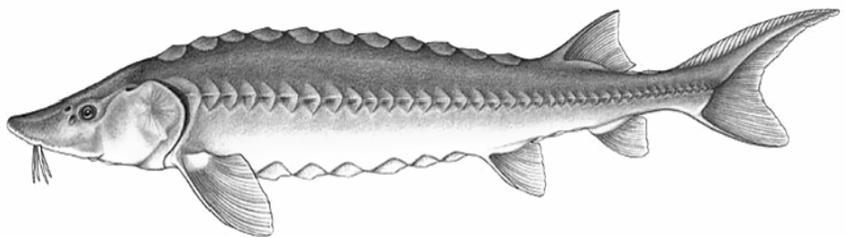


Movement and Seasonal Distribution of Lake Sturgeon in the Namakan River, Ontario

2011 Progress Report



Movement and Seasonal Distribution of Lake Sturgeon in the Namakan River, Ontario

2011 PROGRESS REPORT

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ABSTRACT

Acoustic telemetry was used to assess movement and seasonal distribution of adult lake sturgeon in the Namakan River between Namakan Lake and Lac La Croix, Ontario from May 2007 to October 2011. Three hydroelectric generating facilities have been proposed for development at Hay Rapids, High Falls, and Myrtle Falls by Ojibway Power and Energy Group (OPEG). Thirty-four sturgeon were sampled, surgically implanted with coded transmitters, and released. An array of 15 submersible, hydrophone receivers were deployed at points of rapid elevation change (falls and rapids) along the river extending from below Lady Rapids to above Snake Falls. Preliminary findings have confirmed both upstream and downstream migration of sturgeon at most locations including Lady Rapids, Hay Rapids, Back Channel around Eva Island, Quetico Rapids, Twisted Rapids and Myrtle/Ivy Falls. Only downstream migration was confirmed at High Falls, along with movement into Quetico Provincial Park at two locations, including Quetico River and Bearpelt Creek below Wolseley Rapids. A total of 397 sturgeon (605 to 1,746 mm in length) were also tagged with 23 reported recaptures. Both tagged ($n = 6$) and telemetered ($n = 22$ of 34) lake sturgeon moved into the Namakan Reservoir (a shared international water with Minnesota). Additional telemetered fish ($n = 22$ of 26) from the Reservoir also moved into the Namakan River above Lady Rapids during the 5 year study period. Potential spawning habitats exist at most natural rapids based on the presence or staging of fish during critical periods. Selection of preferred habitats was confirmed in the three lake environments and below major rapids or falls. Sturgeon avoided shallow rapids in winter with no detected movement between receiver from November to April, and over-winter habitats selected by individual fish were also documented. Fish moved through shallow rapids and falls at water flows ranging from 29 to 464 m³/sec and temperatures ranging from 5.2 to 24.9°C. Upstream movements in the Back Channel were also documented with estimated flows ranging from 5 to 31 m³/sec. Site specific movements were further evaluated in relation to season, water flow and temperature, for consideration in environmental reviews and water management planning. Preliminary results of this study provide insight into the importance of the Namakan River to the continued sustainability of this population.

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INTRODUCTION

This report represents an update to the preliminary technical report (McLeod and Debruyne, 2009) and subsequent progress reports (McLeod and Martin, 2010), (McLeod and Denyes, 2011) with data analysis completed to October 19, 2011. Several sections have not been revised to include data from Year 3-5 (2009- 2011) information specific to seasonal distribution; monthly movements; diel movements; duration, distance and speed of travel.

During this study, a similar investigation was undertaken on Namakan Reservoir in 2008 including acoustic telemetry, population assessment and determination of reproductive structure based on blood sampling of adult lake sturgeon (Shaw, 2010). Additional research explored the results of genetic sampling in comparison to documented movements of telemetered adult fish (Welsh and McLeod, 2010). An investigation of movements, habitat use and growth of juvenile lake sturgeon was also initiated in 2010 in both Namakan River and Reservoir using various sampling techniques and acoustic telemetry (Trembath, 2010).

METHODS

In addition to the changes in receiver locations and minor malfunctions noted in 2009 and 2010, there was only one issue with the receiver array in 2011. The receiver placed in Little Eva Lake was not functioning due to human disturbance from August 1 to October 20, 2011. On May 15, 2011, there was a reported subsistence harvest of Fish ID 8493 from below Snake Falls. In addition, Fish ID 8494 was documented as not having moved

from June 2008 to October 2011, and is suspected to be either a mortality or an expelled transmitter. This fish was been excluded from the dataset due to the high number of detections at Location 14 and the influence on total detections and fish movements. A number of adult transmitters have also been detected in the juvenile receiver array in Bill Lake; however these detections have not been included in data analysis for this project.

RESULTS AND DISCUSSION

Table 1 provides a revised summary of the serial number, description and location of all 15 receivers deployed in the study since May, 2007. A total of 3,574,467 detections were recorded throughout the Namakan River study area over the five year (2007-2011) sampling period (Table 2). Detections for a single receiver ranged from 0 (above Snake Falls) to 1,959,420 (Little Eva Lake above Hay Rapids). Each receiver detected a mean of 25 fish with a range of 0-45 fish.

Daily movement patterns between all 15 receiver locations were analyzed for each individual lake sturgeon implanted with a transmitter (Appendix I and II respectively). All 34 implanted sturgeon, along with an additional 22 individuals from the collaborative Namakan Reservoir study, were detected at a minimum of one receiver location in the Namakan River (Table 3). The maximum number of detections from a single fish was 419,610 (ID 4753), however this fish spent the majority of its time in Little Eva Lake since it was released on May 17, 2007. Excluding this fish, the next highest number of detections was 308,348 (ID 4596), while the minimum was 6 (ID 49645). One individual (ID 4589) was detected at 14 of the 15 stations, over a distance of 30 km. Three

individuals were detected at one station only, and the mean number of receivers at which an individual fish was detected at was 6.8. Twenty-two of the 26 fish released in the Namakan Reservoir were detected in the Namakan River study area, with 21 of these fish located upstream of Lady Rapids.

Movements of individual fish through shallow rapids and falls along the river were also evaluated based on detections from both upstream and downstream receivers (Table 4). Movements through the proposed hydro development sites at Hay Rapids, High Falls, Back Channel, and Ivy/Myrtle Falls were documented (Appendix III), as well as all other undeveloped sites along the Namakan River and Quetico River (Appendix IV). The only exceptions were that no upstream movements were recorded at Snake Falls or High Falls. The maximum number of movements ($n = 149$) was observed at Hay Rapids at the outlet of Little Eva Lake. This was followed closely by Lady Rapids ($n=147$) in the lowest reach of the Namakan River, and Twisted Rapids ($n=127$) at the outlet of Three Mile Lake, with direction of movement equally distributed between upstream and downstream over the sampling period. The most significant observations were 31 downstream movements of 24 individual fish over High Falls, an elevation drop of 6.8 m (Table 4). Seven of these downstream movements took place in 2011, while four of these movements occurred in 2010 (Year 4) under the lowest observed flow conditions. Five fish have moved twice downstream at this site and one fish (ID 49630) on three separate events.

In addition, both upstream and downstream movements of sturgeon through the Back Channel were documented since October, 2007. Thirteen additional movements occurred in 2011. Of the 44 recorded fish movements, the majority (36 or 82%) were moving upstream from Little Eva Lake to Bill Lake. Six partial or interrupted upstream movements were detected, and these have been excluded from the analysis, but remain highlighted in Appendix III. Duration of movements in the 2 km long Back Channel was also evaluated based on telemetry detections. Upstream movements (n=36) were longer in duration with a mean of 50.2 hours and ranging from 1.5 to 307.5 hours. As anticipated, downstream movements were much shorter in duration with a mean of 14.7 hours and ranging from 7.3 to 22.5 hours.

No additional movements of fish were detected in the Quetico River within Quetico Provincial Park in 2011. Movements of 9 additional fish were detected at Ivy/Myrtle Falls in 2011, with all upstream movement occurring in the side channel that exists between the falls. In May 2011, there was a confirmed presence of 9 different telemetered fish below High Falls over the period with suitable water temperatures for spawning. This was lower than the numbers of fish documented in 2010 when water levels and flows were much lower, which may have restricted all movements upstream in the Back Channel. Peak detections of only 2 fish occurred on May 2011; compared to similar aggregations of 5 to 6 telemetered fish in 2010.

The addition of two receivers adjacent Ivy and Myrtle Falls in 2009 have helped identify fish movements through these areas and the associated side channels. Initial findings

suggest that downstream movements occur predominately through both Ivy and Myrtle Falls (n = 21), however upstream migration (n = 14) of telemetered fish occurs most often on the side channel(s) where elevation and flow/velocities are lower. In 2011, there was one fish detected migrating back downstream through the side channel.

The over-winter locations of telemetered sturgeon were also evaluated after four full winters of study, based on movement data from 30 transmitter implants in Namakan River in 2007 and an additional 30 in Namakan River/Reservoir in 2008 (Table 5). Preliminary winter locations for 2011/12 were also postulated based on known and continuous fish locations as of October 19, 2011 after fall movements in the river had generally ceased. The most important winter habitat was clearly in the lakes of the Namakan Reservoir with 61% of locations. Within the Namakan River the majority (41 or 16%) of fish were detected in Little Eva Lake over the five winters. An additional 28 fish (11%) selected over-winter habitats in Three Mile Lake followed by 14 fish (5%) in Bill Lake. In total, 93% of fish spent the winter in lake (lentic) environments. The remaining over-winter locations within Namakan River included riverine habitats below Hay Rapids (n=11) and below Snake Falls (n=6). During the winters of 2008/09 to 2011/12, 17 of the 26 fish from the Namakan Reservoir study were found to over-winter in Little Eva Lake (n=13) and Three Mile Lake (n=4) suggesting high fidelity for the river system.

Mean daily water temperatures from a HOBO temperature logger were also obtained for Lady Rapids from May 10, 2007 to October 19, 2009 and October 22, 2010 to October

20, 2011 (Appendix V). Surface water temperature data from Lac La Croix was used from October 20, 2009 to October 21, 2010 due to malfunction of the data logger in Namakan River over this period. Movements through the rapids/falls occurred between temperatures of 5.2-24.7°C downstream and 6.8-25.1°C upstream (Figure 1). In general, no movement of fish through shallow rapids/falls were recorded when temperatures were lower than 5.2°C. Details of downstream and upstream fish movements in relation to daily temperature through each undeveloped rapids/falls are provided in Appendices III and IV, while site specific movements for High Falls and Back Channel are represented in Appendix VI. In general, it would appear that most fish movement in the Back Channel occurs during periods of increasing water temperature, and continue until mid-summer peaks occur.

Estimated daily outflows from Lac La Croix for 2007-2011 were provided by Environment Canada and the Lake of the Woods Control Board (LWCB, 2011), and were used to represent the flow conditions in the Namakan River (Appendix VII).

Downstream and upstream movements of lake sturgeon were related to daily mean water flows at each of the undeveloped rapids/falls along the river (Table 6). Details of downstream and upstream fish movements in relation to daily flow through each undeveloped rapids/falls are provided in Appendices III and IV, while site specific movements for High Falls and Back Channel are represented in Appendix VIII.

There were no documented movements of fish at Snake Falls, and water flow information was not available for Quetico River and Bearpelt Creek within QPP. Water flows from

the river could not be used for the Back Channel where only a portion of the natural flow occurs around Eva Island and High Falls. Simulated Back Channel flows for the study period were provided by OPEG based on the flow distributions outlined in Technical Note #2, Revision 3.0 (Genivar, 2009).

Ivy/Myrtle Falls had the highest mean flow for both downstream and upstream movements at 300 m³/sec and 396 m³/sec respectively. Other than the Back Channel, Lady Rapids had the lowest mean flow for upstream movements at 171 m³/sec, whereas mean flow for downstream movement was lowest in the side channel between Ivy/Myrtle Falls, although this was only one fish movement. The minimum river flow used by sturgeon at any of the shallow rapid/falls was 29 m³/sec at Quetico Rapids. Field observations suggest that this location had the lowest elevation change at approximately 0.7 m. Adult lake sturgeon were also able to move upstream at river flows as high as 464 m³/sec at both Quetico Rapids and Ivy/Myrtle Falls.

Movement of telemetered fish in the Back Channel around Eva Island and High Falls has occurred in all years of the study from late fall 2007 to mid-summer 2011, when flow conditions are suitable. Ten additional upstream movements of adult fish occurred in 2011, after a peak in flow conditions in May (Appendix VIII). This coincided with 3 partial upstream movements in May, and three additional downstream movements occurring in May and July. Mean flows during upstream (n=36) and downstream (n=8) movements were both estimated at 18 m³/sec, with flows ranging from 5 to 31 m³/sec. The lowest flow reflects a new minimum value for upstream fish passage through the

entire back channel. There have also been six partial or incomplete upstream movements documented since 2007.

Movements through other undeveloped rapids/falls also occurred during periods of increasing and decreasing outflow from May through November each year (Figure 2). The majority of fish movements in 2008, 2009 and 2011 occurred in both directions during a lengthy period of decreasing outflow from June 1 to September 30. In contrast, little or no movement was documented during the period of increasing spring flows in these three years. Movements in 2007 were more limited with unusually low spring flows, followed by a small rise in mid-summer flows. Some movement of fish occurred during a significant increase in flows in late fall. Low flow conditions existed throughout 2010 and fish movements were generally limited to the lower reaches of river, except during a short mid-summer peak in flows from 50 to 164 m³/sec. Details of downstream and upstream movements through High Falls and the Back Channel in relation to outflow are provided in Appendix VIII.

ADDITIONAL REFERENCES

- Genivar, 2009. High Falls and Hay Rapids: Water levels and flow measurements. Technical Note #2, Revision 3.0. December 17, 2009. 5 p.
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- Shaw, S.L. 2010. Lake sturgeon (*Acipenser fulvescens*) population attributes, reproductive structure and distribution in Namakan Reservoir, Minnesota and Ontario. MSc Thesis. South Dakota State University. 77 p + appendices.
- Trembath, C. 2010. A comparison of juvenile lake sturgeon in the Namakan River and Namakan Reservoir: Habitat use and growth rates. A graduate thesis proposal. Lakehead University. 19 p.
- Welsh, A.B. and D.T. McLeod. 2010. Detection of natural barriers to movement of lake sturgeon (*Acipenser fulvescens*) with the Namakan River, Ontario. Can. J. Zool. 88:390-397.

Table 1: Serial number, description and location of VR2W submersible acoustic receivers in the Namakan River, Ontario from 2007 to 2011.

| Receiver Serial No. | UTM Location | Date of Deployment | Time of Deployment | Location Description |
|---------------------|-------------------|--------------------|--------------------|--|
| 100847 | 547347 5365369 | 15-May-07 | 17:57 | Namakan River - below Hay Rapids |
| 100846 ⁶ | 548468 5366363 | 17-May-07 | 17:50 | Little Eva Lake – above Hay Rapids |
| 100855 | 549195 5365895 | 17-May-07 | 11:22 | Namakan River – back channel above first rapids |
| 100853 | 550641 5366874 | 18-May-07 | 13:50 | Little Eva Lake – below High Falls |
| 100849 | 555250 5369250 | 22-May-07 | 16:00 | Quetico River – above first rapids (QPP) |
| 100848 | 553224 5367427 | 22-May-07 | 16:25 | Namakan River – above Quetico (Bill) Rapids |
| 100851 | 544310 5366389 | 22-May-07 | 18:40 | Namakan River – below Lady Rapids (VNP) |
| 100852 | 550984 5365634 | 23-May-07 | 17:25 | Bill Lake – above back channel |
| 100850 | 560161 5363439 | 24-May-07 | 16:45 | Three Mile Lake – below Ivy and Myrtle Falls channel |
| 100689 | 558319 5367294 | 24-May-07 | 19:07 | Three Mile Lake – above Twisted Rapids |
| 100854 | 560235 5364154 | 25-May-07 | 10:18 | Three mile Lake – mouth of Bearpelt Creek (QPP) |
| 100851 ¹ | 540596 5366483 | 28-May-07 | 15:00 | Namakan River – mouth of Namakan Lake |
| 100849 ² | 555305 5369225 | 18-Sept-07 | 11:40 | Quetico River – below second rapids |
| 100854 ³ | 562169 5364364 | 12-Oct-07 | 10:48 | Bearpelt Creek - below Wolseley Lake (QPP) |
| 101942 | 561210 5360316 | 30-April-08 | 11:20 | Namakan River – below Snake Falls |
| 103459 | 561160 5358657 | 22-May-08 | 15:15 | Namakan River – above Snake Falls (OPEG) |
| 100689 ⁴ | 558003 5367479 | 18-Sept-07 | 14:09 | Namakan River - below Twisted Rapids |
| 104898 | 562350 5361290 | 14-May-09 | 13:14 | Namakan River- Above Ivy Falls |
| 104900 ⁵ | 544310 5366389 | 28-May-09 | 14:40 | Namakan River – below Lady Rapids |
| 104901 | 559827 5362906 | 20-May-09 | 10:12 | Namakan River- below Myrtle Falls |

¹ moved due to disturbance by anglers, and more suitable, long-term location.

² moved further upstream to deeper water below second rapids to avoid potential freeze-in during winter months.

³ moved to planned location within QPP. Low water prevented boat access to Bearpelt Creek prior to Oct/07. Receiver removed Aug. 20, 2010.

⁴ moved to below Twisted Rapids to better evaluate habitat use below the rapids, while still documenting fish passage

⁵ replaced 100851 at the mouth of Namakan Lake due to theft or human disturbance.

⁶ receiver not functioning due to human disturbance from Aug. 1 to Oct. 20, 2011

Table 2: Lake sturgeon detections by receiver location in the Namakan River, Ontario from May, 2007 to October, 2011.

| Location No. | Location Description | Distance Upstream (km) | Receiver Serial No. | No. Detections | No. Transmitters Detected |
|---------------------|-----------------------------|-------------------------------|----------------------------|-----------------------|----------------------------------|
| 1 | Below Lady Rapids | 0 | 100851/104900 | 437,190 | 43 |
| 2 | Below Hay Rapids | 7.4 | 100847 | 214,203 | 45 |
| 3 | Little Eva Lake | 9.1 | 100846 | 1,959,420 | 44 |
| 4 | Below High Falls | 11.7 | 100853 | 113,445 | 44 |
| 5 | Lower Back Channel | 10.2 | 100855 | 4,153 | 27 |
| 6 | Bill Lake | 12.6 | 100852 | 392,392 | 29 |
| 7 | Above Quetico Rapids | 14.7 | 100848 | 9,137 | 29 |
| 8 | Quetico River | 17.5 | 100849 | 2,332 | 5 |
| 9 | Below Twisted Rapids | 20.0 | 100689 | 49,048 | 29 |
| 10 | Bearpelt Creek ¹ | 27.4 | 100854 | 7,117 | 11 |
| 11 | Three Mile Lake | 24.7 | 100850 | 187,815 | 30 |
| 12 | Below Myrtle Falls | 25.5 | 104901 | 29,981 | 23 |
| 13 | Above Ivy Falls | 27.3 | 104898 | 28,906 | 6 |
| 14 | Below Snake Falls | 28.8 | 101942 | 139,328 | 12 |
| 15 | Above Snake Falls | 30.5 | 103459 | 0 | 0 |
| Total | - | - | - | 3,574,467 | |
| Mean | - | - | - | 238,298 | 25 |

¹ only 2 fish detected at revised location after October 12, 2007. Receiver removed Aug. 20, 2010.

Table 3: Individual lake sturgeon detections and last known date/location by transmitter code in the Namakan River, Ontario from May, 2007 to October, 2011. Shaded gray rows represent transmitters detected from adult lake sturgeon from the Namakan Reservoir study.

| Transmitter ID Code | Release Date | Release Location | Last Detection Date | Last Known Location | No. Detections | No. Receivers |
|---------------------|--------------|------------------------|---------------------|----------------------|----------------|---------------|
| 4739 | 15-May-07 | Below Hay Rapids | 15-Oct-11 | Namakan Lake | 222,080 | 4 |
| 4740 | 15-May-07 | Below Hay Rapids | 19-Jun-09 | Namakan Lake | 50,411 | 12 |
| 4741 | 15-May-07 | Below Hay Rapids | 06-Apr-11 | Namakan Lake | 147,945 | 10 |
| 4742 | 15-May-07 | Below Hay Rapids | 18-Oct-11 | Namakan Lake | 100,211 | 4 |
| 4743 | 15-May-07 | Below Hay Rapids | 09-Oct-11 | Below High Falls | 23,834 | 4 |
| 4744 | 16-May-07 | Below Hay Rapids | 11-Aug-11 | Below Hay Rapids | 91,794 | 4 |
| 4745 | 16-May-07 | Below Hay Rapids | 12-Sep-11 | Namakan Lake | 61,318 | 4 |
| 4746 | 16-May-07 | Below Hay Rapids | 20-Oct-11 | Below Hay Rapids | 205,953 | 9 |
| 4747 | 16-May-07 | Below Hay Rapids | 18-May-07 | Below Hay Rapids | 453 | 1 |
| 4748 | 16-May-07 | Below Hay Rapids | 10-Aug-09 | Namakan Lake | 56,772 | 2 |
| 4749 | 17-May-07 | Little Eva Lake | 25-May-11 | Namakan Lake | 27,075 | 10 |
| 4750 | 17-May-07 | Little Eva Lake | 06-Jun-09 | Namakan Lake | 11,985 | 4 |
| 4751 | 17-May-07 | Little Eva Lake | 03-Jun-11 | Namakan Lake | 152,645 | 4 |
| 4752 | 17-May-07 | Little Eva Lake | 28-Aug-11 | Below High Falls | 169,645 | 4 |
| 4753 | 17-May-07 | Little Eva Lake | 31-Jul-11 | Above Hay Rapids | 419,610 | 3 |
| 4588 | 18-May-07 | Little Eva Lake | 07-Jun-09 | Namakan Lake | 59,245 | 4 |
| 4589 | 18-May-07 | Little Eva Lake | 06-Jul-09 | Namakan Lake | 5,827 | 14 |
| 4590 | 18-May-07 | Little Eva Lake | 20-May-10 | Namakan Lake | 6,488 | 4 |
| 4591 | 18-May-07 | Little Eva Lake | 26-Jul-11 | Namakan Lake | 64,088 | 4 |
| 4592 | 18-May-07 | Little Eva Lake | 12-Oct-11 | Below Hay Rapids | 241,911 | 13 |
| 4593 | 23-May-07 | Bill Lake | 14-Oct-11 | Below Twisted Rapids | 25,625 | 11 |
| 4594 | 23-May-07 | Bill Lake | 31-Aug-11 | Namakan Lake | 41,497 | 11 |
| 4595 | 23-May-07 | Bill Lake | 31-May-09 | Namakan Lake | 12,445 | 10 |
| 4596 | 23-May-07 | Bill Lake | 19-Oct-11 | Bill Lake | 308,348 | 2 |
| 4597 | 23-May-07 | Bill Lake | 01-Oct-11 | Bill Lake | 4,992 | 5 |
| 4598 | 24-May-07 | Three Mile Lake | 19-Oct-11 | Three Mile Lake | 67,678 | 4 |
| 4599 | 24-May-07 | Three Mile Lake | 20-Jun-09 | Above Ivy Falls | 20,067 | 6 |
| 4600 | 25-May-07 | Three Mile Lake | 14-Apr-10 | Bill Lake | 59,415 | 6 |
| 4601 | 25-May-07 | Three Mile Lake | 29-Sep-11 | Three Mile Lake | 74,908 | 11 |
| 4602 | 25-May-07 | Three Mile Lake | 20-Sep-11 | Namakan Lake | 26,068 | 11 |
| 8491 | 30-Apr-08 | Below Snake Falls | 19-Oct-11 | Three Mile Lake | 48,191 | 4 |
| 8492 | 30-Apr-08 | Below Snake Falls | 27-Oct-11 | Below Snake Falls | 160,280 | 10 |
| 8493 ¹ | 02-May-08 | Below Snake Falls | 01-Feb-11 | Below Snake Falls | 71,720 | 9 |
| 8494 ² | 02-May-08 | Below Snake Falls | 27-Oct-11 | Below Snake Falls | - | - |
| 8495 | 14-May-08 | Sand Point Lake | 17-Jun-09 | Namakan Lake | 1,065 | 3 |
| 49630 | 20-May-08 | Namakan Lake | 22-May-11 | Namakan Lake | 66,152 | 10 |
| 49631 | 16-May-08 | Little Vermillion Lake | 26-May-10 | Namakan Lake | 34,086 | 4 |
| 49632 | 15-May-08 | Sand Point Lake | 10-Oct-11 | Namakan Lake | 11,546 | 9 |
| 49633 | 21-May-08 | Namakan Lake | 13-Sep-11 | Namakan Lake | 47,880 | 9 |
| 49634 | 21-May-08 | Namakan Lake | 09-Jun-11 | Namakan Lake | 17,774 | 11 |
| 49635 | 20-May-08 | Namakan Lake | 31-Jul-11 | Above Hay Rapids | 49,375 | 10 |
| 49636 | 21-May-08 | Namakan Lake | 16-Aug-11 | Namakan Lake | 1,169 | 1 |

| | | | | | | |
|--------------|-----------|-----------------------|-----------|------------------|------------------|------------|
| 49637 | 21-May-08 | Namakan Lake | 07-Sep-11 | Namakan Lake | 5,461 | 10 |
| 49638 | 20-May-08 | Namakan Lake | 29-Aug-11 | Namakan Lake | 24,480 | 10 |
| 49640 | 14-May-08 | Sand Point Lake | 13-Oct-11 | Namakan Lake | 31,095 | 12 |
| 49641 | 14-May-08 | Sand Point Lake | 29-Sep-11 | Below Hay Rapids | 47,070 | 4 |
| 49642 | 07-May-08 | Crane Lake | 28-May-10 | Namakan Lake | 40,555 | 4 |
| 49643 | 07-May-08 | Crane Lake | 18-Aug-11 | Below Hay Rapids | 26,907 | 8 |
| 49644 | 07-May-08 | Crane Lake | 09-Aug-10 | Namakan Lake | 8,743 | 10 |
| 49645 | 07-May-08 | Crane Lake | 21-Apr-11 | Above Hay Rapids | 6 | 1 |
| 49646 | 07-May-08 | Crane Lake | 25-May-11 | Namakan Lake | 14,074 | 10 |
| 49647 | 13-May-08 | Sand Point Lake | 14-Oct-11 | Namakan Lake | 41,186 | 4 |
| 49650 | 15-May-08 | Sand Point Lake | 23-May-11 | Namakan Lake | 46,239 | 10 |
| 49652 | 14-May-08 | Sand Point Lake | 26-May-10 | Namakan Lake | 7,112 | 4 |
| 49653 | 14-May-08 | Sand Point Lake | 24-Aug-11 | Namakan Lake | 10,811 | 10 |
| 49654 | 14-May-08 | Little Vermilion Lake | 10-Oct-11 | Below High Falls | 1,157 | 3 |
| Total | 55 | - | - | - | 3,574,467 | - |
| Mean | - | - | - | - | 64,990 | 6.8 |

¹ Reported mortality (subsistence harvest) on May 15, 2011.

² Suspected mortality or expelled transmitter. Detections not included in analysis.

Table 4: Movements of lake sturgeon through undeveloped rapids/falls in the Namakan River, Ontario from May 15, 2007 to Oct. 19, 2011. Locations are listed from downstream to upstream, and proposed hydro development sites are in bold

| Location | Elevation ¹ (m) | Upstream | Downstream | Total |
|----------------------------------|-------------------------------|-----------|------------|------------|
| Lady Rapids | 1.6 | 66 | 81 | 147 |
| Hay Rapids | 3.0 | 70 | 79 | 149 |
| Back Channel (Eva Island) | 7.0 | 36 | 8 | 44 |
| High Falls | 6.8 | 0 | 31 | 31 |
| Quetico Rapids | 0.7 | 55 | 58 | 113 |
| Quetico River (QPP) | - | 8 | 8 | 16 |
| Twisted Rapids | - | 62 | 65 | 127 |
| Ivy/Myrtle Falls | 4.0 | 22 | 21 | 43 |
| Ivy Falls ² | - | 0 | 7 | 7 |
| Myrtle Falls ² | - | 0 | 6 | 6 |
| Side Channel | - | 14 | 1 | 15 |
| Snake Falls | 3.2 | 0 | 0 | 0 |

¹ change in elevation at an average flow of 120 m³/sec.

² site-specific movements since additional receivers were deployed in May, 2009

Table 5: Over-winter locations of adult lake sturgeon in the Namakan River and Reservoir from 2007 to 2011.

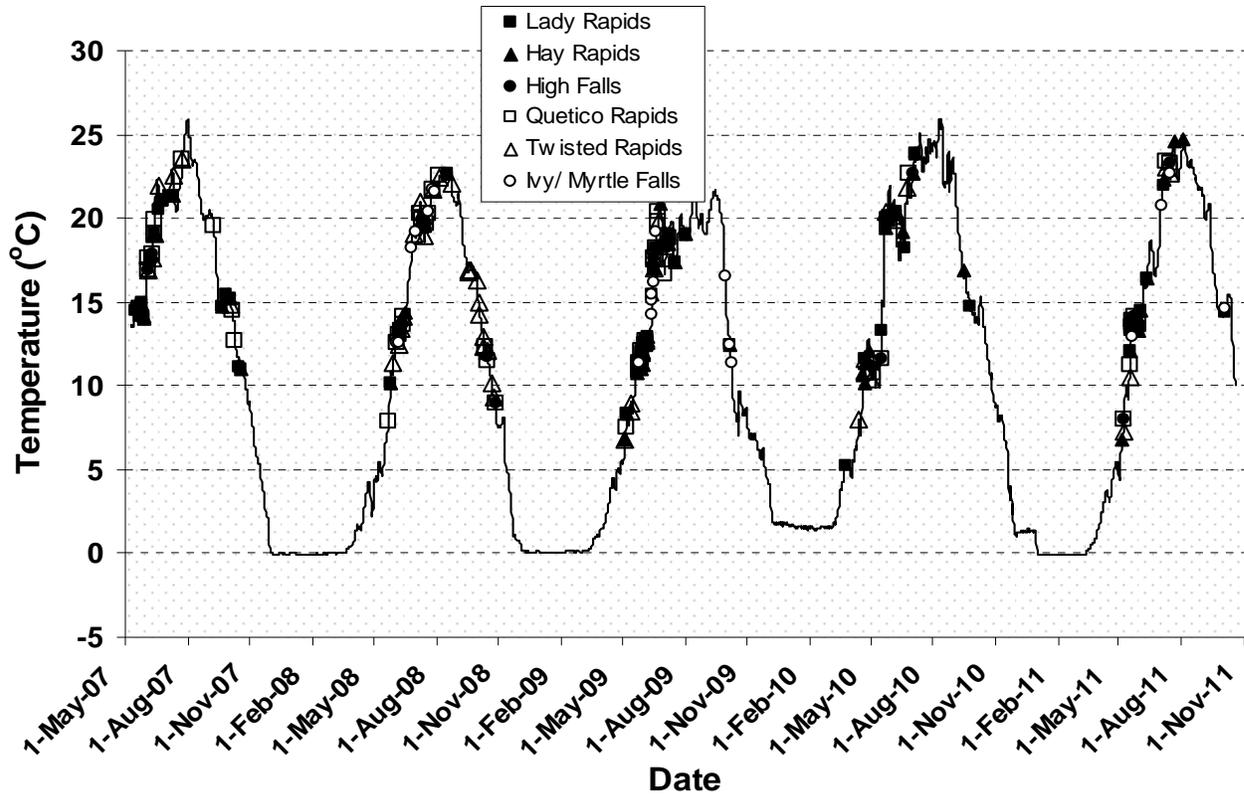
| Location | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 (preliminary) | Total (%) |
|-------------------|-----------|-----------|-----------|-----------|--------------------------|--------------------|
| Namakan Reservoir | 18 | 30 | 37 | 40 | 34 | 159 (61.4) |
| Below Hay Rapids | 1 | 2 | 0 | 2 | 6 | 11 (4.3) |
| Little Eva Lake | 3 | 14 | 12 | 7 | 5 | 41 (15.8) |
| Bill Lake | 2 | 3 | 4 | 3 | 2 | 14 (5.4) |
| Three Mile Lake | 6 | 8 | 6 | 4 | 4 | 28 (10.8) |
| Below Snake Falls | 0 | 2 | 0 | 3 | 1 | 6 (2.3) |
| Total (n) | 30 | 59 | 59 | 59 | 52 | 259 (100.0) |

Table 6: Mean and range of water flows for lake sturgeon movements through undeveloped rapids/falls in the Namakan River, Ontario from May 15, 2007 to Oct. 19, 2011. Locations are listed from downstream to upstream, and proposed hydro development sites are in bold.

| Location | Downstream | | | Upstream | | |
|---------------------------------|------------|-----------------------------|------------------------------|-----------|-----------------------------|------------------------------|
| | n | Mean (m ³ /s) | Range (m ³ /s) | n | Mean (m ³ /s) | Range (m ³ /s) |
| Lady Rapids | 81 | 167 | 29-464 | 66 | 171 | 31-407 |
| Hay Rapids | 79 | 184 | 40-464 | 70 | 173 | 32-411 |
| Back Channel¹ | 8 | 18 | 7-31 | 36 | 18 | 5-31 |
| High Falls | 31 | 228 | 41-406 | 0 | - | - |
| Quetico Rapids | 58 | 211 | 36-467 | 55 | 227 | 29-464 |
| Twisted Rapids | 65 | 191 | 40-446 | 62 | 189 | 41-444 |
| Ivy/Myrtle Falls | 7 | 300 | 109-409 | 8 | 396 | 313-464 |
| Ivy Falls | 7 | 207 | 29-288 | 0 | - | - |
| Myrtle Falls | 6 | 194 | 51-385 | 0 | - | - |
| Side channel | 1 | 140 | 140 | 14 | 236 | 45-394 |

¹Flows in Back Channel represent values converted from the Namakan River outflow and the flow distribution reported by OPEG, 2009 (Genivar - Technical Note #2, Revision 3.0). All other values represent outflows reported from Lac La Croix (05PA006).

A)



B)

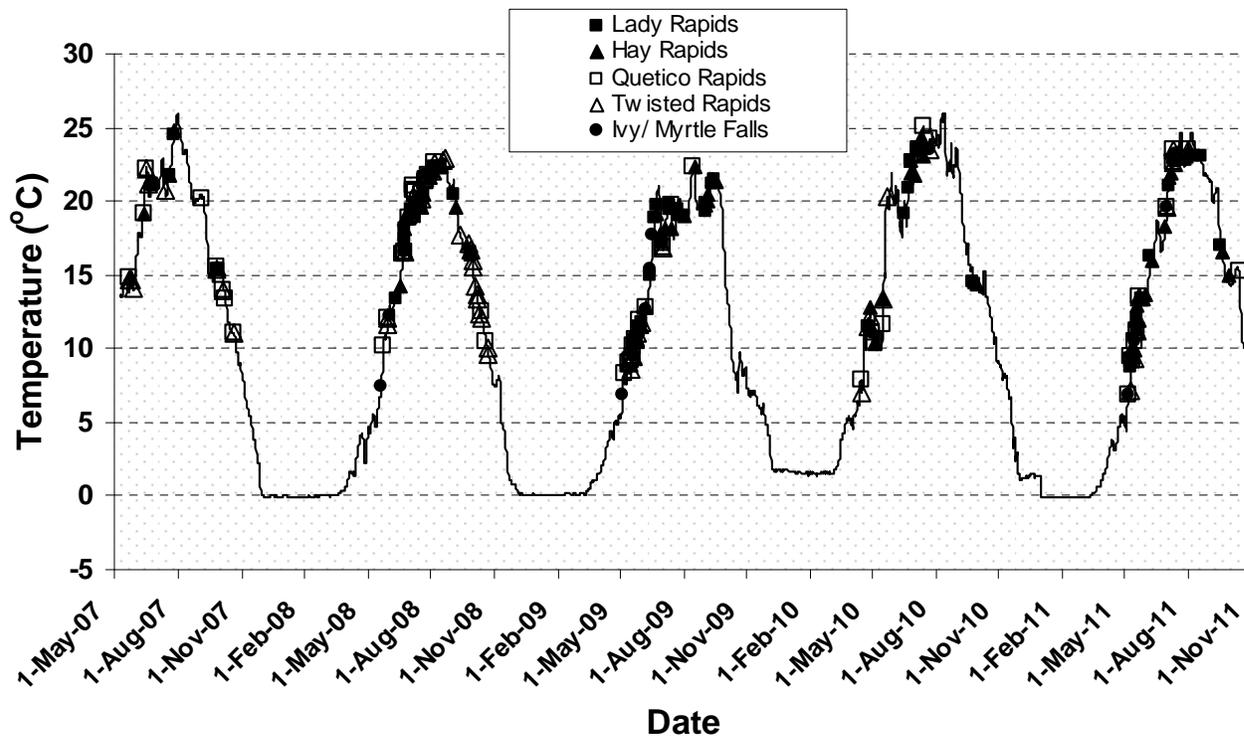
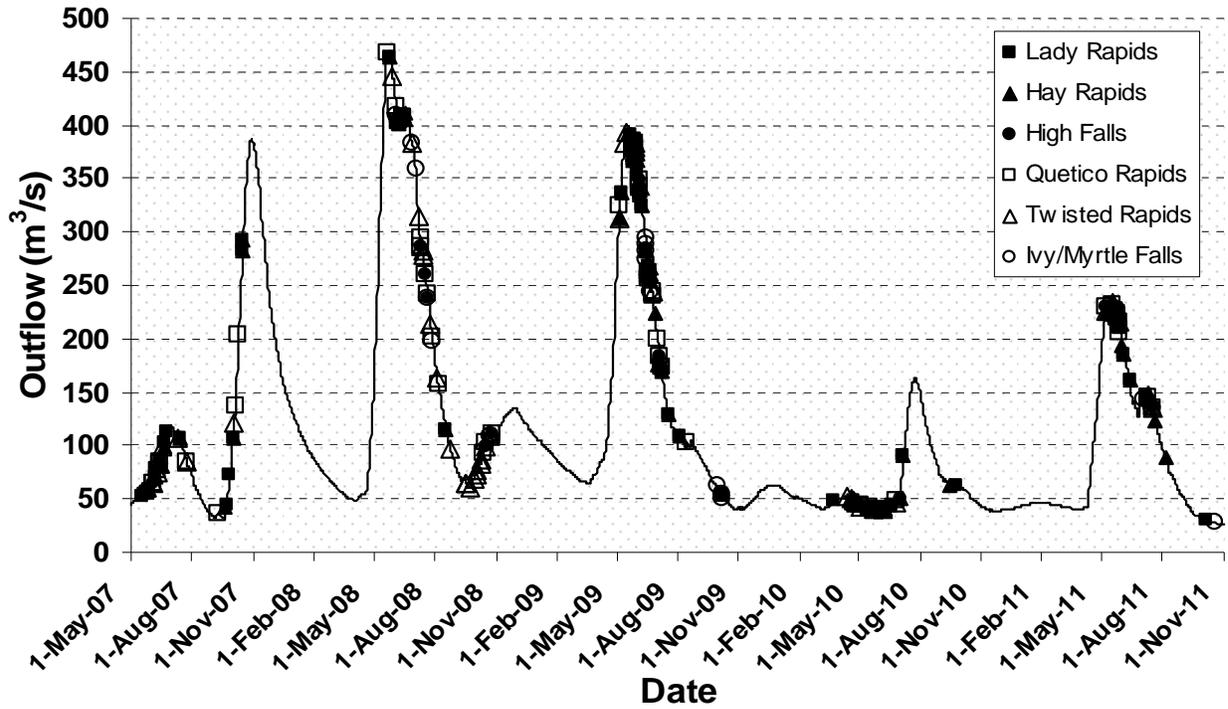


Figure 1: Downstream (A) and upstream (B) movement of lake sturgeon in relation to mean daily temperature through undeveloped rapids/falls in the Namakan River.

A)



B)

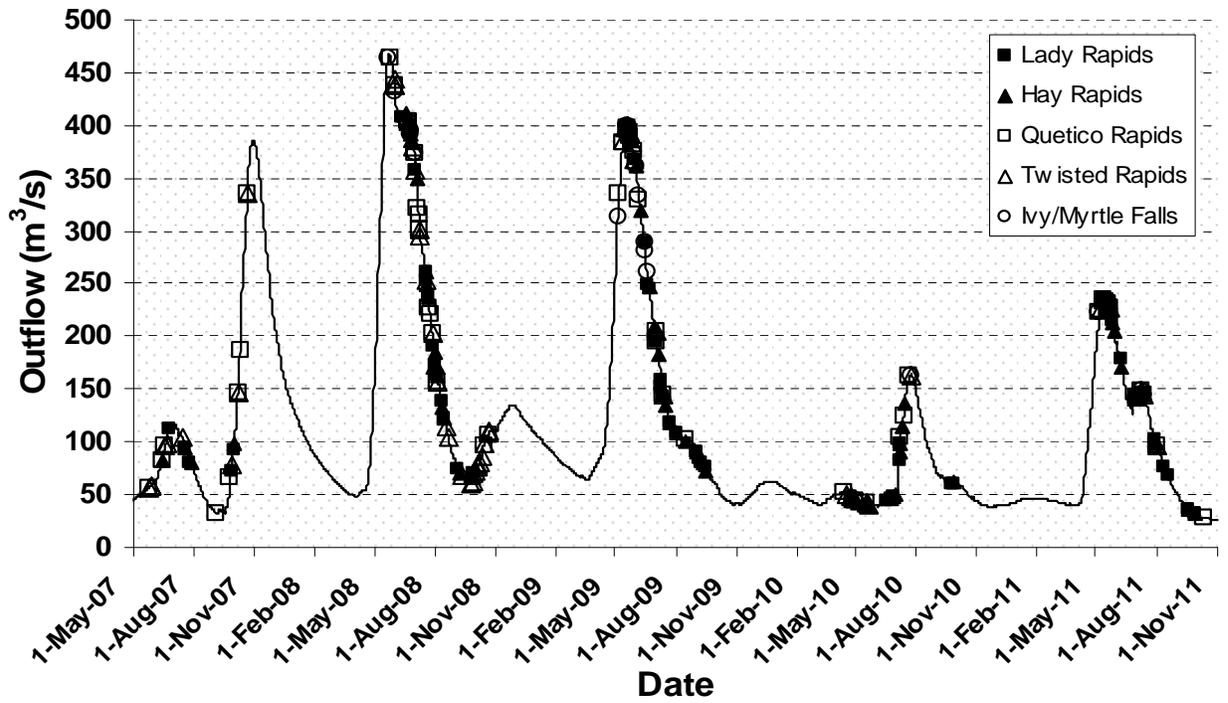
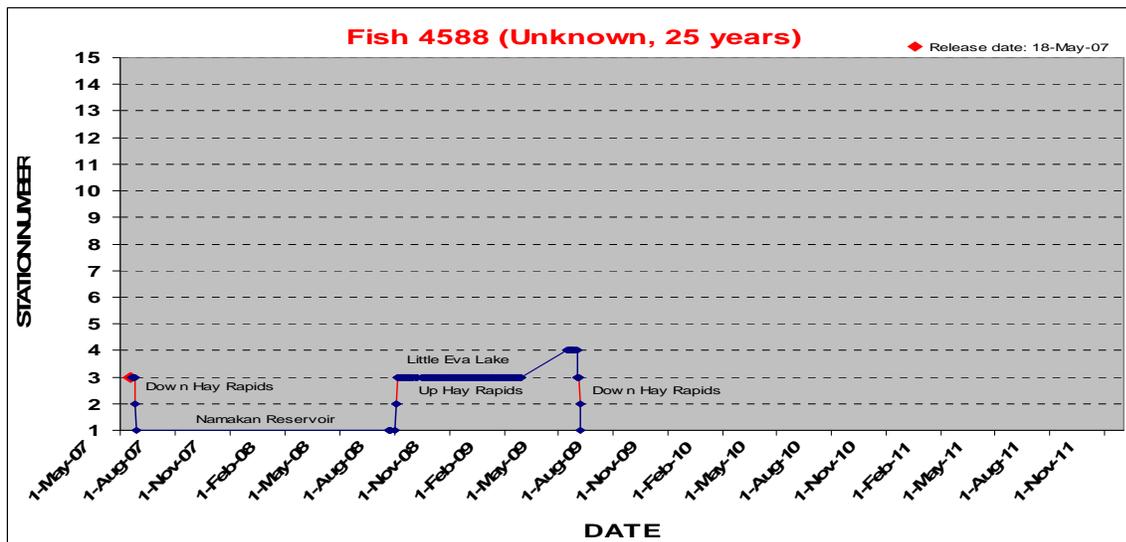
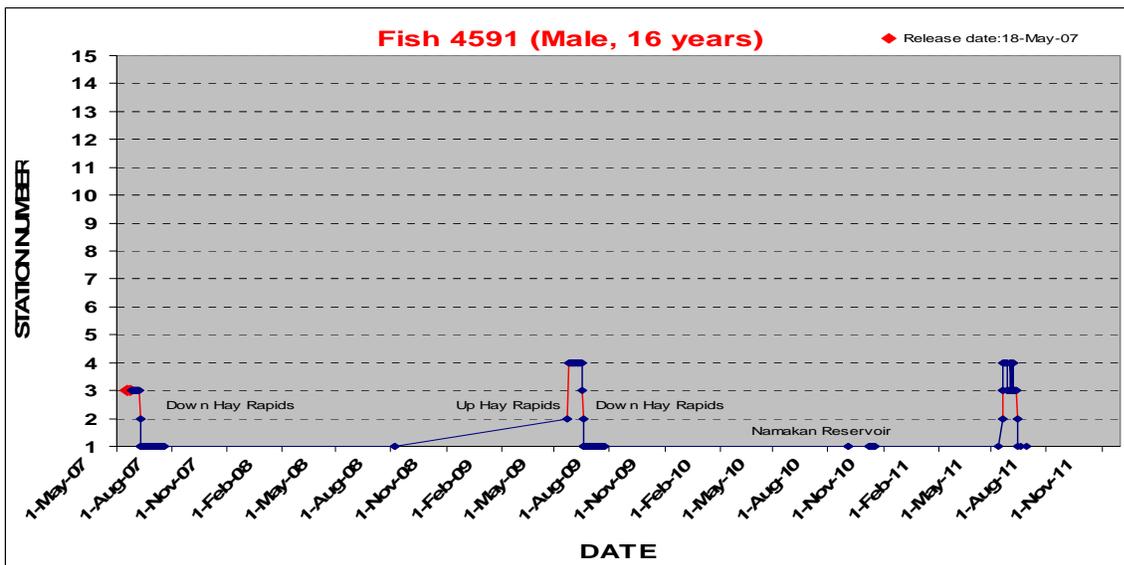
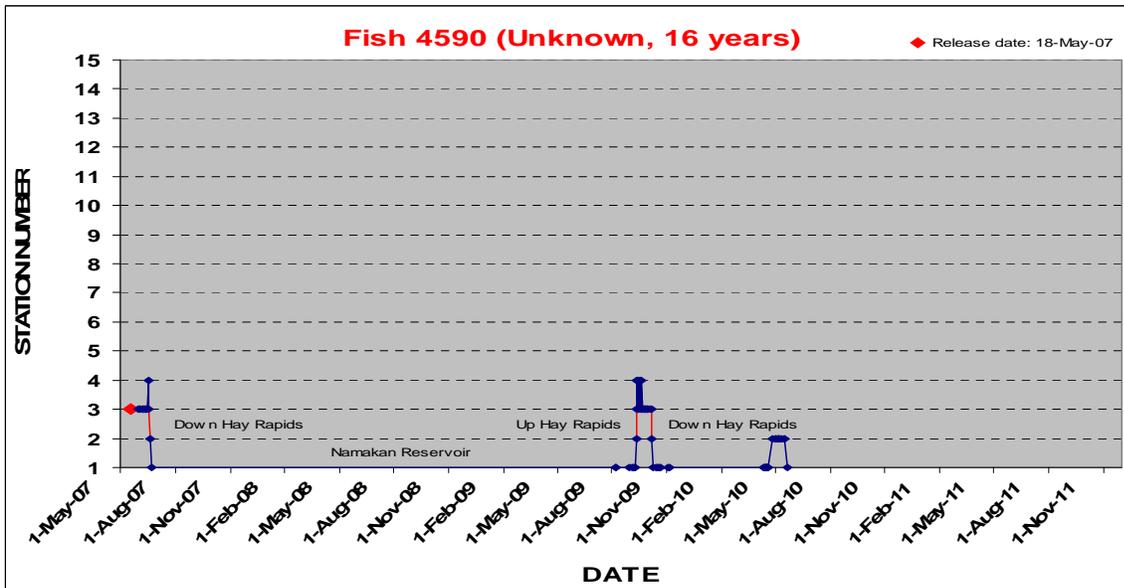
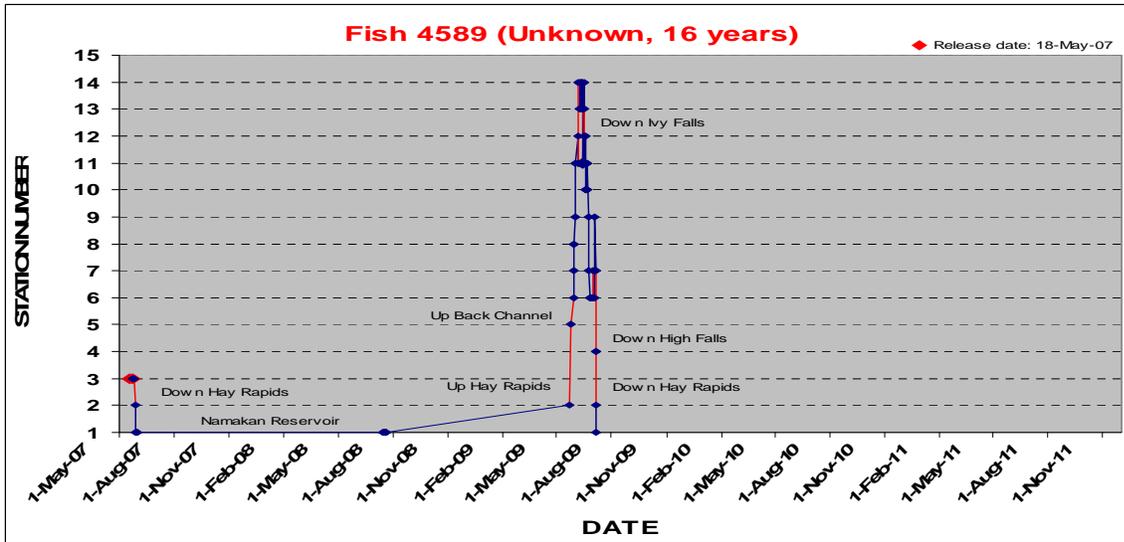


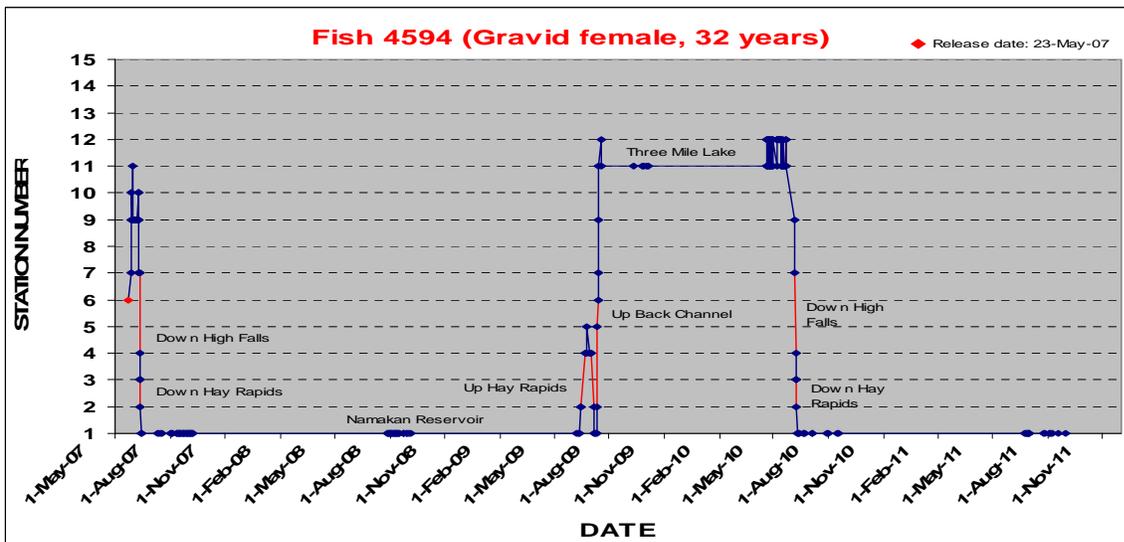
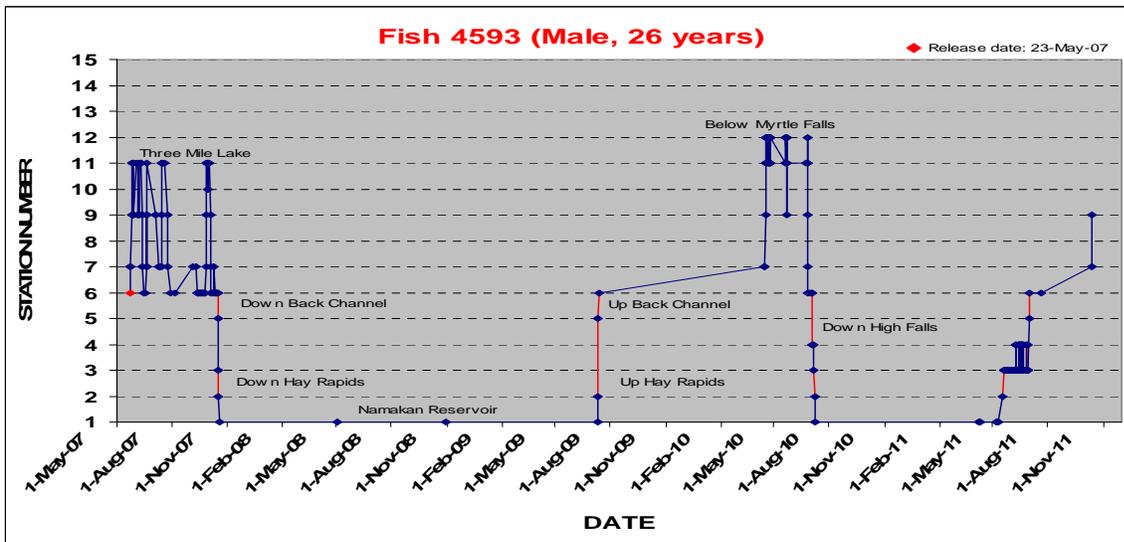
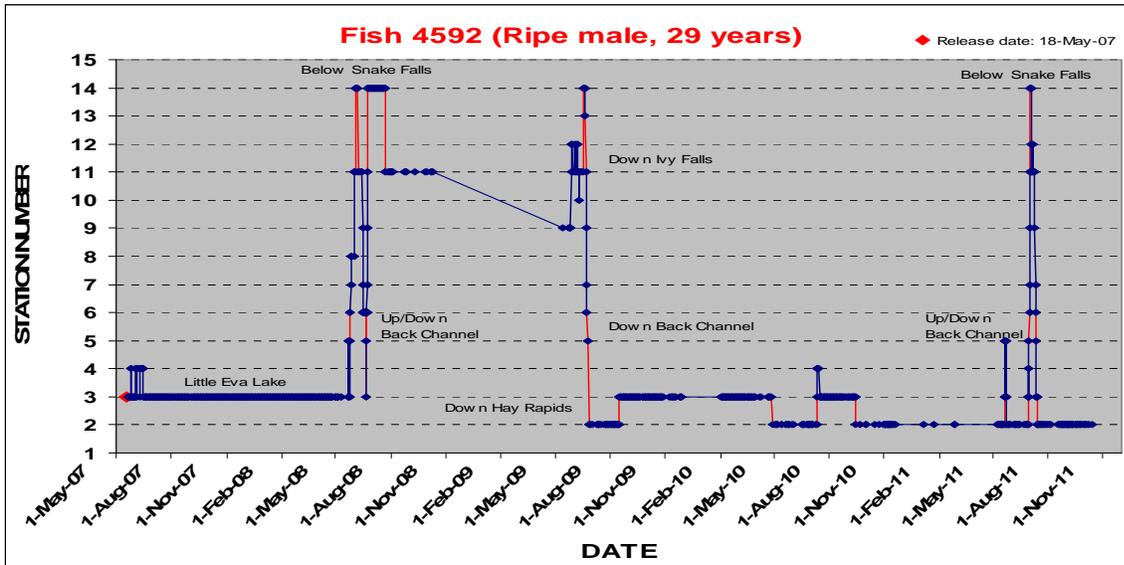
Figure 2: Downstream (A) and upstream (B) movement of lake sturgeon in relation to mean daily outflow through undeveloped rapids/falls in the Namakan River.

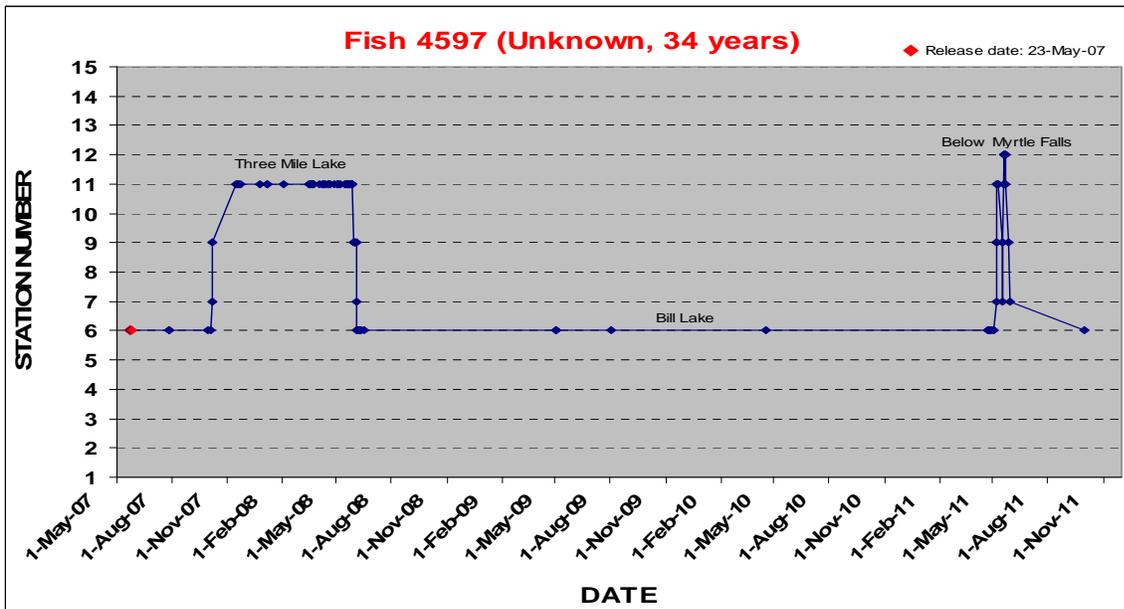
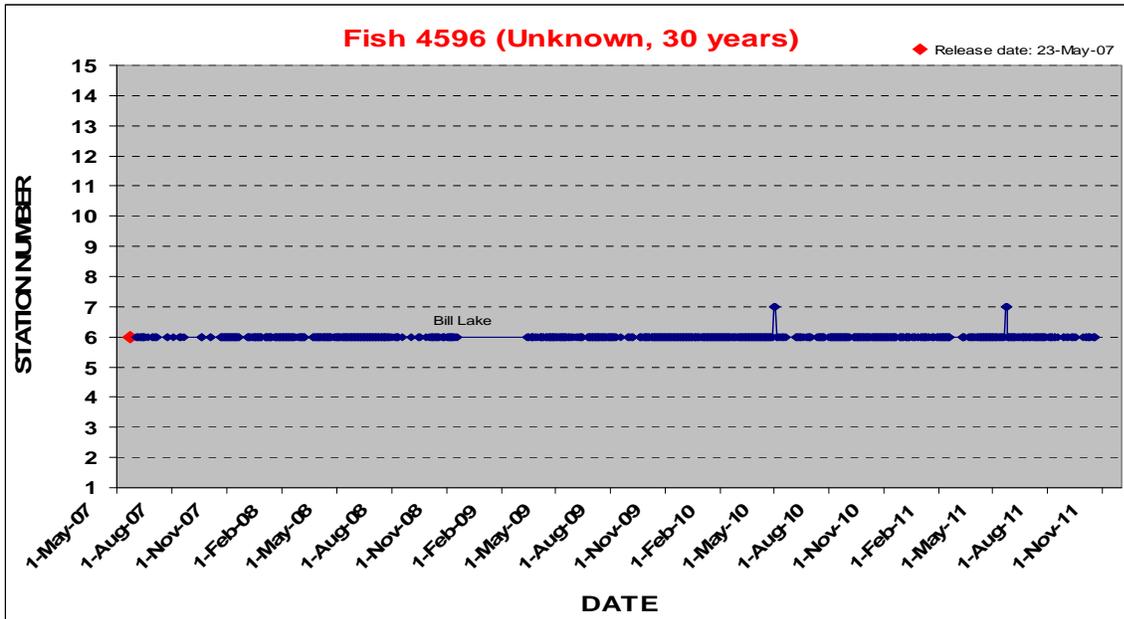
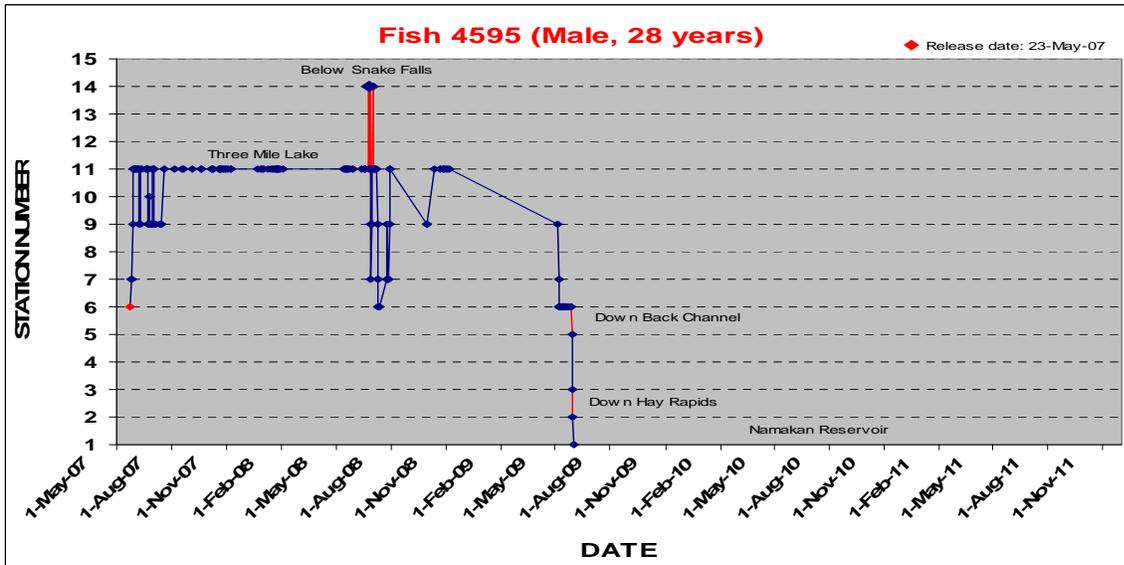
Appendix I: Movement of individual lake sturgeon released in 2007 within the Namakan River, Ontario.

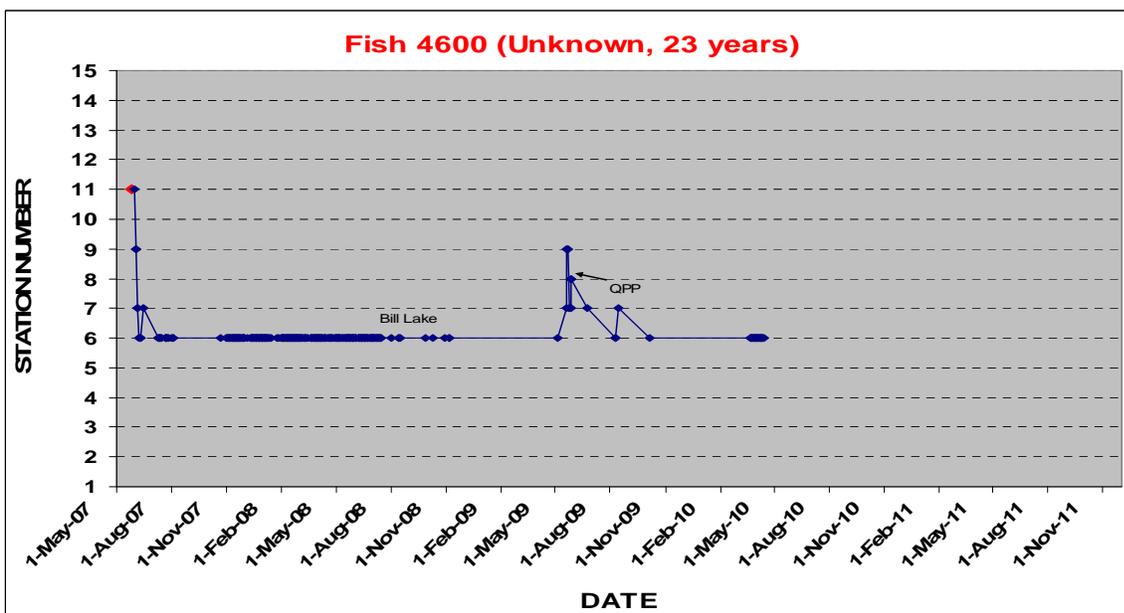
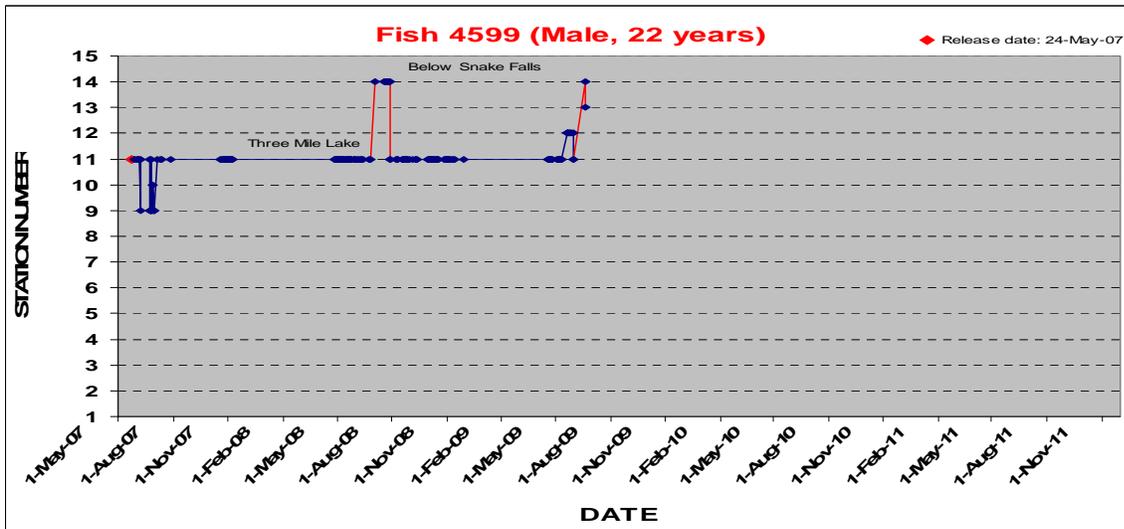
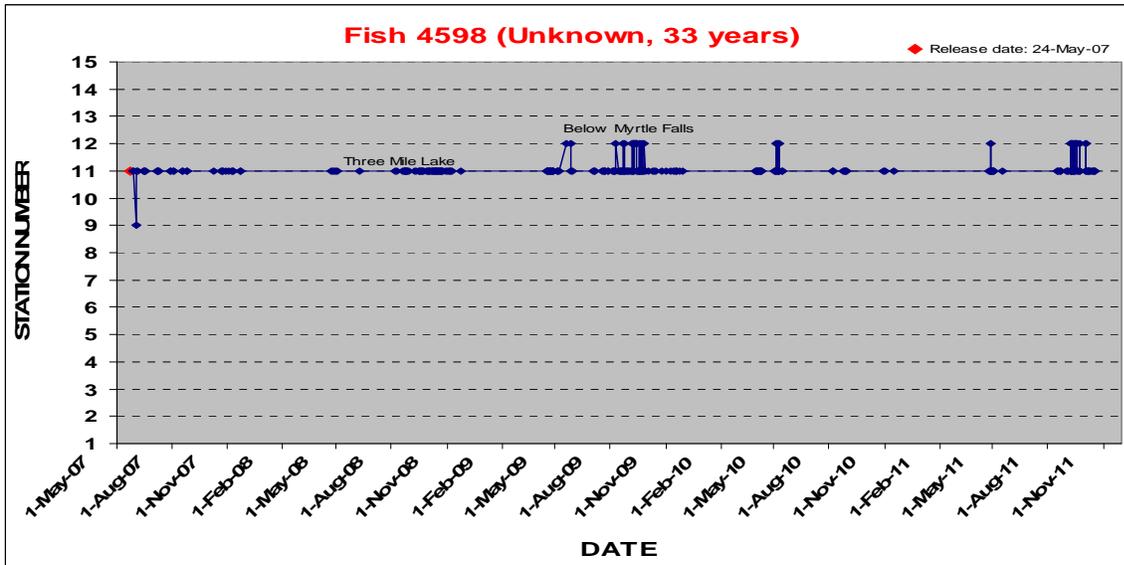
| <u>Station #</u> | <u>Location Name</u> |
|------------------|--|
| 15 | Above Snake Falls |
| 14 | Below Snake Falls |
| 13 | Above Ivy Falls |
| 12 | Below Myrtle Falls |
| 11 | Below Ivy/Myrtle Falls (Three Mile Lake) |
| 10 | Bearpelt Creek |
| 9 | Below Twisted Rapids |
| 8 | Quetico River |
| 7 | Above Quetico Rapids |
| 6 | Above Back Channel (Bill Lake) |
| 5 | Lower Back Channel |
| 4 | Below High Falls |
| 3 | Above Hay Rapids (Little Eva Lake) |
| 2 | Below Hay Rapids |
| 1 | Below Lady Rapids (Namakan Lake) |

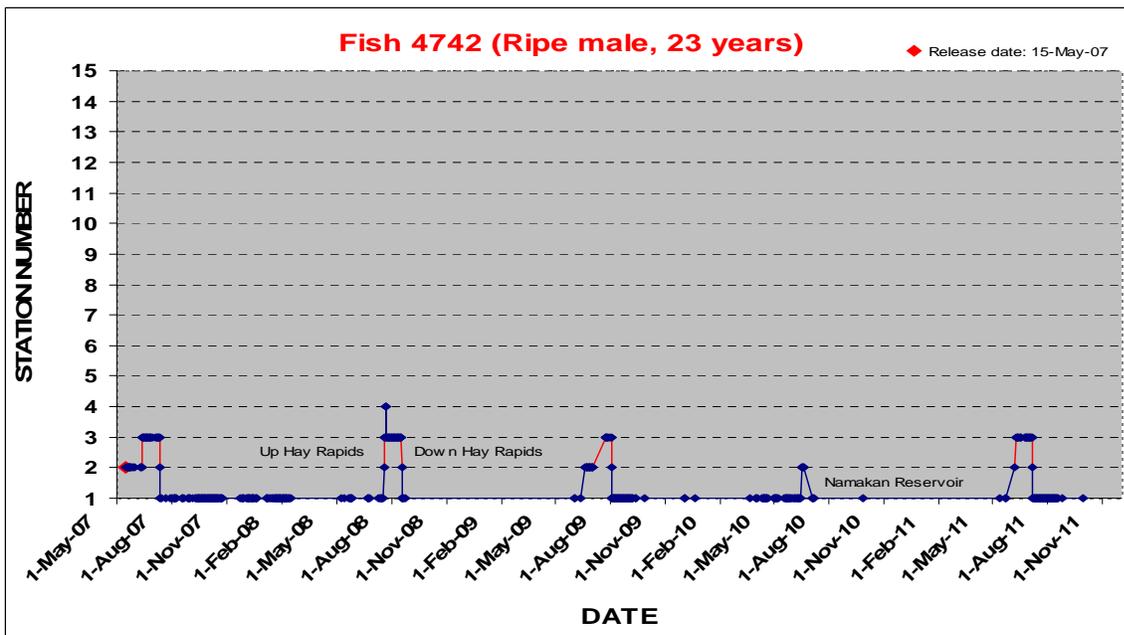
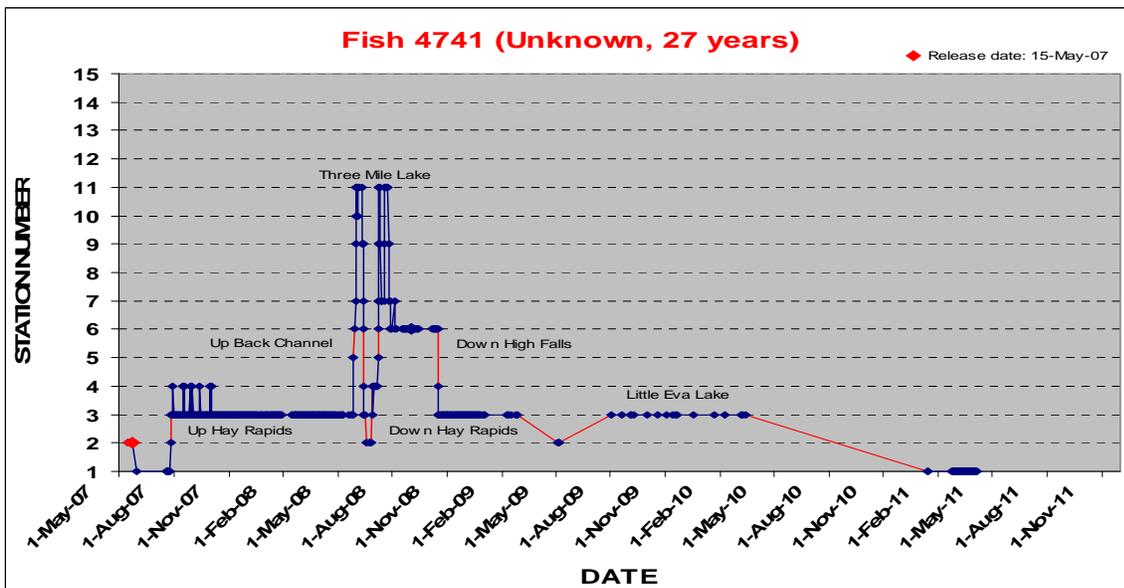
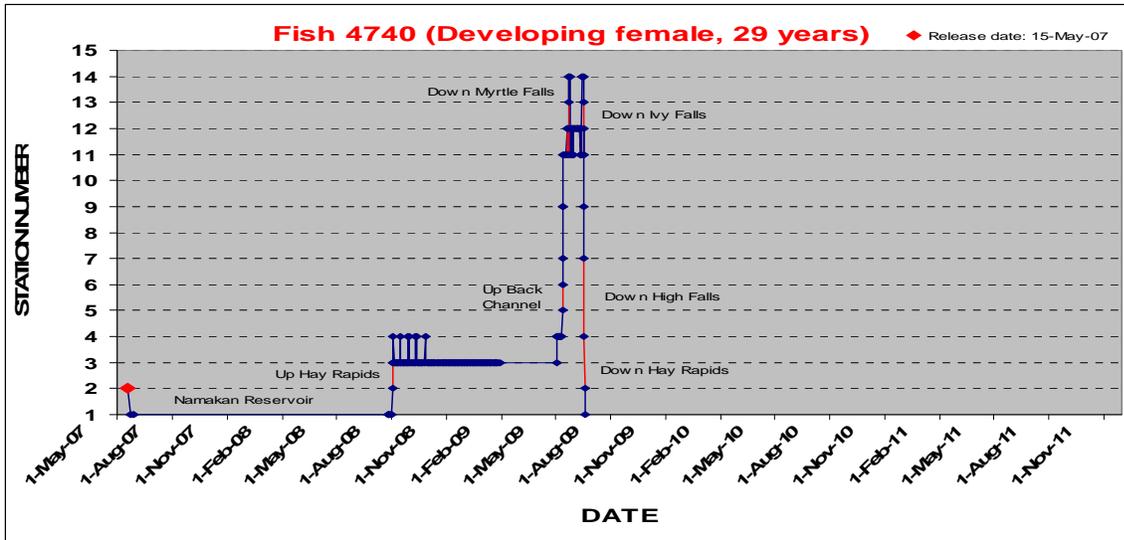


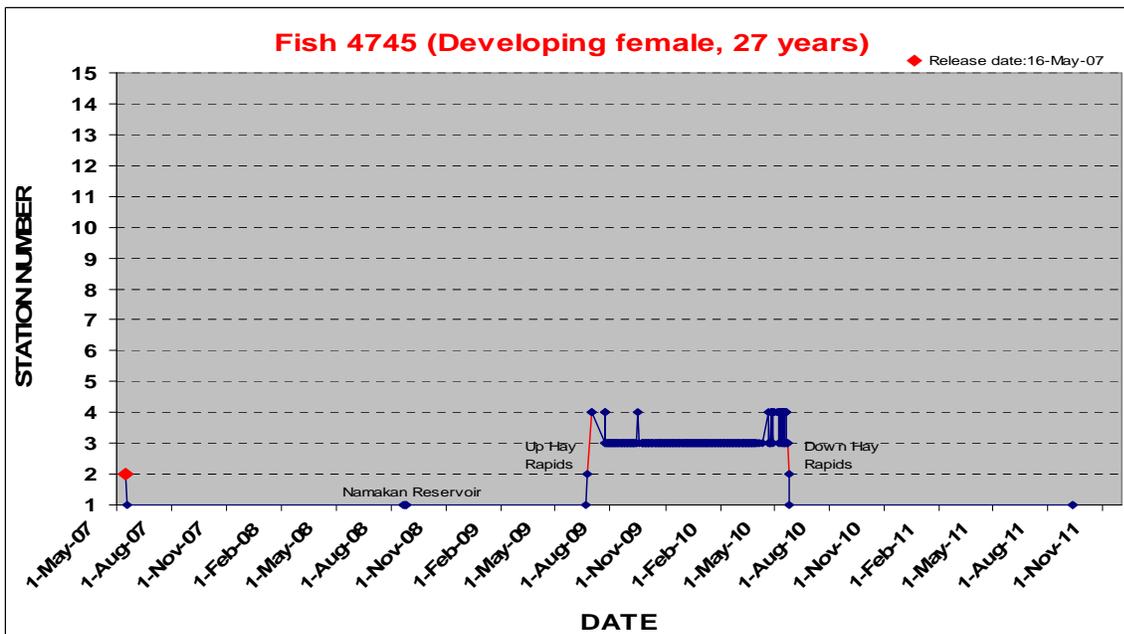
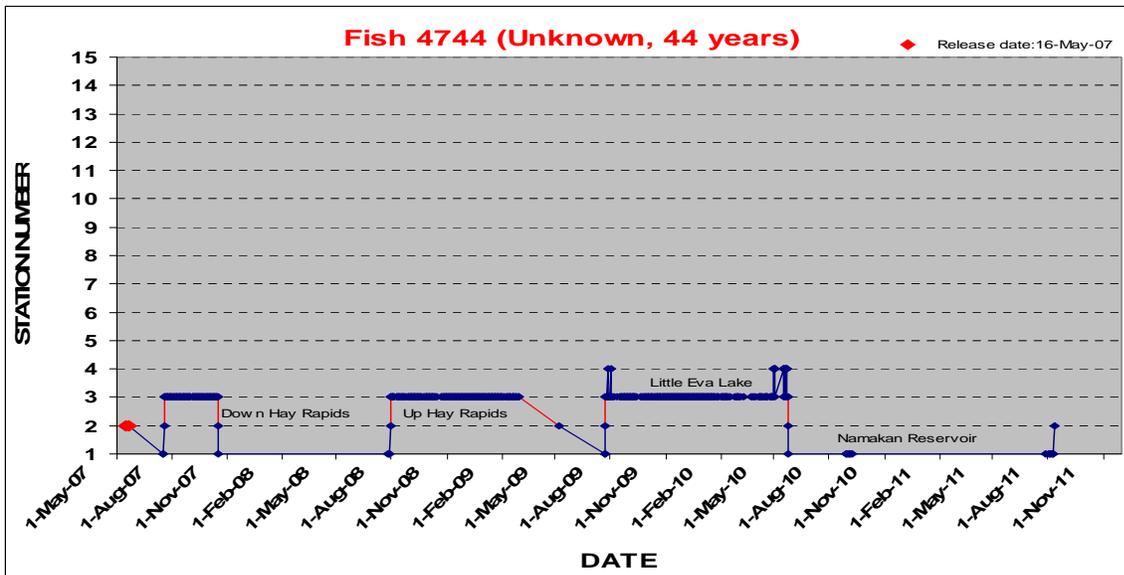
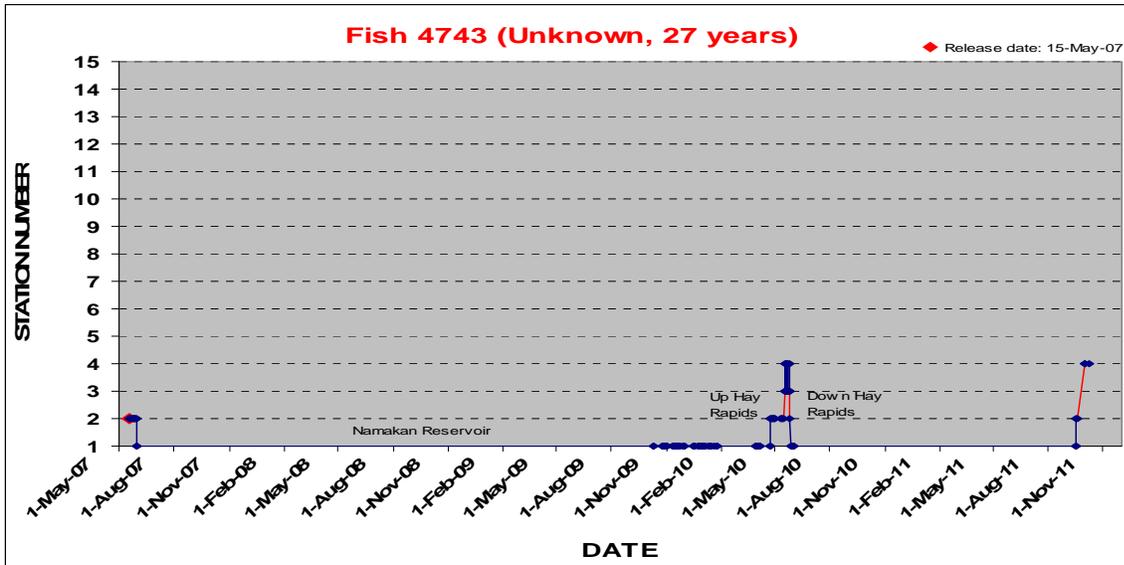


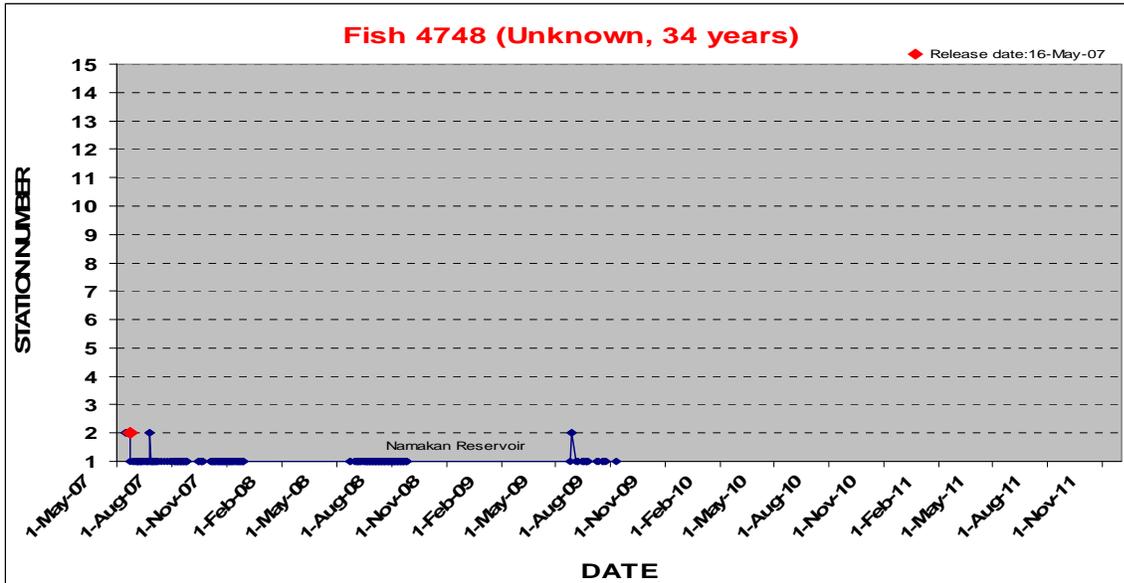
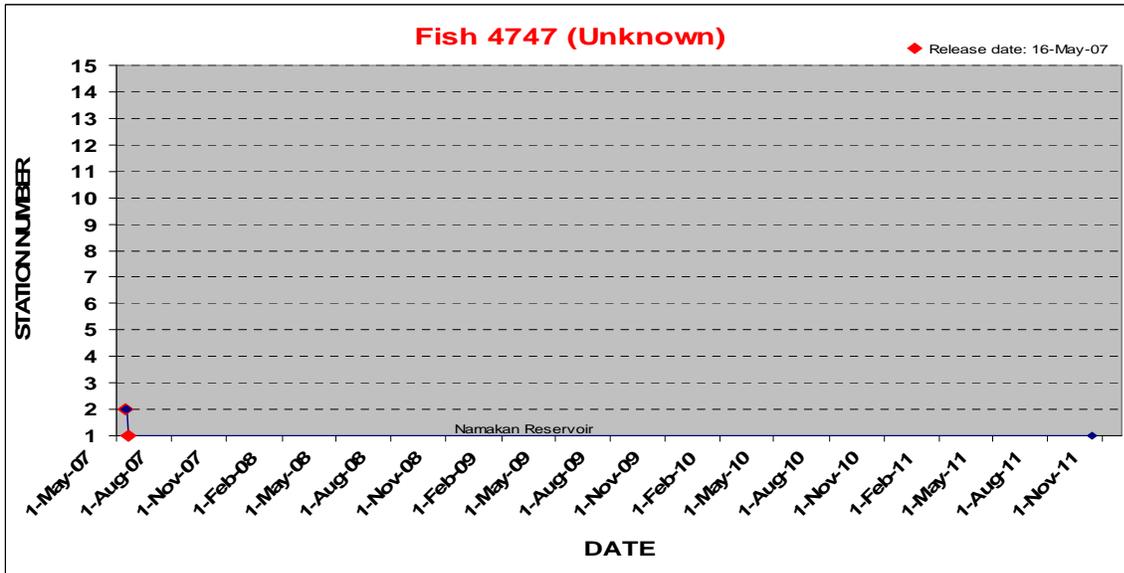
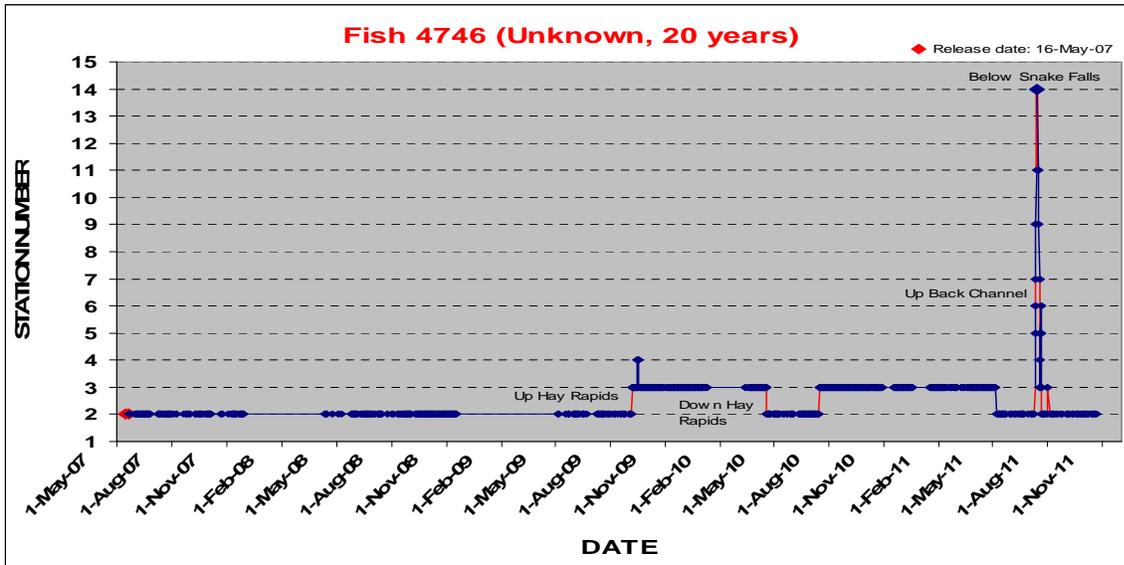


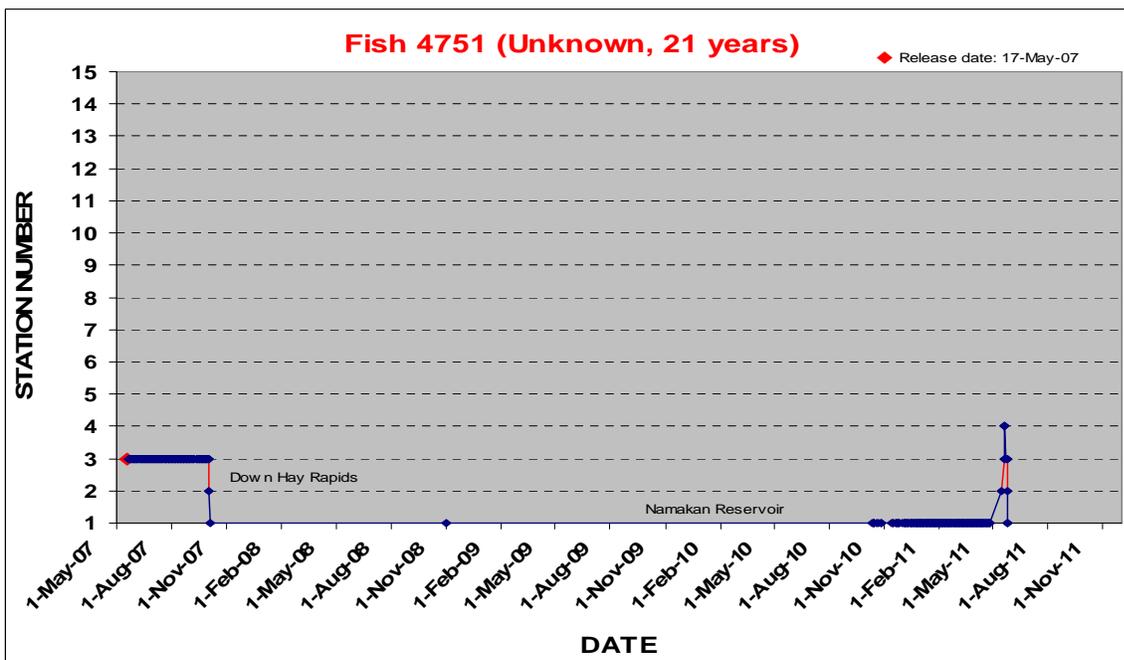
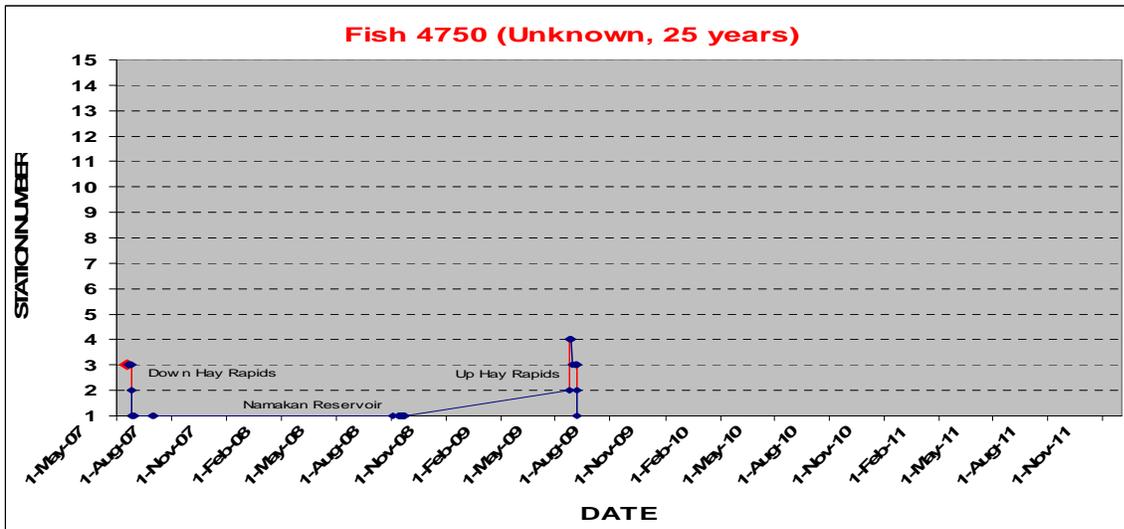
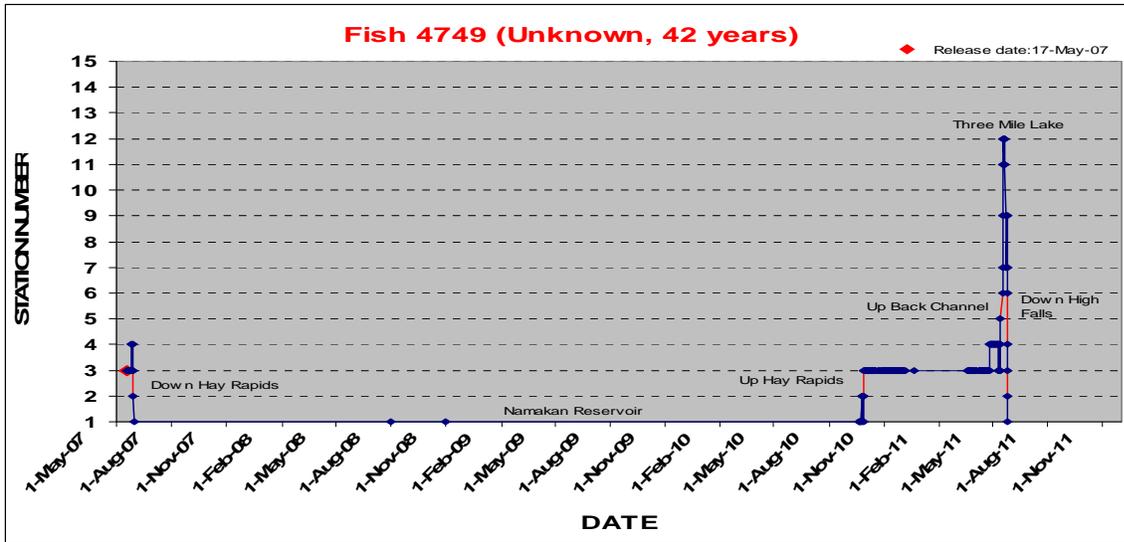


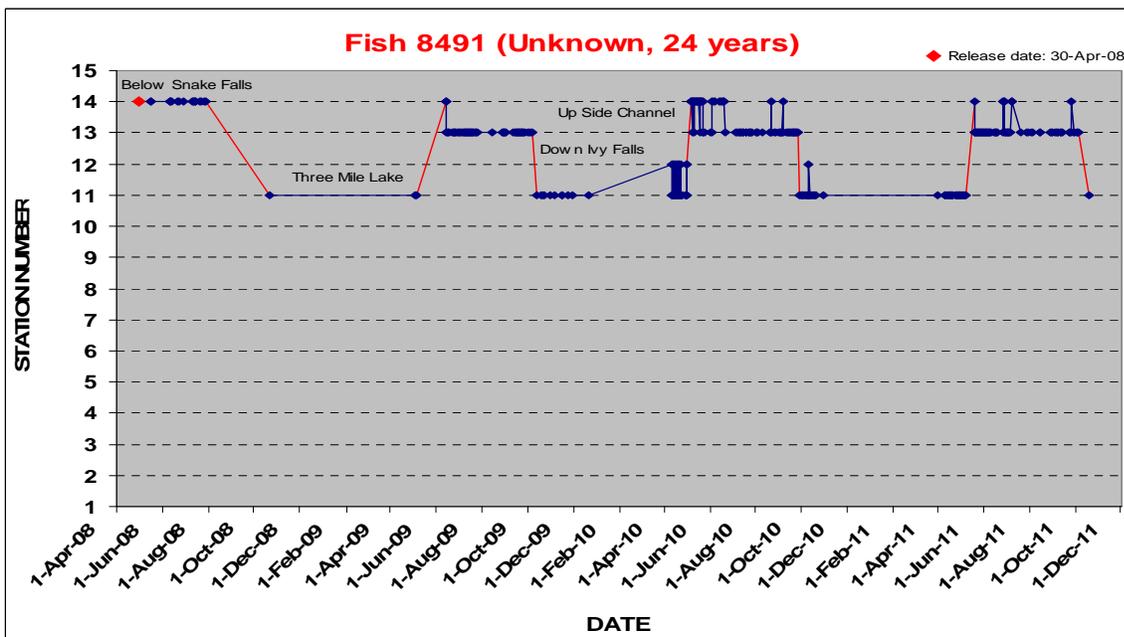
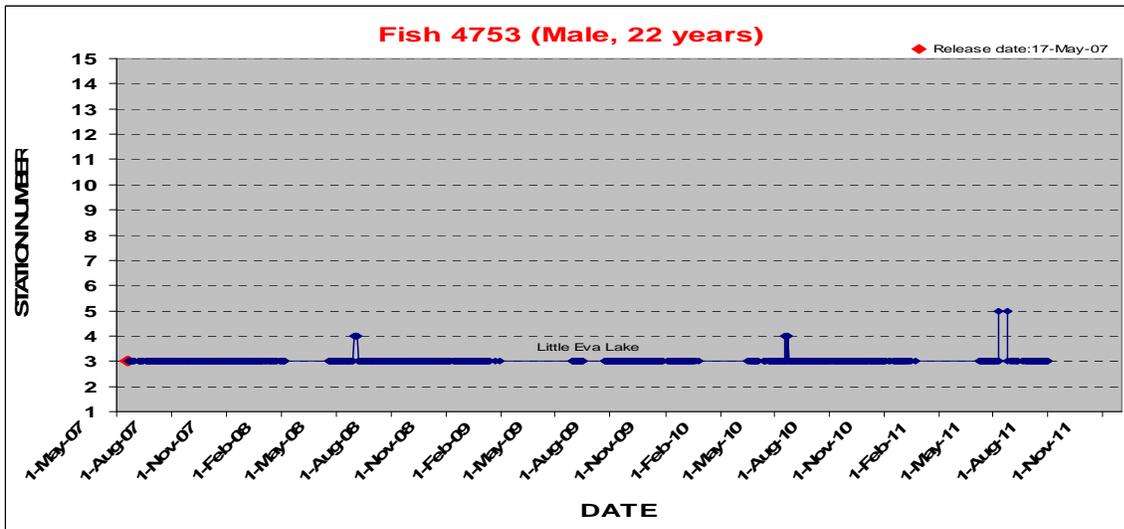
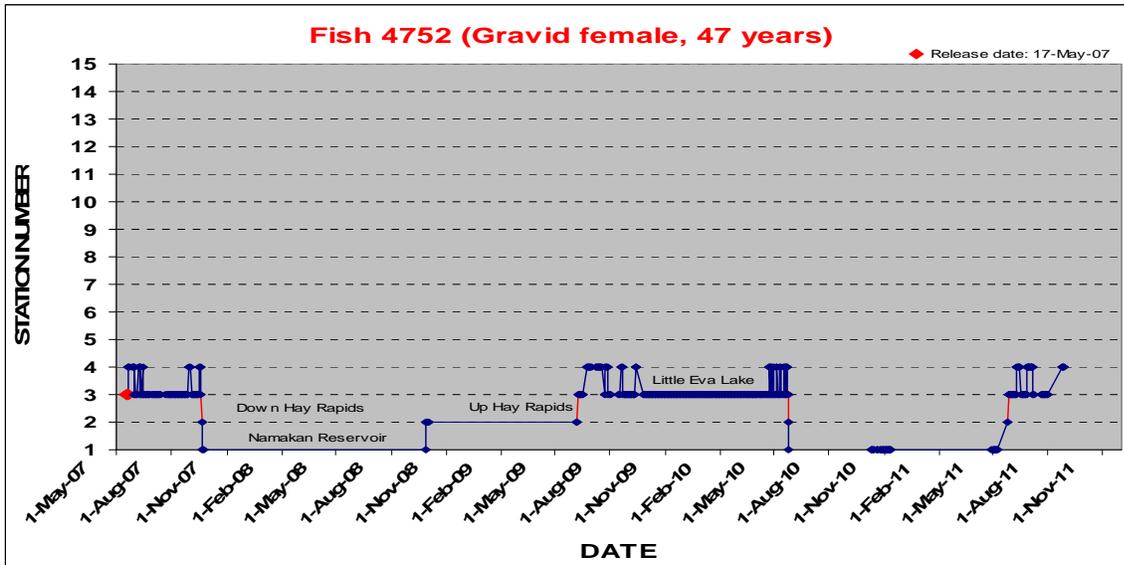


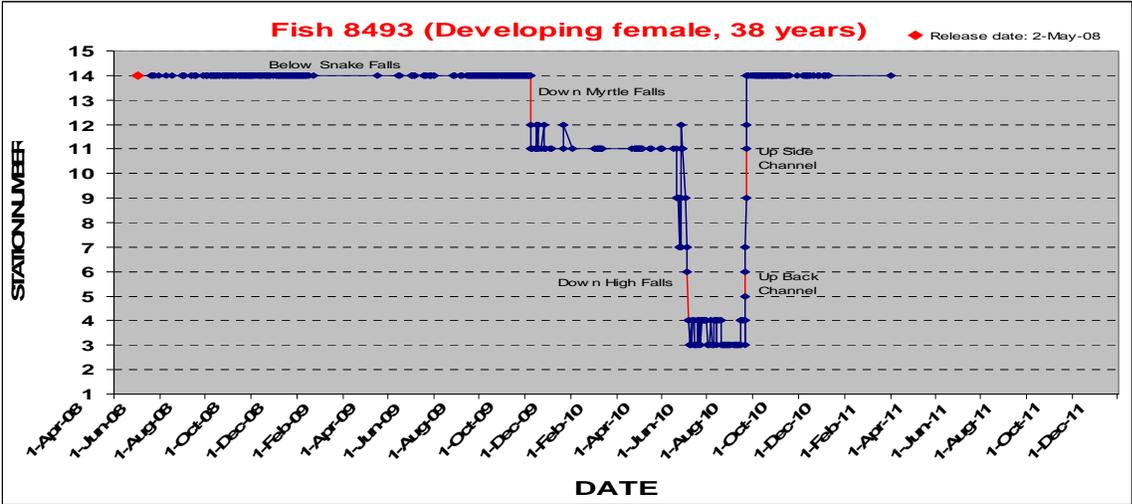
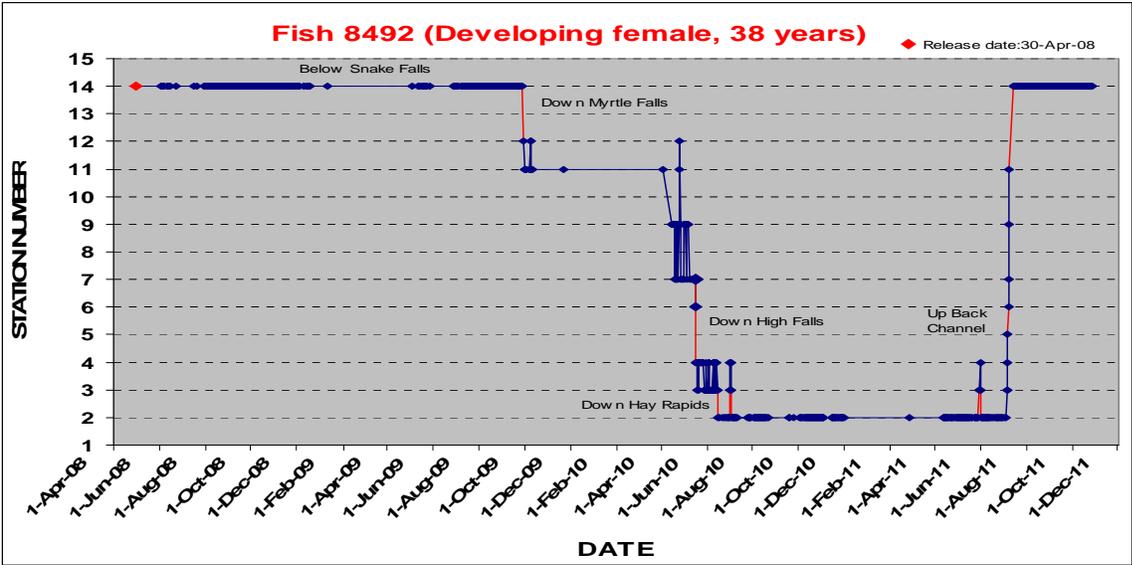






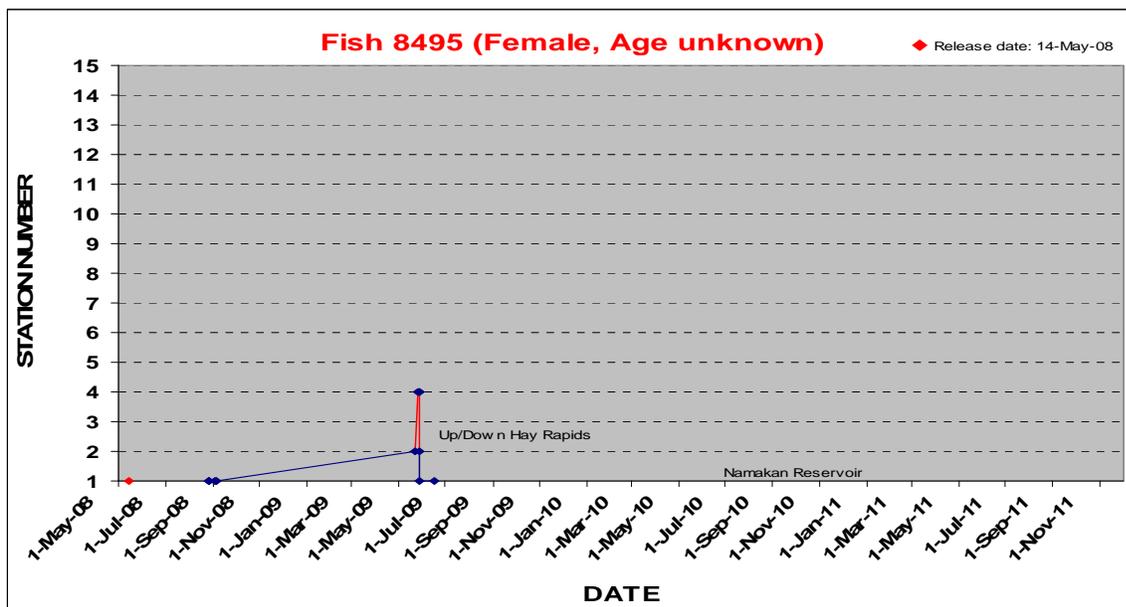


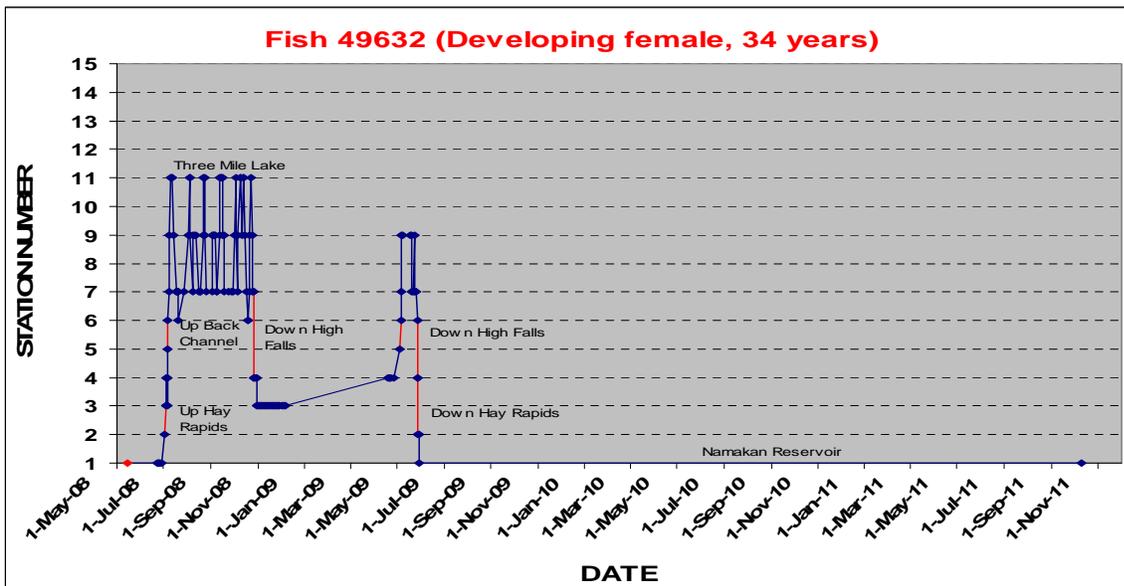
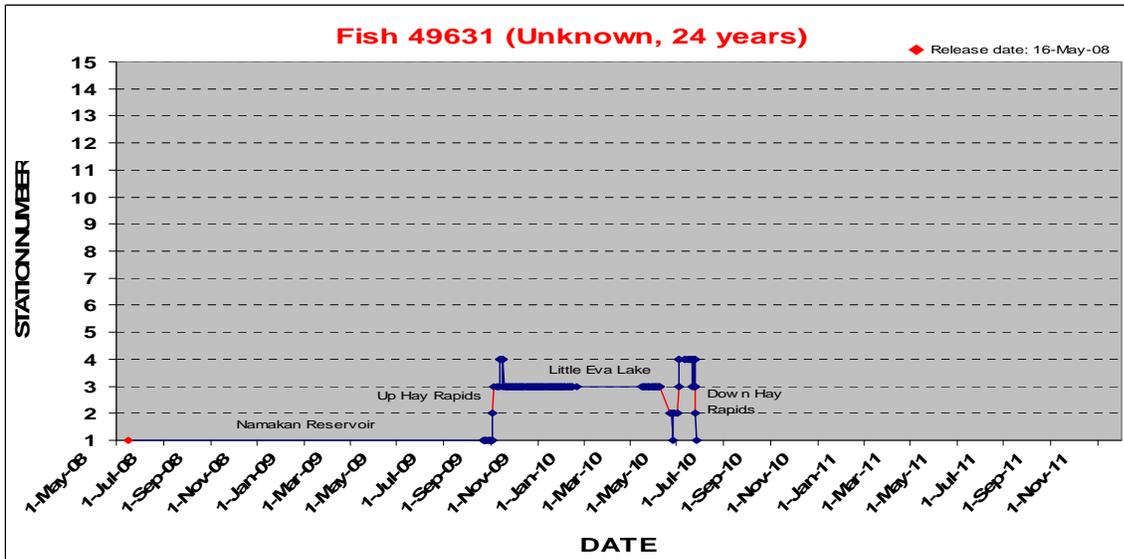
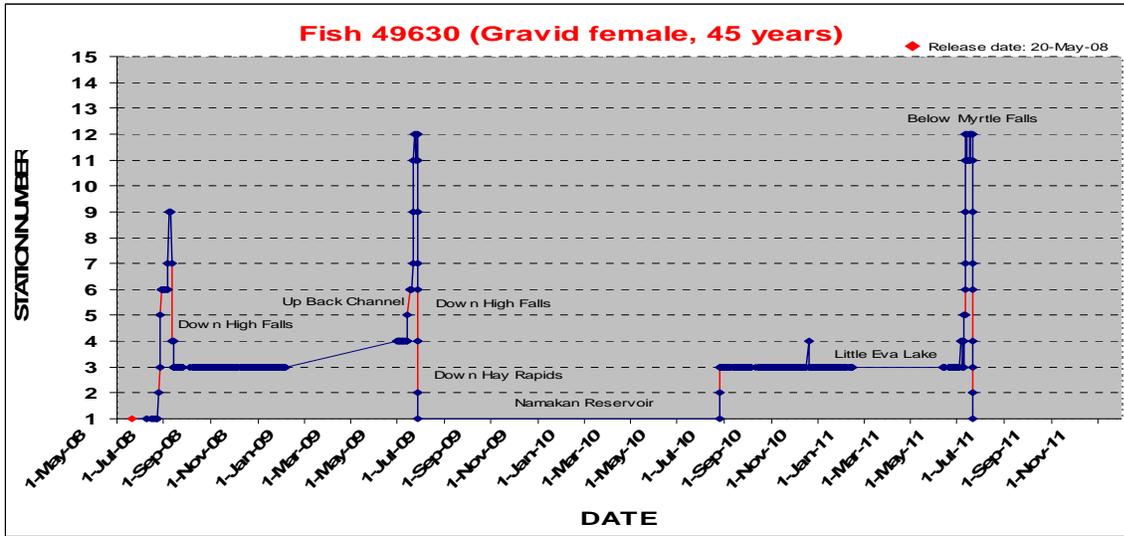


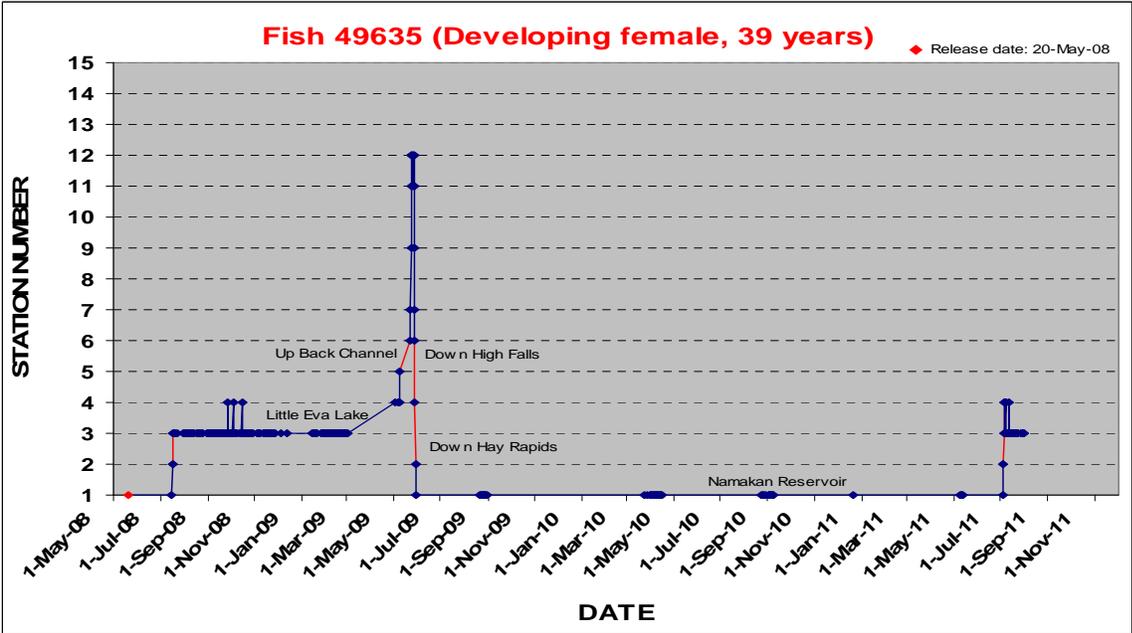
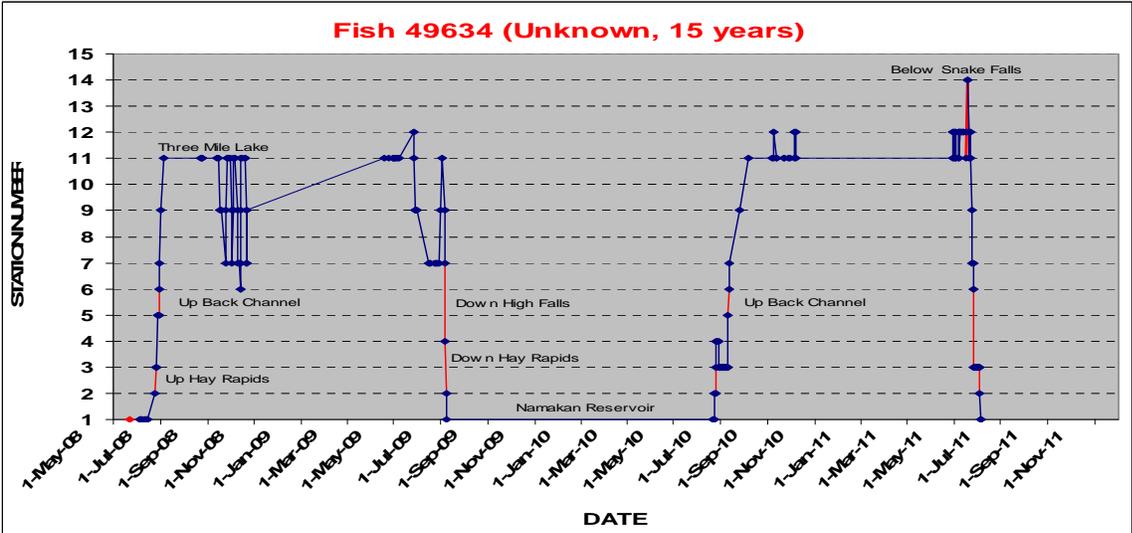
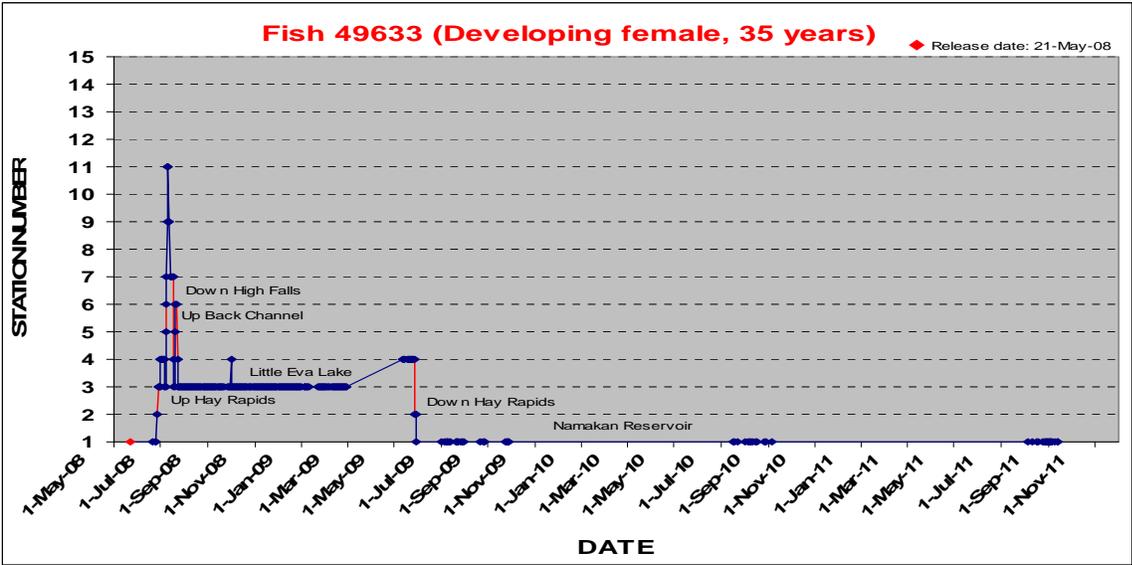


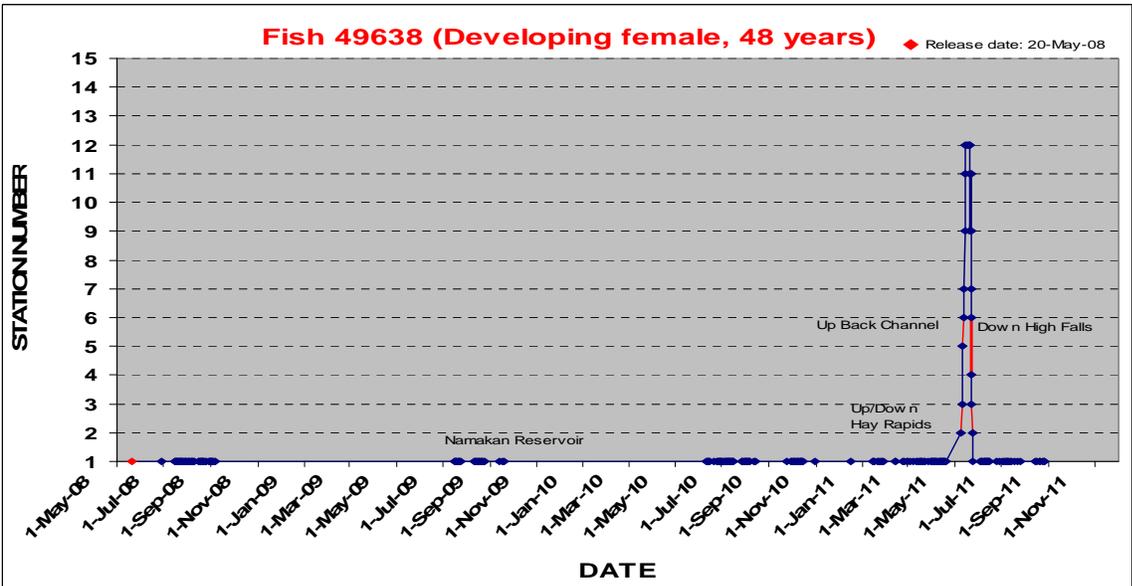
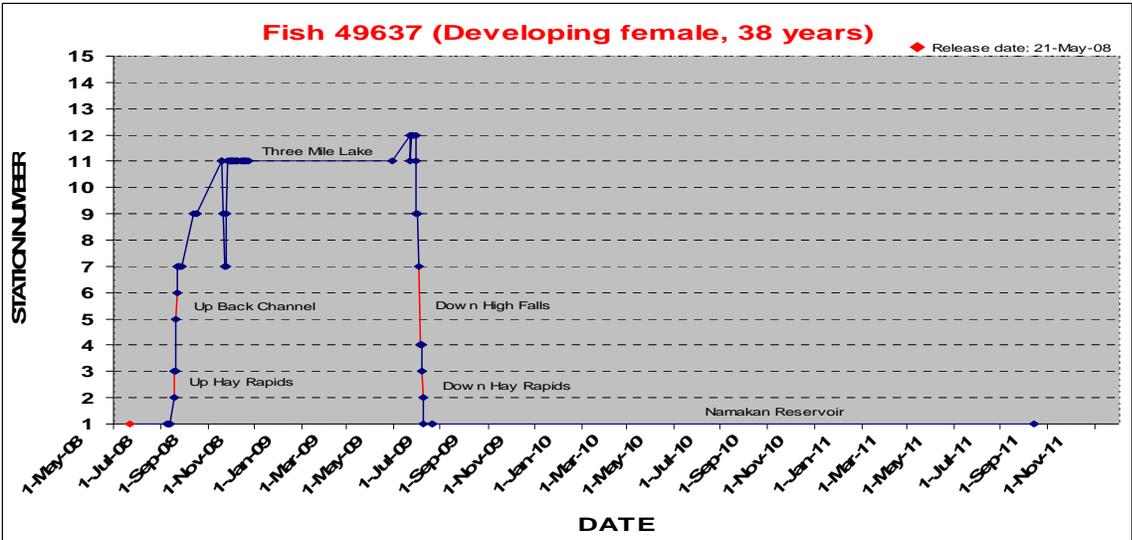
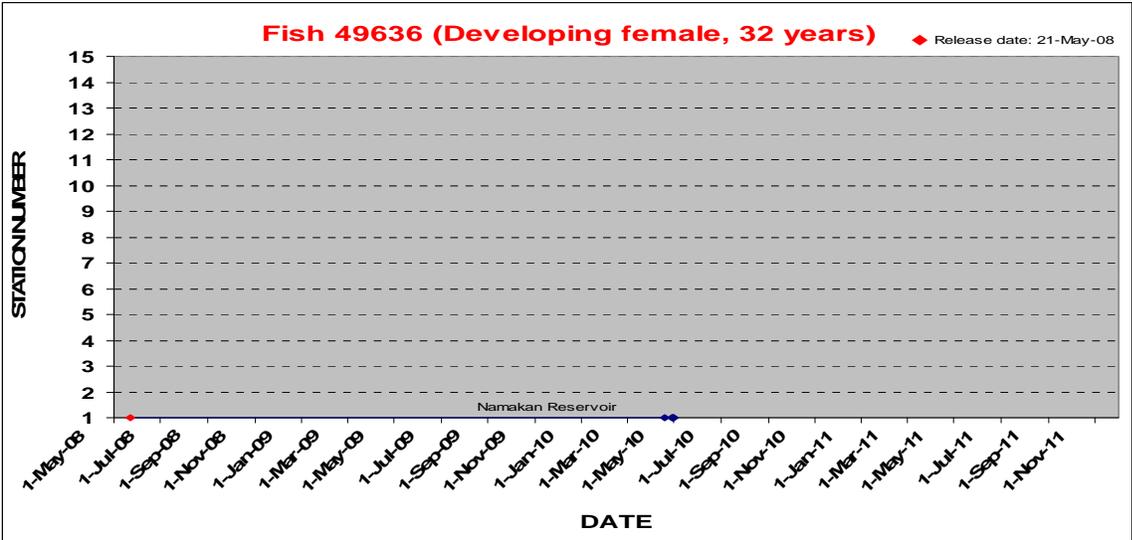
Appendix II: Movement of individual lake sturgeon released in 2008 within the Namakan River, Ontario.

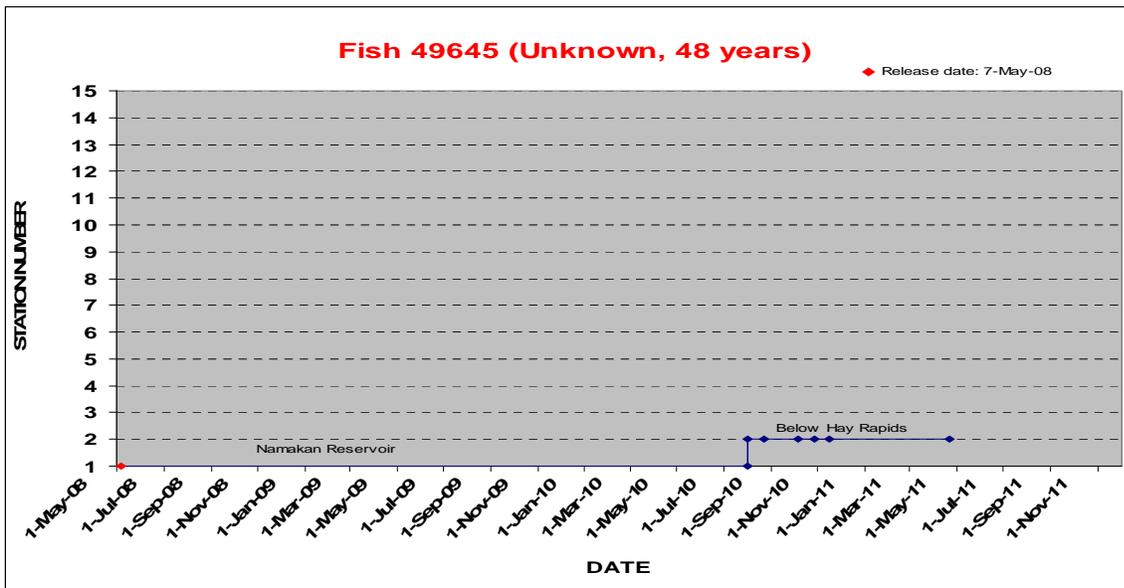
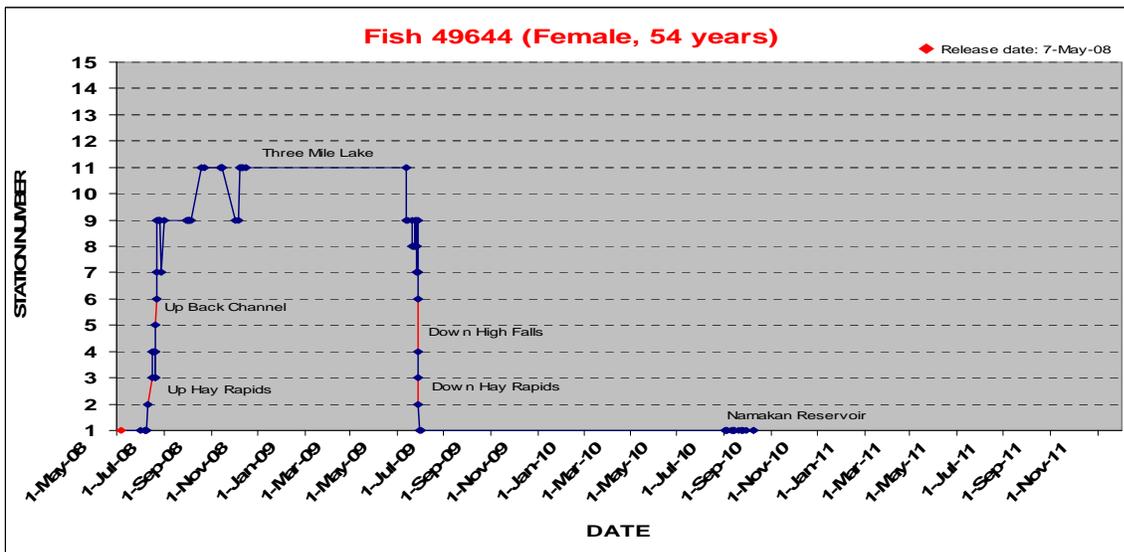
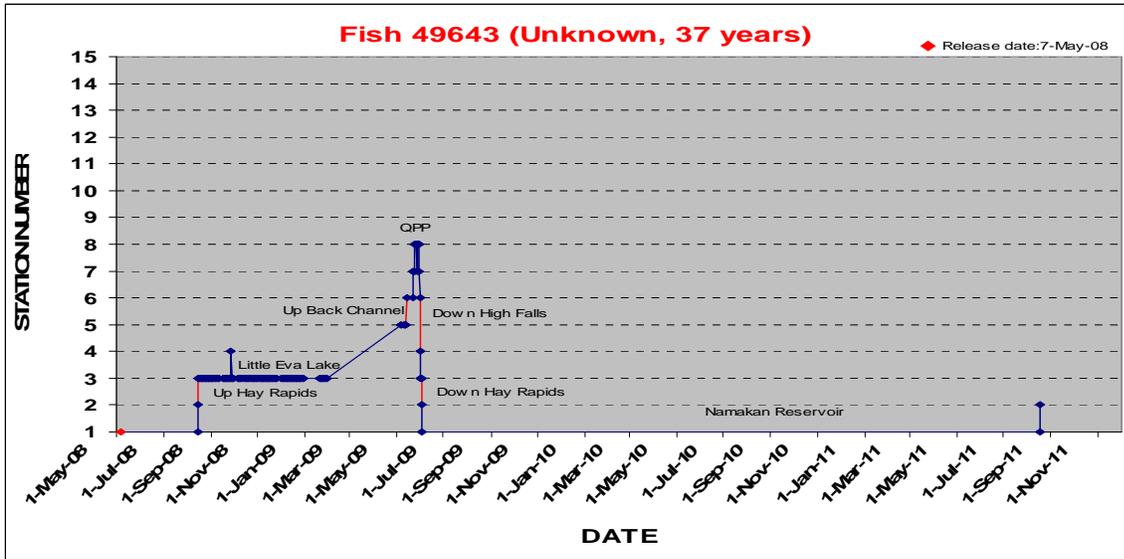
| <u>Station #</u> | <u>Location Name</u> |
|------------------|--|
| 15 | Above Snake Falls |
| 14 | Below Snake Falls |
| 13 | Above Ivy Falls |
| 12 | Below Myrtle Falls |
| 11 | Below Ivy/Myrtle Falls (Three Mile Lake) |
| 10 | Bearpelt Creek |
| 9 | Below Twisted Rapids |
| 8 | Quetico River |
| 7 | Above Quetico Rapids |
| 6 | Above Back Channel (Bill Lake) |
| 5 | Lower Back Channel |
| 4 | Below High Falls |
| 3 | Above Hay Rapids (Little Eva Lake) |
| 2 | Below Hay Rapids |
| 1 | Below Lady Rapids (Namakan Lake) |

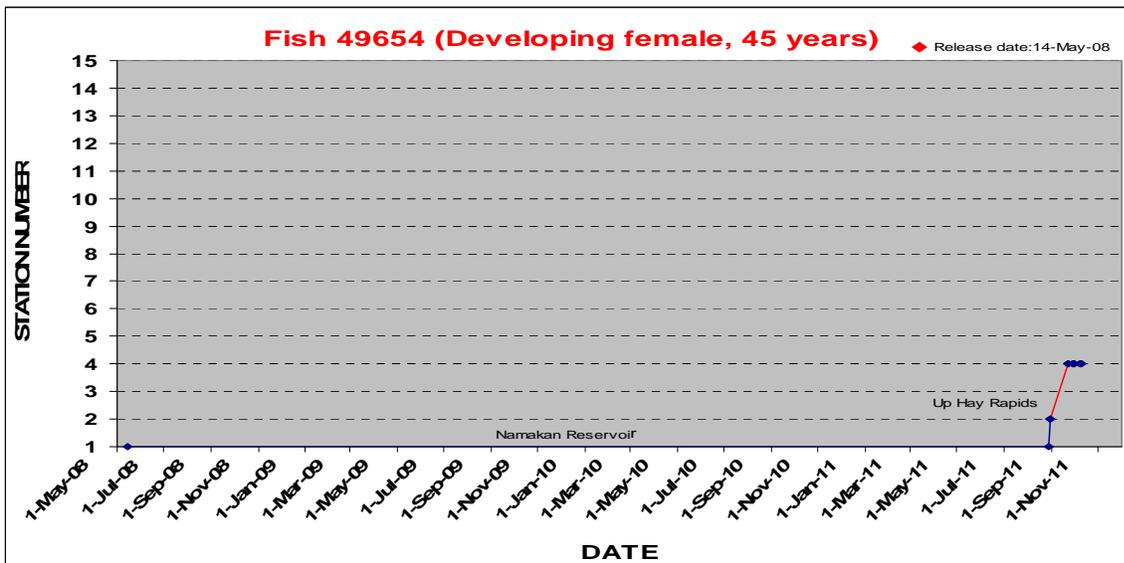
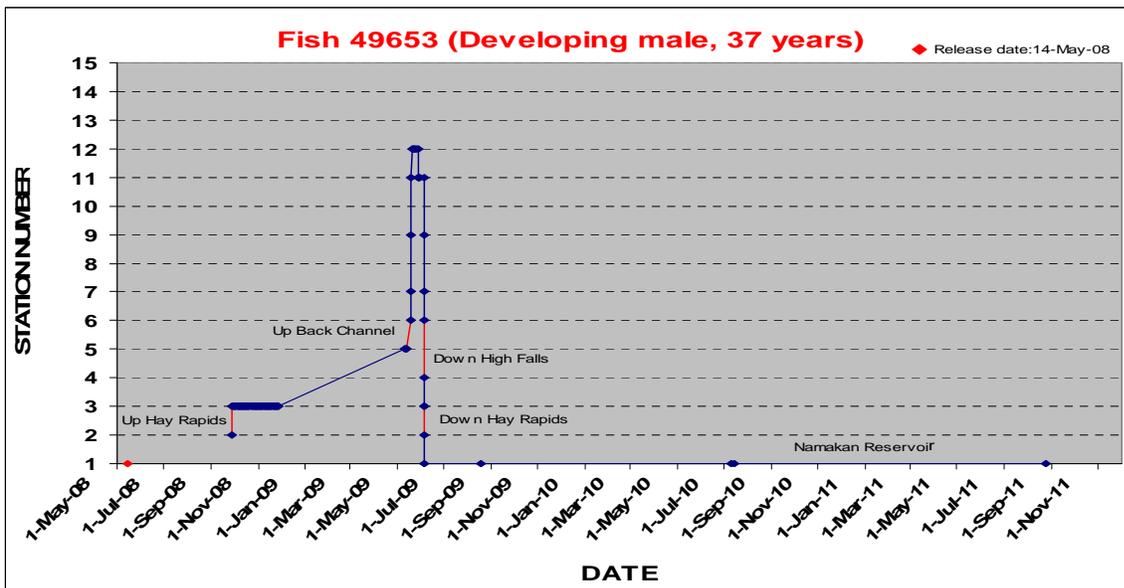
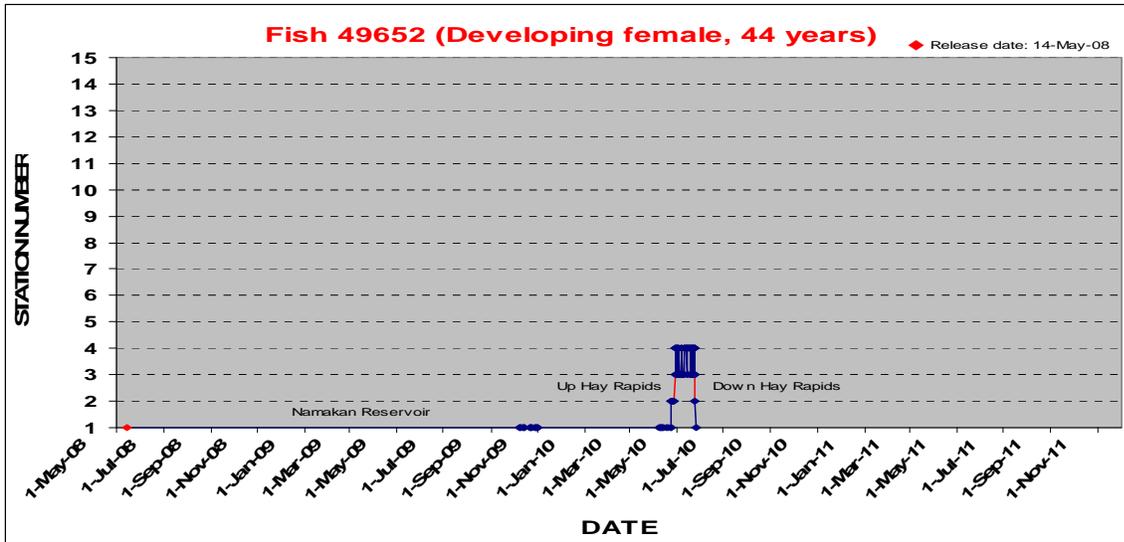












Appendix III: Movement of lake sturgeon through proposed hydro development sites (weir locations) on Namakan River, Ontario from 2007 to 2011. All flow values represent the main river flow based on reported outflow from Lac La Croix (05PA006). Estimated flows in the Back Channel are also provided based on flow distribution from Genivar, 2009 (Technical Note #2 Revision 3.0).

| Location Description | Transmitter ID Code | Direction of Movement | Date/Time of Movement START | Date/Time of Movement END | Temperature (°C) | Water Flow (m ³ /s) |
|---------------------------|---------------------|-----------------------|--------------------------------|------------------------------|---------------------|-----------------------------------|
| Ivy/Myrtle Falls | 4602 | Downstream | Jun. 03, 2008 22:37 | Jun. 04, 2008 22:07 | 12.6 | 409 |
| | 4592 | Downstream | Jun. 06, 2008 07:38 | Jun. 07, 2008 16:39 | 12.5 | 403 |
| | 4595 | Downstream | Jun. 25, 2008 23:10 | Jun. 28, 2008 00:46 | 18.2 | 384 |
| | 4595 | Downstream | Jul. 01, 2008 21:24 | Jul. 02, 2008 12:53 | 19.2 | 358 |
| | 4592 | Downstream | Jul. 21, 2008 04:08 | Jul. 21, 2008 13:37 | 20.4 | 238 |
| | 4599 | Downstream | Jul. 27, 2008 20:33 | Jul. 28, 2008 18:42 | 21.7 | 197 |
| | 8491 | Downstream | Jul. 28, 2008 22:15 | Oct. 21, 2008 02:21 | 19.5 | 109 |
| | 4602 | Upstream | May 21, 2008 23:56 | May 29, 2008 18:40 | 7.4 | 464 |
| | 4592 | Upstream | Jun. 01, 2008 20:41 | Jun. 02, 2008 19:50 | 12.2 | 431 |
| | 4592 | Upstream | Jun. 22, 2008 13:24 | Jun. 22, 2008 21:50 | 16.5 | 403 |
| | 4595 | Upstream | Jun. 24, 2008 12:21 | Jun. 24, 2008 21:30 | 17.4 | 396 |
| | 4599 | Upstream | Jun. 25, 2008 00:13 | Jul. 03, 2008 00:38 | 18.2 | 391 |
| | 4595 | Upstream | Jun. 30, 2008 14:18 | Jul. 01, 2008 13:07 | 18.8 | 373 |
| | 8491 | Upstream | May 05, 2009 23:22 | Jun. 13, 2009 23:10 | 6.8 | 313 |
| | 49640 | Upstream | May 19, 2009 21:25 | May 24, 2009 23:03 | 9.4 | 400 |
| Ivy Falls ¹ | 4589 | Downstream | Jun. 14, 2009 20:28 | Jun. 14, 2009 22:46 | 15.0 | 288 |
| | 49640 | Downstream | Jun. 15, 2009 19:57 | Jun. 18, 2009 13:56 | 15.5 | 282 |
| | 4589 | Downstream | Jun. 16, 2009 02:07 | Jun. 16, 2009 14:05 | 16.1 | 275 |
| | 4740 | Downstream | Jun. 16, 2009 20:31 | Jun. 17, 2009 07:24 | 16.1 | 275 |
| | 4592 | Downstream | Jun. 21, 2009 18:24 | Jun. 22, 2009 05:28 | 19.2 | 245 |
| | 8491 | Downstream | Oct. 06, 2009 18:58 | Oct. 12, 2009 06:19 | 12.5 | 54 |
| | 8491 | Downstream | Oct. 05, 2011 21:02 | Oct 19, 2011 03:47 | 14.6 | 29 |
| Myrtle Falls ² | 4740 | Downstream | May 25, 2009 11:02 | May 26, 2009 13:52 | 11.3 | 385 |
| | 49640 | Downstream | Jun. 12, 2009 23:49 | Jun. 13, 2009 06:46 | 14.3 | 294 |
| | 8492 | Downstream | Sept. 27, 2009 23:14 | Sept. 29, 2009 22:22 | 16.5 | 62 |
| | 8493 | Downstream | Oct. 08, 2009 03:47 | Oct. 08, 2009 23:04 | 11.4 | 51 |
| | 49634 | Downstream | May 19, 2011 15:00 | May 20, 2011 00:01 | 12.9 | 228 |
| | 4592 | Downstream | Jul. 03, 2011 15:17 | Jul. 03, 2011 21:21 | 20.7 | 143 |
| Side Channel ³ | 4746 | Downstream | Jul. 14, 2011 21:46 | Jul. 16, 2011 00:08 | 22.6 | 140 |

| | | | | | | |
|-------------------|------------|--------------------|---------------------|---------------------|------|-----|
| | 4740 | Upstream | May 22, 2009 02:58 | May 23, 2009 15:57 | 10.6 | 394 |
| | 4599 | Upstream | Jun. 01, 2009 07:45 | Jun. 19, 2009 17:03 | 11.5 | 361 |
| | 4589 | Upstream | Jun. 06, 2009 05:32 | Jun. 07, 2009 08:56 | 12.7 | 334 |
| | 4740 | Upstream | Jun. 14, 2009 00:13 | Jun. 14, 2009 18:45 | 15.0 | 288 |
| | 49640 | Upstream | Jun. 14, 2009 02:19 | Jun. 14, 2009 17:56 | 15.0 | 288 |
| | 4589 | Upstream | Jun. 15, 2009 07:19 | Jun. 15, 2009 19:42 | 15.5 | 282 |
| | 4592 | Upstream | Jun. 18, 2009 04:24 | Jun. 18, 2009 18:44 | 17.6 | 262 |
| | 8491 | Upstream | May 01, 2010 07:40 | May 06, 2010 06:48 | 11.0 | 45 |
| | 8493 | Upstream | Jul. 23, 2010 19:07 | Jul. 24, 2010 14:49 | 23.4 | 163 |
| | 8491 | Upstream | May 07, 2011 04:56 | May 19, 2011 12:44 | 6.8 | 223 |
| | 49634 | Upstream | May 17, 2011 18:53 | May 18, 2011 15:54 | 10.5 | 233 |
| | 4592 | Upstream | Jul. 01, 2011 23:21 | Jul. 02, 2011 21:22 | 19.5 | 142 |
| | 8492 | Upstream | Jul. 09, 2011 19:26 | Jul 14, 2011 01:26 | 22.6 | 148 |
| | 4746 | Upstream | Jul. 12, 2011 07:59 | Jul. 13, 2011 05:41 | 23.2 | 144 |
| High Falls | 4602 | Downstream | Jun. 03, 2007 18:24 | Jun. 04, 2007 14:31 | 16.9 | 64 |
| | 4594 | Downstream | Jun. 10, 2007 02:19 | Jun. 11, 2007 01:41 | 17.9 | 77 |
| | 4602 | Downstream | Jun. 07, 2008 07:04 | Jun. 07, 2008 08:03 | 13.0 | 403 |
| | 4741 | Downstream | Jun. 13, 2008 04:24 | Jun. 13, 2008 10:41 | 13.6 | 406 |
| | 49630 | Downstream | Jul. 11, 2008 18:46 | Jul. 12, 2008 11:05 | 19.9 | 287 |
| | 49633 | Downstream | Jul. 17, 2008 04:52 | Jul. 17, 2008 12:48 | 19.6 | 260 |
| | 49633 | Downstream | Jul. 21, 2008 02:44 | Jul. 22, 2008 05:51 | 20.4 | 238 |
| | 4741 | Downstream | Oct. 15, 2008 05:15 | Oct. 16, 2008 02:28 | 11.8 | 99 |
| | 49632 | Downstream | Oct. 26, 2008 02:35 | Oct. 26, 2008 23:37 | 8.9 | 111 |
| | 49632 | Downstream | May 27, 2009 20:50 | May 27, 2009 21:31 | 11.1 | 383 |
| | 49630 | Downstream | May 28, 2009 00:43 | May 28, 2009 01:24 | 11.4 | 378 |
| | 49635 | Downstream | May 28, 2009 07:25 | May 28, 2009 08:10 | 11.4 | 378 |
| | 49644 | Downstream | May 29, 2009 06:12 | May 29, 2009 10:45 | 11.9 | 375 |
| | 49643 | Downstream | May 31, 2009 12:16 | May 31, 2009 13:33 | 11.8 | 367 |
| | 49637 | Downstream | Jun. 03, 2009 06:03 | Jun. 04, 2009 10:55 | 12.5 | 350 |
| | 49653 | Downstream | Jun. 04, 2009 20:09 | Jun. 04, 2009 21:15 | 12.7 | 343 |
| | 4740 | Downstream | Jun. 18, 2009 03:40 | Jun. 18, 2009 07:42 | 17.6 | 262 |
| | 49640 | Downstream | Jun. 19, 2009 04:13 | Jun. 19, 2009 06:54 | 18.2 | 256 |
| | 4589 | Downstream | Jul. 05, 2009 09:16 | Jul. 05, 2009 22:37 | 18.2 | 183 |
| | 49634 | Downstream | Jul. 07, 2009 00:32 | Jul. 07, 2009 11:48 | 18.8 | 174 |
| 8493 | Downstream | May 05, 2010 07:36 | May 06, 2010 21:03 | 11.1 | 43 | |

| | | | | | | |
|---------------------|-------|------------|---------------------|---------------------------|------|----------|
| | 8492 | Downstream | May 16, 2010 21:30 | May 17, 2010 15:47 | 11.6 | 42 |
| | 4594 | Downstream | Jun. 06, 2010 03:13 | Jun. 07, 2010 01:39 | 20.0 | 41 |
| | 4593 | Downstream | Jul. 03, 2010 09:49 | Jul. 04, 2010 21:28 | 22.7 | 50 |
| | 4601 | Downstream | May 9, 2011 20:51 | May 16, 2011 00:39 | 8.0 | 230 |
| | 49630 | Downstream | May 21, 2011 23:40 | May 22, 2011 00:16 | 13.5 | 227 |
| | 49650 | Downstream | May 22, 2011 03:17 | May 22, 2011 03:42 | 13.8 | 225 |
| | 49638 | Downstream | May 23, 2011 07:22 | May 23, 2011 13:32 | 14.1 | 223 |
| | 49646 | Downstream | May 24, 2011 00:01 | May 24, 2011 00:50 | 13.6 | 221 |
| | 4749 | Downstream | May 24, 2011 22:41 | May 24, 2011 23:56 | 13.6 | 221 |
| | 4746 | Downstream | July 17, 2011 19:29 | Jul. 18, 2011 00:45 | 23.3 | 134 |
| Back Channel | 4593 | Downstream | Oct. 15, 2007 22:48 | Oct. 16, 2007 06:15 | 11.5 | 283 / 18 |
| | 4601 | Downstream | May 23, 2008 21:05 | May 24, 2008 17:01 | 8.5 | 467 / 31 |
| | 4592 | Downstream | Jun. 19, 2008 01:41 | Jun. 19, 2008 13:05 | 15.4 | 409 / 27 |
| | 4595 | Downstream | May 28, 2009 19:59 | May 29, 2009 14:51 | 11.4 | 375 / 24 |
| | 4592 | Downstream | Jun. 23, 2009 18:32 | Jun. 24, 2009 17:23 | 19.8 | 239 / 15 |
| | 49634 | Downstream | May 27, 2011 00:22 | - | 13.3 | 212/ 13 |
| | 4592 | Downstream | Jul. 11, 2011 23:42 | Jul. 12, 2011 10:02 | 23.4 | 144/ 8 |
| | 4746 | Downstream | Jul. 20, 2011 08:23 | Jul. 20, 2011 21:52 | 24.5 | 128/ 7 |
| | 4602 | Upstream | Oct. 04, 2007 19:40 | Return to Little Eva Lake | 14.8 | 128 / 7 |
| | 4602 | Upstream | Oct. 19, 2007 03:28 | Oct. 19, 2007 20:27 | 11.1 | 320 / 21 |
| | 4592 | Upstream | May 21, 2008 19:40 | Return to Little Eva Lake | 7.4 | 464 / 31 |
| | 4592 | Upstream | May 23, 2008 00:35 | May 25, 2008 03:34 | 8.5 | 467 / 31 |
| | 4741 | Upstream | May 27, 2008 06:18 | May 30, 2008 12:38 | 10.7 | 444 / 30 |
| | 4592 | Upstream | Jun. 19, 2008 15:29 | Jun. 20, 2008 00:41 | 15.4 | 407 / 27 |
| | 49644 | Upstream | Jun. 20, 2008 17:16 | Jun. 21, 2008 03:58 | 16.0 | 404 / 27 |
| | 49630 | Upstream | Jun. 26, 2008 21:10 | Jun. 27, 2008 21:55 | 18.9 | 383 / 25 |
| | 49634 | Upstream | Jun. 28, 2008 23:50 | Jun. 30, 2008 07:57 | 19.1 | 373 / 24 |
| | 49632 | Upstream | Jul. 05, 2008 17:04 | Jul. 06, 2008 13:44 | 19.9 | 321 / 23 |
| | 4741 | Upstream | Jul. 07, 2008 00:30 | Jul. 07, 2008 11:26 | 21.0 | 315 / 21 |
| | 49633 | Upstream | Jul. 07, 2008 20:56 | Jul. 08, 2008 14:52 | 21.0 | 302 / 19 |
| | 49633 | Upstream | Jul. 19, 2008 23:20 | Jul. 20, 2008 19:19 | 20.3 | 243 / 15 |
| | 49637 | Upstream | Jul. 20, 2008 20:48 | Jul. 22, 2008 15:59 | 20.2 | 232 / 14 |
| | 49632 | Upstream | May 04, 2009 19:36 | May 06, 2009 17:20 | 6.3 | 325 / 21 |
| | 49640 | Upstream | May 04, 2009 22:39 | May 08, 2009 10:22 | 6.3 | 346 / 22 |

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|-------------------|------------|----------------|-------|---------------------------|-------|------|----------|
| 49643 | Upstream | May 06, 2009 | 21:36 | May 15, 2009 | 16:54 | 7.5 | 392 / 26 |
| 49635 | Upstream | May 09, 2009 | 12:44 | May 22, 2009 | 08:32 | 7.9 | 394 / 26 |
| 49653 | Upstream | May 11, 2009 | 23:57 | May 18, 2009 | 12:32 | 8.2 | 398 / 26 |
| 4740 | Upstream | May 13, 2009 | 00:28 | May 13, 2009 | 13:26 | 9.0 | 383 / 25 |
| 49630 | Upstream | May 14, 2009 | 23:03 | May 17, 2009 | 14:22 | 9.1 | 398 / 26 |
| 4589 | Upstream | May 25, 2009 | 01:54 | May 29, 2009 | 16:49 | 11.5 | 375 / 26 |
| 4601 | Upstream | Jun. 05, 2009 | 19:54 | Jun. 06, 2009 | 14:15 | 12.8 | 334 / 22 |
| 4594 | Upstream | Jun. 24, 2009 | 06:59 | Return to Little Eva Lake | | 20.4 | 239 / 15 |
| 4593 | Upstream | Jul. 11, 2009 | 17:00 | Jul. 12, 2009 | 04:19 | 19.8 | 149 / 9 |
| 4594 | Upstream | Jul. 12, 2009 | 20:43 | Jul. 13, 2009 | 09:48 | 19.6 | 145 / 9 |
| 49646 | Upstream | Jul. 09, 2010 | 00:39 | Jul. 09, 2010 | 20:31 | 23.6 | 105/ 6 |
| 49634 | Upstream | Jul. 11, 2010 | 23:26 | Jul. 13, 2010 | 08:10 | 24.4 | 125/ 8 |
| 8493 | Upstream | Jul. 21, 2010 | 16:16 | Jul. 22, 2010 | 08:45 | 23.3 | 162/ 10 |
| 49650 | Upstream | May 07, 2011 | 22:59 | May 17, 2011 | 06:33 | 6.8 | 233/ 15 |
| 49630 | Upstream | May 09, 2011 | 22:28 | May 11, 2011 | 04:45 | 8.0 | 233/ 15 |
| 4753 | Upstream | May 11, 2011 | 00:12 | Return to Little Eva Lake | | 9.5 | 233/ 15 |
| 49638 | Upstream | May 12, 2011 | 20:12 | May 14, 2011 | 17:28 | 10.0 | 236/ 15 |
| 4749 | Upstream | May 14, 2011 | 20:25 | May 17, 2011 | 02:14 | 9.1 | 233/ 15 |
| 4592 | Upstream | May 23, 2011 | 02:42 | Return to Little Eva Lake | | 14.1 | 223/ 14 |
| 4753 | Upstream | May 24, 2011 | 04:22 | Return to Little Eva Lake | | 13.6 | 221/ 14 |
| 4593 | Upstream | Jun. 30, 2011 | 00:06 | Jul. 01, 2011 | 01:44 | 18.7 | 142/ 8 |
| 4592 | Upstream | Jun. 30, 2011 | 21:21 | Jul. 01, 2011 | 07:27 | 18.7 | 142/ 8 |
| 8492 | Upstream | Jul. 07, 2011 | 20:29 | Jul. 09, 2011 | 01:49 | 22.3 | 148/ 9 |
| 4746 | Upstream | Jul. 10, 2011 | 09:57 | Jul. 10, 2011 | 22:49 | 23.0 | 147/ 9 |
| 4746 | Upstream | Jul. 19, 2011 | 04:43 | Jul. 20, 2011 | 06:24 | 24.3 | 128/ 7 |
| 4601 | Upstream | Aug. 1, 2011 | 03:02 | Aug. 01, 2011 | 15:56 | 23.3 | 96/ 5 |
| Hay Rapids | | | | | | | |
| 4588 | Downstream | May 24, 2007 | 22:27 | May 25, 2007 | 23:12 | 14.9 | 56 |
| 4750 | Downstream | May 25, 2007 | 02:23 | May 25, 2007 | 23:47 | 14.9 | 56 |
| 4589 | Downstream | May 25, 2007 | 03:02 | May 27, 2007 | 02:13 | 14.1 | 58 |
| 4749 | Downstream | May 28, 2007 | 01:32 | May 28, 2007 | 05:38 | 14.0 | 59 |
| 4602 | Downstream | Jun. 07, 2007 | 11:36 | Jun. 08, 2007 | 05:51 | 17.7 | 71 |
| 4591 | Downstream | Jun. 07, 2007 | 12:53 | Jun. 08, 2007 | 03:03 | 17.7 | 71 |
| 4594 | Downstream | Jun. 12, 2007 | 08:31 | Jun. 12, 2007 | 17:53 | 19.1 | 83 |
| 4590 | Downstream | Jun. 18, 2007 | 05:53 | Jun. 19, 2007 | 22:46 | 21.1 | 99 |
| 4742 | Downstream | Jul. 11, 2007 | 11:45 | Jul. 12, 2007 | 00:24 | 21.4 | 106 |
| 4752 | Downstream | Sept. 19, 2007 | 04:40 | Sept. 20, 2007 | 23:57 | 14.7 | 42 |
| 4751 | Downstream | Sept. 30, 2007 | 19:24 | Oct. 01, 2007 | 22:54 | 15.2 | 106 |

| | | | | | | | |
|-------|------------|---------------|-------|---------------|--------------------|------|-----|
| 4744 | Downstream | Oct. 15, 2007 | 22:11 | Oct. 16, 2007 | 13:41 | 11.2 | 283 |
| 4593 | Downstream | Oct. 17, 2007 | 00:49 | Oct. 17, 2007 | 08:18 | 11.0 | 293 |
| 4601 | Downstream | May 24, 2008 | 20:57 | May 25, 2008 | 13:28 | 10.2 | 464 |
| 4602 | Downstream | Jun. 08, 2008 | 06:06 | Jun. 08, 2008 | 09:33 | 13.4 | 402 |
| 4741 | Downstream | Jun. 16, 2008 | 10:32 | Jun. 17, 2008 | 01:32 | 14.4 | 411 |
| 4742 | Downstream | Aug. 17, 2008 | 02:05 | Aug. 17, 2008 | 22:03 | 22.7 | 115 |
| 4741 | Downstream | Feb. 26, 2009 | 23:21 | May 05, 2009 | 14:53 | 6.8 | 313 |
| 49642 | Downstream | Mar. 01, 2009 | 00:35 | May 23, 2009 | 04:18 | 10.7 | 391 |
| 4744 | Downstream | Mar. 01, 2009 | 02:49 | May 07, 2009 | 13:39 | 8.3 | 336 |
| 49633 | Downstream | May 27, 2009 | 10:31 | May 28, 2009 | 23:40 | 11.4 | 378 |
| 49630 | Downstream | May 28, 2009 | 02:11 | May 28, 2009 | 15:10 ⁴ | 11.4 | 378 |
| 8495 | Downstream | May 28, 2009 | 02:54 | May 28, 2009 | 12:21 ⁴ | 11.4 | 378 |
| 49635 | Downstream | May 28, 2009 | 08:27 | May 29, 2009 | 11:54 ⁴ | 11.9 | 375 |
| 49632 | Downstream | May 28, 2009 | 18:32 | May 28, 2009 | 23:57 ⁴ | 11.4 | 378 |
| 49644 | Downstream | May 29, 2009 | 13:53 | May 29, 2009 | 18:52 | 11.9 | 375 |
| 4595 | Downstream | May 29, 2009 | 21:26 | May 30, 2009 | 01:19 | 12.1 | 369 |
| 49643 | Downstream | Jun. 02, 2009 | 02:13 | Jun. 02, 2009 | 05:04 | 11.9 | 355 |
| 49653 | Downstream | Jun. 05, 2009 | 04:03 | Jun. 05, 2009 | 06:08 | 12.8 | 338 |
| 4588 | Downstream | Jun. 05, 2009 | 22:52 | Jun. 06, 2009 | 22:10 | 12.7 | 334 |
| 4750 | Downstream | Jun. 06, 2009 | 02:28 | Jun. 06, 2009 | 06:06 | 12.7 | 334 |
| 49637 | Downstream | Jun. 07, 2009 | 16:41 | Jun. 08, 2009 | 23:08 | 12.9 | 324 |
| 4739 | Downstream | Jun. 14, 2009 | 22:22 | Jun. 15, 2009 | 02:28 | 15.5 | 282 |
| 4591 | Downstream | Jun. 16, 2009 | 12:40 | Jun. 17, 2009 | 05:22 | 17.0 | 268 |
| 4740 | Downstream | Jun. 18, 2009 | 07:58 | Jun. 19, 2009 | 09:00 ⁴ | 18.2 | 256 |
| 49640 | Downstream | Jun. 18, 2009 | 18:00 | Jun. 19, 2009 | 13:59 ⁴ | 18.2 | 256 |
| 4592 | Downstream | Jun. 24, 2009 | 17:23 | Jun. 27, 2009 | 03:16 ⁴ | 20.8 | 223 |
| 4594 | Downstream | Jul. 01, 2009 | 14:33 | Jul. 06, 2009 | 13:30 ⁴ | 18.6 | 178 |
| 4589 | Downstream | Jul. 06, 2009 | 01:38 | Jul. 06, 2009 | 15:58 ⁴ | 18.6 | 178 |
| 49634 | Downstream | Jul. 07, 2009 | 17:48 | Jul. 08, 2009 | 02:10 ⁴ | 19.0 | 169 |
| 49647 | Downstream | Jul. 17, 2009 | 02:51 | Jul. 18, 2009 | 11:13 ⁴ | 17.4 | 130 |
| 4742 | Downstream | Aug. 02, 2009 | 23:49 | Aug. 03, 2009 | 04:33 | 19.0 | 108 |
| 4590 | Downstream | Oct. 05, 2009 | 17:55 | Oct. 06, 2009 | 20:50 | 12.5 | 54 |
| 4741 | Downstream | Mar. 15, 2010 | 21:21 | - | - | - | - |
| 49646 | Downstream | Mar. 25, 2010 | 23:52 | Jul. 07, 2010 | 21:57 | 23.9 | 91 |
| 49631 | Downstream | Apr. 09, 2010 | 20:16 | Apr. 23, 2010 | 13:15 | 10.1 | 48 |
| 4746 | Downstream | Apr. 18, 2010 | 22:57 | Apr. 19, 2010 | 18:26 | 10.6 | 50 |
| 4592 | Downstream | Apr. 26, 2010 | 16:17 | Apr. 29, 2010 | 08:35 | 12.1 | 46 |

| | | | | | |
|-------|------------|----------------------|----------------------|------|-----|
| 4752 | Downstream | May 24, 2010 07:56 | May 24, 2010 18:37 | 19.4 | 41 |
| 4745 | Downstream | May 24, 2010 13:27 | May 25, 2010 03:59 | 20.0 | 41 |
| 4744 | Downstream | May 24, 2010 15:46 | May 25, 2010 01:41 | 20.0 | 41 |
| 49647 | Downstream | May 24, 2010 17:19 | May 25, 2010 06:24 | 20.0 | 41 |
| 49631 | Downstream | May 25, 2010 01:51 | May 25, 2010 15:46 | 20.0 | 41 |
| 49652 | Downstream | May 25, 2010 10:31 | May 25, 2010 16:55 | 20.0 | 41 |
| 49641 | Downstream | May 26, 2010 11:48 | May 26, 2010 21:07 | 19.9 | 40 |
| 4743 | Downstream | May 26, 2010 16:12 | May 26, 2010 23:11 | 19.9 | 40 |
| 49642 | Downstream | May 27, 2010 02:38 | May 27, 2010 14:28 | 20.2 | 40 |
| 4594 | Downstream | Jun. 08, 2010 02:37 | Jun. 08, 2010 19:32 | 20.4 | 41 |
| 8492 | Downstream | Jun. 15, 2010 17:17 | Jun. 16, 2010 05:05 | 19.1 | 44 |
| 8492 | Downstream | Jul. 02, 2010 15:16 | Jul. 03, 2010 01:12 | 22.7 | 50 |
| 4593 | Downstream | Jul. 05, 2010 22:39 | Jul. 07, 2010 00:28 | 23.9 | 91 |
| 4592 | Downstream | Sept. 14, 2010 14:30 | Sept. 14, 2010 22:59 | 16.9 | 62 |
| 4746 | Downstream | May 04, 2011 23:07 | May 07, 2011 02:33 | 6.8 | 223 |
| 4601 | Downstream | May 17, 2011 01:30 | May 19, 2011 00:25 | 12.1 | 229 |
| 49650 | Downstream | May 22, 2011 08:09 | May 22, 2011 12:17 | 13.8 | 225 |
| 49630 | Downstream | May 22, 2011 10:48 | May 22, 2011 15:39 | 13.8 | 225 |
| 4592 | Downstream | May 23, 2011 14:32 | May 23, 2011 22:11 | 14.1 | 223 |
| 49638 | Downstream | May 23, 2011 20:43 | May 24, 2011 01:11 | 13.6 | 221 |
| 4751 | Downstream | May 24, 2011 03:31 | May 25, 2011 04:54 | 13.5 | 218 |
| 49646 | Downstream | May 24, 2011 15:37 | May 24, 2011 18:22 | 13.6 | 221 |
| 4749 | Downstream | May 25, 2011 05:00 | May 25, 2011 08:21 | 13.5 | 218 |
| 4739 | Downstream | May 27, 2011 00:55 | May 27, 2011 23:48 | 13.3 | 212 |
| 8492 | Downstream | May 31, 2011 13:31 | Jun. 01, 2011 22:35 | 14.0 | 194 |
| 49634 | Downstream | Jun. 04, 2011 01:25 | Jun. 04, 2011 20:23 | 14.4 | 185 |
| 4591 | Downstream | Jun. 11, 2011 20:38 | Jun. 12, 2011 05:34 | 16.4 | 160 |
| 4742 | Downstream | Jul. 05, 2011 13:30 | Jul. 07, 2011 00:14 | 22.3 | 146 |
| 4592 | Downstream | Jul. 13, 2011 17:21 | Jul. 13, 2011 22:50 | 22.9 | 143 |
| 4746 | Downstream | Jul. 21, 2011 07:25 | Jul. 21, 2011 12:58 | 24.6 | 123 |
| 4746 | Downstream | Jul. 31, 2011 18:56 | Aug. 05, 2011 00:06 | 24.7 | 88 |
| 4742 | Upstream | Jun. 12, 2007 03:12 | Jun. 12, 2007 14:52 | 19.1 | 83 |
| 4744 | Upstream | Jul. 19, 2007 09:37 | Jul. 19, 2007 17:59 | 21.8 | 94 |
| 4741 | Upstream | Jul. 26, 2007 22:10 | Jul. 27, 2007 10:02 | 24.9 | 80 |
| 4602 | Upstream | Sept. 29, 2007 23:22 | Sept. 30, 2007 06:56 | 15.4 | 99 |
| 49644 | Upstream | Jun. 11, 2008 23:09 | Jun. 16, 2008 10:49 | 14.3 | 411 |
| 49634 | Upstream | Jun. 23, 2008 16:00 | Jun. 25, 2008 23:41 | 18.2 | 391 |

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|-------|----------|----------------|-------|----------------|-------|------|-----|
| 49630 | Upstream | Jun. 24, 2008 | 15:45 | Jun. 26, 2008 | 09:52 | 18.9 | 386 |
| 49633 | Upstream | Jun. 25, 2008 | 23:21 | Jun. 27, 2008 | 16:12 | 19.2 | 383 |
| 4741 | Upstream | Jun. 26, 2008 | 05:08 | Jun. 27, 2008 | 00:45 | 19.2 | 383 |
| 49632 | Upstream | Jul. 02, 2008 | 19:27 | Jul. 03, 2008 | 23:10 | 19.3 | 350 |
| 49635 | Upstream | Jul. 17, 2008 | 05:35 | Jul. 17, 2008 | 11:57 | 19.6 | 260 |
| 49637 | Upstream | Jul. 18, 2008 | 18:21 | Jul. 19, 2008 | 03:14 | 20.3 | 249 |
| 4742 | Upstream | Jul. 21, 2008 | 00:43 | Jul. 21, 2008 | 15:22 | 20.4 | 238 |
| 4744 | Upstream | Jul. 29, 2008 | 20:41 | Jul. 30, 2008 | 08:53 | 21.9 | 185 |
| 4740 | Upstream | Aug. 02, 2008 | 09:45 | Aug. 02, 2008 | 17:35 | 22.0 | 173 |
| 4588 | Upstream | Aug. 03, 2008 | 21:37 | Aug. 04, 2008 | 19:42 | 22.4 | 163 |
| 49640 | Upstream | Aug. 04, 2008 | 05:57 | Aug. 04, 2008 | 11:40 | 22.4 | 163 |
| 49642 | Upstream | Aug. 10, 2008 | 20:22 | Aug. 12, 2008 | 07:45 | 22.4 | 132 |
| 49643 | Upstream | Aug. 15, 2008 | 03:02 | Aug. 15, 2008 | 11:15 | 22.3 | 122 |
| 4739 | Upstream | Sept. 06, 2008 | 22:44 | Sept. 07, 2008 | 22:43 | 19.6 | 70 |
| 49653 | Upstream | Sept. 27, 2008 | 02:14 | Sept. 27, 2008 | 06:36 | 16.5 | 67 |
| 4741 | Upstream | May 07, 2009 | 03:31 | Aug. 02, 2009 | 21:16 | 19.0 | 109 |
| 8495 | Upstream | May 21, 2009 | 15:39 | May 26, 2009 | 16:37 | 11.3 | 385 |
| 4589 | Upstream | May 22, 2009 | 13:12 | May 25, 2009 | 16:49 | 11.5 | 386 |
| 4591 | Upstream | May 23, 2009 | 00:03 | May 25, 2009 | 16:07 | 11.5 | 386 |
| 4750 | Upstream | May 25, 2009 | 16:35 | May 25, 2009 | 21:43 | 11.5 | 386 |
| 4601 | Upstream | Jun. 01, 2009 | 02:38 | Jun. 01, 2009 | 19:06 | 11.5 | 361 |
| 4752 | Upstream | Jun. 07, 2009 | 17:02 | Jun. 09, 2009 | 23:06 | 12.8 | 319 |
| 4594 | Upstream | Jun. 15, 2009 | 00:26 | Jun. 22, 2009 | 09:44 | 19.2 | 248 |
| 4745 | Upstream | Jun. 24, 2009 | 00:10 | Jun. 30, 2009 | 03:04 | 17.9 | 208 |
| 49641 | Upstream | Jul. 03, 2009 | 22:28 | Jul. 05, 2009 | 03:42 | 18.2 | 183 |
| 4742 | Upstream | Jul. 03, 2009 | 22:55 | Jul. 23, 2009 | 22:11 | 19.2 | 119 |
| 4593 | Upstream | Jul. 10, 2009 | 23:23 | Jul. 11, 2009 | 17:00 | 19.8 | 153 |
| 4594 | Upstream | Jul. 11, 2009 | 23:05 | Jul. 12, 2009 | 20:43 | 19.6 | 149 |
| 49647 | Upstream | Jul. 14, 2009 | 08:19 | Jul. 16, 2009 | 18:56 | 18.2 | 134 |
| 4744 | Upstream | Jul. 24, 2009 | 07:22 | Jul. 24, 2009 | 21:14 | 19.5 | 118 |
| 49647 | Upstream | Aug. 01, 2009 | 21:32 | Aug. 02, 2009 | 03:12 | 19.0 | 109 |
| 4592 | Upstream | Aug. 16, 2009 | 13:59 | Aug. 16, 2009 | 22:36 | 22.4 | 101 |
| 49642 | Upstream | Sept. 02, 2009 | 22:14 | Sept. 03, 2009 | 02:04 | 19.7 | 90 |
| 49631 | Upstream | Sept. 04, 2009 | 00:22 | Sept. 05, 2009 | 00:15 | 20 | 88 |
| 4746 | Upstream | Sept. 05, 2009 | 08:17 | Sept. 06, 2009 | 16:45 | 20.4 | 86 |
| 4590 | Upstream | Sept. 10, 2009 | 02:25 | Sept. 11, 2009 | 02:12 | 21.4 | 80 |

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|-------|----------|----------------------|----------------------|------|-----|
| 4739 | Upstream | Sept. 16, 2009 23:24 | Sept. 17, 2009 14:15 | 21.3 | 73 |
| 49652 | Upstream | Apr. 27, 2010 03:36 | Apr. 28, 2010 06:14 | 12.8 | 46 |
| 49631 | Upstream | May 02, 2010 04:24 | May 03, 2010 05:42 | 10.4 | 43 |
| 4743 | Upstream | May 15, 2010 17:08 | May 17, 2010 08:22 | 13.3 | 41 |
| 49634 | Upstream | Jun. 24, 2010 18:54 | Jun. 25, 2010 10:01 | 21.9 | 47 |
| 49630 | Upstream | Jun. 26, 2010 02:33 | Jun. 26, 2010 19:04 | 22.7 | 48 |
| 8492 | Upstream | Jun. 30, 2010 23:54 | Jul. 01, 2010 10:12 | 21.8 | 50 |
| 49650 | Upstream | Jul. 06, 2010 14:01 | Jul. 07, 2010 02:27 | 23.9 | 91 |
| 49646 | Upstream | Jul. 08, 2010 07:59 | Jul. 08, 2010 19:04 | 23.6 | 98 |
| 4592 | Upstream | Jul. 11, 2010 03:27 | Jul. 11, 2010 13:35 | 24.4 | 115 |
| 4746 | Upstream | Jul. 14, 2010 19:56 | Jul. 15, 2010 22:04 | 23.1 | 137 |
| 4749 | Upstream | Sept. 27, 2010 19:49 | Sept. 28, 2010 12:41 | 14.4 | 61 |
| 49638 | Upstream | May 10, 2011 19:45 | May 12, 2011 05:53 | 10.0 | 234 |
| 4751 | Upstream | May 14, 2011 14:48 | May 20, 2011 00:22 | 12.9 | 228 |
| 4593 | Upstream | May 18, 2011 09:37 | May 19, 2011 03:24 | 12.1 | 229 |
| 4591 | Upstream | May 19, 2011 00:45 | May 19, 2011 21:30 | 12.1 | 229 |
| 4592 | Upstream | May 20, 2011 17:50 | May 21, 2011 04:11 | 13.5 | 227 |
| 4752 | Upstream | May 26, 2011 11:07 | May 27, 2011 16:52 | 13.3 | 212 |
| 8492 | Upstream | May 28, 2011 15:57 | May 30, 2011 14:40 | 13.7 | 205 |
| 4742 | Upstream | Jun. 07, 2011 22:35 | Jun. 09, 2011 07:17 | 16.0 | 172 |
| 4592 | Upstream | Jun. 29, 2011 05:26 | Jun. 29, 2011 23:16 | 18.3 | 141 |
| 8492 | Upstream | Jul. 04, 2011 12:37 | Jul. 06, 2011 17:19 | 22.0 | 146 |
| 49635 | Upstream | Jul. 04, 2011 23:40 | Jul. 05, 2011 14:08 | 21.6 | 146 |
| 4746 | Upstream | Jul. 08, 2011 17:56 | Jul. 10, 2011 00:55 | 23.0 | 147 |
| 4601 | Upstream | Jul. 29, 2011 21:59 | Jul. 30, 2011 04:20 | 23.0 | 101 |
| 4746 | Upstream | Jul. 30, 2011 18:49 | Jul. 31, 2011 06:05 | 23.3 | 98 |
| 4743 | Upstream | Sept. 18, 2011 01:58 | - | 16.6 | 35 |
| 49641 | Upstream | Sept. 28, 2011 04:14 | Sept. 28, 2011 13:41 | 15.0 | 32 |

Appendix IV: Movement of lake sturgeon through other flowing (undeveloped) rapids on Namakan River, Ontario from 2007 to 2011. All flow values represent the main river flow based on reported outflow from Lac La Croix (05PA006).

| Location Description | Transmitter ID Code | Direction of Movement | Date/Time of Movement START | Date/Time of Movement END | Temperature (°C) | Water Flow (m ³ /s) |
|----------------------|---------------------|-----------------------|-----------------------------|---------------------------|------------------|--------------------------------|
| Twisted Rapids | 4600 | Downstream | Jun. 02, 2007 04:29 | Jun. 03, 2007 09:51 | 16.9 | 64 |
| | 4602 | Downstream | Jun. 02, 2007 20:25 | Jun. 03, 2007 17:09 | 16.9 | 64 |
| | 4594 | Downstream | Jun. 09, 2007 04:13 | Jun. 09, 2007 16:48 | 17.6 | 74 |
| | 4593 | Downstream | Jun. 11, 2007 21:42 | Jun. 12, 2007 05:50 | 19.1 | 83 |
| | 4593 | Downstream | Jun. 18, 2007 07:22 | Jun. 18, 2007 14:11 | 21.9 | 99 |
| | 4593 | Downstream | Jul. 04, 2007 00:44 | Jul. 10, 2007 07:27 | 22.6 | 108 |
| | 4593 | Downstream | Jul. 23, 2007 23:54 | Jul. 24, 2007 10:57 | 23.5 | 84 |
| | 4593 | Downstream | Oct. 01, 2007 03:04 | Oct. 03, 2007 23:13 | 14.9 | 121 |
| | 4597 | Downstream | May 28, 2008 10:44 | May 29, 2008 13:07 | 11.4 | 446 |
| | 4602 | Downstream | Jun. 06, 2008 16:30 | Jun. 06, 2008 22:38 | 12.5 | 407 |
| | 4741 | Downstream | Jun. 10, 2008 12:47 | Jun. 11, 2008 13:41 | 13.4 | 407 |
| | 4592 | Downstream | Jun. 13, 2008 06:39 | Jun. 14, 2008 05:19 | 14.1 | 407 |
| | 4595 | Downstream | Jun. 28, 2008 02:24 | Jun. 28, 2008 07:34 | 19.1 | 384 |
| | 4595 | Downstream | Jul. 07, 2008 08:12 | Jul. 07, 2008 23:10 | 21.0 | 315 |
| | 49633 | Downstream | Jul. 10, 2008 00:38 | Jul. 12, 2008 04:16 | 19.7 | 283 |
| | 4741 | Downstream | Jul. 10, 2008 18:03 | Jul. 11, 2008 17:11 | 19.9 | 287 |
| | 49632 | Downstream | Jul. 12, 2008 03:06 | Jul. 13, 2008 14:43 | 18.9 | 278 |
| | 4741 | Downstream | Jul. 24, 2008 15:17 | Jul. 25, 2008 06:27 | 21.7 | 213 |
| | 4595 | Downstream | Jul. 29, 2008 17:39 | Sept. 28, 2008 01:00 | 16.3 | 69 |
| | 49632 | Downstream | Aug. 04, 2008 03:47 | Aug. 04, 2008 11:32 | 22.4 | 163 |
| | 49632 | Downstream | Aug. 23, 2008 08:09 | Aug. 23, 2008 13:07 | 22.1 | 96 |
| | 49634 | Downstream | Sept. 14, 2008 06:21 | Sept. 17, 2008 22:34 | 16.9 | 65 |
| | 49644 | Downstream | Sept. 15, 2008 02:41 | Oct. 03, 2008 00:43 | 14.3 | 76 |
| | 49632 | Downstream | Sept. 16, 2008 04:14 | Sept. 16, 2008 15:47 | 16.8 | 65 |
| | 49637 | Downstream | Sept. 19, 2008 00:59 | Sept. 21, 2008 16:46 | 16.9 | 61 |
| | 49634 | Downstream | Sept. 29, 2008 18:57 | Oct. 01, 2008 19:15 | 15.0 | 73 |
| | 49632 | Downstream | Oct. 02, 2008 23:09 | Oct. 03, 2008 18:28 | 14.3 | 76 |
| | 49634 | Downstream | Oct. 06, 2008 01:26 | Oct. 09, 2008 07:02 | 12.9 | 83 |
| | 4592 | Downstream | Oct. 08, 2008 10:29 | May 15, 2009 21:30 | 8.5 | 392 |
| | 49632 | Downstream | Oct. 09, 2008 22:46 | Oct. 10, 2008 06:45 | 12.3 | 87 |
| | 49632 | Downstream | Oct. 13, 2008 19:03 | Oct. 14, 2008 21:33 | 12.1 | 98 |

| | | | | | | | |
|-------|------------|---------------|-------|---------------|-------|------|-----|
| 49634 | Downstream | Oct. 20, 2008 | 03:53 | Oct. 21, 2008 | 05:49 | 10.1 | 109 |
| 49632 | Downstream | Oct. 23, 2008 | 16:26 | Oct. 24, 2008 | 00:03 | 9.3 | 111 |
| 4595 | Downstream | Nov. 04, 2008 | 12:23 | May 05, 2009 | 19:49 | 6.8 | 313 |
| 49644 | Downstream | May 12, 2009 | 07:28 | May 13, 2009 | 20:28 | 9.0 | 383 |
| 49630 | Downstream | May 27, 2009 | 17:16 | May 27, 2009 | 18:35 | 11.1 | 383 |
| 49635 | Downstream | May 27, 2009 | 22:43 | May 28, 2009 | 01:23 | 11.4 | 378 |
| 49634 | Downstream | May 28, 2009 | 10:12 | May 29, 2009 | 00:10 | 11.9 | 375 |
| 49637 | Downstream | May 30, 3009 | 04:03 | May 30, 2009 | 09:26 | 12.1 | 369 |
| 49653 | Downstream | Jun. 04, 2009 | 10:57 | Jun. 04, 2009 | 14:30 | 12.7 | 343 |
| 4740 | Downstream | Jun. 17, 2009 | 14:20 | Jun. 17, 2009 | 19:16 | 17.0 | 268 |
| 49640 | Downstream | Jun. 18, 2009 | 15:17 | Jun. 18, 2009 | 21:35 | 17.6 | 262 |
| 4589 | Downstream | Jun. 22, 2009 | 03:27 | Jun. 23, 2009 | 16:44 | 19.8 | 245 |
| 4592 | Downstream | Jun. 22, 2009 | 16:46 | Jun. 23, 2009 | 02:04 | 19.8 | 245 |
| 49634 | Downstream | Jul. 02, 2009 | 11:36 | Jul. 06, 2009 | 05:05 | 18.6 | 178 |
| 4601 | Downstream | Oct. 08, 2009 | 00:00 | Apr. 24, 2010 | 22:00 | 11.6 | 48 |
| 8492 | Downstream | Apr. 02, 2010 | 04:30 | Apr. 14, 2010 | 21:37 | 7.9 | 52 |
| 8493 | Downstream | Apr. 21, 2010 | 15:15 | Apr. 21, 2010 | 23:58 | 10.9 | 49 |
| 8492 | Downstream | Apr. 25, 2010 | 02:23 | Apr. 26, 2010 | 19:58 | 11.5 | 47 |
| 8493 | Downstream | Apr. 28, 2010 | 21:43 | May 03, 2010 | 06:09 | 10.4 | 43 |
| 4593 | Downstream | May 21, 2010 | 18:55 | May 22, 2010 | 01:21 | 20.3 | 41 |
| 4593 | Downstream | May 23, 2010 | 08:01 | Jun. 25, 2010 | 22:25 | 21.9 | 47 |
| 4594 | Downstream | May 23, 2010 | 11:40 | Jun. 05, 2010 | 15:33 | 19.9 | 40 |
| 4601 | Downstream | Apr. 10, 2011 | 02:10 | May 08, 2011 | 04:43 | 7.2 | 227 |
| 4597 | Downstream | May 10, 2011 | 22:35 | May 17, 2011 | 15:57 | 10.5 | 233 |
| 49630 | Downstream | May 21, 2011 | 05:12 | May 21, 2011 | 11:28 | 13.5 | 227 |
| 49638 | Downstream | May 21, 2011 | 09:04 | May 21, 2011 | 13:34 | 13.5 | 227 |
| 4749 | Downstream | May 21, 2011 | 14:20 | May 23, 2011 | 04:13 | 14.1 | 223 |
| 49650 | Downstream | May 21, 2011 | 15:57 | May 21, 2011 | 21:26 | 13.5 | 227 |
| 49638 | Downstream | May 22, 2011 | 14:31 | May 22, 2011 | 18:29 | 13.8 | 225 |
| 49634 | Downstream | May 22, 2011 | 20:38 | May 24, 2011 | 01:14 | 13.6 | 221 |
| 49646 | Downstream | May 23, 2011 | 09:22 | May 23, 2011 | 15:47 | 14.1 | 223 |
| 4597 | Downstream | May 23, 2011 | 16:18 | May 26, 2011 | 22:01 | 13.4 | 216 |
| 4592 | Downstream | Jul. 10, 2011 | 07:21 | Jul. 10, 2011 | 21:05 | 23.0 | 147 |
| 4746 | Downstream | Jul. 16, 2011 | 03:15 | Jul. 16, 2011 | 18:04 | 22.6 | 136 |
| 4593 | Upstream | May 23, 2007 | 21:21 | May 25, 2007 | 22:17 | 14.7 | 55 |
| 4595 | Upstream | May 26, 2007 | 14:13 | May 27, 2007 | 19:08 | 14.6 | 58 |
| 4594 | Upstream | May 27, 2007 | 07:44 | May 27, 2007 | 22:40 | 14.1 | 58 |

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|-------|----------|----------------|-------|----------------|-------|------|-----|
| 4593 | Upstream | Jun. 17, 2007 | 22:46 | Jun. 18, 2007 | 03:47 | 22.2 | 97 |
| 4593 | Upstream | Jun. 19, 2007 | 12:37 | Jun. 19, 2007 | 18:39 | 21.1 | 99 |
| 4593 | Upstream | Jul. 13, 2007 | 08:00 | Jul. 13, 2007 | 21:38 | 20.7 | 105 |
| 4593 | Upstream | Sept. 27, 2007 | 00:09 | Sept. 27, 2007 | 07:58 | 15.4 | 78 |
| 4597 | Upstream | Oct. 06, 2007 | 20:34 | Nov. 15, 2007 | 21:29 | 14.0 | 147 |
| 4602 | Upstream | Oct. 20, 2007 | 10:20 | - | | 11.0 | 335 |
| 4592 | Upstream | May 30, 2008 | 21:05 | May 31, 2008 | 05:35 | 11.7 | 444 |
| 4741 | Upstream | May 31, 2008 | 14:12 | May 31, 2008 | 18:26 | 12.0 | 439 |
| 4592 | Upstream | Jun. 22, 2008 | 08:01 | Jun. 22, 2008 | 12:54 | 16.5 | 403 |
| 4595 | Upstream | Jun. 29, 2008 | 12:50 | Jun. 29, 2008 | 17:05 | 19.1 | 380 |
| 49634 | Upstream | Jul. 02, 2008 | 04:21 | Jul. 06, 2008 | 04:50 | 19.5 | 358 |
| 4741 | Upstream | Jul. 08, 2008 | 02:51 | Jul. 08, 2008 | 06:04 | 20.6 | 302 |
| 49632 | Upstream | Jul. 08, 2008 | 15:44 | Jul. 09, 2008 | 01:22 | 20.6 | 302 |
| 49633 | Upstream | Jul. 09, 2008 | 01:59 | Jul. 09, 2008 | 08:46 | 20.2 | 295 |
| 4741 | Upstream | Jul. 18, 2008 | 19:18 | Jul. 19, 2008 | 05:23 | 20.1 | 253 |
| 4595 | Upstream | Jul. 27, 2008 | 21:42 | Jul. 28, 2008 | 14:05 | 21.7 | 202 |
| 49632 | Upstream | Aug. 02, 2008 | 12:20 | Aug. 03, 2008 | 16:01 | 22.0 | 173 |
| 49644 | Upstream | Aug. 05, 2008 | 22:01 | Aug. 19, 2008 | 20:29 | 22.6 | 158 |
| 49637 | Upstream | Aug. 17, 2008 | 21:26 | Aug. 18, 2008 | 22:27 | 22.7 | 115 |
| 49632 | Upstream | Aug. 21, 2008 | 22:17 | Aug. 22, 2008 | 12:51 | 22.9 | 104 |
| 49632 | Upstream | Sept. 12, 2008 | 01:55 | Sept. 12, 2008 | 23:17 | 17.7 | 69 |
| 49637 | Upstream | Sept. 24, 2008 | 22:11 | Sept. 27, 2008 | 11:30 | 17.1 | 61 |
| 49634 | Upstream | Sept. 26, 2008 | 00:08 | Sept. 26, 2008 | 10:33 | 16.7 | 63 |
| 4595 | Upstream | Sept. 29, 2008 | 10:30 | Oct. 11, 2008 | 01:19 | 16.0 | 70 |
| 49632 | Upstream | Sept. 30, 2008 | 12:45 | Oct. 02, 2008 | 00:53 | 15.5 | 72 |
| 49634 | Upstream | Oct. 03, 2008 | 19:43 | Oct. 04, 2008 | 03:17 | 14.3 | 76 |
| 49632 | Upstream | Oct. 05, 2008 | 23:06 | Oct. 08, 2008 | 02:20 | 13.7 | 79 |
| 49644 | Upstream | Oct. 06, 2008 | 05:01 | Oct. 08, 2008 | 05:09 | 13.4 | 81 |
| 49632 | Upstream | Oct. 10, 2008 | 21:04 | Oct. 12, 2008 | 09:02 | 12.3 | 87 |
| 49634 | Upstream | Oct. 14, 2008 | 05:40 | Oct. 14, 2008 | 14:11 | 12.1 | 98 |
| 49632 | Upstream | Oct. 21, 2008 | 21:01 | Oct. 23, 2008 | 11:16 | 10.1 | 109 |
| 49634 | Upstream | Oct. 22, 2008 | 19:57 | Apr. 18, 2009 | 15:43 | 9.6 | 109 |
| 4740 | Upstream | May 14, 2009 | 08:24 | May 14, 2009 | 16:05 | 9.1 | 386 |
| 49640 | Upstream | May 17, 2009 | 22:24 | May 18, 2009 | 05:47 | 8.6 | 398 |
| 49653 | Upstream | May 19, 2009 | 05:54 | May 19, 2009 | 15:04 | 9.4 | 400 |
| 49630 | Upstream | May 22, 2009 | 13:48 | May 22, 2009 | 21:21 | 10.6 | 394 |
| 49635 | Upstream | May 23, 2009 | 18:34 | May 23, 2009 | 21:26 | 10.7 | 391 |

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|----------------------|-------|------------|---------------------|---------------------|------|-----|
| | 4592 | Upstream | May 27, 2009 19:58 | May 28, 2009 00:34 | 11.1 | 383 |
| | 4589 | Upstream | May 31, 2009 00:21 | May 31, 2009 05:29 | 11.8 | 367 |
| | 49634 | Upstream | Jul. 01, 2009 03:23 | Jul. 02, 2009 11:04 | 16.8 | 204 |
| | 4601 | Upstream | Jul. 01, 2009 13:28 | Jul. 07, 2009 02:00 | 16.8 | 204 |
| | 4594 | Upstream | Jul. 13, 2009 19:06 | Jul. 14, 2009 05:40 | 19.7 | 145 |
| | 4593 | Upstream | Apr. 16, 2010 04:46 | Apr. 17, 2010 01:31 | 7.0 | 50 |
| | 8492 | Upstream | Apr. 24, 2010 01:07 | Apr. 24, 2010 22:41 | 11.6 | 48 |
| | 8493 | Upstream | Apr. 27, 2010 06:11 | Apr. 27, 2010 12:55 | 12.3 | 46 |
| | 4601 | Upstream | May 17, 2010 11:00 | May 17, 2010 17:11 | 13.3 | 41 |
| | 4593 | Upstream | May 22, 2010 21:04 | May 23, 2010 00:38 | 20.3 | 41 |
| | 8493 | Upstream | Jul. 23, 2010 01:07 | Jul. 23, 2010 07:50 | 23.4 | 163 |
| | 4597 | Upstream | May 08, 2011 01:15 | May 08, 2011 11:14 | 7.2 | 227 |
| | 49630 | Upstream | May 12, 2011 06:35 | May 12, 2011 18:49 | 10.0 | 234 |
| | 49638 | Upstream | May 15, 2011 02:38 | May 15, 2011 08:03 | 9.2 | 235 |
| | 4749 | Upstream | May 18, 2011 01:49 | May 18, 2011 07:02 | 11.2 | 231 |
| | 4597 | Upstream | May 18, 2011 22:43 | May 19, 2011 03:58 | 11.2 | 231 |
| | 49650 | Upstream | May 19, 2011 05:02 | May 19, 2011 08:43 | 12.1 | 229 |
| | 49638 | Upstream | May 21, 2011 21:37 | May 22, 2011 09:39 | 13.5 | 227 |
| | 4592 | Upstream | Jul. 01, 2011 18:08 | Jul. 01, 2011 22:59 | 19.5 | 142 |
| | 8492 | Upstream | Jul. 09, 2011 13:39 | Jul. 09, 2011 18:20 | 22.6 | 148 |
| | 4746 | Upstream | Jul. 11, 2011 21:32 | Jul. 12, 2011 06:51 | 23.4 | 144 |
| | 4601 | Upstream | Aug 01, 2011 16:31 | Aug 26, 2011 04:47 | 23.5 | 96 |
| Quetico River | 4592 | Downstream | May 30, 2008 21:05 | May 31, 2008 05:35 | 11.7 | 444 |
| | 49644 | Downstream | May 23, 2009 16:00 | May 24, 2009 03:26 | 10.7 | 391 |
| | 49643 | Downstream | May 25, 2009 12:31 | May 27, 2009 13:32 | 11.5 | 386 |
| | 49644 | Downstream | May 26, 2009 04:30 | May 27, 2009 14:46 | 11.3 | 385 |
| | 49644 | Downstream | May 27, 2009 17:05 | May 27, 2009 20:13 | 11.1 | 383 |
| | 4600 | Downstream | May 28, 2009 13:49 | Jun. 24, 2009 08:24 | 11.4 | 378 |
| | 49643 | Downstream | May 30, 2009 20:20 | May 30, 2009 22:21 | 12.1 | 369 |
| | 4589 | Downstream | May 30, 2009 20:56 | May 31, 2009 00:18 | 12.1 | 369 |
| | 4592 | Upstream | May 25, 2008 23:18 | May 26, 2008 02:22 | 10.9 | 463 |
| | 49644 | Upstream | May 21, 2009 04:55 | May 21, 2009 20:42 | 10.2 | 395 |
| | 49644 | Upstream | May 24, 2009 06:07 | May 24, 2009 11:51 | 11.2 | 388 |
| | 49643 | Upstream | May 24, 2009 18:32 | May 24, 2009 20:47 | 11.2 | 388 |
| | 49644 | Upstream | May 27, 2009 14:56 | May 27, 2009 16:56 | 11.1 | 383 |
| | 49643 | Upstream | May 27, 2009 15:35 | May 27, 2009 18:31 | 11.1 | 383 |
| | 4600 | Upstream | May 27, 2009 18:50 | May 27, 2009 21:53 | 11.1 | 383 |

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|-----------------------|------------|---------------------|----------------------|----------------------|------|-----|
| | 4589 | Upstream | May 29, 2009 20:43 | May 29, 2009 23:16 | 11.9 | 375 |
| Quetico Rapids | 4602 | Downstream | Jun. 03, 2007 18:24 | Jun. 04, 2007 14:31 | 16.9 | 64 |
| | 4600 | Downstream | Jun. 04, 2007 00:34 | Jun. 06, 2007 22:52 | 17.6 | 64 |
| | 4594 | Downstream | Jun. 10, 2007 02:19 | Jun. 10, 2007 13:41 | 17.9 | 77 |
| | 4593 | Downstream | Jun. 12, 2007 06:42 | Jun. 15, 2007 05:11 | 19.1 | 83 |
| | 4600 | Downstream | Jun. 13, 2007 00:16 | Jul. 09, 2007 13:14 | 19.9 | 85 |
| | 4593 | Downstream | Jul. 24, 2007 11:25 | Jul. 28, 2007 03:31 | 23.5 | 84 |
| | 4593 | Downstream | Sept. 08, 2007 05:56 | Sept. 11, 2007 04:38 | 19.6 | 36 |
| | 4593 | Downstream | Oct. 05, 2007 03:37 | Oct. 05, 2007 06:52 | 14.5 | 138 |
| | 4593 | Downstream | Oct. 10, 2007 01:09 | Oct. 11, 2007 16:09 | 12.7 | 205 |
| | 4601 | Downstream | May 22, 2008 12:39 | May 23, 2008 21:01 | 7.9 | 467 |
| | 4597 | Downstream | Jun. 03, 2008 16:16 | Jun. 04, 2008 00:33 | 12.6 | 417 |
| | 4602 | Downstream | Jun. 07, 2008 04:52 | Jun. 07, 2008 06:38 | 13.0 | 403 |
| | 4741 | Downstream | Jun. 13, 2008 01:57 | Jun. 13, 2008 04:06 | 13.6 | 406 |
| | 4592 | Downstream | Jun. 14, 2008 12:13 | Jun. 14, 2008 15:57 | 14.1 | 407 |
| | 4595 | Downstream | Jul. 09, 2008 19:01 | Jul. 10, 2008 04:55 | 20.2 | 295 |
| | 49630 | Downstream | Jul. 11, 2008 18:46 | Jul. 11, 2008 23:05 | 19.9 | 287 |
| | 49633 | Downstream | Jul. 17, 2008 04:52 | Jul. 17, 2008 05:48 | 19.6 | 260 |
| | 49632 | Downstream | Jul. 20, 2008 12:55 | Jul. 20, 2008 19:16 | 20.2 | 243 |
| | 4741 | Downstream | Jul. 27, 2008 13:11 | Jul. 27, 2008 19:32 | 21.7 | 202 |
| | 4741 | Downstream | Aug. 05, 2008 13:18 | Aug. 05, 2008 18:53 | 22.6 | 158 |
| | 49634 | Downstream | Oct. 12, 2008 00:55 | Oct. 13, 2008 00:02 | 12.3 | 94 |
| | 49632 | Downstream | Oct. 16, 2008 22:27 | Oct. 18, 2008 22:28 | 11.5 | 102 |
| | 49632 | Downstream | Oct. 26, 2008 02:35 | Oct. 26, 2008 23:37 | 8.9 | 111 |
| | 4595 | Downstream | May 06, 2009 21:48 | May 07, 2009 03:40 | 7.5 | 325 |
| | 49632 | Downstream | May 26, 2009 23:37 | May 27, 2009 03:53 | 11.3 | 385 |
| | 49630 | Downstream | May 27, 2009 22:32 | May 28, 2009 00:43 | 11.1 | 383 |
| | 49635 | Downstream | May 28, 2009 05:35 | May 28, 2009 07:25 | 11.4 | 378 |
| | 49644 | Downstream | May 28, 2009 23:34 | May 29, 2009 06:09 | 11.4 | 378 |
| | 49643 | Downstream | May 30, 2009 22:35 | May 31, 2009 12:15 | 12.1 | 369 |
| | 49637 | Downstream | Jun. 03, 2009 06:03 | Jun. 04, 2009 10:55 | 12.5 | 350 |
| | 49653 | Downstream | Jun. 04, 2009 18:20 | Jun. 04, 2009 20:09 | 12.7 | 343 |
| | 4740 | Downstream | Jun. 18, 2009 03:40 | Jun. 18, 2009 07:42 | 17.6 | 262 |
| | 49640 | Downstream | Jun. 19, 2009 01:17 | Jun. 19, 2009 04:11 | 18.2 | 256 |
| 4592 | Downstream | Jun. 23, 2009 12:18 | Jun. 23, 2009 16:31 | 19.8 | 245 | |
| 4589 | Downstream | Jun. 23, 2009 23:40 | Jun. 25, 2009 02:20 | 19.8 | 245 | |
| 4600 | Downstream | Jun. 24, 2009 17:21 | Aug. 09, 2009 06:33 | 20.4 | 239 | |

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|-------|------------|----------------------|----------------------|------|-----|
| 4589 | Downstream | Jul. 02, 2009 20:56 | Jul. 03, 2009 00:45 | 16.7 | 199 |
| 4589 | Downstream | Jul. 05, 2009 09:16 | Jul. 05, 2009 22:37 | 18.2 | 183 |
| 49634 | Downstream | Jul. 07, 2009 00:32 | Jul. 07, 2009 11:48 | 18.8 | 174 |
| 4600 | Downstream | Aug. 15, 2009 19:11 | Oct. 06, 2009 10:35 | 22.4 | 102 |
| 8493 | Downstream | May 04, 2010 23:11 | May 05, 2010 07:36 | 10.7 | 43 |
| 4596 | Downstream | May 04, 2010 23:40 | May 05, 2010 12:35 | 10.7 | 43 |
| 8492 | Downstream | May 16, 2010 00:15 | May 16, 2010 11:52 | 11.6 | 42 |
| 8492 | Downstream | May 16, 2010 21:30 | May 17, 2010 15:47 | 11.6 | 42 |
| 4594 | Downstream | Jun. 06, 2010 03:13 | Jun. 07, 2010 01:39 | 20.0 | 41 |
| 4593 | Downstream | Jun. 26, 2010 08:49 | Jun. 26, 2010 22:42 | 22.7 | 48 |
| 4601 | Downstream | May 09, 2011 20:51 | - | 8.0 | 230 |
| 49650 | Downstream | May 18, 2011 04:44 | May 18, 2011 09:54 | 11.2 | 231 |
| 49630 | Downstream | May 21, 2011 16:52 | May 21, 2011 23:04 | 13.5 | 227 |
| 49650 | Downstream | May 22, 2011 01:51 | May 22, 2011 03:00 | 13.8 | 225 |
| 49638 | Downstream | May 22, 2011 23:43 | May 23, 2011 07:22 | 13.8 | 225 |
| 49646 | Downstream | May 23, 2011 20:49 | May 24, 2011 00:01 | 14.1 | 223 |
| 4596 | Downstream | May 24, 2011 19:19 | May 25, 2011 22:35 | 13.6 | 221 |
| 4749 | Downstream | May 24, 2011 20:57 | May 24, 2011 22:41 | 13.6 | 221 |
| 49634 | Downstream | May 26, 2011 17:48 | May 26, 2011 23:20 | 13.4 | 216 |
| 4597 | Downstream | May 29, 2011 18:46 | Oct 01, 2011 21:41 | 13.6 | 206 |
| 4592 | Downstream | Jul. 11, 2011 09:50 | Jul. 11, 2011 17:38 | 23.4 | 144 |
| 4746 | Downstream | Jul. 17, 2011 19:29 | Jul. 18, 2011 00:45 | 23.3 | 134 |
| 4593 | Upstream | May 23, 2007 14:00 | May 23, 2007 18:36 | 14.7 | 55 |
| 4600 | Upstream | Jun. 09, 2007 06:01 | Jun. 12, 2007 21:58 | 19.1 | 83 |
| 4593 | Upstream | Jun. 17, 2007 16:00 | Jun. 17, 2007 21:19 | 22.2 | 97 |
| 4593 | Upstream | Sept. 25, 2007 05:43 | Sept. 25, 2007 19:18 | 15.6 | 65 |
| 4593 | Upstream | - | Sept. 4, 2007 21:33 | 20.1 | 33 |
| 4597 | Upstream | Oct. 04, 2007 01:01 | Oct. 06, 2007 03:29 | 14.0 | 147 |
| 4593 | Upstream | Oct. 07, 2007 23:07 | Oct. 09, 2007 20:27 | 13.3 | 186 |
| 4602 | Upstream | Oct. 20, 2007 00:18 | Oct. 20, 2007 03:35 | 11.0 | 335 |
| 4592 | Upstream | May 25, 2008 08:15 | May 25, 2008 22:50 | 10.2 | 464 |
| 4741 | Upstream | May 30, 2008 15:21 | May 31, 2008 07:33 | 12.0 | 439 |
| 49644 | Upstream | Jun. 21, 2008 05:27 | Jun. 21, 2008 19:46 | 16.4 | 404 |
| 4592 | Upstream | Jun. 21, 2008 09:04 | Jun. 22, 2008 01:58 | 16.5 | 403 |
| 49634 | Upstream | Jun. 30, 2008 09:01 | Jun. 30, 2008 21:35 | 18.8 | 373 |
| 49630 | Upstream | Jul. 06, 2008 03:57 | Jul. 06, 2008 11:01 | 20.7 | 321 |
| 49632 | Upstream | Jul. 06, 2008 14:45 | Jul. 07, 2008 21:58 | 21.0 | 315 |

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|-------|----------|---------------|-------|---------------|-------|------|-----|
| 4741 | Upstream | Jul. 07, 2008 | 15:45 | Jul. 07, 2008 | 18:41 | 21.0 | 315 |
| 49633 | Upstream | Jul. 08, 2008 | 16:23 | Jul. 08, 2008 | 20:47 | 20.6 | 302 |
| 4595 | Upstream | Jul. 11, 2008 | 12:19 | Jul. 24, 2008 | 09:44 | 21.4 | 220 |
| 49632 | Upstream | Jul. 20, 2008 | 20:30 | Jul. 27, 2008 | 19:56 | 21.7 | 202 |
| 49637 | Upstream | Jul. 22, 2008 | 16:34 | Jul. 23, 2008 | 08:24 | 21.3 | 226 |
| 4741 | Upstream | Jul. 30, 2008 | 12:41 | Aug. 05, 2008 | 02:47 | 22.6 | 158 |
| 49634 | Upstream | Oct. 13, 2008 | 06:56 | Oct. 13, 2008 | 23:42 | 12.5 | 96 |
| 49632 | Upstream | Oct. 19, 2008 | 07:04 | Oct. 20, 2008 | 07:00 | 10.5 | 107 |
| 4600 | Upstream | May 05, 2009 | 06:17 | May 19, 2009 | 14:38 | 9.4 | 400 |
| 49632 | Upstream | May 06, 2009 | 18:16 | May 07, 2009 | 09:00 | 8.3 | 336 |
| 49640 | Upstream | May 13, 2009 | 09:38 | May 13, 2009 | 21:20 | 9.0 | 383 |
| 4740 | Upstream | May 13, 2009 | 13:54 | May 13, 2009 | 17:18 | 9.0 | 383 |
| 49653 | Upstream | May 18, 2009 | 13:28 | May 18, 2009 | 21:06 | 9.2 | 398 |
| 49630 | Upstream | May 20, 2009 | 21:18 | May 21, 2009 | 19:45 | 10.2 | 395 |
| 49643 | Upstream | May 21, 2009 | 01:15 | May 21, 2009 | 05:38 | 10.2 | 395 |
| 49635 | Upstream | May 22, 2009 | 09:06 | May 22, 2009 | 13:45 | 10.6 | 394 |
| 4589 | Upstream | May 29, 2009 | 17:37 | May 29, 2009 | 20:15 | 11.9 | 375 |
| 4601 | Upstream | Jun. 06, 2009 | 15:35 | Jun. 07, 2009 | 03:59 | 12.8 | 328 |
| 4589 | Upstream | Jul. 01, 2009 | 10:14 | Jul. 01, 2009 | 21:28 | 16.8 | 204 |
| 4589 | Upstream | Jul. 03, 2009 | 00:45 | Jul. 03, 2009 | 03:42 | 17.1 | 194 |
| 4594 | Upstream | Jul. 13, 2009 | 10:56 | Jul. 13, 2009 | 13:44 | 19.7 | 145 |
| 4600 | Upstream | Aug. 10, 2009 | 08:59 | Aug. 15, 2009 | 06:33 | 22.4 | 102 |
| 4593 | Upstream | Jul. 12, 2009 | 05:08 | Apr. 14, 2010 | 22:16 | 7.9 | 52 |
| 4596 | Upstream | Apr. 28, 2010 | 12:34 | May 1, 2010 | 00:20 | 11.0 | 45 |
| 8492 | Upstream | May 16, 2010 | 12:21 | May 16, 2010 | 14:15 | 11.6 | 42 |
| 49646 | Upstream | Jul. 09, 2010 | 20:40 | Jul. 09, 2010 | 23:16 | 23.6 | 105 |
| 49634 | Upstream | Jul. 13, 2010 | 09:09 | Jul. 13, 2010 | 16:35 | 25.1 | 125 |
| 8493 | Upstream | Jul. 22, 2010 | 09:17 | Jul. 22, 2010 | 14:57 | 24.2 | 162 |
| 4597 | Upstream | May 02, 2011 | 23:00 | May 07, 2011 | 16:00 | 6.8 | 223 |
| 49630 | Upstream | May 11, 2011 | 08:26 | May 11, 2011 | 16:53 | 9.5 | 233 |
| 49638 | Upstream | May 14, 2011 | 18:20 | May 14, 2011 | 20:57 | 9.1 | 236 |
| 4749 | Upstream | May 17, 2011 | 03:10 | May 17, 2011 | 07:34 | 10.5 | 233 |
| 49650 | Upstream | May 17, 2011 | 10:46 | May 17, 2011 | 12:32 | 10.5 | 233 |
| 49650 | Upstream | May 18, 2011 | 17:00 | May 18, 2011 | 19:51 | 11.2 | 231 |
| 4596 | Upstream | May 20, 2011 | 21:22 | May 21, 2011 | 14:09 | 13.5 | 227 |
| 4592 | Upstream | Jul. 01, 2011 | 08:05 | Jul. 01, 2011 | 10:49 | 19.5 | 142 |
| 8492 | Upstream | Jul. 09, 2011 | 05:30 | Jul. 09, 2011 | 08:57 | 22.6 | 148 |

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|--------------------|-------|------------|----------------|-------|----------------|-------|------|-----|
| | 4746 | Upstream | Jul. 11, 2011 | 08:48 | Jul. 11, 2011 | 14:45 | 23.4 | 144 |
| | 4593 | Upstream | Jul 21, 2011 | 15:16 | Oct 13, 2011 | 17:16 | 15.2 | 29 |
| | 4601 | Upstream | Aug 01, 2011 | 11:21 | Aug 01, 2011 | 13:24 | 23.5 | 96 |
| Lady Rapids | 4745 | Downstream | May 16, 2007 | 14:29 | - | | 14.5 | 52 |
| | 4739 | Downstream | May 16, 2007 | 15:46 | - | | 14.5 | 52 |
| | 4740 | Downstream | May 16, 2007 | 21:52 | May 22, 2007 | 18:34 | 14.5 | 52 |
| | 4747 | Downstream | May 18, 2007 | 21:17 | - | | 14.7 | 53 |
| | 4744 | Downstream | May 19, 2007 | 20:19 | Jul. 16, 2007 | 13:45 | 14.6 | 54 |
| | 4748 | Downstream | May 22, 2007 | 01:46 | May 22, 2007 | 20:51 | 14.2 | 55 |
| | 4741 | Downstream | May 24, 2007 | 14:49 | May 30, 2007 | 03:55 | 15.0 | 56 |
| | 4588 | Downstream | May 25, 2007 | 23:50 | May 26, 2007 | 05:36 | 14.9 | 56 |
| | 4750 | Downstream | May 26, 2007 | 00:12 | May 26, 2007 | 03:29 | 14.6 | 58 |
| | 4589 | Downstream | May 27, 2007 | 02:51 | May 28, 2007 | 00:25 | 14.1 | 58 |
| | 4749 | Downstream | May 28, 2007 | 06:57 | May 28, 2007 | 21:00 | 14.0 | 59 |
| | 4743 | Downstream | May 28, 2007 | 23:40 | May 29, 2007 | 16:22 | 14.0 | 59 |
| | 4591 | Downstream | Jun. 08, 2007 | 03:46 | Jun. 08, 2007 | 11:48 | 17.7 | 71 |
| | 4602 | Downstream | Jun. 08, 2007 | 06:48 | June 08, 2007 | 21:35 | 17.7 | 71 |
| | 4594 | Downstream | Jun. 12, 2007 | 18:05 | Jun. 13, 2007 | 07:04 | 19.1 | 83 |
| | 4590 | Downstream | Jun. 20, 2007 | 02:24 | Jun. 21, 2007 | 06:55 | 20.5 | 103 |
| | 4748 | Downstream | Jun. 24, 2007 | 23:17 | Jun. 26, 2007 | 00:56 | 21.0 | 113 |
| | 4742 | Downstream | Jul. 12, 2007 | 01:05 | Jul. 12, 2007 | 10:06 | 21.4 | 106 |
| | 4752 | Downstream | Sept. 21, 2007 | 00:16 | Sept. 21, 2007 | 10:11 | 14.7 | 44 |
| | 4602 | Downstream | Sept. 26, 2007 | 20:07 | Sept. 27, 2007 | 05:16 | 15.4 | 72 |
| | 4751 | Downstream | Oct. 01, 2007 | 23:48 | Oct. 02, 2007 | 21:00 | 15.2 | 106 |
| | 4744 | Downstream | Oct. 16, 2007 | 14:45 | Oct. 16, 2007 | 23:19 | 11.2 | 283 |
| | 4593 | Downstream | Oct. 17, 2007 | 13:51 | Oct. 18, 2007 | 03:46 | 11.0 | 293 |
| | 4601 | Downstream | May 25, 2008 | 13:45 | May 31, 2008 | 13:00 | 10.2 | 464 |
| | 4602 | Downstream | Jun. 08, 2008 | 09:38 | Jun. 08, 2008 | 21:27 | 13.4 | 402 |
| | 4742 | Downstream | Aug. 17, 2008 | 22:39 | Aug. 18, 2008 | 06:00 | 22.7 | 115 |
| | 4744 | Downstream | May 07, 2009 | 20:19 | Jul. 22, 2009 | 22:00 | 8.3 | 336 |
| | 49642 | Downstream | May 23, 2009 | 05:41 | Aug. 30, 2009 | 19:20 | 10.7 | 391 |
| | 4748 | Downstream | May 28, 2009 | 11:10 | Jun. 05, 2009 | 06:01 | 11.4 | 378 |
| | 8495 | Downstream | May 28, 2009 | 12:46 | May 28, 2009 | 19:58 | 11.4 | 378 |
| | 49630 | Downstream | May 28, 2009 | 15:19 | May 28, 2009 | 19:11 | 11.4 | 378 |
| | 49632 | Downstream | May 29, 2009 | 00:42 | May 29, 2009 | 05:01 | 11.9 | 375 |
| | 49633 | Downstream | May 29, 2009 | 02:46 | May 29, 2009 | 10:54 | 11.9 | 375 |
| | 49635 | Downstream | May 29, 2009 | 12:25 | May 29, 2009 | 16:30 | 11.9 | 375 |

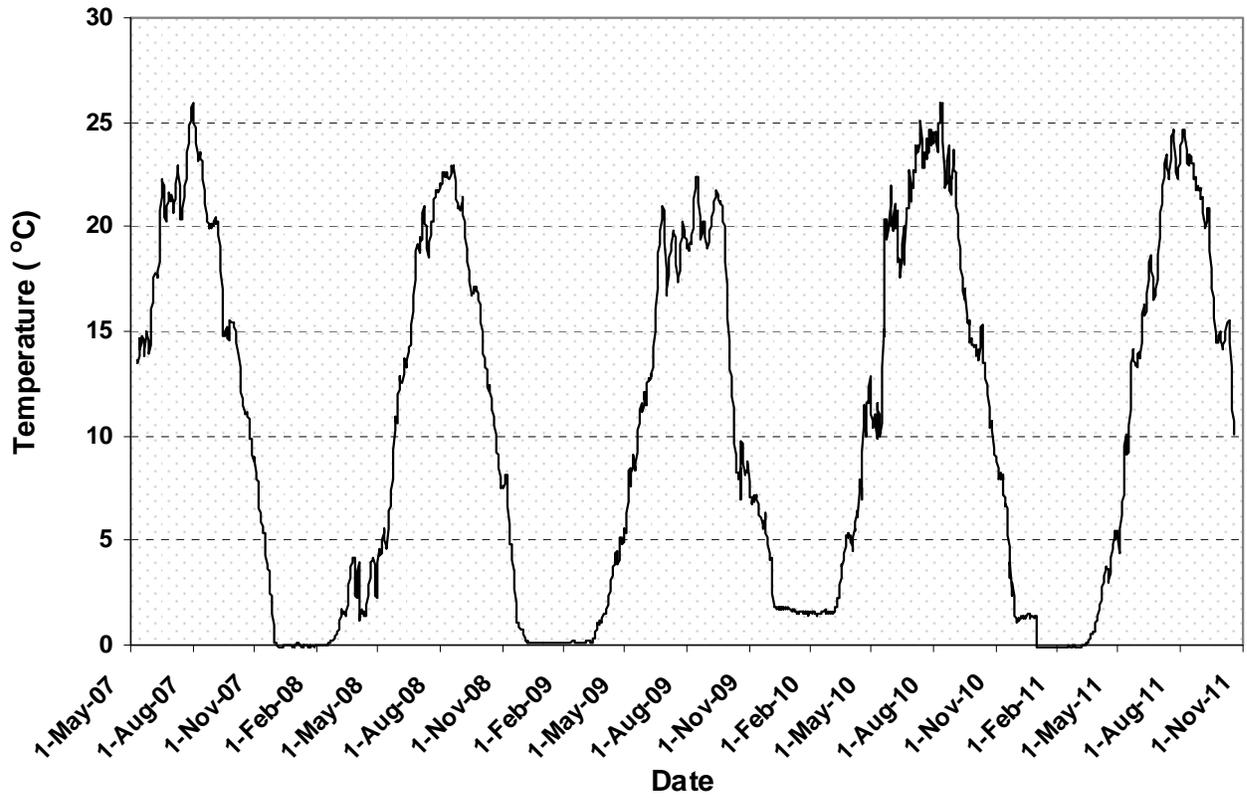
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| 4739 | Downstream | Jun. 15, 2009 | 02:43 | Jun. 15, 2009 | 14:19 | 15.5 | 282 |
| 4591 | Downstream | Jun. 17, 2009 | 05:41 | Jun. 17, 2009 | 12:46 | 17.0 | 268 |
| 4740 | Downstream | Jun. 19, 2009 | 09:23 | Jun. 19, 2009 | 21:22 | 18.2 | 256 |
| 49640 | Downstream | Jun. 19, 2009 | 14:09 | Jun. 19, 2009 | 17:13 | 18.2 | 256 |
| 4594 | Downstream | Jul. 06, 2009 | 14:09 | Jul. 07, 2009 | 10:26 | 18.6 | 178 |
| 4589 | Downstream | Jul. 06, 2009 | 16:05 | Jul. 06, 2009 | 20:30 | 18.6 | 178 |
| 49647 | Downstream | Jul. 06, 2009 | 16:34 | Jul. 07, 2009 | 00:18 | 18.6 | 178 |
| 49634 | Downstream | Jul. 08, 2009 | 02:20 | Jul. 08, 2009 | 07:53 | 19.0 | 169 |
| 49647 | Downstream | Jul. 18, 2009 | 12:04 | Jul. 19, 2009 | 08:37 | 17.4 | 130 |
| 4742 | Downstream | Aug. 03, 2009 | 05:19 | Aug. 03, 2009 | 21:19 | 19.0 | 108 |
| 4590 | Downstream | Oct. 06, 2009 | 21:17 | Oct. 10, 2009 | 05:42 | 12.5 | 54 |
| 4741 | Downstream | Mar. 15, 2010 | 21:21 | - | | 0.1 | 42 |
| 49646 | Downstream | Mar. 25, 2010 | 23:52 | Jul. 07, 2010 | 21:57 | 5.2 | 48 |
| 49631 | Downstream | Apr. 24, 2010 | 17:19 | Apr. 25, 2010 | 20:46 | 11.6 | 48 |
| 4590 | Downstream | May 17, 2010 | 04:58 | May 20, 2010 | 07:10 | 13.3 | 41 |
| 4752 | Downstream | May 24, 2010 | 19:13 | May 25, 2010 | 07:31 | 19.4 | 41 |
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| 49647 | Downstream | May 25, 2010 | 06:56 | May 25, 2010 | 17:40 | 20.0 | 41 |
| 49631 | Downstream | May 25, 2010 | 16:23 | May 26, 2010 | 03:26 | 20.0 | 41 |
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| 4743 | Downstream | May 26, 2010 | 23:52 | May 27, 2010 | 13:40 | 19.9 | 40 |
| 49642 | Downstream | May 27, 2010 | 15:06 | May 27, 2010 | 21:35 | 20.2 | 40 |
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| 4742 | Downstream | Jun. 19, 2010 | 13:01 | Jul. 04, 2010 | 04:14 | 18.3 | 44 |
| 4593 | Downstream | Jul. 07, 2010 | 02:20 | Jul. 07, 2010 | 09:36 | 23.9 | 91 |
| 4749 | Downstream | Sept. 25, 2010 | 10:31 | Sept. 26, 2010 | 05:01 | 14.7 | 62 |
| 4601 | Downstream | May 19, 2011 | 07:44 | May 20, 2011 | 23:57 | 12.1 | 229 |
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| 4739 | Downstream | May 28, 2011 00:24 | May 29, 2011 00:29 | 13.3 | 209 |
| 49634 | Downstream | Jun. 04, 2011 20:33 | Jun. 05, 2011 00:58 | 14.4 | 185 |
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| 4601 | Upstream | May 31, 2008 14:29 | May 31, 2009 23:37 | 11.8 | 367 |
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| 49632 | Upstream | Jun. 28, 2008 11:54 | Jul. 02, 2008 18:45 | 19.5 | 358 |
| 49637 | Upstream | Jul. 14, 2008 00:38 | Jul. 18, 2008 18:01 | 20.1 | 253 |
| 49635 | Upstream | Jul. 14, 2008 10:55 | Jul. 17, 2008 04:57 | 19.6 | 260 |
| 4742 | Upstream | Jul. 17, 2008 03:02 | Jul. 21, 2008 00:07 | 20.4 | 238 |
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| 4744 | Upstream | Jul. 28, 2008 11:07 | Jul. 29, 2008 19:54 | 21.7 | 191 |
| 49640 | Upstream | Jul. 29, 2008 00:42 | Aug. 04, 2008 05:34 | 22.4 | 163 |
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| 4591 | Upstream | Aug. 06, 2008 21:15 | May 22, 2009 23:36 | 10.6 | 394 |
| 49642 | Upstream | Aug. 09, 2008 23:37 | Aug. 10, 2008 20:00 | 22.4 | 139 |
| 49643 | Upstream | Aug. 14, 2008 11:30 | Aug. 15, 2008 02:38 | 22.3 | 122 |
| 4750 | Upstream | Aug. 23, 2008 05:49 | May 25, 2009 21:43 | 11.5 | 386 |
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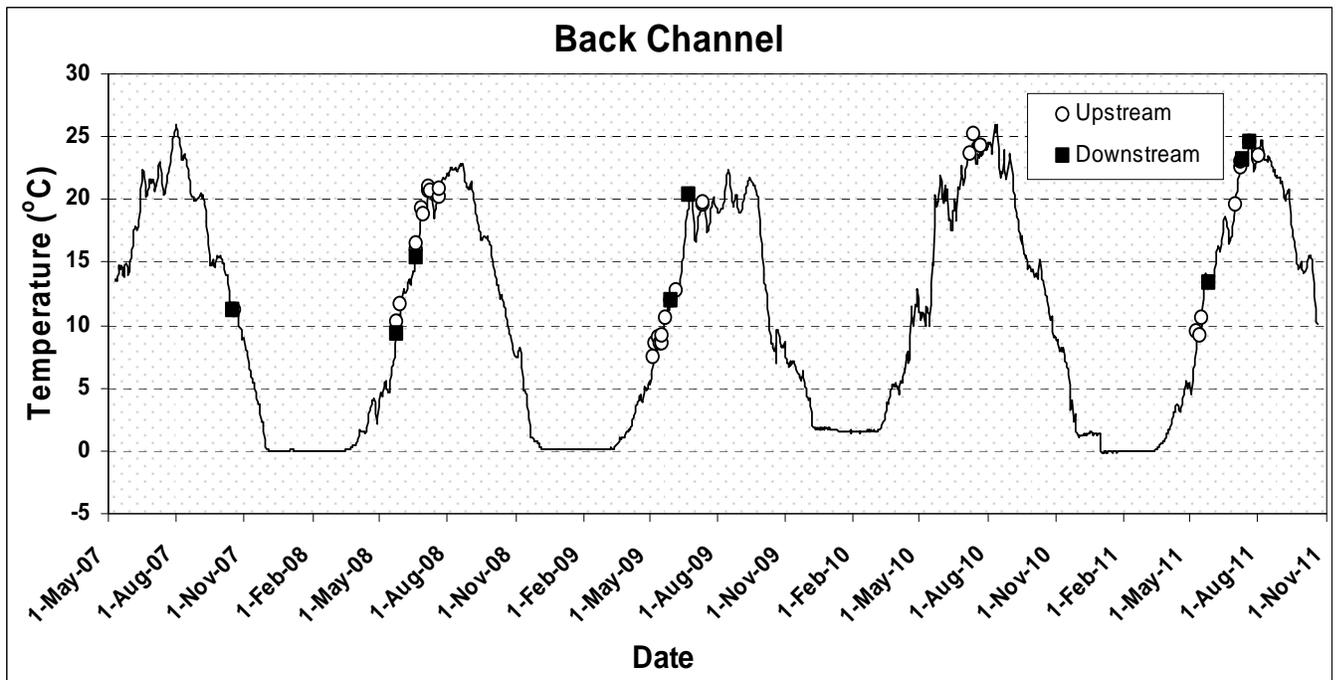
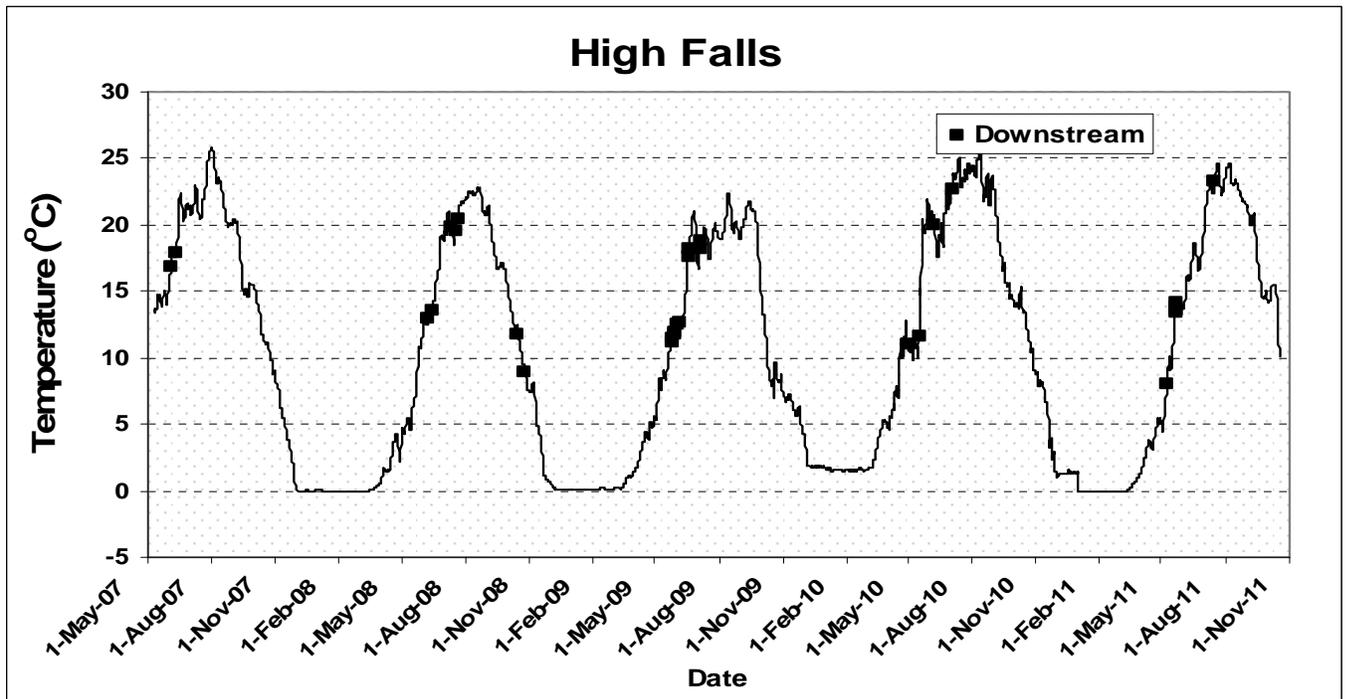
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| 4745 | Upstream | Jun. 20, 2009 15:22 | Jun. 23, 2009 23:49 | 19.8 | 245 |
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| 49641 | Upstream | Jul. 02, 2009 17:21 | Jul. 03, 2009 22:06 | 17.1 | 194 |
| 4593 | Upstream | Jul. 10, 2009 09:13 | Jul. 10, 2009 23:09 | 19.7 | 158 |
| 4594 | Upstream | Jul. 10, 2009 20:15 | Jul. 11, 2009 22:44 | 19.8 | 153 |
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| 49647 | Upstream | Jul. 31, 2009 20:51 | Aug. 01, 2009 19:43 | 19.0 | 108 |
| 49642 | Upstream | Sept. 02, 2009 04:44 | Sept. 02, 2009 19:20 | 19.3 | 91 |
| 49631 | Upstream | Sept. 03, 2009 03:44 | Sept. 03, 2009 23:32 | 19.7 | 90 |
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| 4739 | Upstream | Sept. 14, 2009 22:04 | Sept. 15, 2009 18:33 | 21.5 | 77 |
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| 4743 | Upstream | Apr. 23, 2010 22:12 | Apr. 24, 2010 17:45 | 11.6 | 48 |
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| 49631 | Upstream | Apr. 25, 2010 20:46 | Apr. 26, 2010 13:53 | 11.5 | 47 |
| 4742 | Upstream | Jun. 14, 2010 13:50 | Jun. 16, 2010 06:37 | 19.1 | 44 |
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| 49650 | Upstream | Jul. 06, 2010 02:59 | Jul. 06, 2010 13:42 | 23.4 | 82 |
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| 4749 | Upstream | Sept. 23, 2010 14:07 | Sept. 24, 2010 09:09 | 14.5 | 60 |
| 4749 | Upstream | Sept. 27, 2010 04:45 | Sept. 27, 2010 18:57 | 14.4 | 61 |
| 49638 | Upstream | Apr. 19, 2011 04:20 | May 10, 2011 19:07 | 8.7 | 233 |
| 4751 | Upstream | Apr. 26, 2011 02:36 | May 14, 2011 10:23 | 9.1 | 236 |
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| 49635 | Upstream | Jul. 03, 2011 22:09 | Jul. 04, 2011 23:18 | 21.1 | 144 |
| 4601 | Upstream | Jul. 29, 2011 02:00 | Jul. 29, 2011 12:08 | 22.8 | 103 |
| 4744 | Upstream | Aug. 10, 2011 04:11 | Aug. 11, 2011 14:19 | 23.1 | 76 |
| 49643 | Upstream | Aug 18, 2011 04:32 | Aug. 18, 2011 20:00 | 23.1 | 68 |
| 4743 | Upstream | Sept. 16, 2011 16:28 | Sept 17, 2011 03:39 | 17.0 | 36 |

| | | | | | |
|-------|----------|----------------------|----------------------|------|----|
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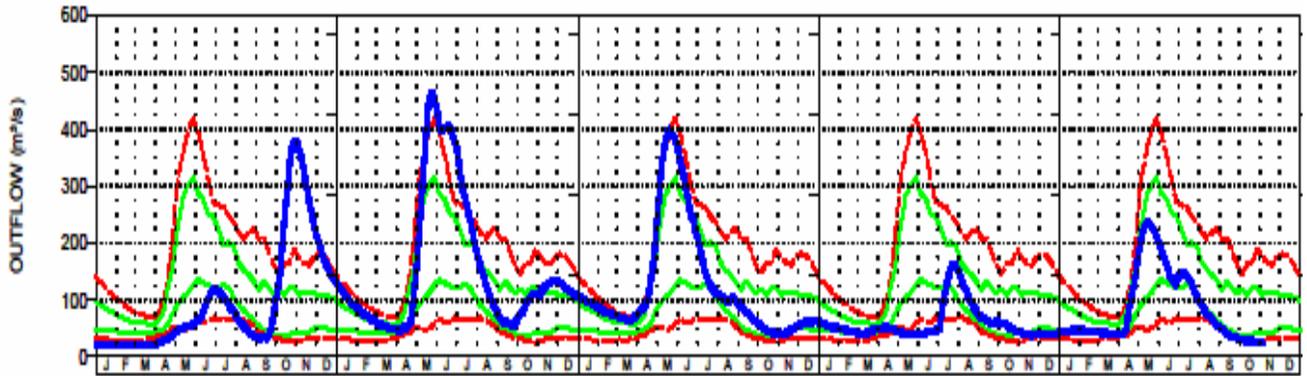
Appendix V: Mean daily water temperature recorded at Lady Rapids in Namakan River, Ontario from May, 2007 to October, 2011.



Appendix VI: Movement of lake sturgeon through High Falls and Back Channel in relation to daily water temperatures in the Namakan River, Ontario.



Appendix VII: Estimated water flow in Namakan River, Ontario from January, 2007 to December, 2011. Data reported as the mean daily outflow from Lac La Croix including 10%, 25%, 75% and 90% percentile flows.



Appendix VIII: Movement of lake sturgeon through High Falls and Back Channel in relation to daily water flows in the Namakan River, Ontario.

