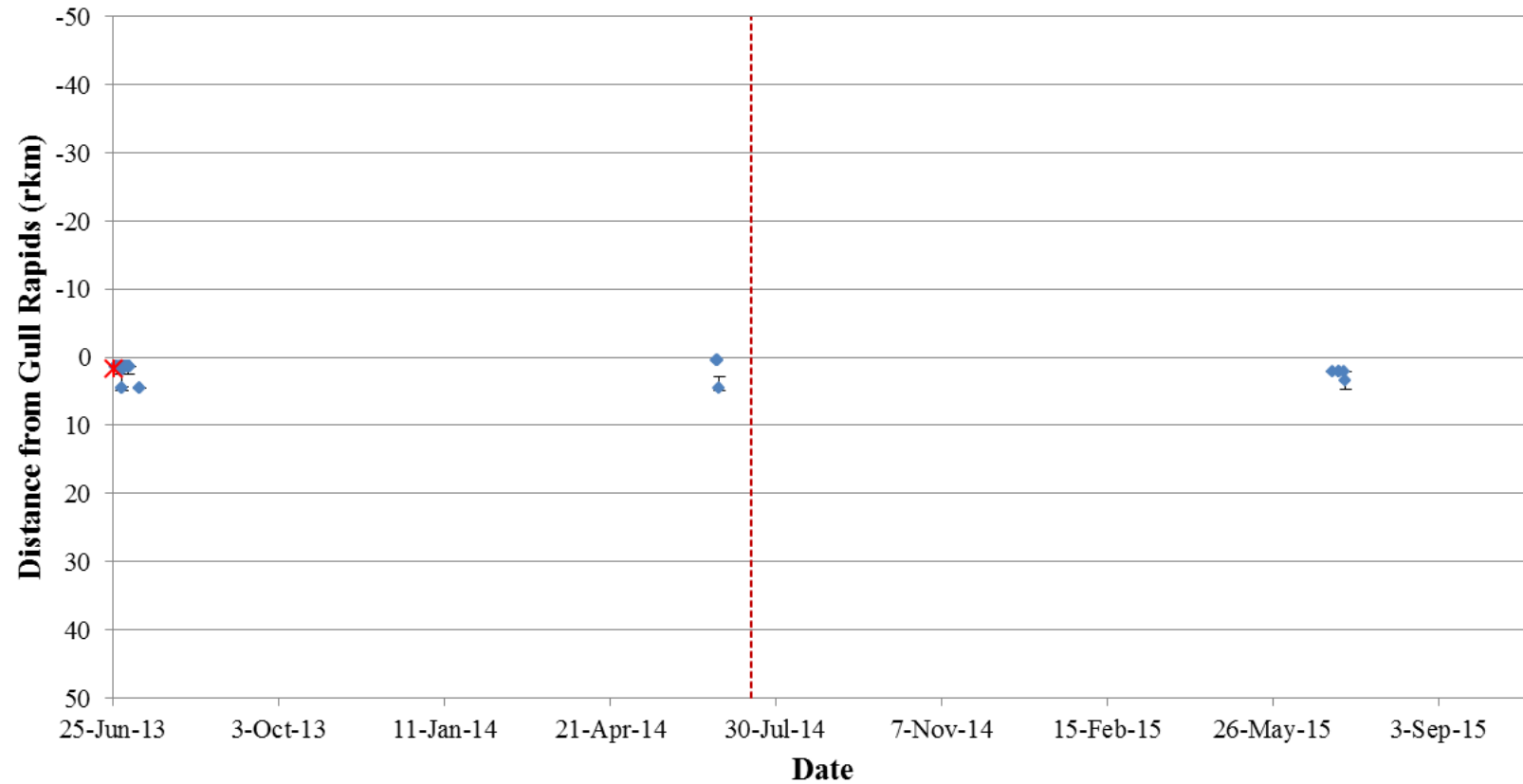


Figure A3-4: Position of a Walleye tagged with an acoustic transmitter (code #32815) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



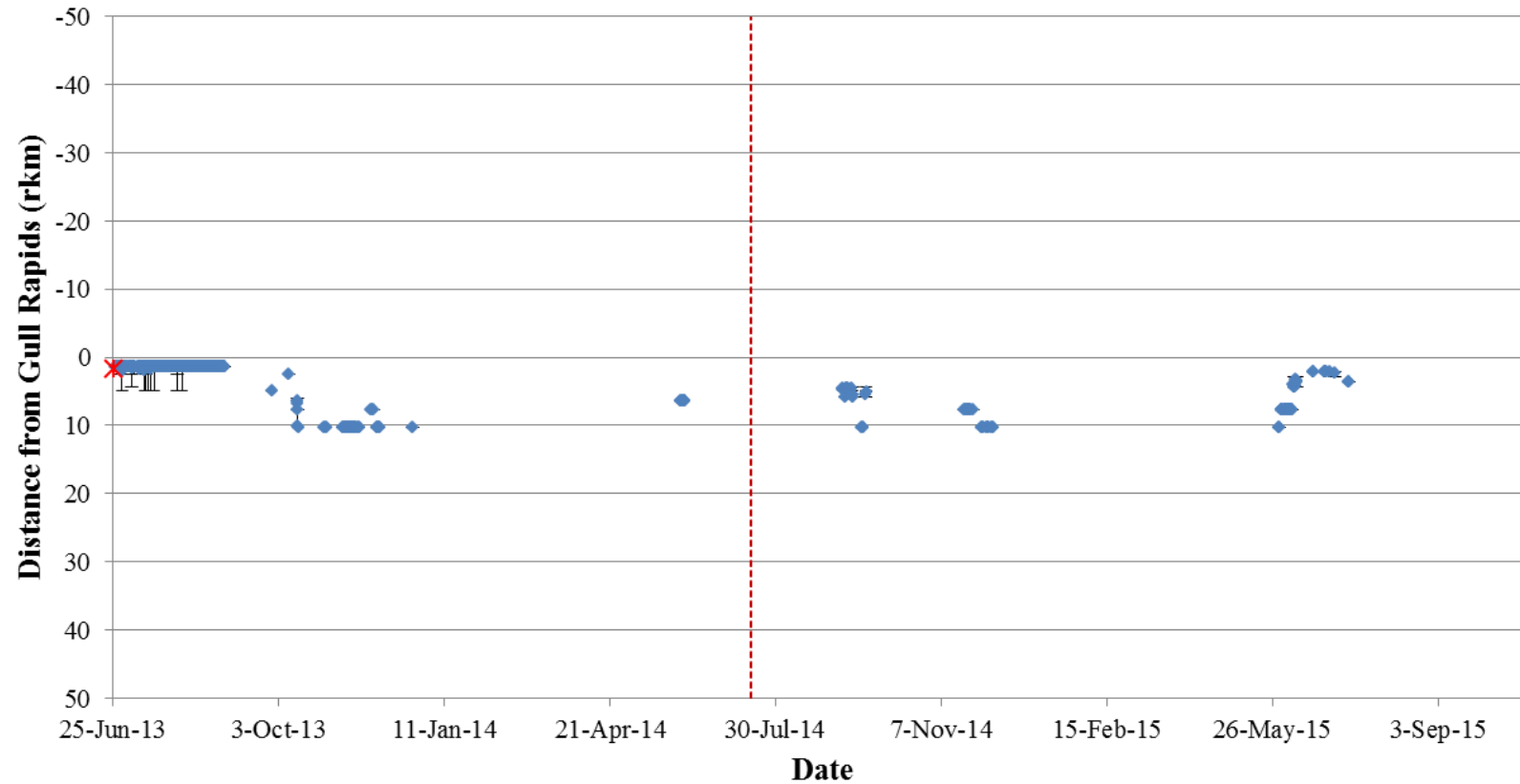


Figure A3-6: Position of a Walleye tagged with an acoustic transmitter (code #32817) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

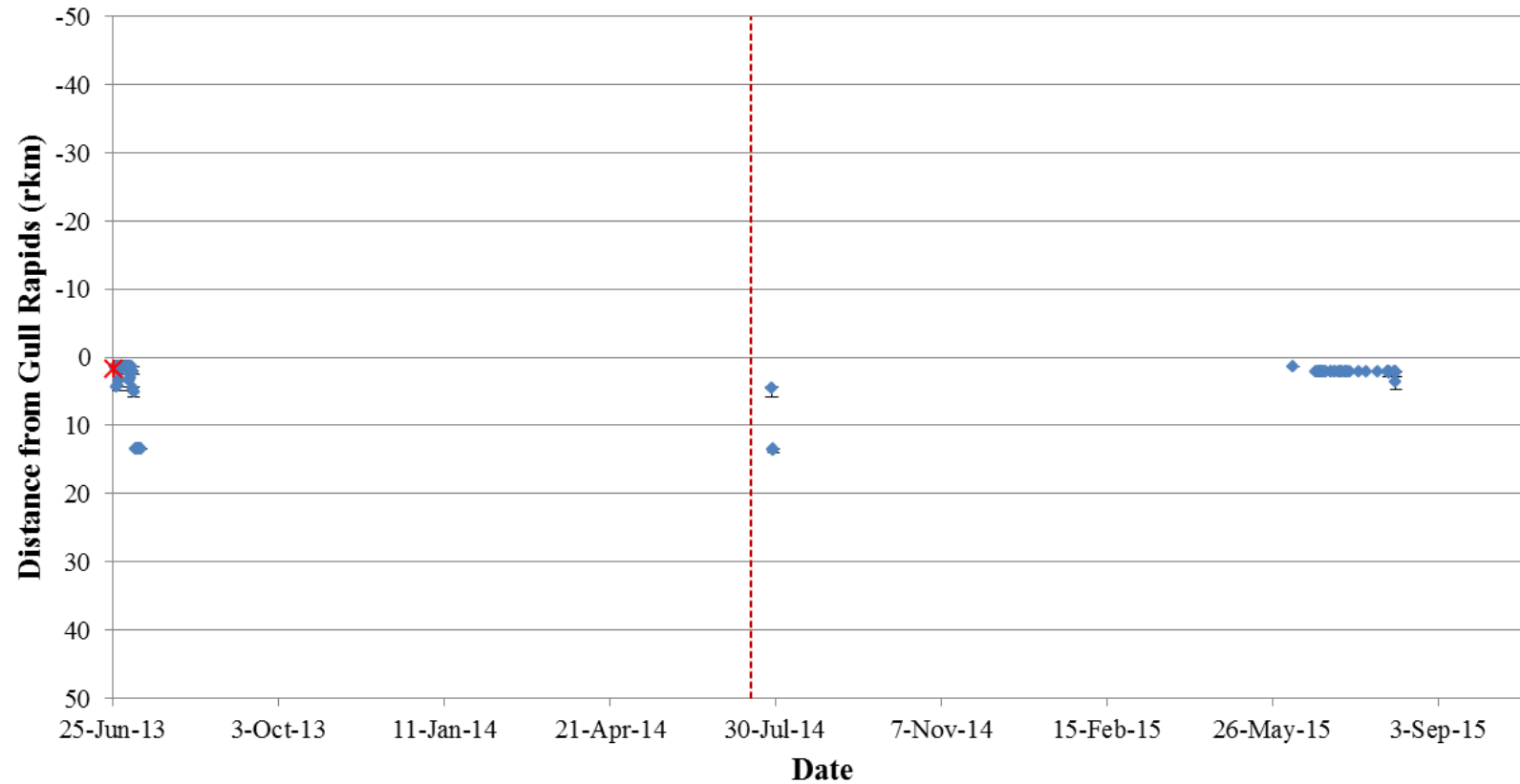


Figure A3-7: Position of a Walleye tagged with an acoustic transmitter (code #32818) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



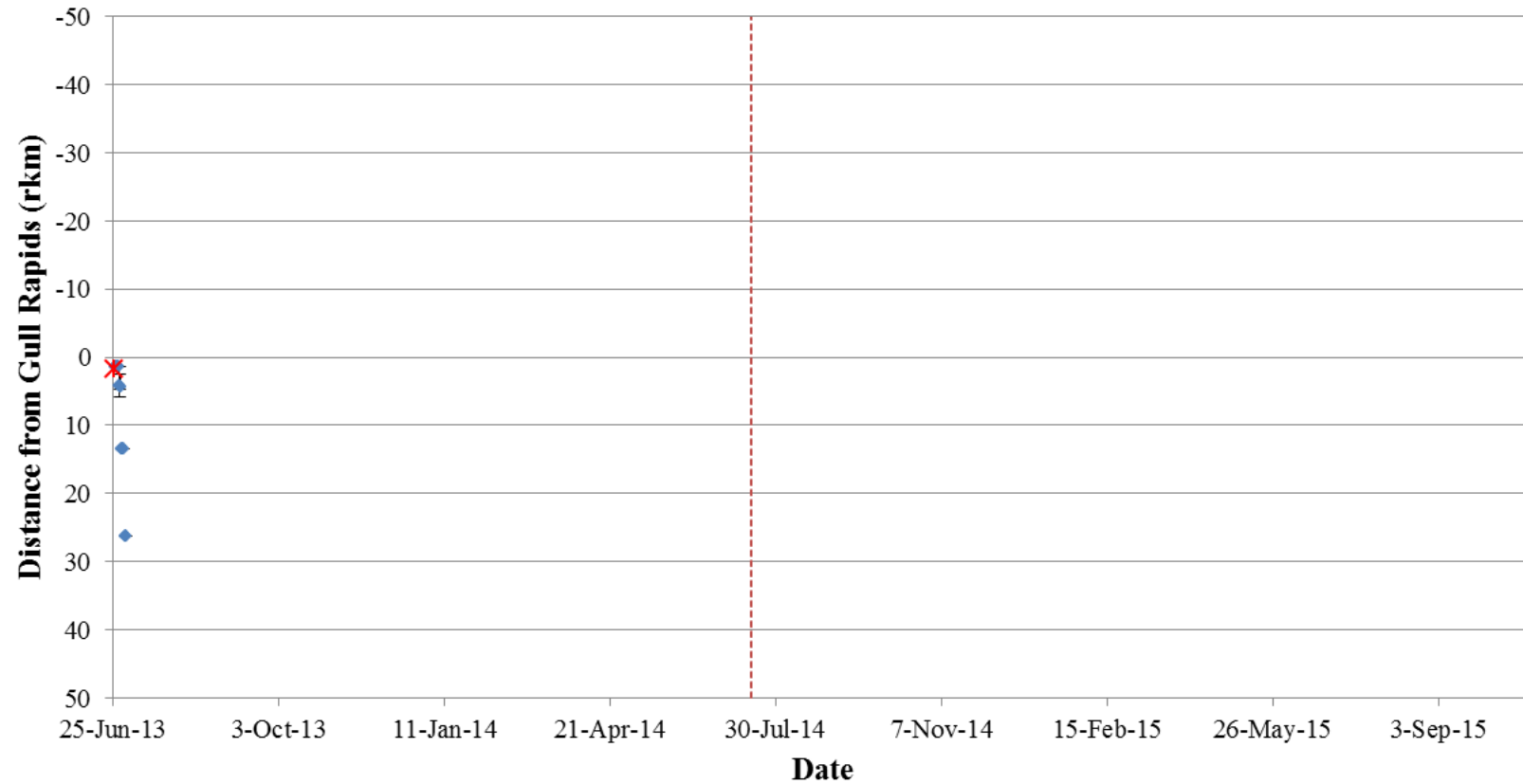


Figure A3-9: Position of a Walleye tagged with an acoustic transmitter (code #32820) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

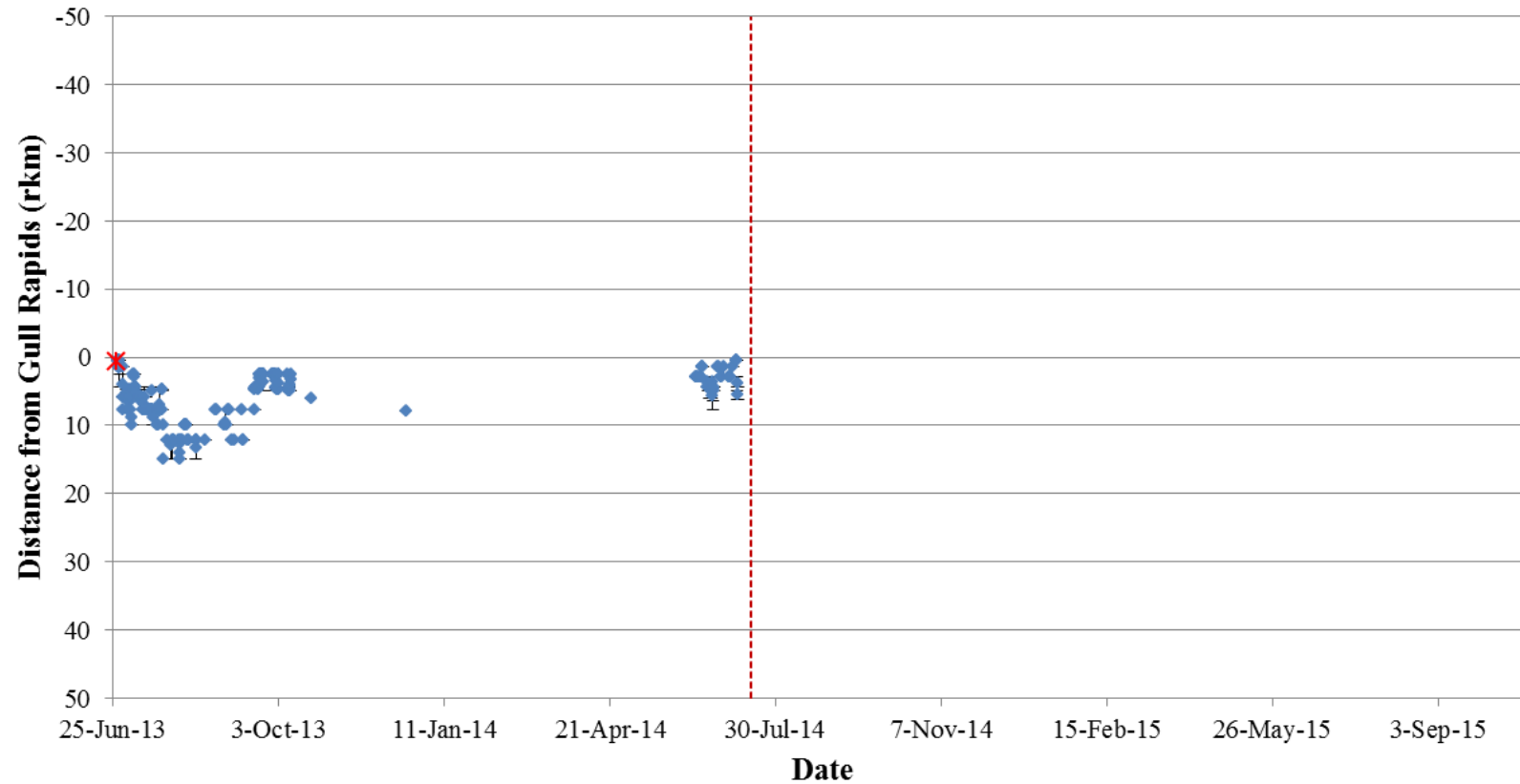


Figure A3-10: Position of a Walleye tagged with an acoustic transmitter (code #32821) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



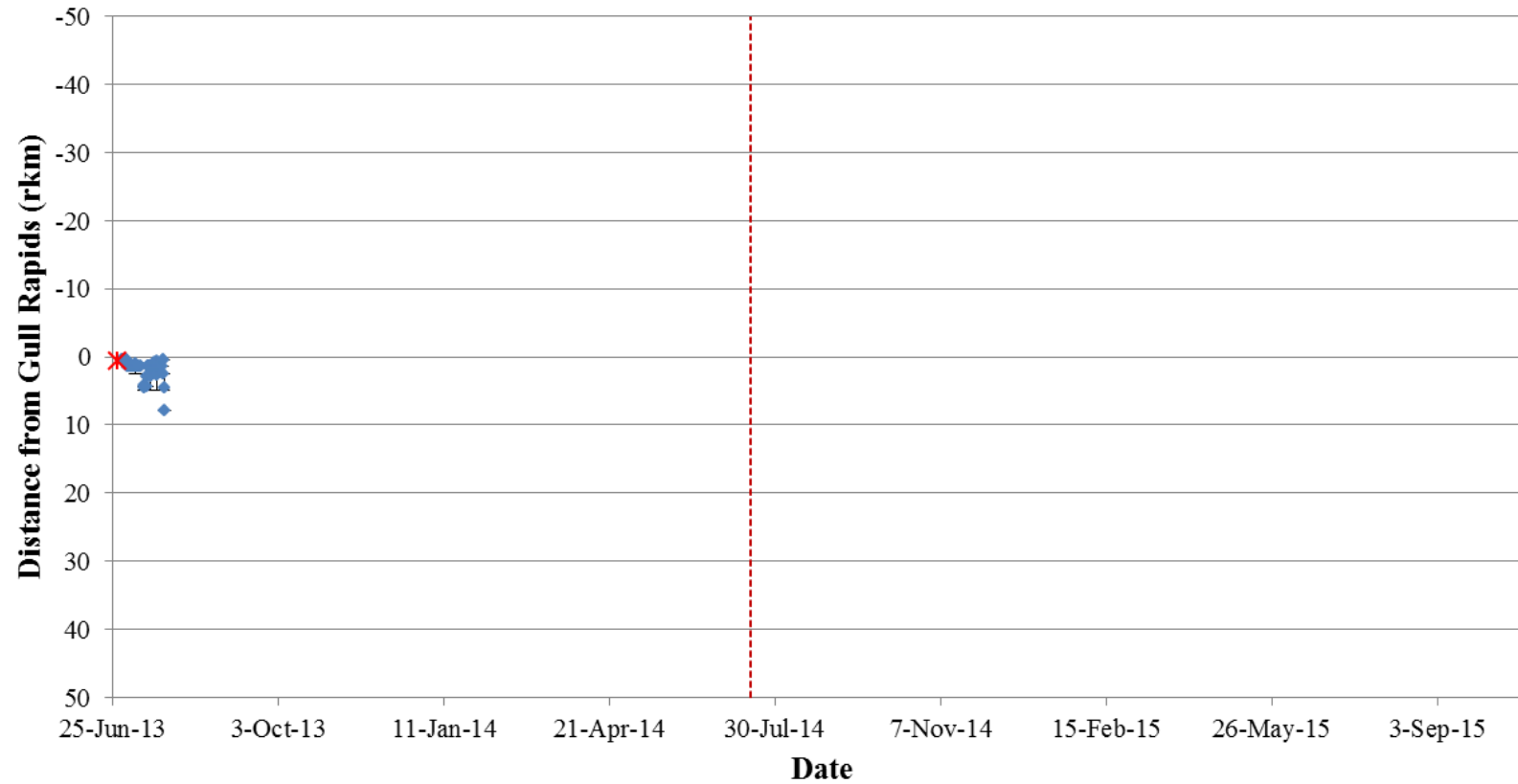


Figure A3-12: Position of a Walleye tagged with an acoustic transmitter (code #32823) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

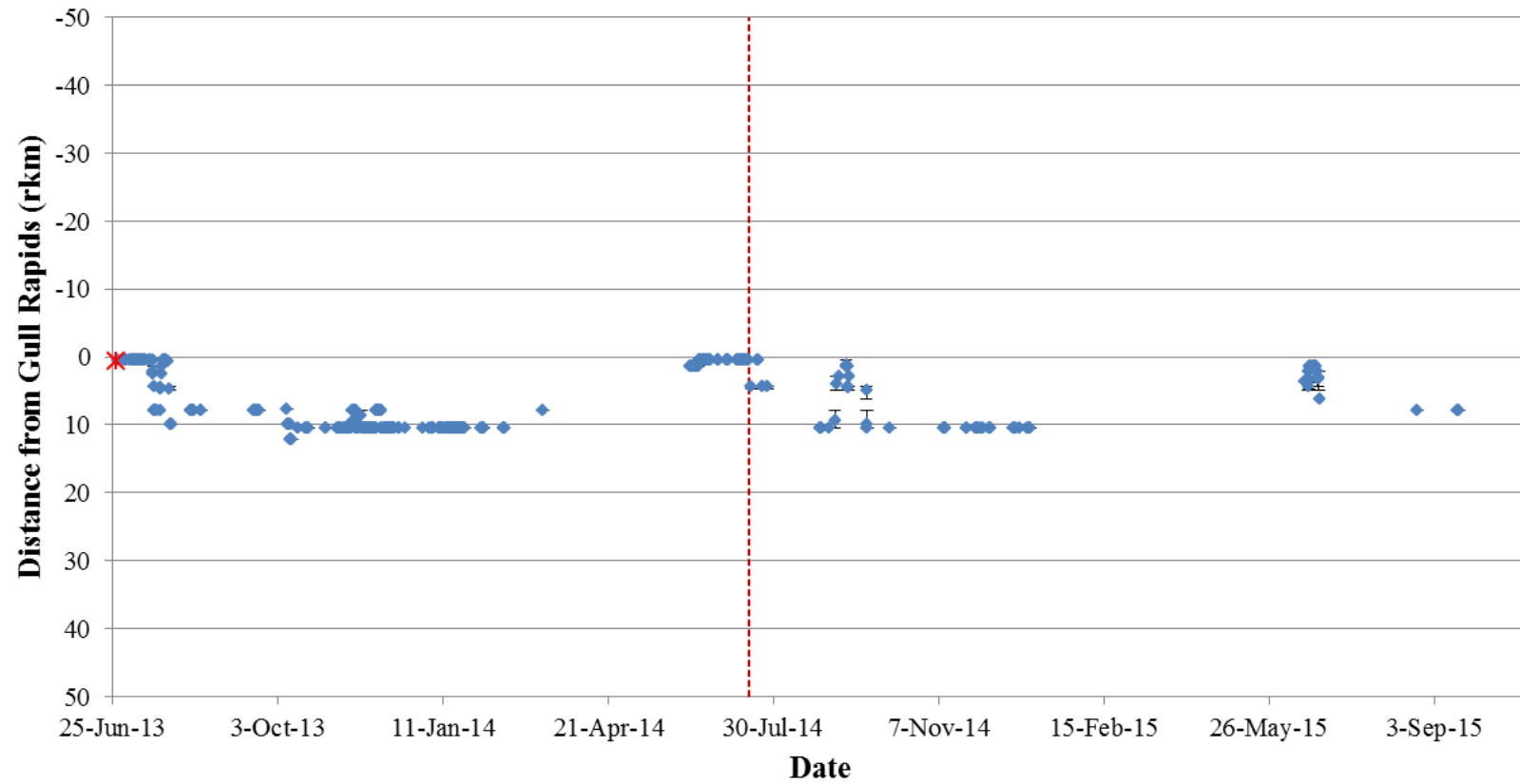


Figure A3-13: Position of a Walleye tagged with an acoustic transmitter (code #32824) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



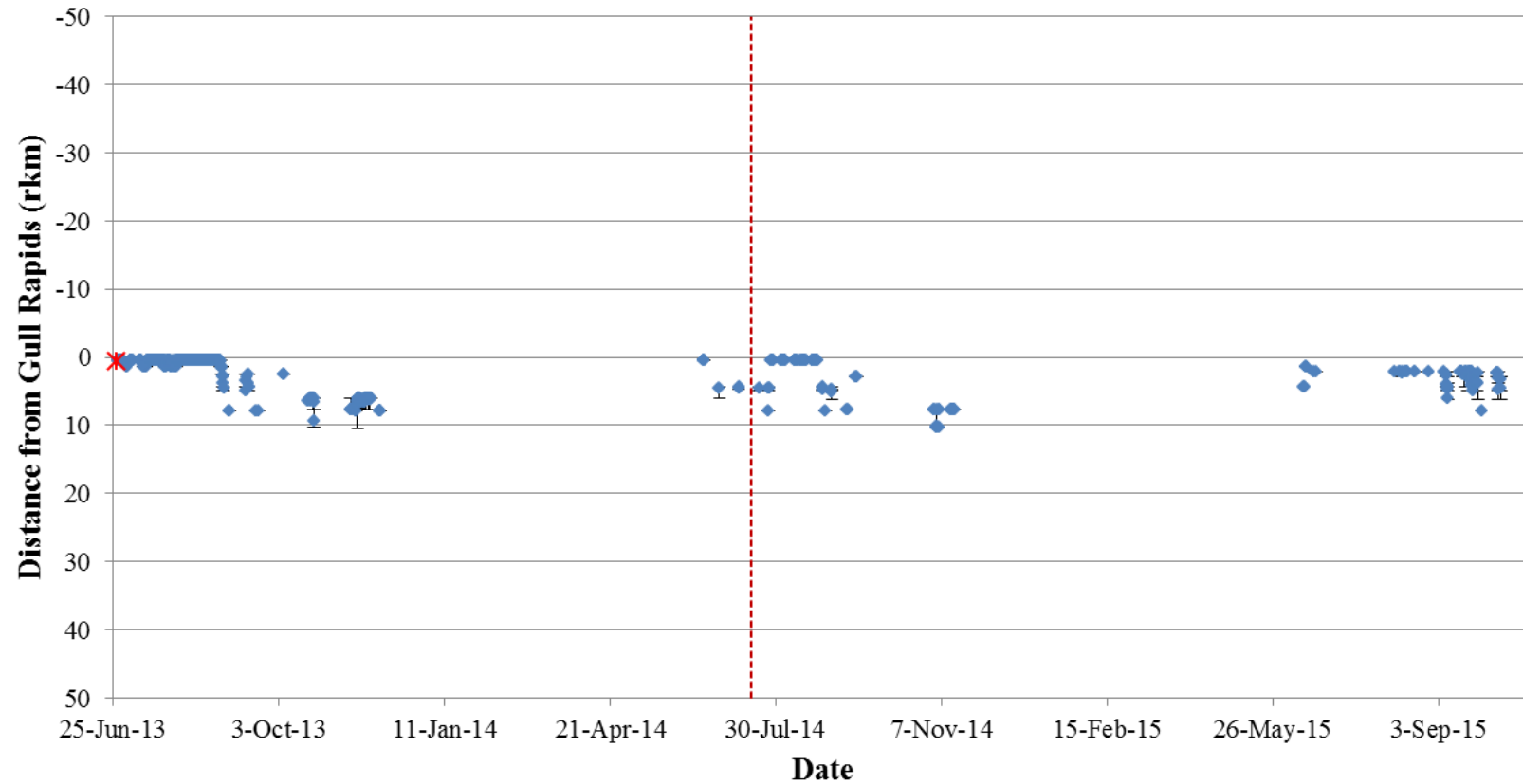


Figure A3-15: Position of a Walleye tagged with an acoustic transmitter (code #32826) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

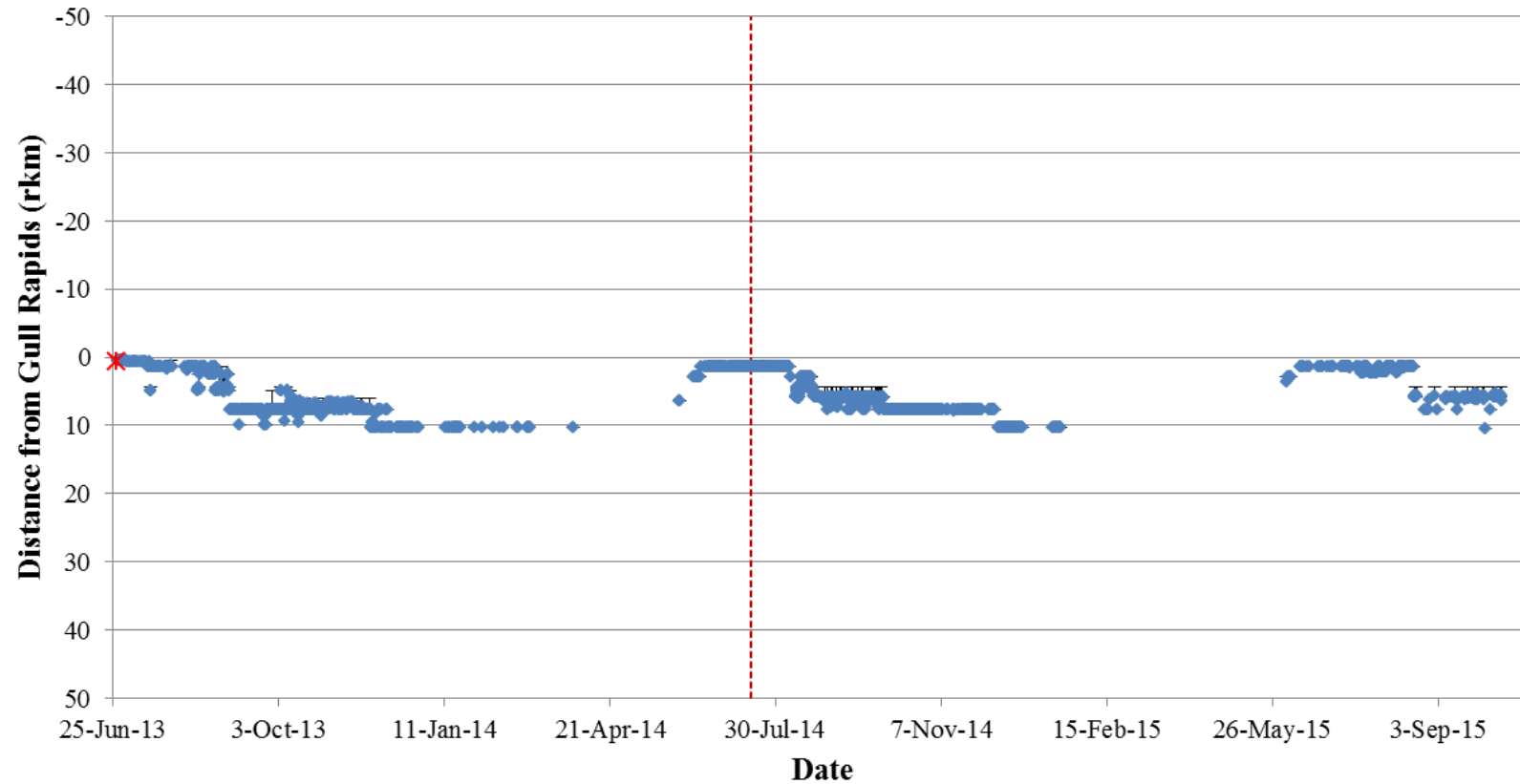


Figure A3-16: Position of a Walleye tagged with an acoustic transmitter (code #32827) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

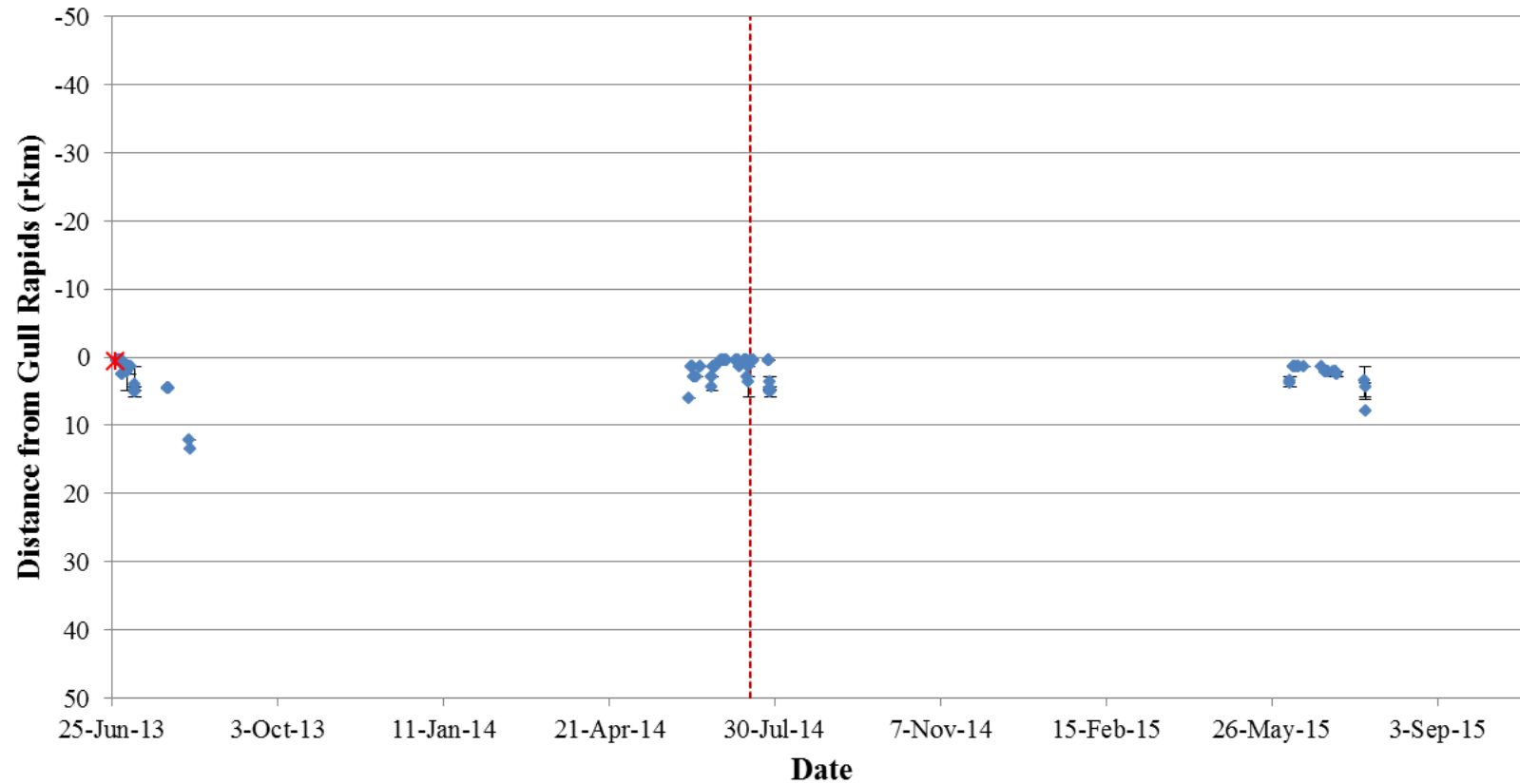


Figure A3-17: Position of a Walleye tagged with an acoustic transmitter (code #32828) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

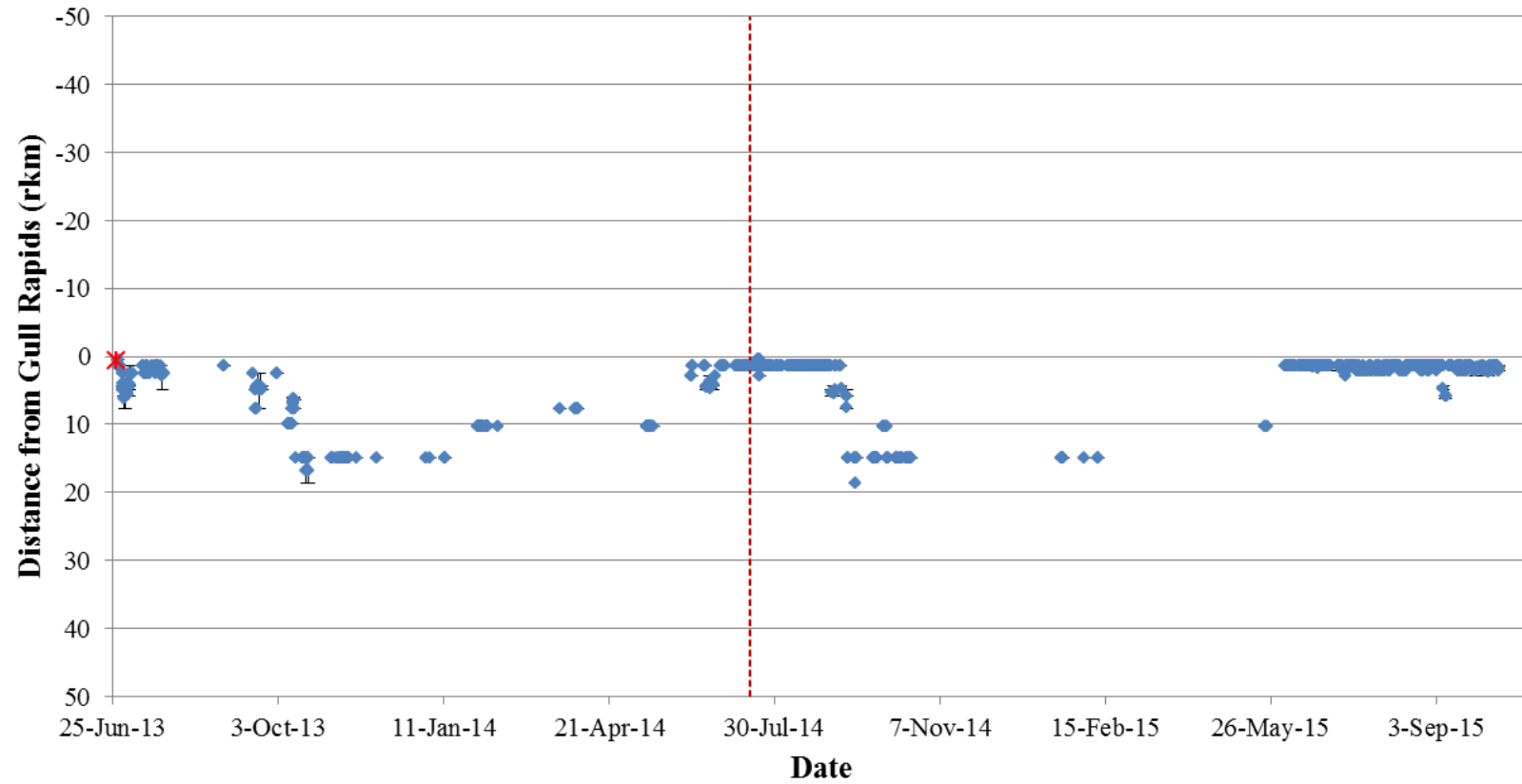


Figure A3-18: Position of a Walleye tagged with an acoustic transmitter (code #32829) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

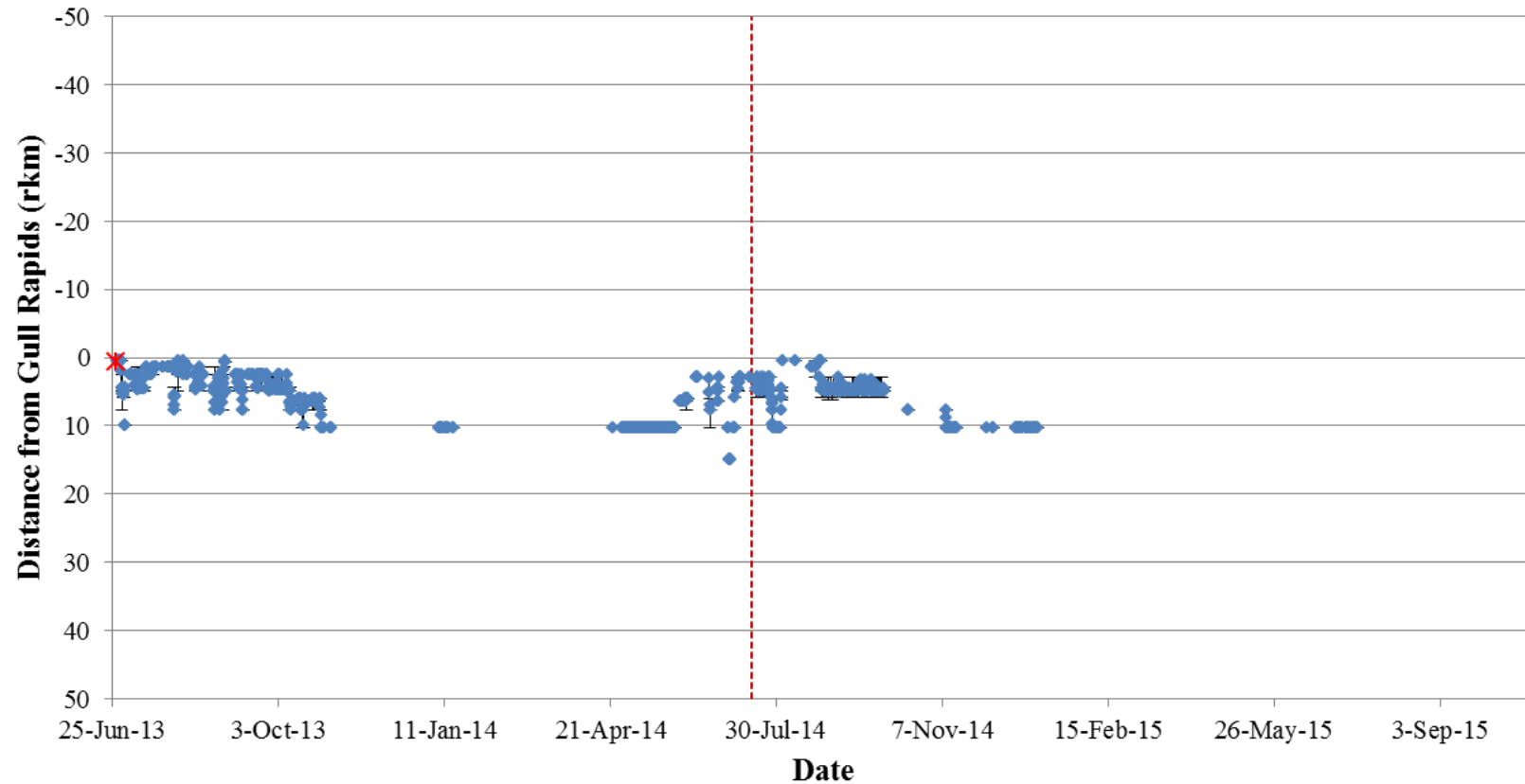


Figure A3-19: Position of a Walleye tagged with an acoustic transmitter (code #32830) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

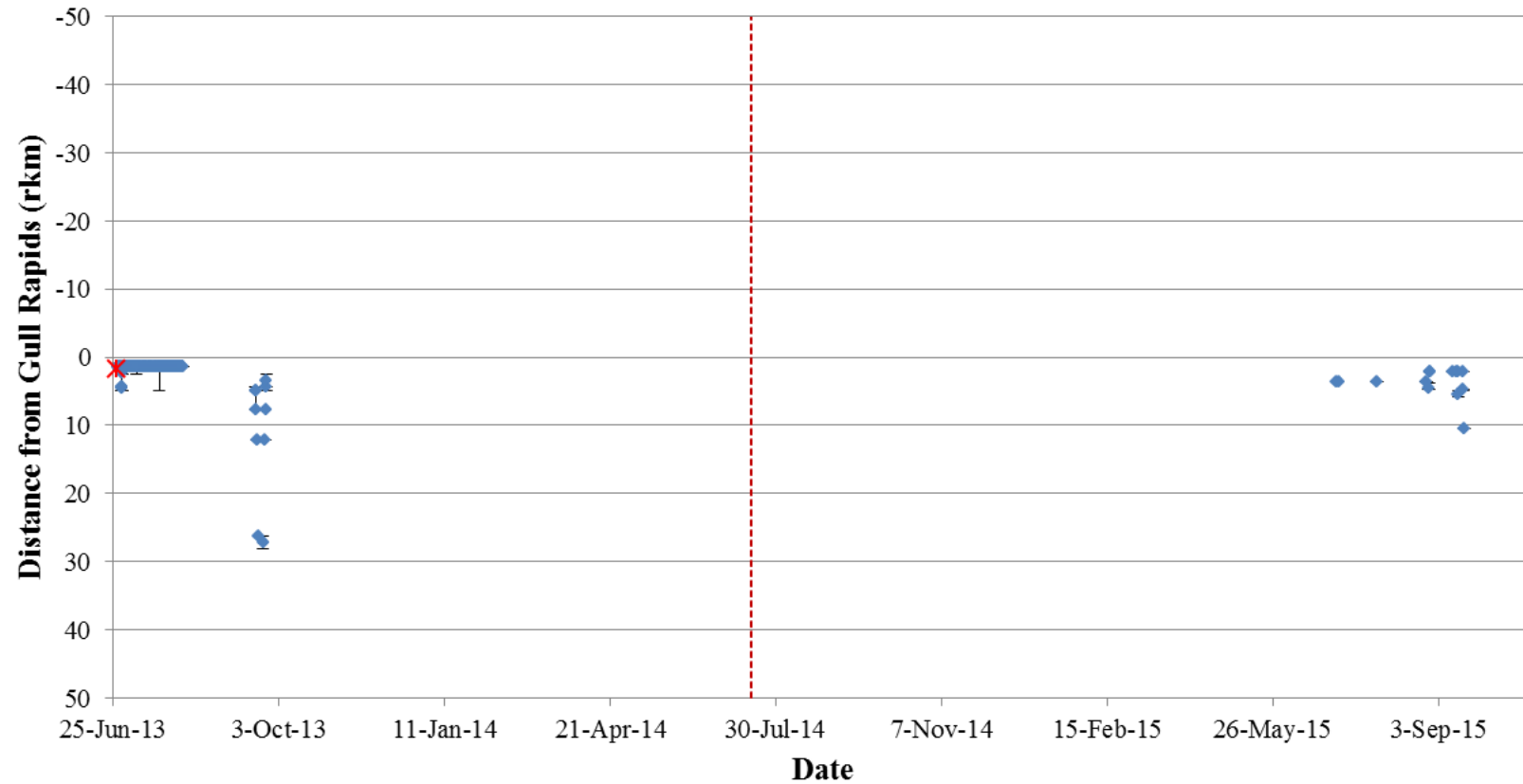


Figure A3-20: Position of a Walleye tagged with an acoustic transmitter (code #32831) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



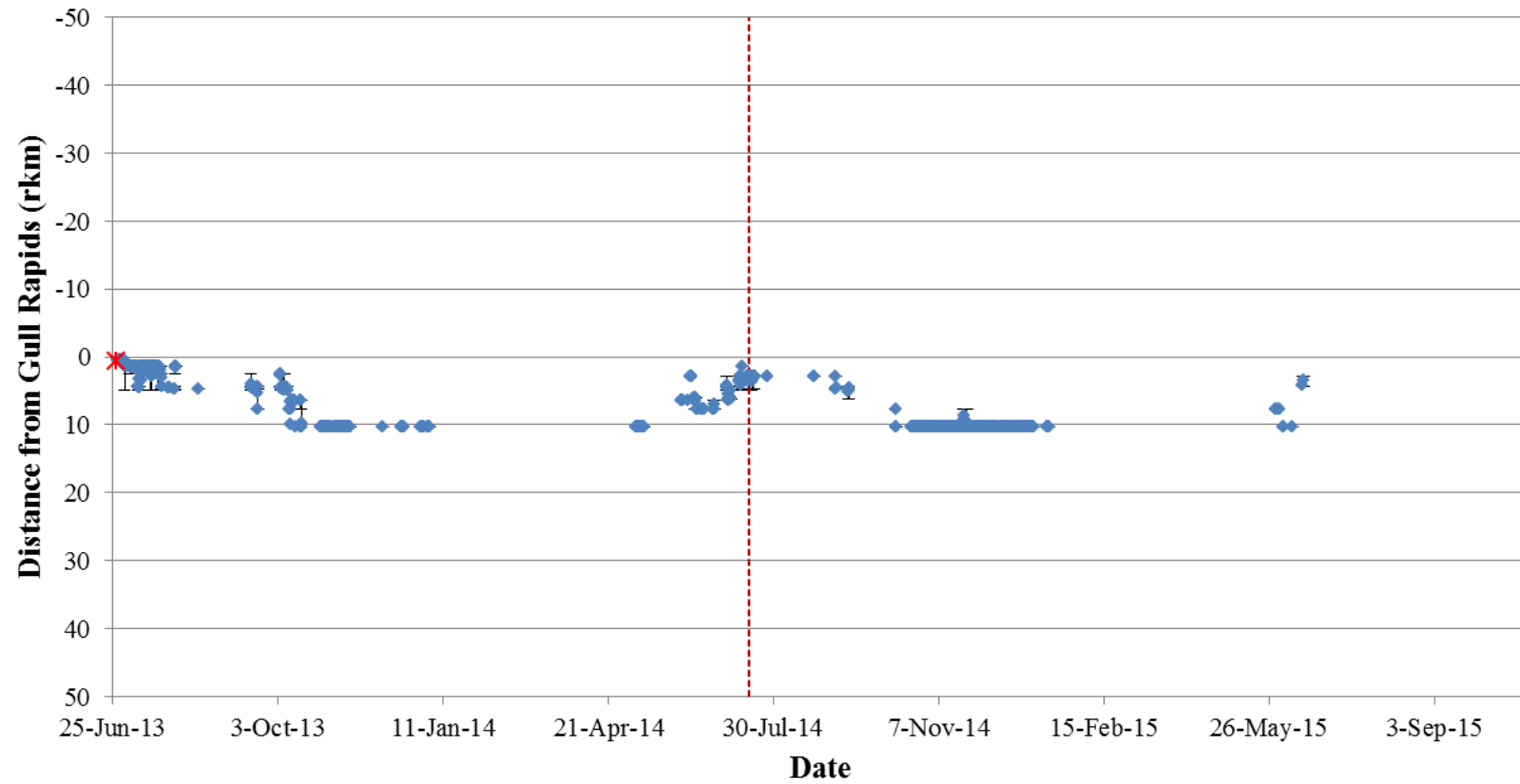


Figure A3-22: Position of a Walleye tagged with an acoustic transmitter (code #32834) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

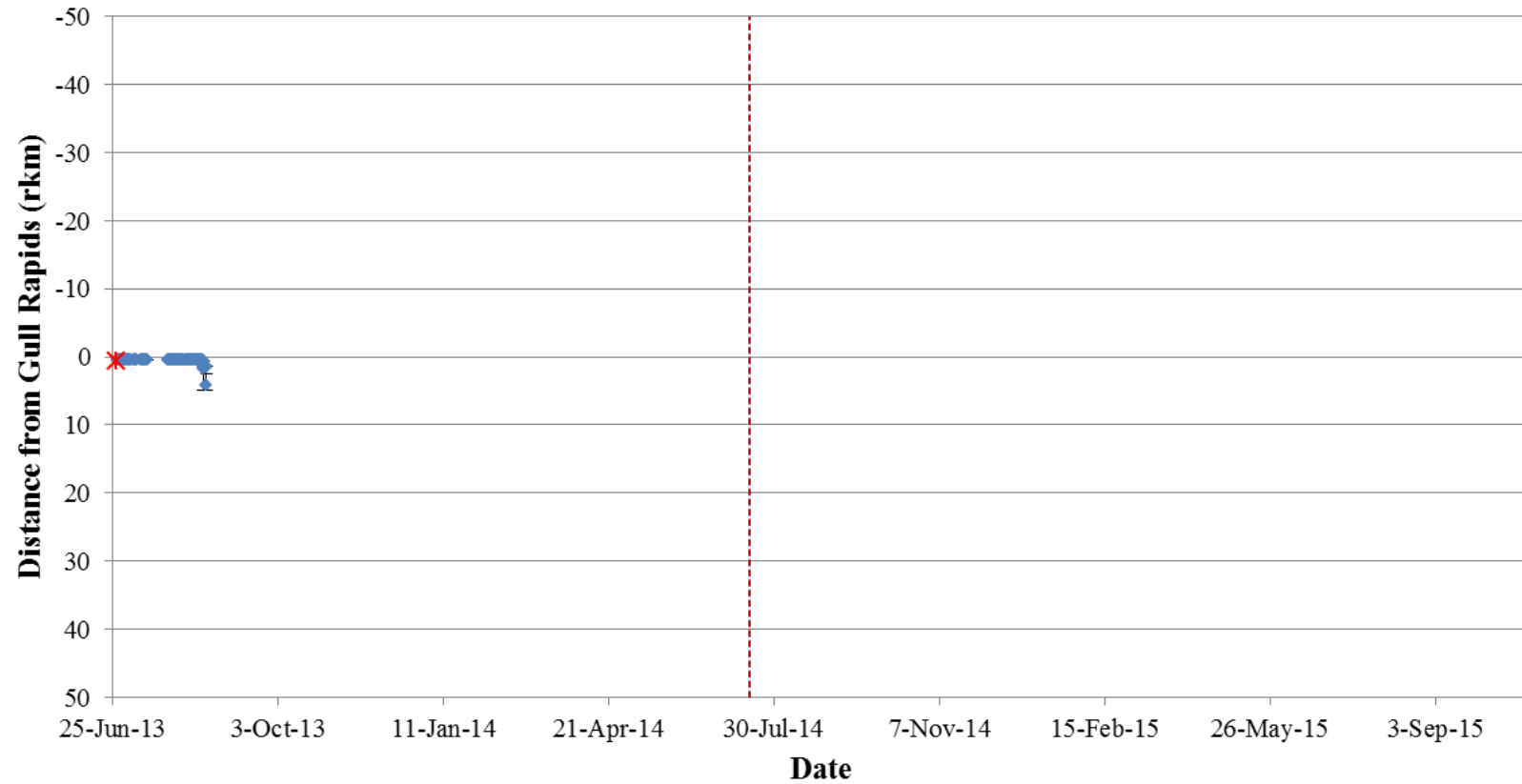


Figure A3-23: Position of a Walleye tagged with an acoustic transmitter (code #32835) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

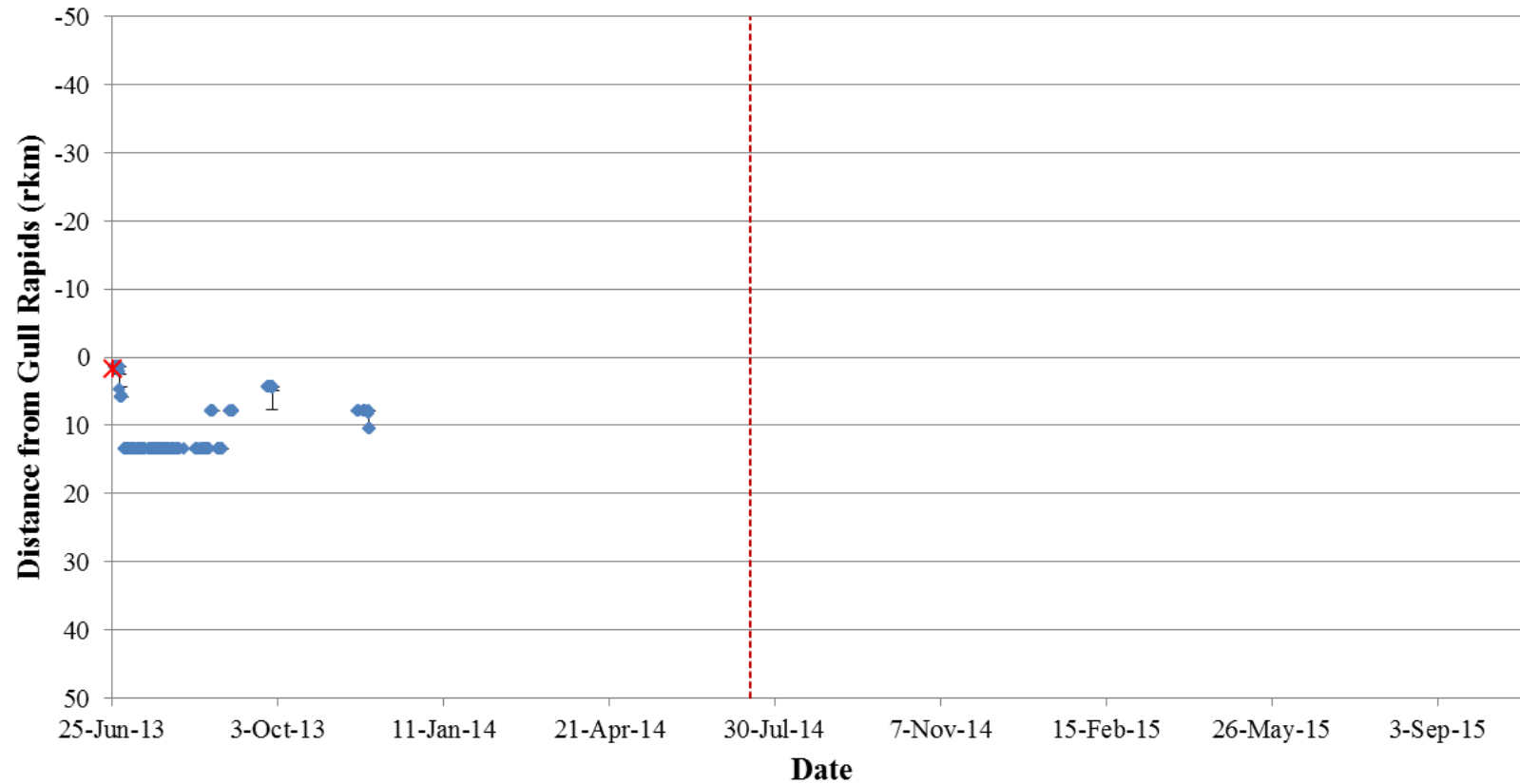


Figure A3-24: Position of a Walleye tagged with an acoustic transmitter (code #32836) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

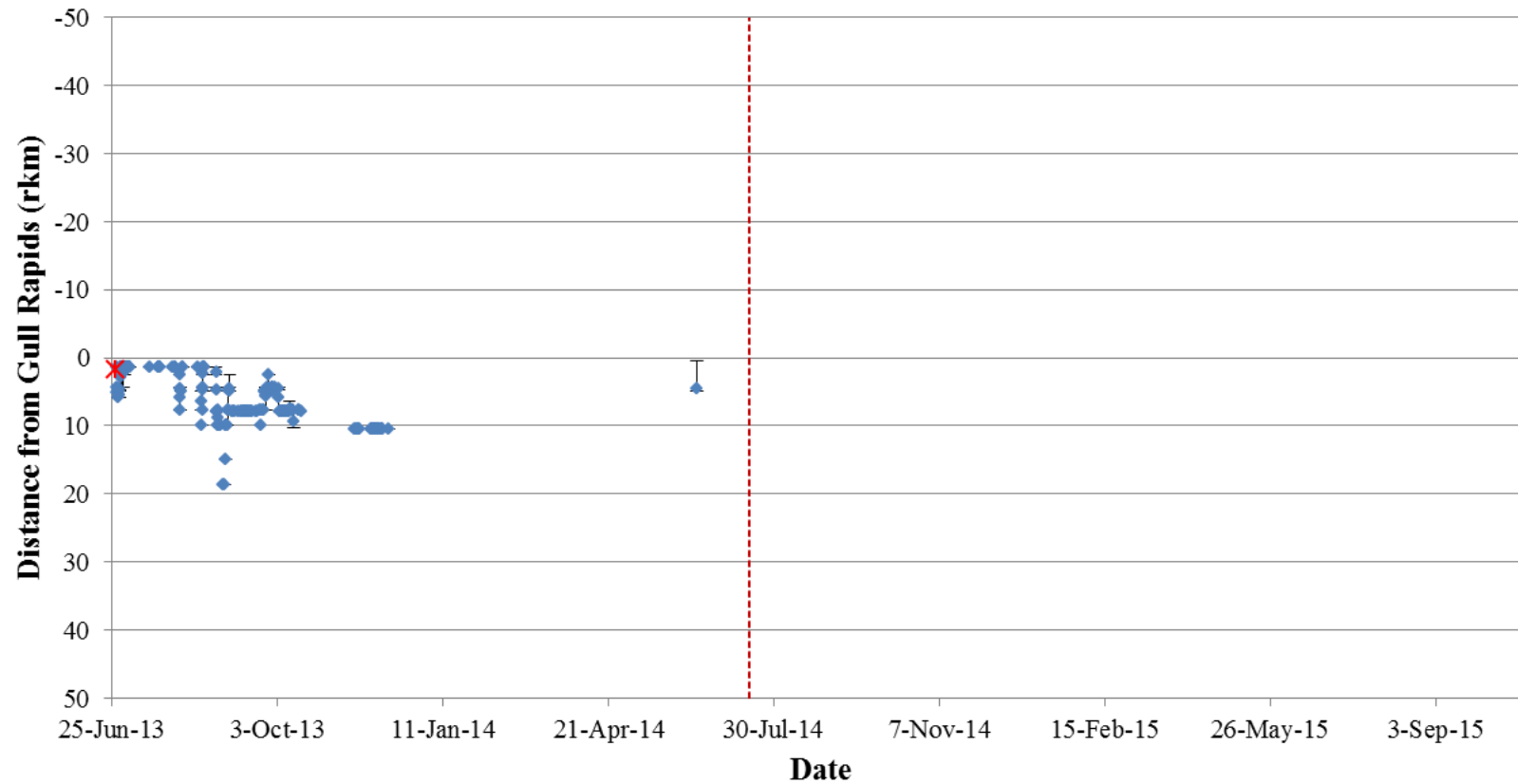


Figure A3-25: Position of a Walleye tagged with an acoustic transmitter (code #32837) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

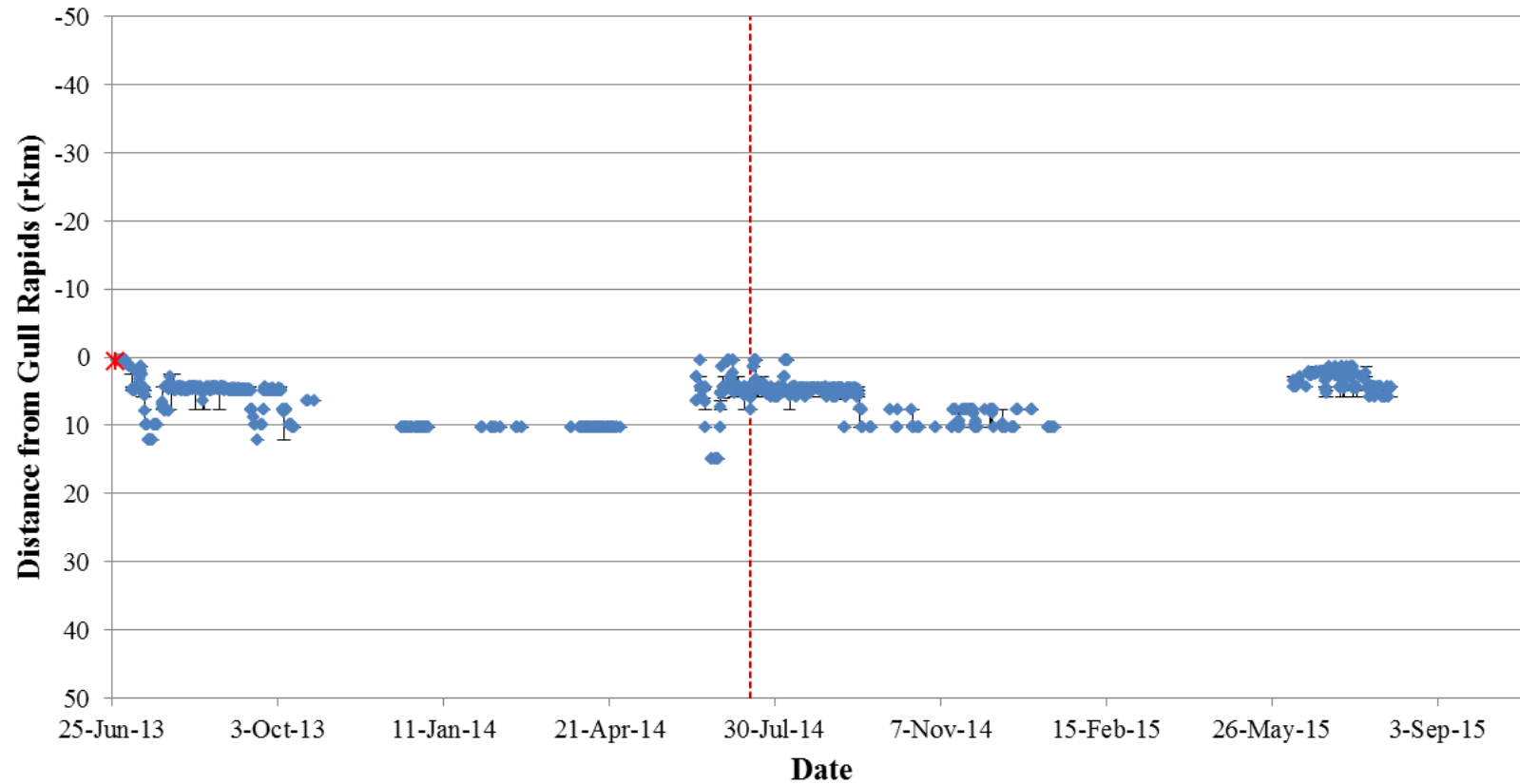


Figure A3-26: Position of a Walleye tagged with an acoustic transmitter (code #32838) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

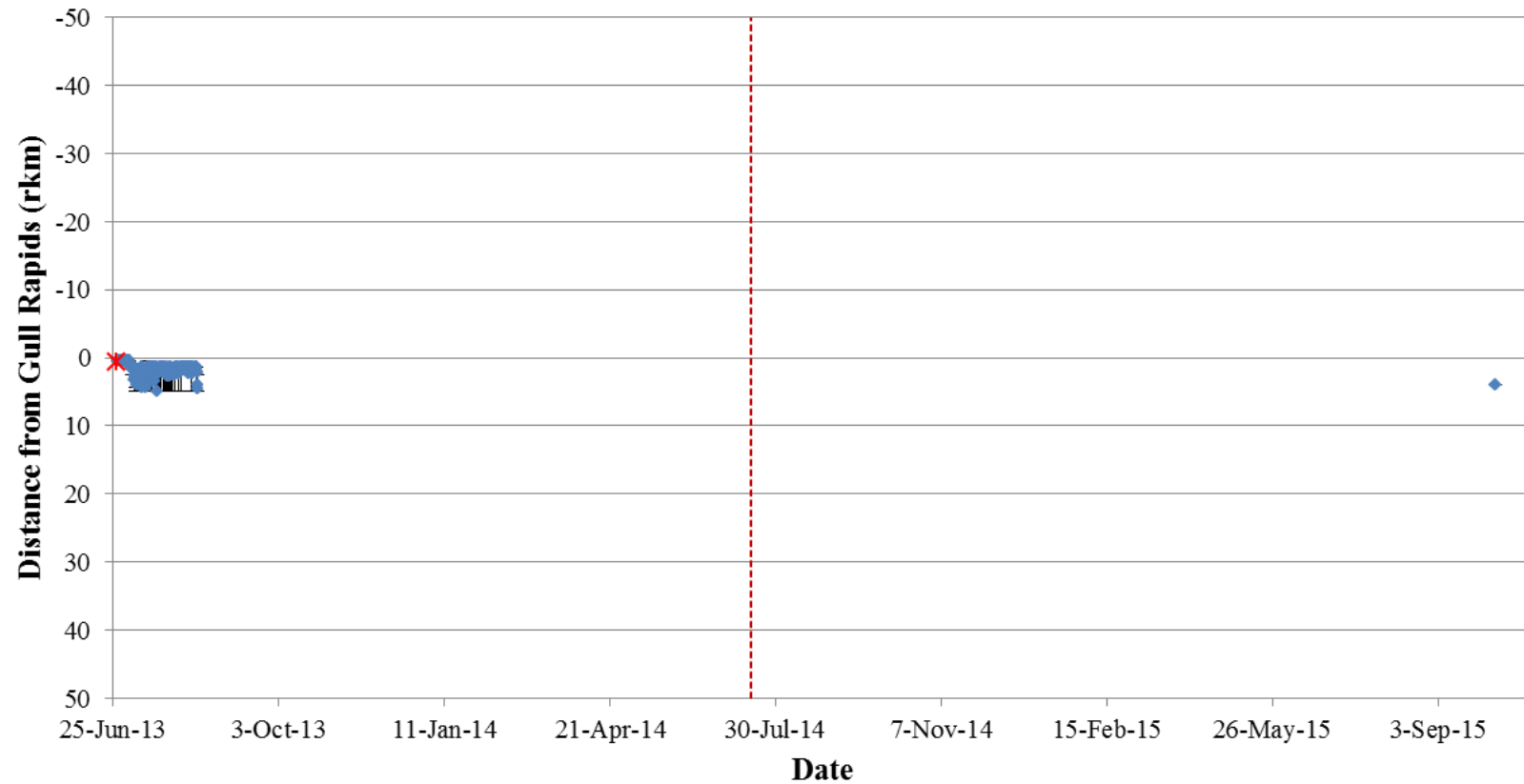


Figure A3-27: Position of a Walleye tagged with an acoustic transmitter (code #32839) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

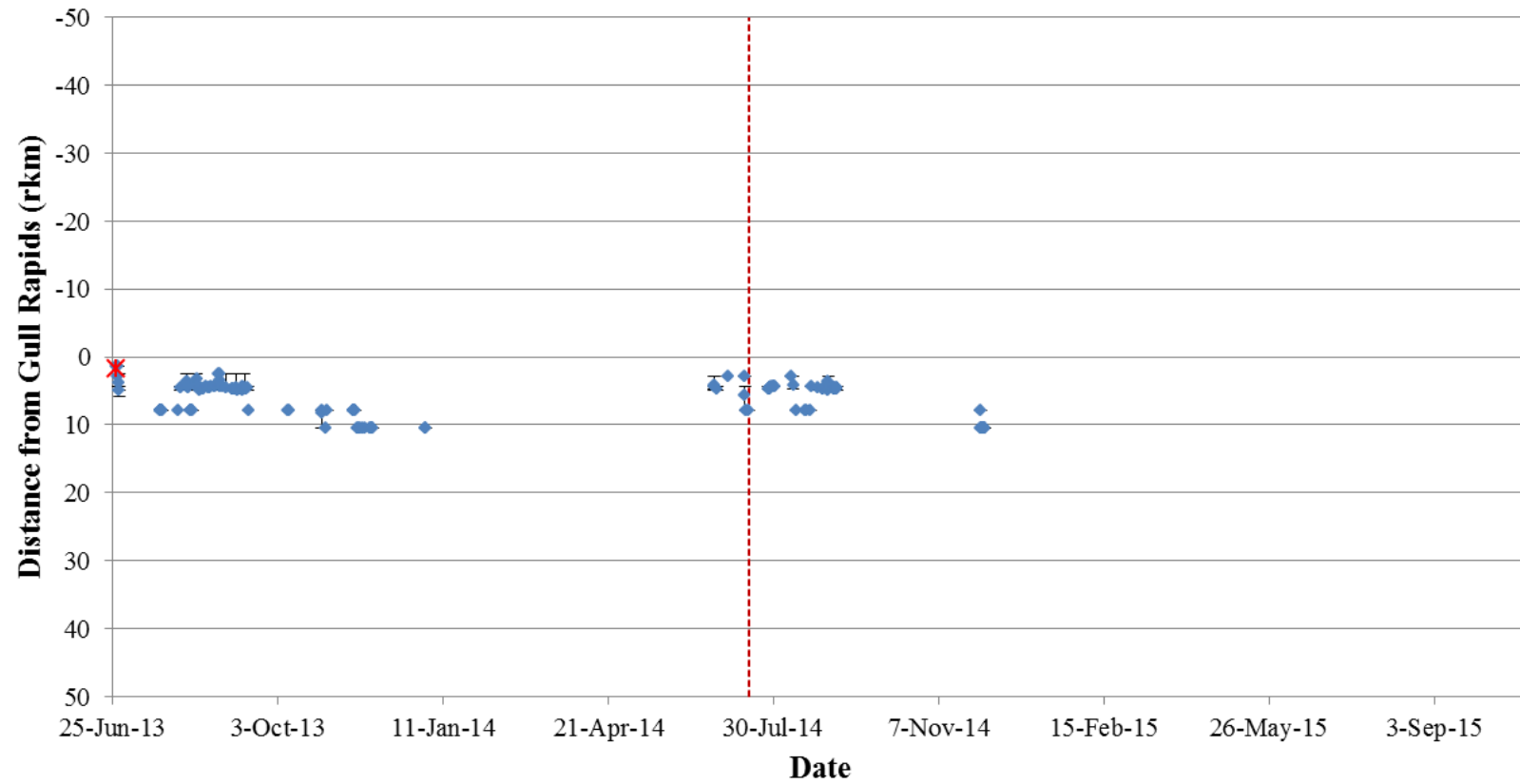


Figure A3-28: Position of a Walleye tagged with an acoustic transmitter (code #32840) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

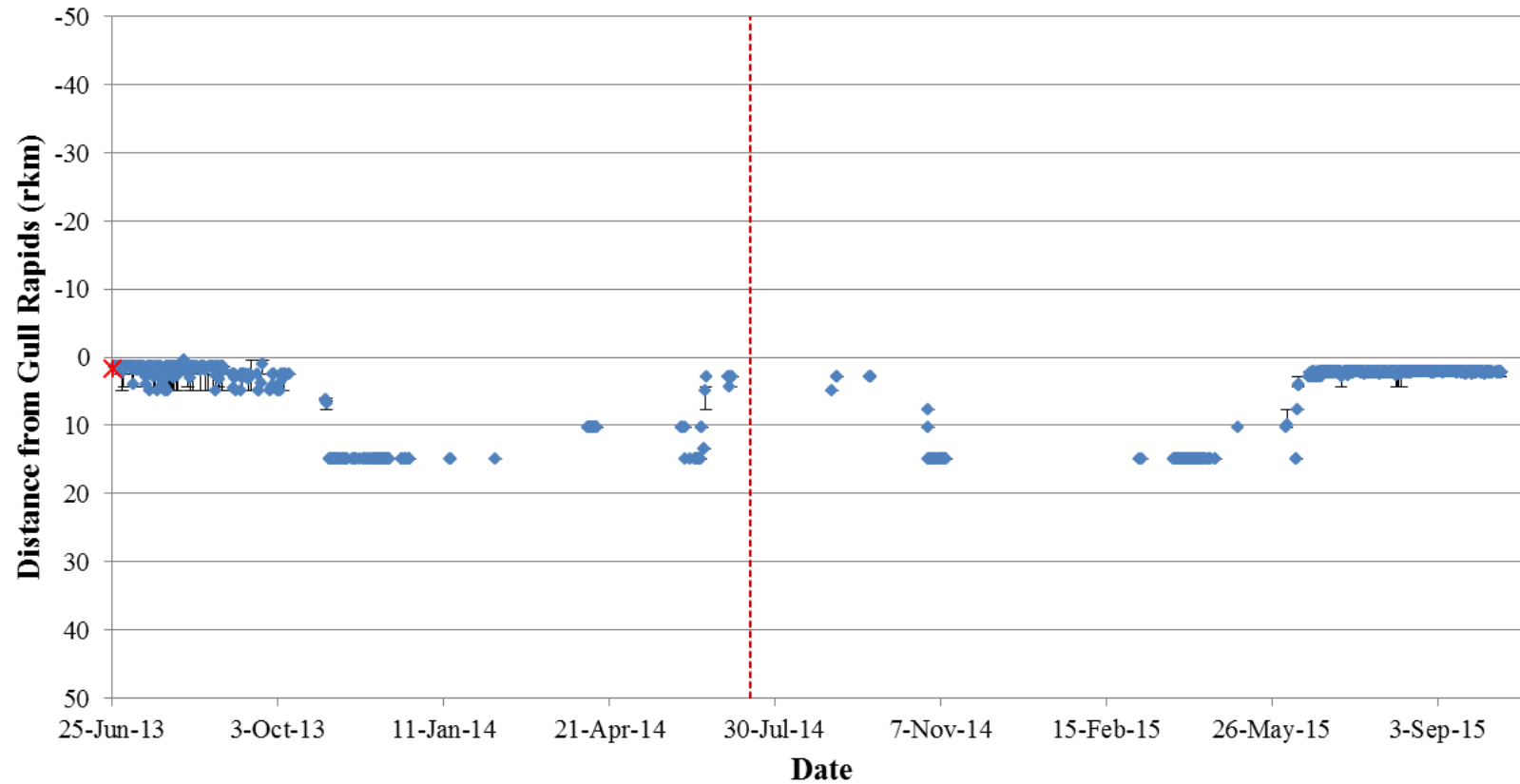


Figure A3-29: Position of a Walleye tagged with an acoustic transmitter (code #32841) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

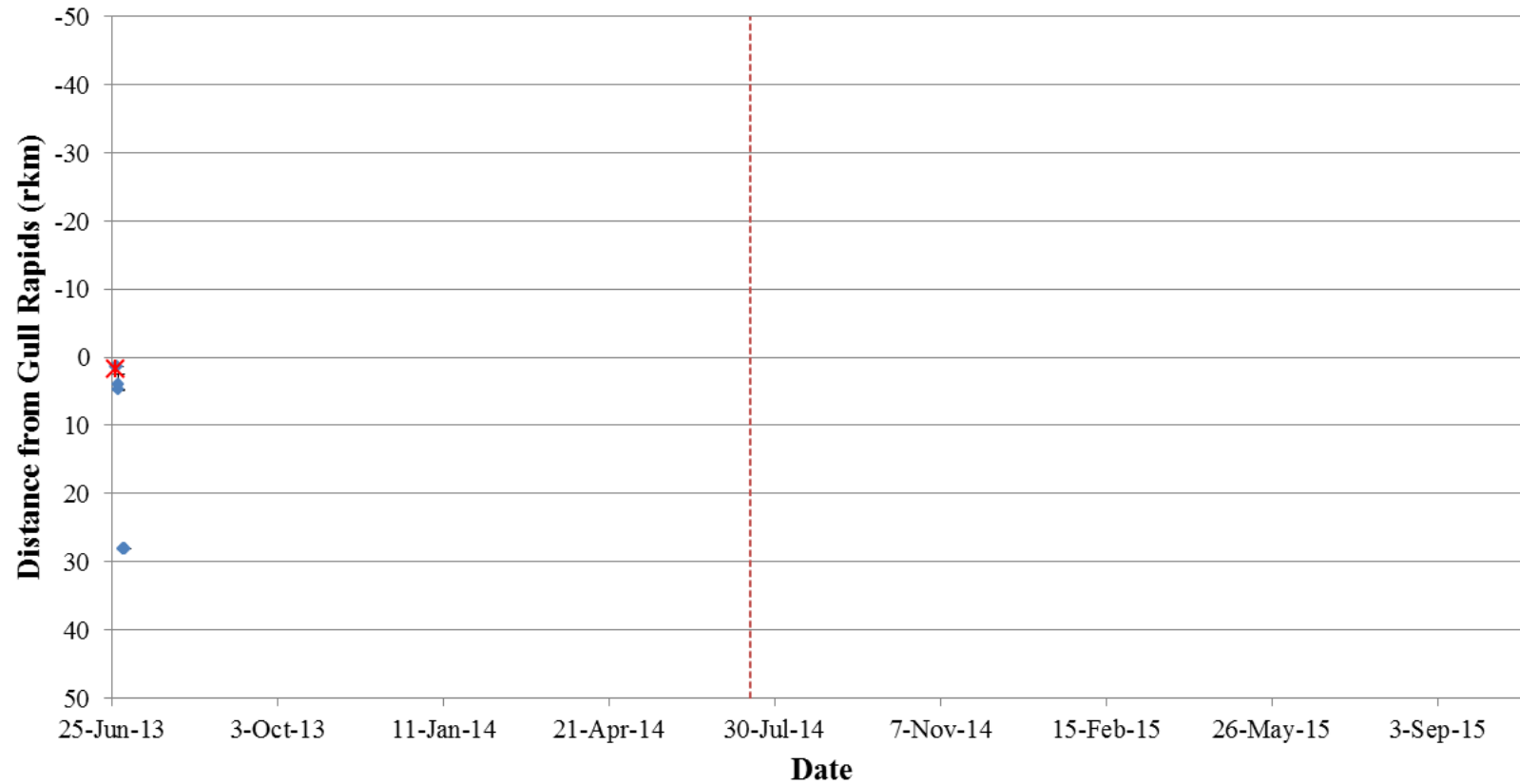


Figure A3-30: Position of a Walleye tagged with an acoustic transmitter (code #32842) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

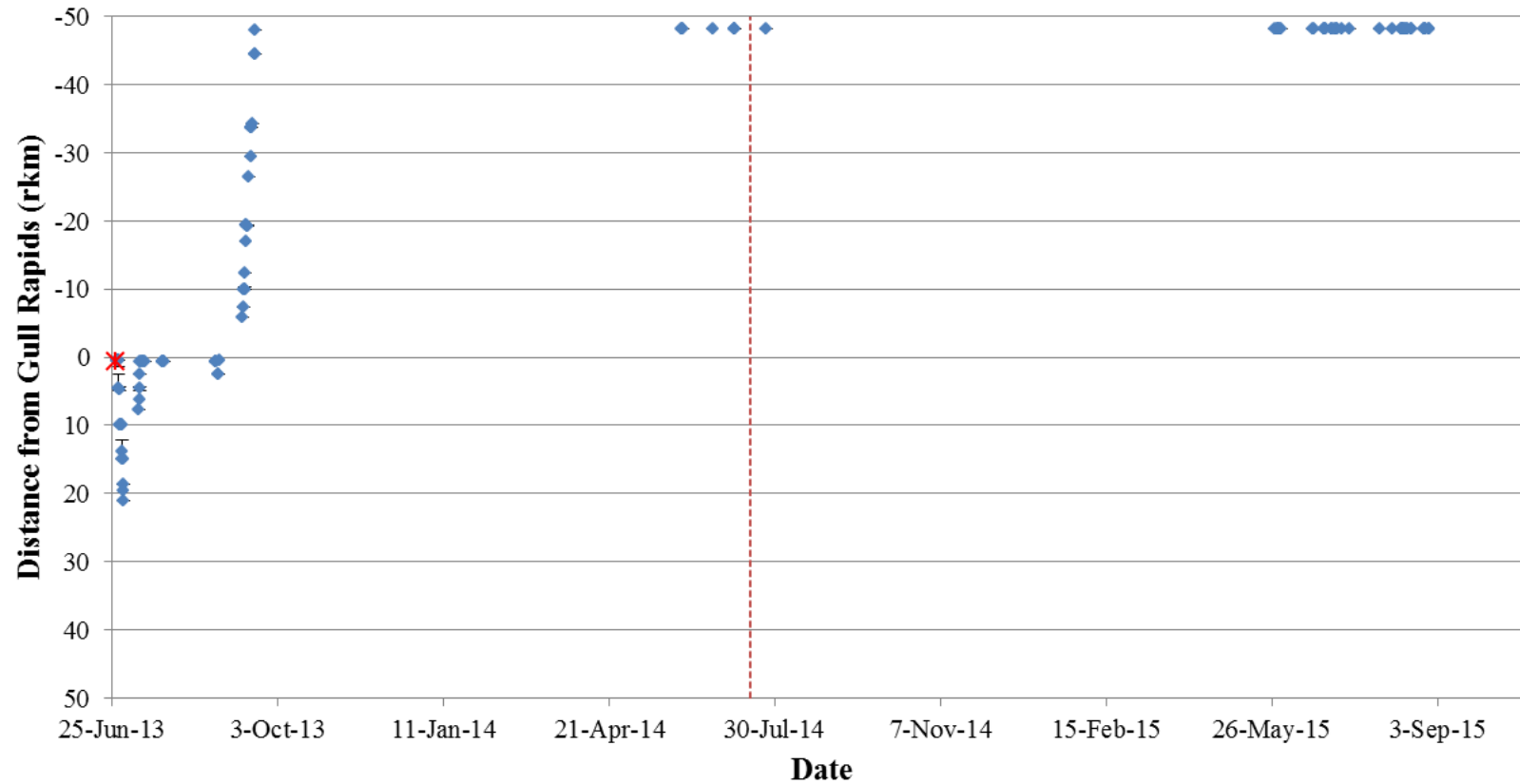


Figure A3-31: Position of a Walleye tagged with an acoustic transmitter (code #32843) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



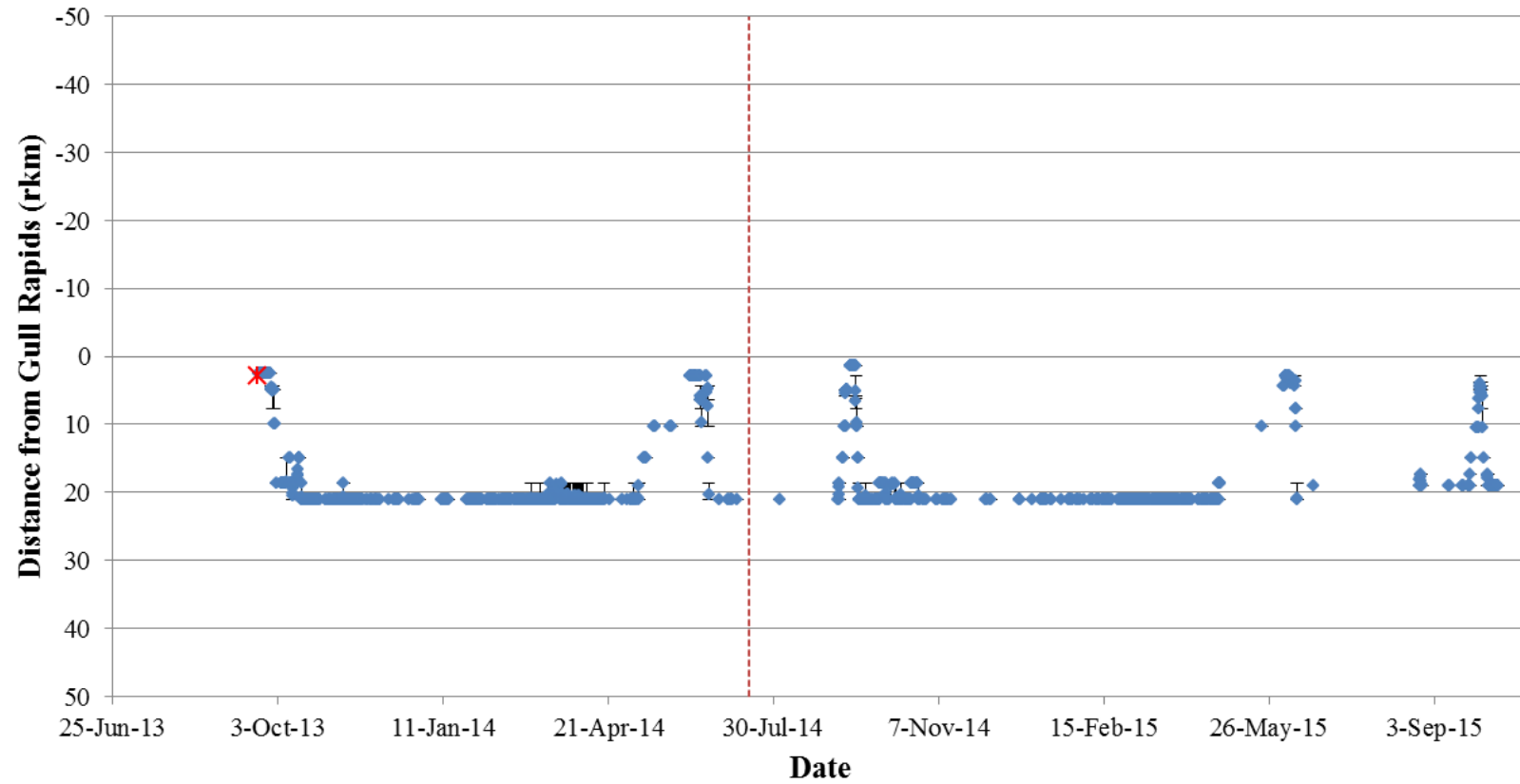


Figure A3-33: Position of a Walleye tagged with an acoustic transmitter (code #32845) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

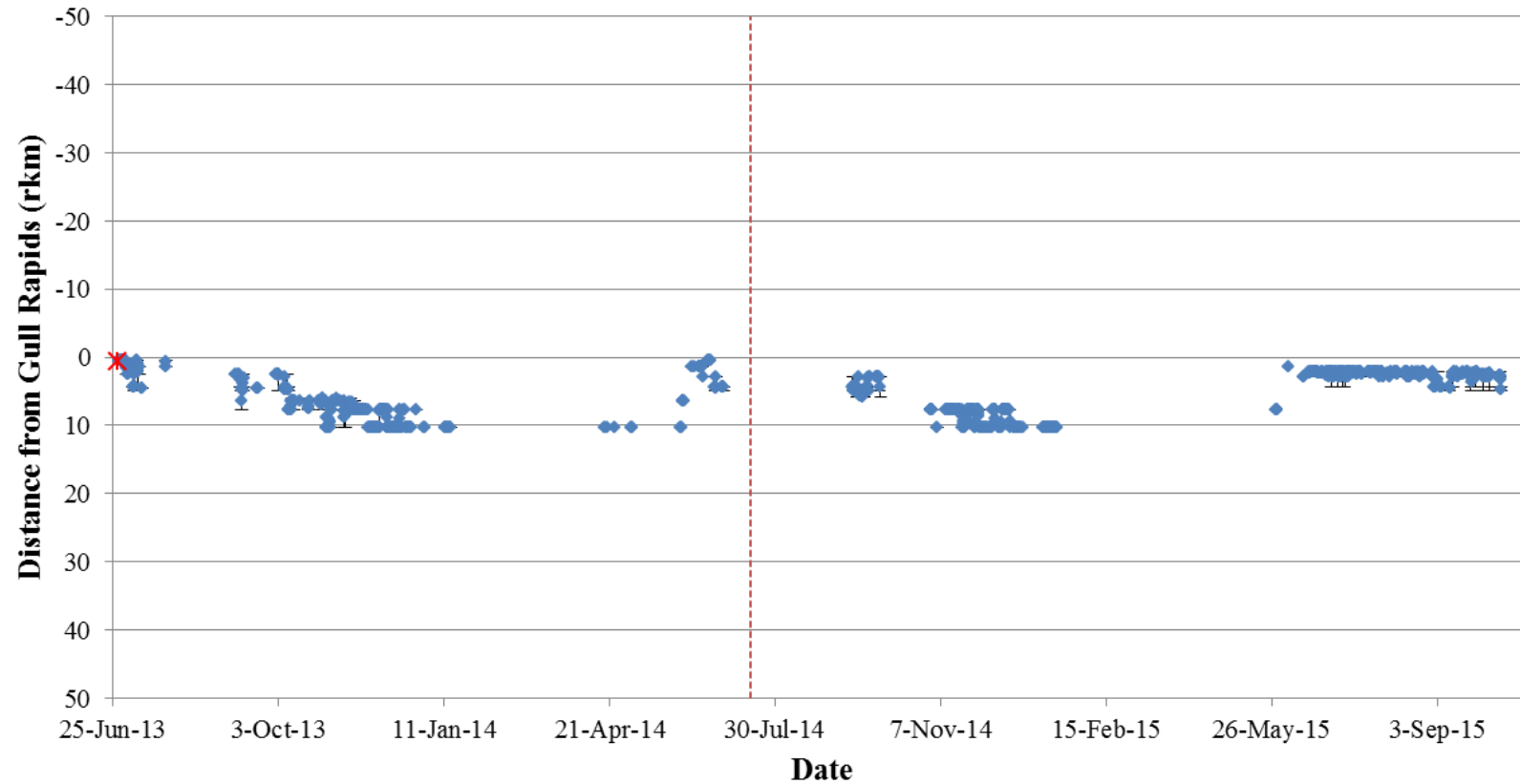
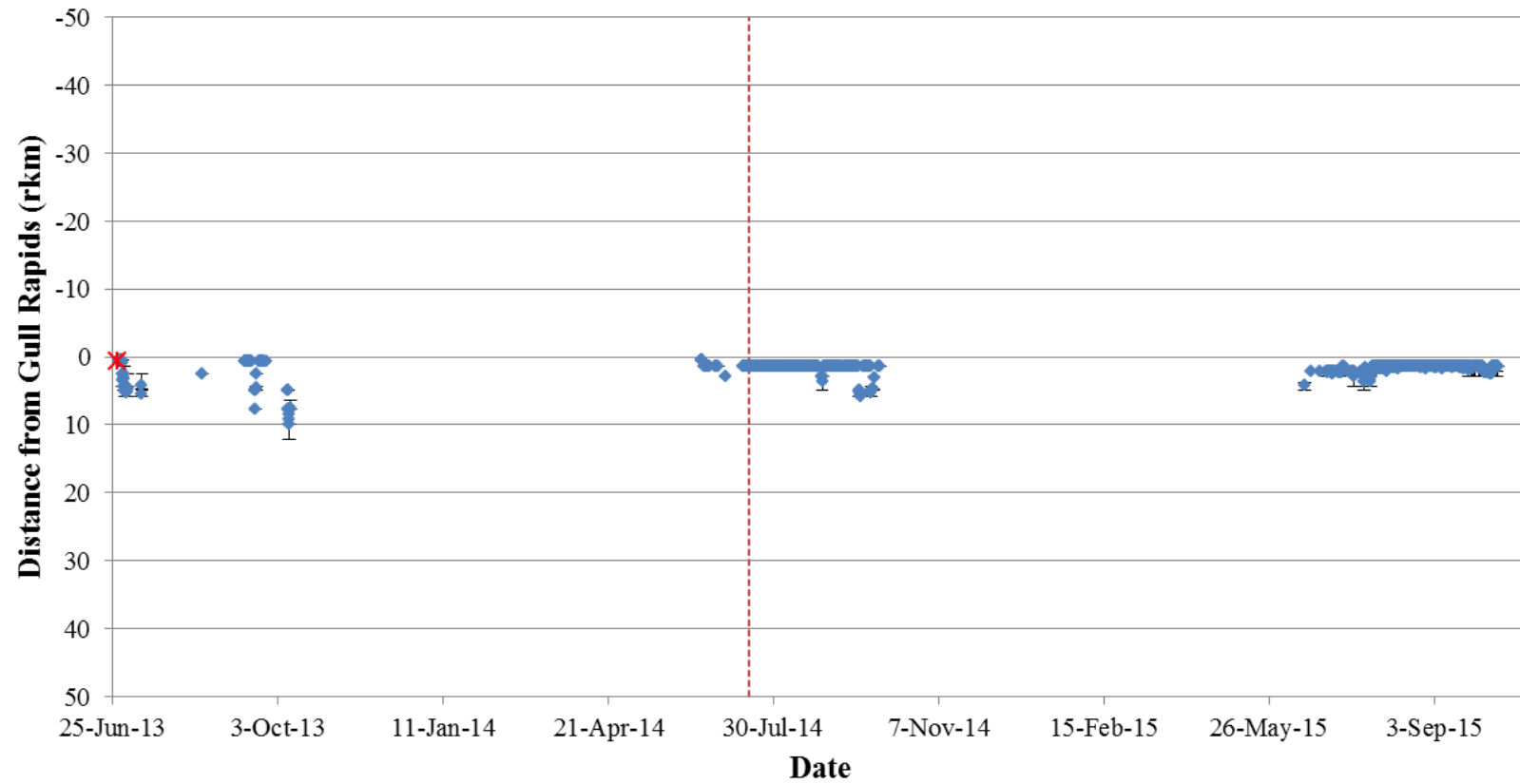


Figure A3-34: Position of a Walleye tagged with an acoustic transmitter (code #32848) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



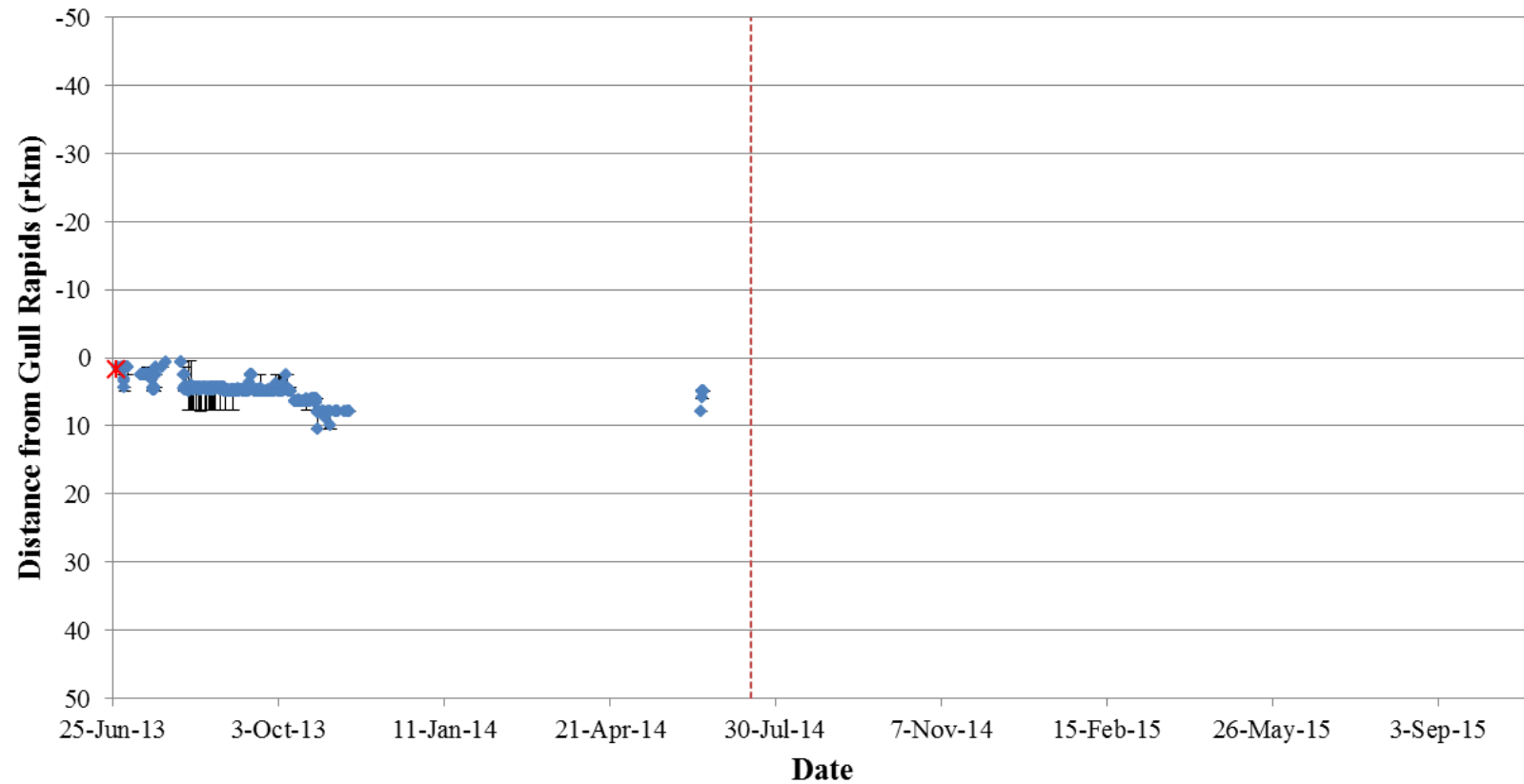


Figure A3-36: Position of a Walleye tagged with an acoustic transmitter (code #32850) in Stephens Lake (rkm >0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

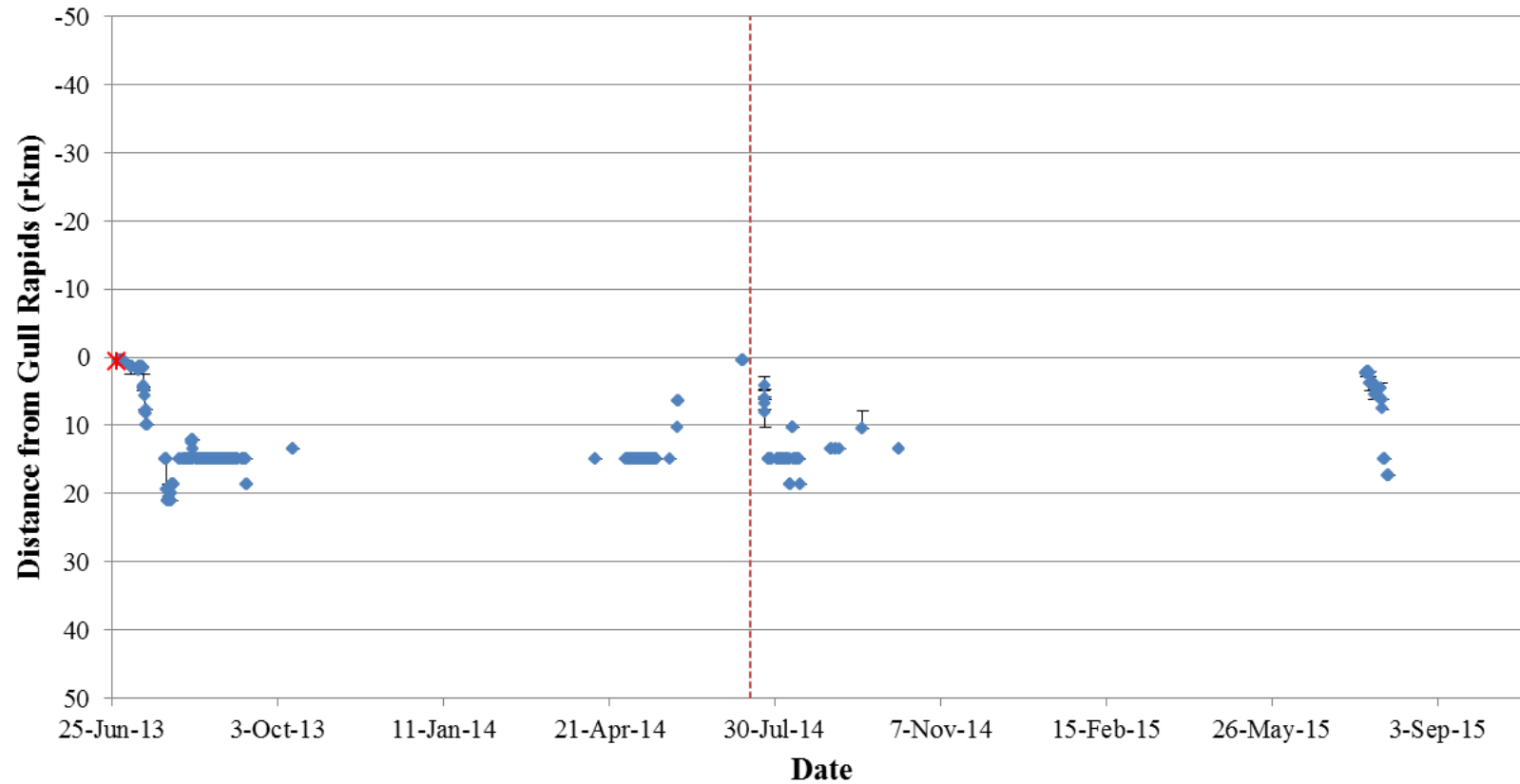


Figure A3-37: Position of a Walleye tagged with an acoustic transmitter (code #32854) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

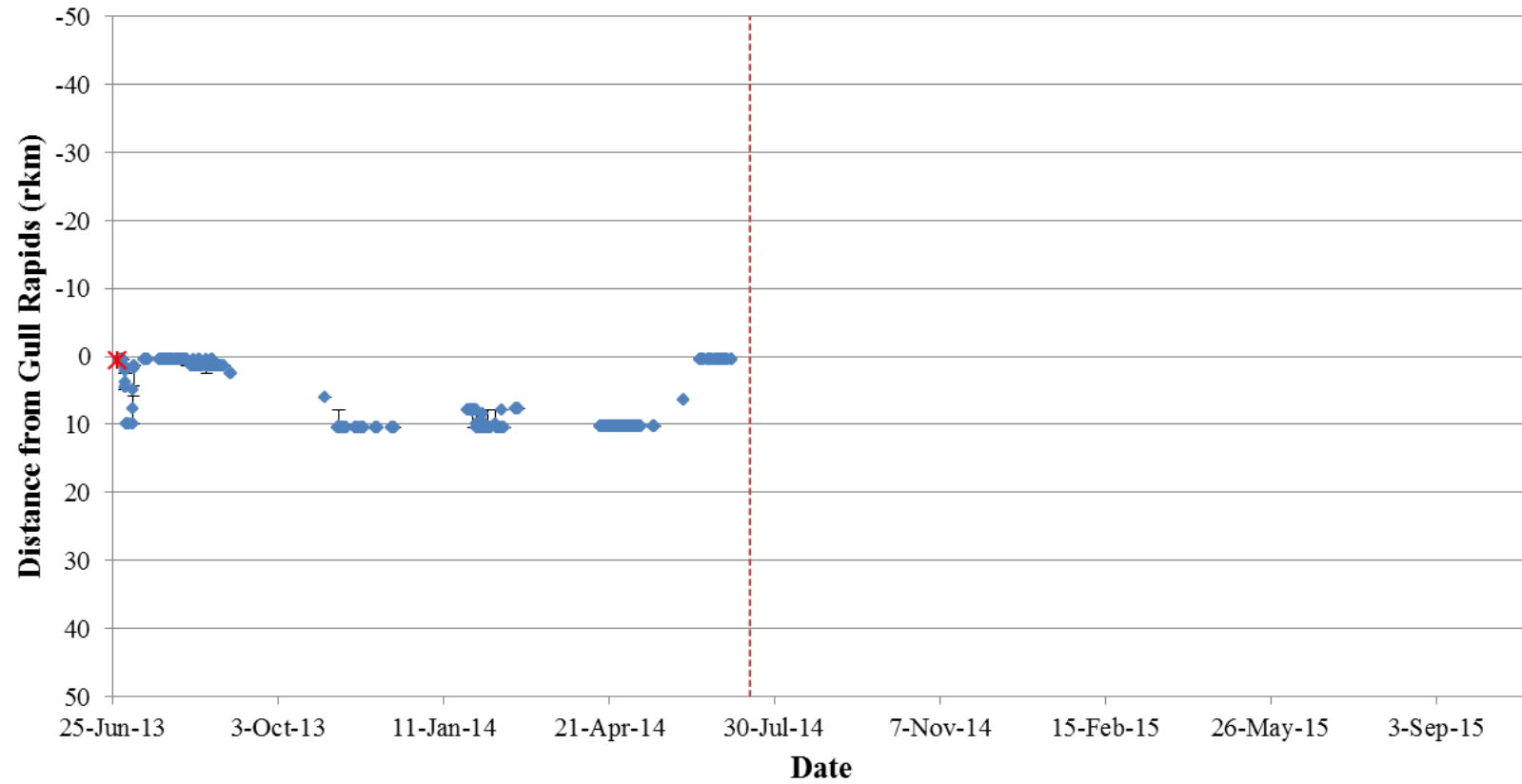


Figure A3-38: Position of a Walleye tagged with an acoustic transmitter (code #32855) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.



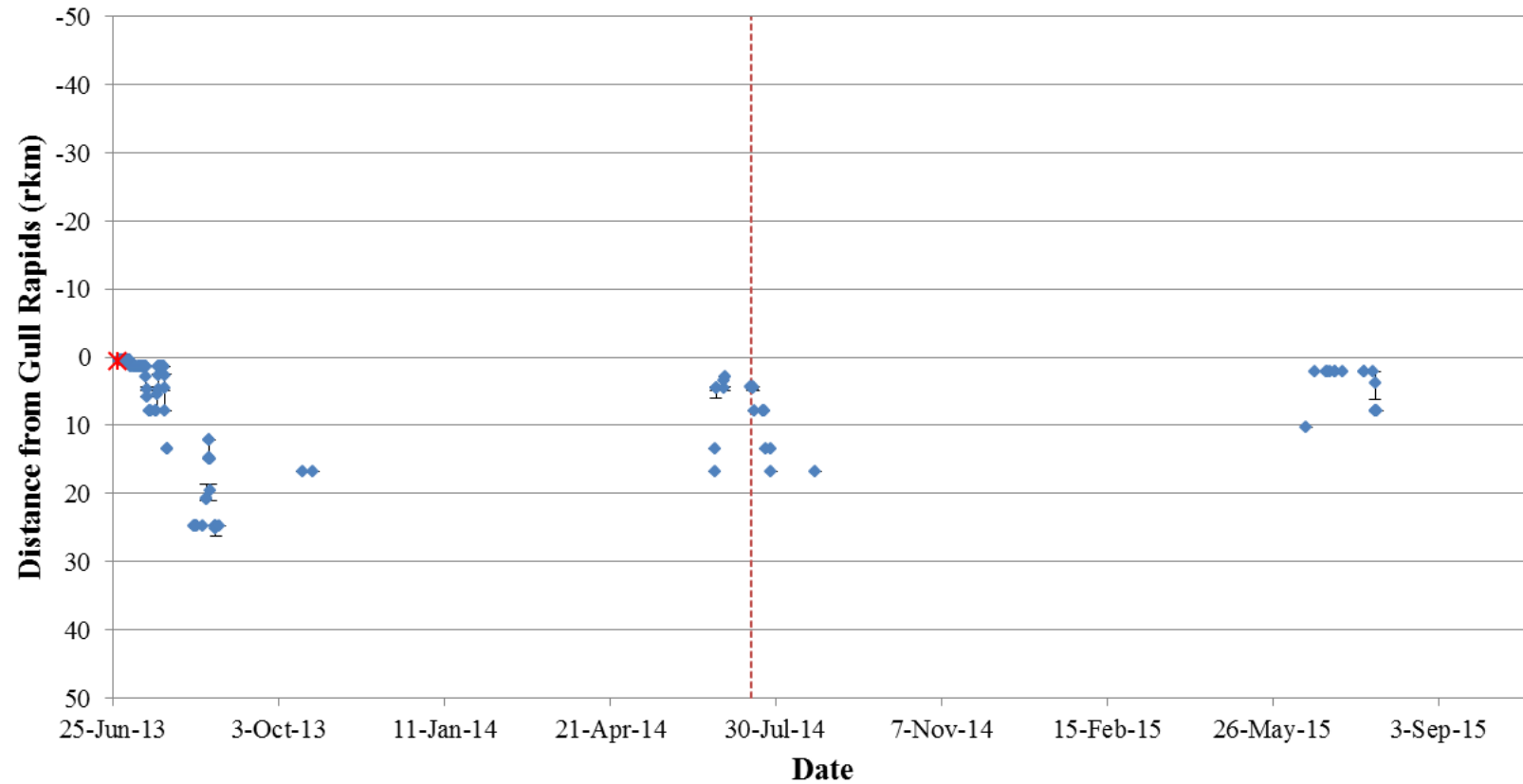


Figure A3-40: Position of a Walleye tagged with an acoustic transmitter (code #32860) in Stephens Lake (rkm > 0), from June, 2013 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

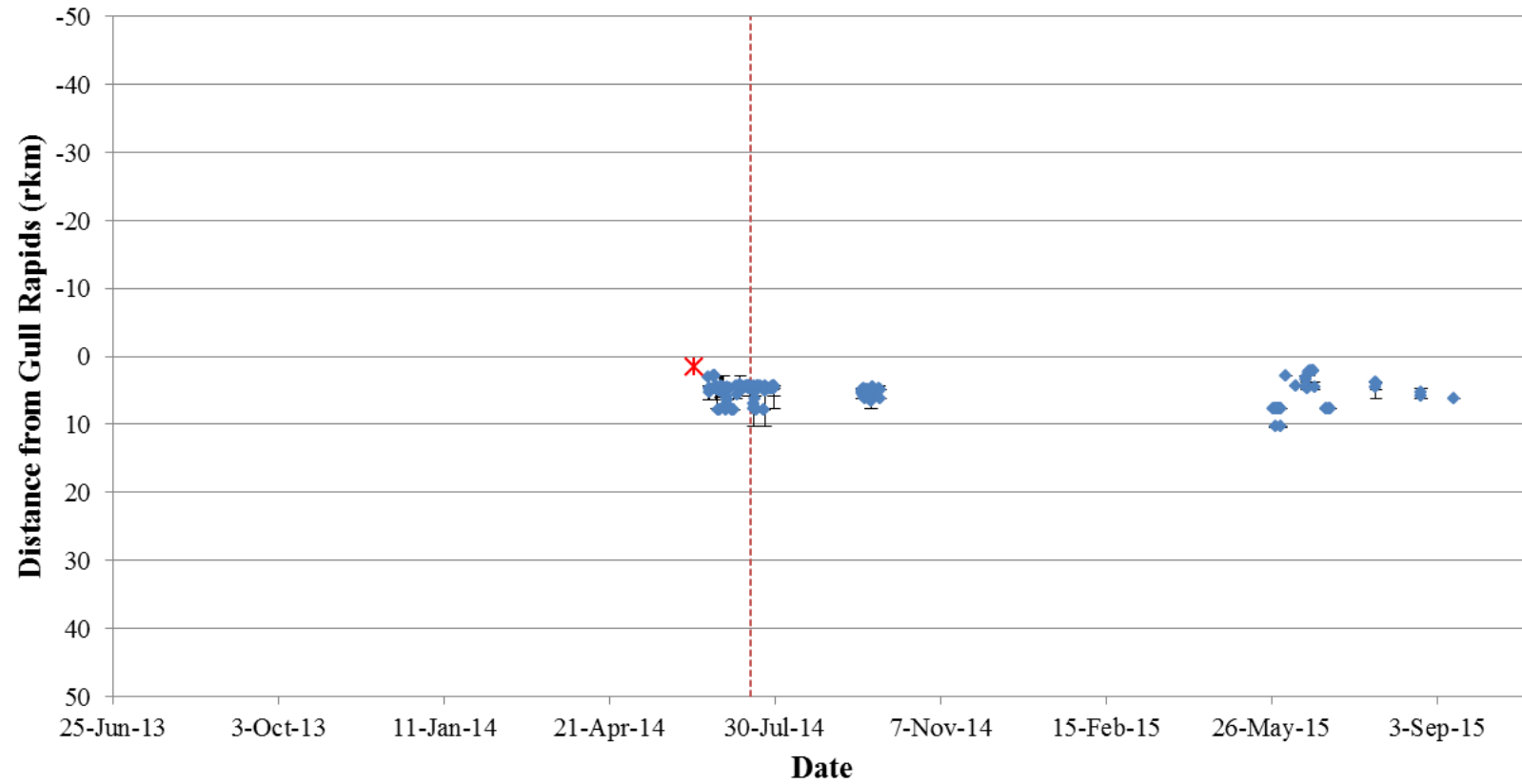


Figure A3-41: Position of a Walleye tagged with an acoustic transmitter (code #6424) in Stephens Lake (rkm >0), from June, 2014 to October, 2015. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

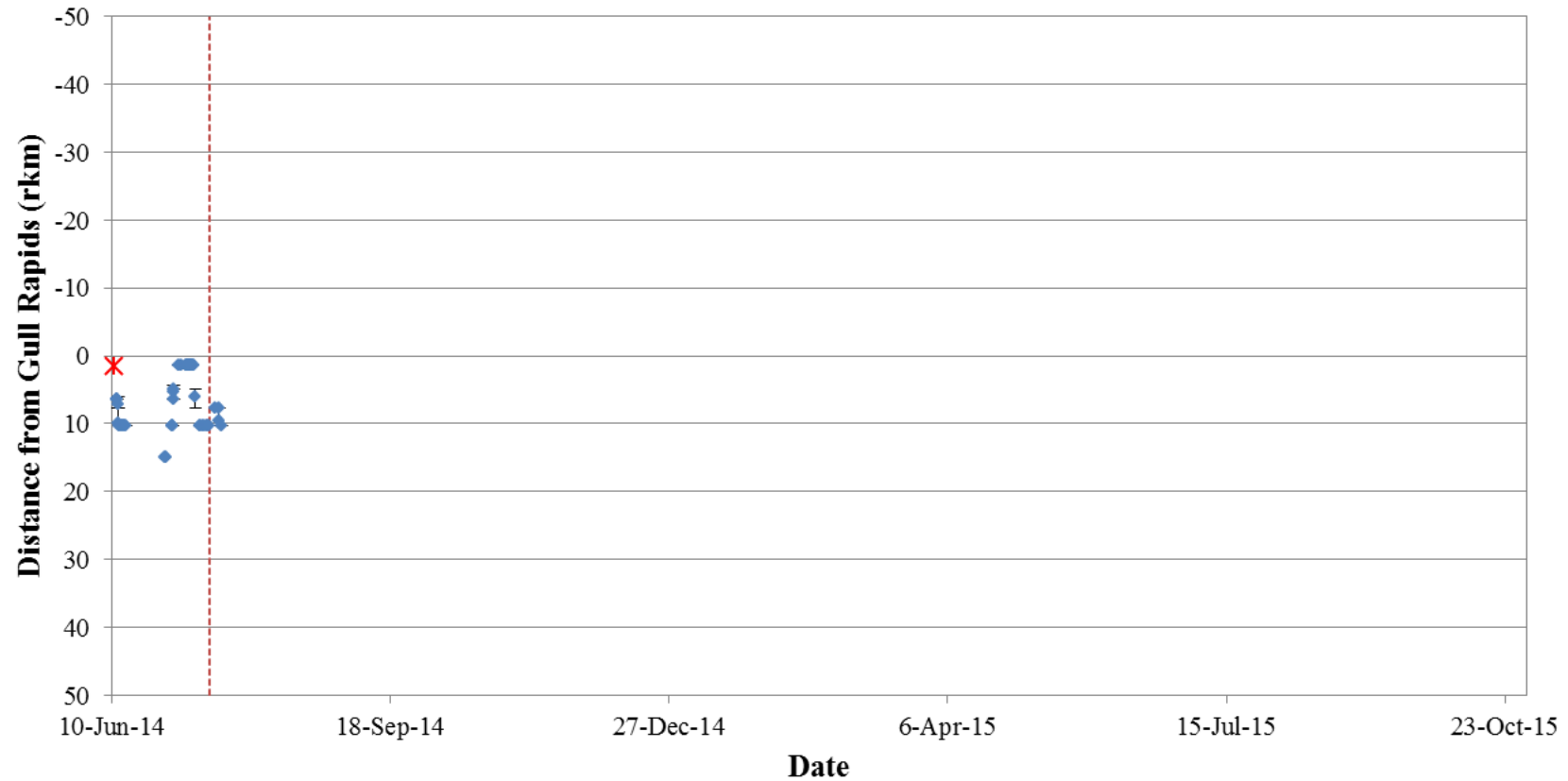


Figure A3-42: Position of a Walleye tagged with an acoustic transmitter (code #6427) Stephens Lake (rkm >0), from June, 2014 to October, 2014. Date and location of tagging is indicated by a star. Beginning of Keeyask construction is indicated with a dotted line.

APPENDIX 4: BIOLOGICAL AND TAG INFORMATION FOR WALLEYE TAGGED UPSTREAM AND DOWNSTREAM OF GULL RAPIDS

Table A4-1:	Tag and biological information for each Walleye acoustically tagged upstream of Gull Rapids in 2013 and 2014.	157
Table A4-2:	Tag and biological information for each Walleye acoustically tagged downstream of Gull Rapids in 2013 and 2014.	159

Table A4-1: Tag and biological information for each Walleye acoustically tagged upstream of Gull Rapids in 2013 and 2014.

Tag ID	Date tagged	Tag Life (days)	Expiry date	Fork Length (mm)	Weight (g)
32813	29-Jun-13	1141	13-Aug-16	410	750
32833	1-Jul-13	1141	15-Aug-16	532	2000
32846	30-Jun-13	1141	14-Aug-16	510	1600
32847	30-Jun-13	1141	14-Aug-16	412	900
32851	30-Jun-13	1141	14-Aug-16	530	1975
32852	29-Jun-13	1141	13-Aug-16	526	1675
32853	30-Jun-13	1141	14-Aug-16	375	575
32856	29-Jun-13	1141	13-Aug-16	580	2675
32857	30-Jun-13	1141	14-Aug-16	560	2225
32858	29-Jun-13	1141	13-Aug-16	495	1550
32861	1-Jul-13	1141	15-Aug-16	530	1975
32862	1-Jul-13	1141	15-Aug-16	500	1850
32863	1-Jul-13	1141	15-Aug-16	460	1200
32868	30-Aug-13	1141	14-Oct-16	396	850
32869	30-Aug-13	1141	14-Oct-16	365	600
32872	27-Aug-13	1141	11-Oct-16	566	2300
32873	30-Aug-13	1141	14-Oct-16	385	750
32874	30-Aug-13	1141	14-Oct-16	443	1000
32875	1-Jul-13	1141	15-Aug-16	412	1000
32877	27-Aug-13	1141	11-Oct-16	476	1310
32878	30-Aug-13	1141	14-Oct-16	446	1150
32879	30-Aug-13	1141	14-Oct-16	437	1070
32880	1-Jul-13	1141	15-Aug-16	600	2700
32881	30-Aug-13	1141	14-Oct-16	405	900
32882	29-Aug-13	1141	13-Oct-16	450	1000
32883	30-Aug-13	1141	14-Oct-16	535	2200
32885	30-Aug-13	1141	14-Oct-16	395	825
32886	30-Aug-13	1141	14-Oct-16	578	2425
32887	30-Aug-13	1141	14-Oct-16	451	1125
32888	30-Aug-13	1141	14-Oct-16	444	1300
32889	30-Aug-13	1141	14-Oct-16	418	940
32890	30-Aug-13	1141	14-Oct-16	390	850
6417	21-Jun-14	1141	5-Aug-17	559	2250
6418	17-Jun-14	1141	1-Aug-17	529	1950

Table A4-1: Tag and biological information for each Walleye acoustically tagged upstream of Gull Rapids in 2013 and 2014 (continued).

Tag ID	Date tagged	Tag Life (days)	Expiry date	Fork Length (mm)	Weight (g)
6419	18-Jun-14	1141	2-Aug-17	490	1550
6420	18-Jun-14	1141	2-Aug-17	467	1250
6421	18-Jun-14	1141	2-Aug-17	514	1800
6422	19-Jun-14	1141	3-Aug-17	514	1750
6423	18-Jun-14	1141	2-Aug-17	503	1800
6425	19-Jun-14	1141	3-Aug-17	364	560
6426	18-Jun-14	1141	2-Aug-17	541	1950

Table A4-2: Tag and biological information for each Walleye acoustically tagged downstream of Gull Rapids in 2013 and 2014.

Tag ID	Date tagged	Tag Life (days)	Expiry date	Fork Length (mm)	Weight (g)
32811	26-Jun-13	1141	10-Aug-16	524	1750
32812	28-Jun-13	1141	12-Aug-16	464	1250
32814	26-Jun-13	1141	10-Aug-16	470	1350
32815	26-Jun-13	1141	10-Aug-16	610	2525
32816	26-Jun-13	1141	10-Aug-16	533	1675
32817	26-Jun-13	1141	10-Aug-16	444	1150
32818	26-Jun-13	1141	10-Aug-16	591	2800
32819	26-Jun-13	1141	10-Aug-16	492	1500
32821	27-Jun-13	1141	11-Aug-16	474	1250
32822	27-Jun-13	1141	11-Aug-16	530	1750
32823	28-Jun-13	1141	12-Aug-16	438	975
32824	27-Jun-13	1141	11-Aug-16	510	1800
32825	27-Jun-13	1141	11-Aug-16	600	2800
32826	27-Jun-13	1141	11-Aug-16	480	1600
32827	27-Jun-13	1141	11-Aug-16	515	2000
32828	27-Jun-13	1141	11-Aug-16	406	900
32829	27-Jun-13	1141	11-Aug-16	395	700
32830	27-Jun-13	1141	11-Aug-16	432	950
32831	27-Jun-13	1141	11-Aug-16	441	1150
32832	27-Jun-13	1141	11-Aug-16	476	1450
32834	27-Jun-13	1141	11-Aug-16	525	1900
32835	27-Jun-13	1141	11-Aug-16	554	2000
32836	26-Jun-13	1141	10-Aug-16	463	1350
32837	27-Jun-13	1141	11-Aug-16	451	1250
32838	27-Jun-13	1141	11-Aug-16	445	1100
32839	27-Jun-13	1141	11-Aug-16	477	1350
32840	27-Jun-13	1141	11-Aug-16	480	1700
32841	26-Jun-13	1141	10-Aug-16	530	1700
32843	27-Jun-13	1141	11-Aug-16	390	800
32844	27-Jun-13	1141	11-Aug-16	492	1400
32845	21-Sep-13	1141	5-Nov-16	474	1400
32848	28-Jun-13	1141	12-Aug-16	500	1500
32849	28-Jun-13	1141	12-Aug-16	472	1525
32850	27-Jun-13	1141	11-Aug-16	460	1225

Table A4-2: Tag and biological information for each Walleye acoustically tagged downstream of Gull Rapids in 2013 and 2014 (continued).

Tag ID	Date tagged	Tag Life (days)	Expiry date	Fork Length (mm)	Weight (g)
32854	28-Jun-13	1141	12-Aug-16	475	1425
32855	28-Jun-13	1141	12-Aug-16	496	1400
32859	28-Jun-13	1141	12-Aug-16	516	1600
32860	28-Jun-13	1141	12-Aug-16	450	1175
6424	11-Jun-14	1141	26-Jul-17	443	1015
6427	11-Jun-14	1141	26-Jul-17	455	1100



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