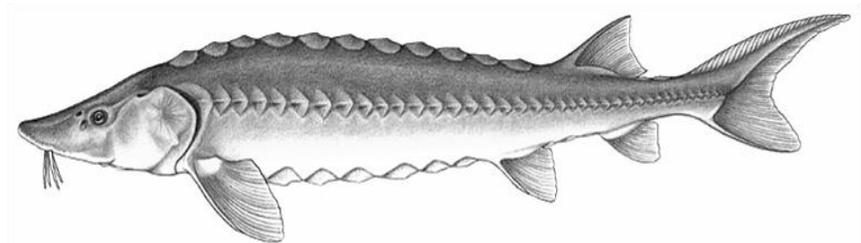


Movement and Seasonal
Distribution of Lake Sturgeon in
the Namakan River, Ontario

2012 Progress Report



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2012 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 2012. Three hydroelectric generating facilities have been proposed for development at Hay Rapids, High Falls, and Myrtle Falls by Ojibway Power and Energy Group (OPEG). The Namakan River lake sturgeon population structure was described, and 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. A total of 4,596,259 detections were recorded throughout the Namakan River study area, with receivers detecting a mean of 27 different lake sturgeon (range 0-45). Twenty-one of 26 telemetered fish released into the Namakan Reservoir moved into the Namakan River above Lady Rapids during the 6 year study period. Lake sturgeon movements from the Namakan River into the Namakan Reservoir, a shared international water with Minnesota, were also detected. Transmitter detections confirmed both upstream and downstream migration of sturgeon at most river 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. Movement into Quetico Provincial Park was detected at two locations: Quetico River and Bearpelt Creek below Wolseley Rapids. Potential spawning habitats exist at most natural rapids based on the presence or staging of fish in these areas during critical periods. Over-wintering habitat was confirmed in the three lake environments and below major rapids or falls; sturgeon avoided shallow rapids in winter with no detected movement between receivers from November to April. Fish moved through shallow rapids and falls at water flows ranging from 29 to 464 m³/sec and temperatures ranging from 5.2 to 25.2°C. Upstream and downstream movements in the Back Channel were also documented with estimated flows ranging from 6 to 48 m³/sec. Details of site specific movements in relation to season, water flow and temperature are provided for consideration in water management planning. At minimum, water management decisions will need to account for impacts to the migration, spawning, foraging and over-wintering of lake sturgeon in the Namakan River.

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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 15, 2012. Several sections have not been revised to include data from Year 3-6 (2009- 2012) information specific to seasonal distribution; monthly movements; diel movements; duration, distance and speed of travel.

During this study, a similar and collaborative 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; Shaw et al. 2012; Shaw et al. 2013). In the Namakan River, the adult lake sturgeon population was sampled and described (McLeod 2008b) and total adult abundance was estimated in Little Eva Lake (McLeod 2008a). Additional research explored genetic diversity of lake sturgeon in comparison to documented movements of telemetered adult fish (Welsh 2008; 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

Previous technical reports note changes in receiver locations, minor receiver malfunctions in 2009 and 2010 and the Little Eva Lake receiver (serial # 100846) not

functioning due to human disturbance from August 1 to October 20, 2011. No problems with receiver function were noted between October 20, 2011 and October 15, 2012. Fish ID 8494 was documented as not having moved from June 2008 to October 2012, and is suspected to be either deceased or have expelled its transmitter. This fish was excluded from analyses due to the high number of detections below Snake Falls (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 4,596,259 detections were recorded throughout the Namakan River study area over the six year (2007-2012) sampling period (Table 2). Detections for a single receiver ranged from 0 (above Snake Falls) to 2,327,543 (Little Eva Lake above Hay Rapids). Receivers detected a mean of 27 fish with a range of 0-45 fish.

Daily movement patterns among all 15 receiver locations were analyzed for each individual lake sturgeon implanted with a transmitter in 2007 and 2008 (Appendix I and II respectively). Thirty-three of 34 transmittered sturgeon released in the Namakan River were detected at a minimum of one receiver location in the Namakan River (Table 3). Twenty-two transmittered sturgeon originally released in the Namakan Reservoir were detected by at least one receiver in the Namakan River array, with 21 of these fish

detected upstream of Lady Rapids. The maximum number of detections from a single fish was 497,634 (ID 4753); this fish spent the majority of its time in Little Eva Lake following release on May 17, 2007. The next highest number of detections was 380,211 (ID 4596), while the minimum was 7 (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 was 7 (Table 3).

Receivers and lake sturgeon recaptures also documented fish movements from the Namakan River into the Namakan Reservoir. As of October 15, 2012, 22 of 34 transmittered fish released in the river were detected by at least one Namakan Reservoir receiver. Also, 8 lake sturgeon tagged in the river between 2006 and 2008 (McLeod 2008b) were recaptured in the Namakan Reservoir by natural resource management agencies and members of the public between May 23, 2007 and May 29, 2011.

In May 2012, there was a confirmed presence of 11 different telemetered fish below High Falls over the period with suitable water temperatures for spawning (12-18°C). An aggregation of 4 different fish was detected on May 11, 2012, similar to peak detections of 3 fish in May 2011. Larger aggregations of telemetered fish (n=7) occurred in 2010, possibly as a result of low flows restricting upstream movement by lake sturgeon through the back channel. These aggregations form part of the evidence used to infer presence of suitable lake sturgeon spawning habitat below High Falls (also see Bio Consulting 2009).

Movements of individual fish through shallow rapids and falls along the river were inferred from detections at upstream and downstream receivers and are summarized in Table 4. Movements through sites proposed for development (Hay Rapids, High Falls, Back Channel, and Ivy/Myrtle Falls; Appendix III) and not proposed for development (Lady Rapids, Quetico Rapids, Quetico River, Twisted Rapids; Appendix IV) were documented. No upstream movements were recorded at Snake Falls or High Falls. The maximum number of movements ($n = 190$) was observed at Hay Rapids at the outlet of Little Eva Lake. This was followed closely by Lady Rapids ($n=178$) in the lowest reach of the Namakan River, and Twisted Rapids ($n=146$) at the outlet of Three Mile Lake, with direction of movement distributed nearly equally between upstream and downstream over the sampling period. Upstream and downstream movements of two fish (ID 4746, 4592) were detected in the Quetico River within Quetico Provincial Park in 2012. Prior to Aug. 20, 2010, 12 different lake sturgeon were detected in Bearpelt Creek below Wolseley Rapids, also within Quetico Provincial Park. Of particular note, 40 downstream movements of 27 individual fish over High Falls, an elevation drop of 6.8 m, were detected (Table 4). Nine of these downstream movements took place in 2012. Eight fish have moved twice downstream at this site, one fish (ID 4601) on three separate events and one fish (ID 49630) on four separate events.

In addition, both upstream and downstream movements of sturgeon through the Back Channel were documented since October, 2007. Seventeen additional movements occurred in 2012. Of the 60 recorded fish movements, the majority (50 or 83%) were moving upstream from Little Eva Lake to Bill Lake. Six partial or interrupted upstream

movements were detected, 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=50) were longer in duration with a mean of 50.9 hours and ranging from 8.8 to 307.5 hours. As anticipated, downstream movements were much shorter in duration with a mean of 23.2 hours and ranging from 3.7 to 88.9 hours. Both the quickest and slowest downstream movements through the back channel were recorded in 2012.

Twenty-eight downstream and 30 upstream movements of 17 individual fish were recorded over Ivy Falls, Myrtle Falls and the side channel collectively over 2007 – 2012 (Appendix III). The addition of two receivers adjacent Ivy and Myrtle Falls in 2009 have helped identify fish movements through the 3 available routes. Records since May 2009 indicate that downstream movements occur predominately through both Ivy and Myrtle Falls while upstream migration of telemetered fish occurs most often in the side channel (20 of 22 movements or 91%) where elevation and flow velocities are lower. In 2012, no fish were detected migrating back downstream through the side channel.

The over-winter locations of telemetered sturgeon were also evaluated after five full winters of study, based on movement data from 33 transmitter implants in Namakan River in 2007/08 and an additional 26 in Namakan Reservoir in 2008 (Table 5).

Preliminary winter locations for 2012/13 were also postulated based on known and continuous fish locations as of October 15, 2012 after fall movements in the river had generally ceased. Between 2007 and 2012, most telemetered lake sturgeon over-wintered

in the Namakan Reservoir (57% of over-wintering events), with 44 fish over-wintering in the reservoir at least once. Within the Namakan River, 47% of over-wintering events occurred in Little Eva Lake over the six winters. Twenty-five percent of overwintering events in the Namakan River occurred in Three Mile Lake and 13% occurred in Bill Lake. In total, 93% of over-wintering events occurred in lake (lentic) environments. The remaining over-winter locations within Namakan River included riverine habitats below Hay Rapids (11 events) and below Snake Falls (9 events). Forty-three fish overwintered in the Namakan River at least once. Lake Sturgeon preferred to over-winter in lentic environments, with small lakes of the Namakan River system perhaps functioning as important staging areas for mature fish preparing to spawn (Bemis and Kynard 1997; McLeod and Debruyne 2009).

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 15, 2012 (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 6.0-25.2°C upstream (Figure 1). No movements 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 rapids/falls are provided in Appendices III and IV. Typical movement patterns in relation to temperature were observed in 2012, with the

exception that 3 upstream movements occurred during particularly low temperatures in early spring (6.0 – 6.3°C).

Site specific movements for High Falls and Back Channel are reported in Appendix VI. In general, fish movement in the Back Channel occurs during periods of increasing water temperature, and continues until mid-summer temperature 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, 2012), 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). 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 which carries only a small portion of the total flow south of Eva Island. 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). 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 presented in Appendix VIII.

Most movements through other rapids/falls also occurred during periods of increasing and decreasing flow from May through November each year (Figure 2). In 2008, 2009

and 2011, peak spring flows corresponded closely with the Namakan River temperature reaching 10°C (within 4 days) and the majority of lake sturgeon movements occurred during a lengthy period of decreasing outflow. Little or no movement was documented during the earlier period of increasing spring flows during these three years. In contrast, many upstream and downstream lake sturgeon movements were recorded during increasing spring flows during 2007, 2010 and 2012. During these years, a water temperature of 10°C was reached in the Namakan River at least 50 days prior to peak spring flows. These observations suggest water temperature may have greater influence than changes in flow on spring lake sturgeon movements, though a longer term dataset is needed to more rigorously evaluate this hypothesis.

Relative to other rapids, downstream and upstream sturgeon movements through Ivy/Myrtle Falls occurred during the highest mean flows at 300 m³/sec and 396 m³/sec respectively¹. Other than the Back Channel, upstream lake sturgeon movements through Hay Rapids occurred during lowest mean flows at 173 m³/sec, while a single downstream movement through the Side Channel between Ivy and Myrtle Falls occurred during a low flow of 140 m³/sec. The minimum Namakan River flow during which a sturgeon movement was detected was 28 m³/sec at Ivy Falls on October 19, 2011. 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.

¹ While Namakan River flow is split through 3 or more channels at the Ivy/Myrtle Falls location, total flow has been applied to each individual channel (Ivy Falls, Myrtle Falls, Side Channel) in the absence of any channel-specific flow estimates. Throughout this report, data for 'Ivy/Myrtle Falls' is limited to detections between the dates May 24, 2007 and May 20, 2009.

Movement of telemetered fish in the Back Channel around Eva Island and High Falls occurred in all years of the study from late fall 2007 to late-summer 2012, when flow conditions were suitable (Appendix VIII). Fourteen additional upstream movements of adult fish occurred in 2012; also, three downstream movements through the Back Channel occurred in June, July and August. Mean flows experienced during all upstream movements (n=50) were estimated at 25m³/s while those experienced during downstream movements (n=11) were estimated at 24 m³/sec. In 2012, the new minimum flow for downstream fish passage through the entire back channel was recorded (6 m³/s) and matches the minimum flow observed for upstream movements. There have been six partial or incomplete upstream movements documented since 2007.

Documented movement patterns have revealed the extent to which lake sturgeon use the Namakan River. There is clear evidence that the rapids and falls between the Namakan Reservoir and Snake Falls do not currently present barriers to migration of lake sturgeon within the Namakan River system (this study; Welsh 2008; Welsh and McLeod, 2010). Together with direct observations of spawning events (Lac La Croix First Nation Traditional Ecological Knowledge, Bio Consulting 2009), aggregations of lake sturgeon below High Falls and extensive upstream movements during periods when water temperatures are suitable for spawning strongly suggest the presence of spawning habitats throughout the river. Evidently, some adult lake sturgeon also choose to over-winter in the lentic environments of Little Eva Lake, Bill Lake and Three-mile Lake. At minimum, water management decisions will need to account for impacts to the migration, spawning, foraging and over-wintering of lake sturgeon in the Namakan River.

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Table 1: Serial number, description and location of VR2W submersible acoustic receivers in the Namakan River, Ontario from 2007 to 2012, ordered by date and time of deployment.

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
100855	549195 5365895	17-May-07	11:22	Namakan River – back channel above first rapids
100846 ¹	548468 5366363	17-May-07	17:50	Little Eva Lake – above Hay 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 ²	540596 5366483	28-May-07	15:00	Namakan River – mouth of Namakan Lake
100849 ³	555305 5369225	18-Sept-07	11:40	Quetico River – below second rapids
100689 ⁴	558003 5367479	18-Sept-07	14:09	Namakan River - below Twisted Rapids
100854 ⁵	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)
104898	562350 5361290	14-May-09	13:14	Namakan River- Above Ivy Falls
104901	559827 5362906	20-May-09	10:12	Namakan River- below Myrtle Falls
104900 ⁶	544310 5366389	28-May-09	14:40	Namakan River – below Lady Rapids

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

² lost due to theft or disturbance by anglers and moved to less visible, long-term location. Did not record data after September 6, 2008.

³ moved further upstream to deeper water below second rapids to avoid potential freeze-in during winter months.

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

⁵ moved to planned location within QPP. Low water prevented boat access to Bearpelt Creek prior to Oct/07. Receiver removed Aug. 20, 2010.

⁶ replaced 100851 at the mouth of Namakan River.

Table 2: Lake sturgeon detections by receiver location in the Namakan River, Ontario from May, 2007 to October, 2012.

Location No.	Location Description	Distance Upstream (km)	Receiver Serial No.	No. Detections	No. Transmitters Detected
1	Below Lady Rapids	0	100851/104900	503,738	42
2	Below Hay Rapids	7.4	100847	357,773	45
3	Little Eva Lake	9.1	100846	2,327,543	45
4	Below High Falls	11.7	100853	125,580	44
5	Lower Back Channel	10.2	100855	5,763	30
6	Bill Lake	12.6	100852	466,274	32
7	Above Quetico Rapids	14.7	100848	13,535	32
8	Quetico River	17.5	100849	2,531	6
9	Below Twisted Rapids	20.0	100689	50,005	33
10	Bearpelt Creek ¹	27.4	100854	7,117	12
11	Three Mile Lake	24.7	100850	206,651	33
12	Below Myrtle Falls	25.5	104901	46,331	25
13	Above Ivy Falls	27.3	104898	44,138	9
14	Below Snake Falls	28.8	101942	157,265	17
15	Above Snake Falls	30.5	103459	0	0
Total	16	-	-	4,314,242	-
Mean	-	-	-	287,616	27

¹ only 2 fish detected at revised location after October 12, 2007. Receiver removed Aug. 20, 2010 and placed at East End Namakan on May 27, 2011 as part of Juvenile study.

Table 3: Individual lake sturgeon detections and last known date/location by transmitter code in the Namakan River, Ontario from May, 2007 to October, 2012. 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 ¹
4739	15-May-07	Below Hay Rapids	15-Oct-12	Above Hay Rapids	241,520	4
4740	15-May-07	Below Hay Rapids	19-Jun-09	Namakan Lake	50,411	12
4741	15-May-07	Below Hay Rapids	07-Jul-12	Above Hay Rapids	148,946	10
4742	15-May-07	Below Hay Rapids	20-Jun-12	Namakan Lake	104,937	4
4743	15-May-07	Below Hay Rapids	13-May-12	Namakan Lake	32,672	9
4744	16-May-07	Below Hay Rapids	15-Oct-12	Above Hay Rapids	135,069	4
4745	16-May-07	Below Hay Rapids	15-Oct-12	Above Hay Rapids	99,631	4
4746	16-May-07	Below Hay Rapids	11-Jul-12	Above Hay Rapids	332,272	12
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	27,089	10
4750	17-May-07	Little Eva Lake	06-Jun-09	Namakan Lake	11,985	4
4751	17-May-07	Little Eva Lake	12-Oct-12	Above Hay Rapids	152,646	4
4752	17-May-07	Little Eva Lake	29-May-12	Namakan Lake	200,988	10
4753	17-May-07	Little Eva Lake	15-Oct-12	Above Hay Rapids	497,634	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	19-Jun-11	Namakan Lake	64,088	4
4592	18-May-07	Little Eva Lake	02-Sep-12	Above Hay Rapids	259,505	13
4593	23-May-07	Bill Lake	22-Jun-12	Namakan Lake	38,281	13
4594	23-May-07	Bill Lake	09-Jun-12	Three Mile Lake	44,930	12
4595	23-May-07	Bill Lake	31-May-09	Namakan Lake	12,445	10
4596	23-May-07	Bill Lake	16-Oct-12	Bill Lake	380,211	2
4597	23-May-07	Bill Lake	10-Oct-12	Bill Lake	7,649	5
4598	24-May-07	Three Mile Lake	16-Aug-12	Below Snake Falls	86,405	5
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	15-Oct-12	Above Hay Rapids	87,900	11
4602	25-May-07	Three Mile Lake	13-Sep-11	Namakan Lake	26,068	11
8491	30-Apr-08	Below Snake Falls	13-Sep-12	Above Ivy Falls	65,444	4
8492	30-Apr-08	Below Snake Falls	12-May-12	Below Snake Falls	173,061	10
8493 ²	02-May-08	Below Snake Falls	01-Feb-11	Below Snake Falls	71,720	9
8494 ³	02-May-08	Below Snake Falls	31-Jul-12	Below Snake Falls	-	-
8495	14-May-08	Sand Point Lake	17-Jun-09	Namakan Lake	1,065	3
49630	20-May-08	Namakan Lake	15-Oct-12	Above Hay Rapids	83,929	10
49631	16-May-08	Little Vermillion Lake	15-Oct-12	Above Hay Rapids	40,393	4
49632	15-May-08	Sand Point Lake	15-Oct-12	Above Hay Rapids	20,444	9
49633	21-May-08	Namakan Lake	15-Oct-12	Above Hay Rapids	81,357	9
49634	21-May-08	Namakan Lake	15-Oct-12	Above Hay Rapids	27,552	11
49635	20-May-08	Namakan Lake	15-May-12	Namakan Lake	68,142	12
49636	21-May-08	Namakan Lake	01-May-10	Namakan Lake	1,169	1

49637	21-May-08	Namakan Lake	09-Oct-12	Above Twisted Rapids	6,054	10
49638	20-May-08	Namakan Lake	26-Jun-12	Namakan Lake	24,480	10
49640	14-May-08	Sand Point Lake	22-Jun-12	Namakan Lake	37,098	12
49641	14-May-08	Sand Point Lake	17-May-12	Namakan Lake	74,944	11
49642	07-May-08	Crane Lake	15-Oct-12	Above Hay Rapids	43,932	4
49643	07-May-08	Crane Lake	26-May-12	Namakan Lake	32,051	9
49644	07-May-08	Crane Lake	09-Aug-10	Namakan Lake	8,743	10
49645	07-May-08	Crane Lake	26-Sep-12	Above Hay Rapids	7	1
49646	07-May-08	Crane Lake	14-Oct-12	Above Hay Rapids	14,076	10
49647	13-May-08	Sand Point Lake	24-Sep-12	Below High Falls	101,586	4
49650	15-May-08	Sand Point Lake	20-Mar-12	Above Hay Rapids	46,241	10
49652	14-May-08	Sand Point Lake	26-May-10	Below Lady Rapids	7,112	4
49653	14-May-08	Sand Point Lake	15-Oct-12	Above Hay rapids	13,874	10
49654	14-May-08	Little Vermilion Lake	14-May-12	Namakan Lake	18,219	4
Total	56	-	-	-	4,314,242	-
Mean	-	-	-	-	78,441	7

¹ Receiver 100851 and its replacement 104900 (Below Lady Rapids) were considered 1 receiver for the purposes of this report.

² Reported mortality (subsistence harvest) on May 15, 2011.

³ 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. 15, 2012. 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	83	95	178
Hay Rapids	3.0	93	97	190
Back Channel (Eva Island)	7.0	50	11	61
High Falls	6.8	0	40	40
Quetico Rapids	0.7	70	71	141
Quetico River (QPP)	-	10	10	20
Twisted Rapids	-	71	75	146
Ivy/Myrtle Falls	4.0	30	21	51
Ivy Falls ²	-	0	9	9
Myrtle Falls ²	-	0	10	10
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 2012 .

Location	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13 (Preliminary)	Total (%)
Namakan Reservoir	18	30	37	40	34	11	170 (57.1)
Below Hay Rapids	1	2	0	2	6	0	11 (3.7)
Little Eva Lake	3	14	12	7	5	19	60 (20.1)
Bill Lake	2	3	4	3	2	2	16 (5.4)
Three Mile Lake	6	8	6	4	4	4	32 (10.7)
Below Snake Falls	0	2	0	3	1	3	9 (3)
Total (n)	30	59	59	59	52	39	298(100.0)

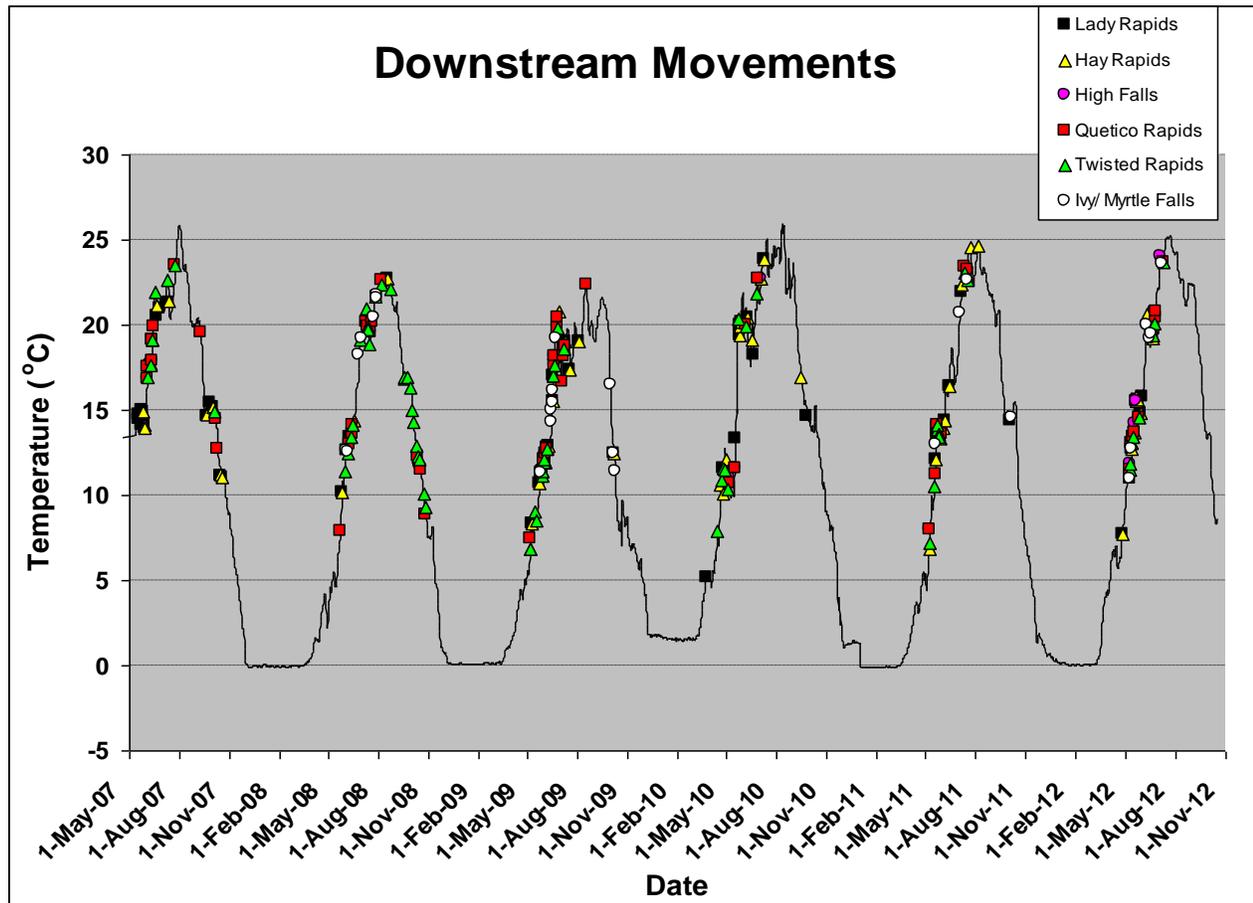
Table 6: Mean and range of water flows for lake sturgeon movements through undeveloped rapids/falls in the Namakan River, Ontario from May 15, 2007 to Oct. 15, 2012. Locations are listed from downstream to upstream, and proposed hydro development sites are in bold.

Location	Downstream			Upstream		
	n	Mean (m ³ /s)	Range (m ³ /s)	n	Mean (m ³ /s)	Range (m ³ /s)
Lady Rapids	95	167	29-464	83	174	31-407
Hay Rapids	97	190	40-464	93	173	19-411
Back Channel¹	11	24	6-48	50	25	6-47
High Falls	40	224	41-406	0	-	-
Quetico Rapids	71	218	36-467	70	218	29-464
Twisted Rapids	75	199	40-446	71	187	21-444
Ivy/Myrtle Falls	7	300	109-409	8	396	313-464
Ivy Falls	10	214	29-288	0	-	-
Myrtle Falls	10	222	51-385	2	158	152-163
Side channel	1	140	N/A	20	224	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).

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)

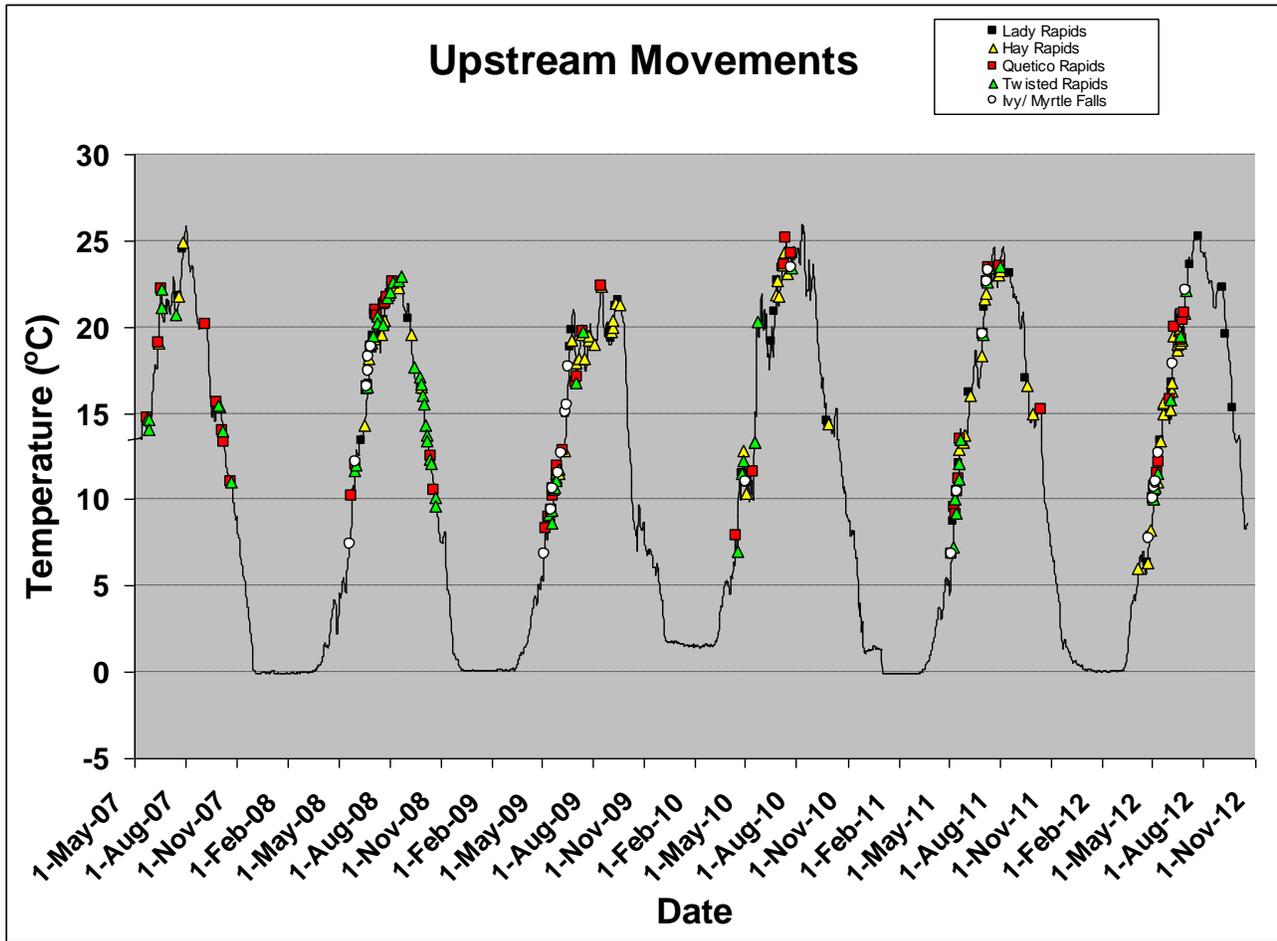
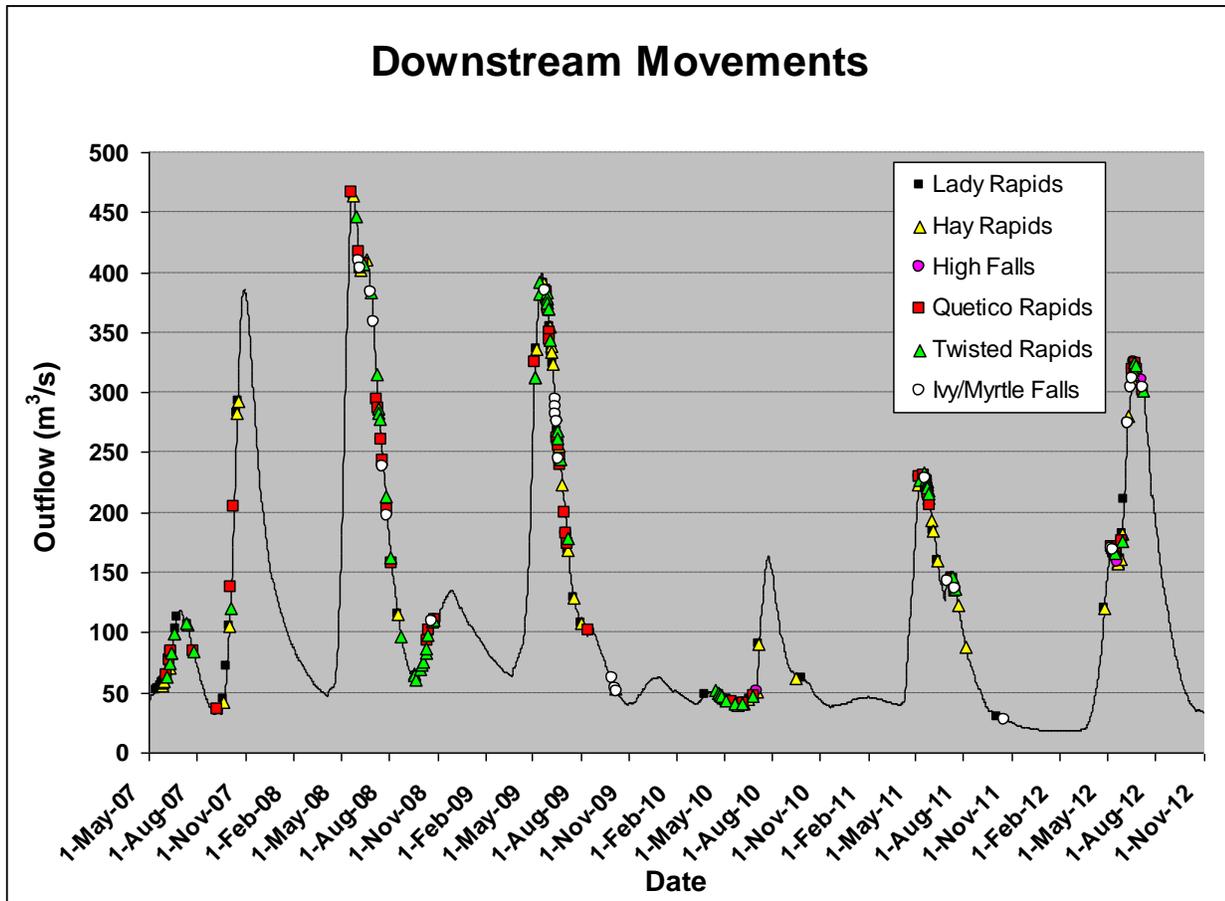
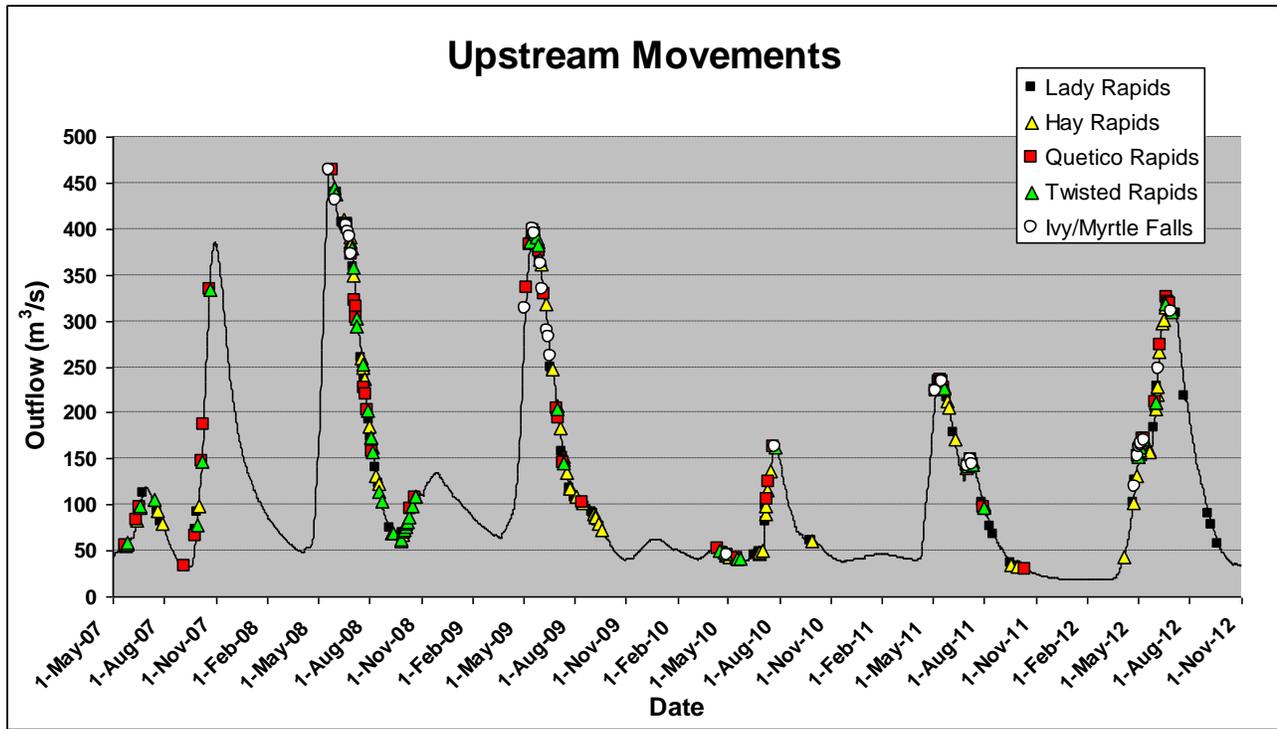


Figure 2: Downstream (A) and upstream (B) movement of lake sturgeon in relation to mean daily outflow through undeveloped rapids/falls in the Namakan River.

A)

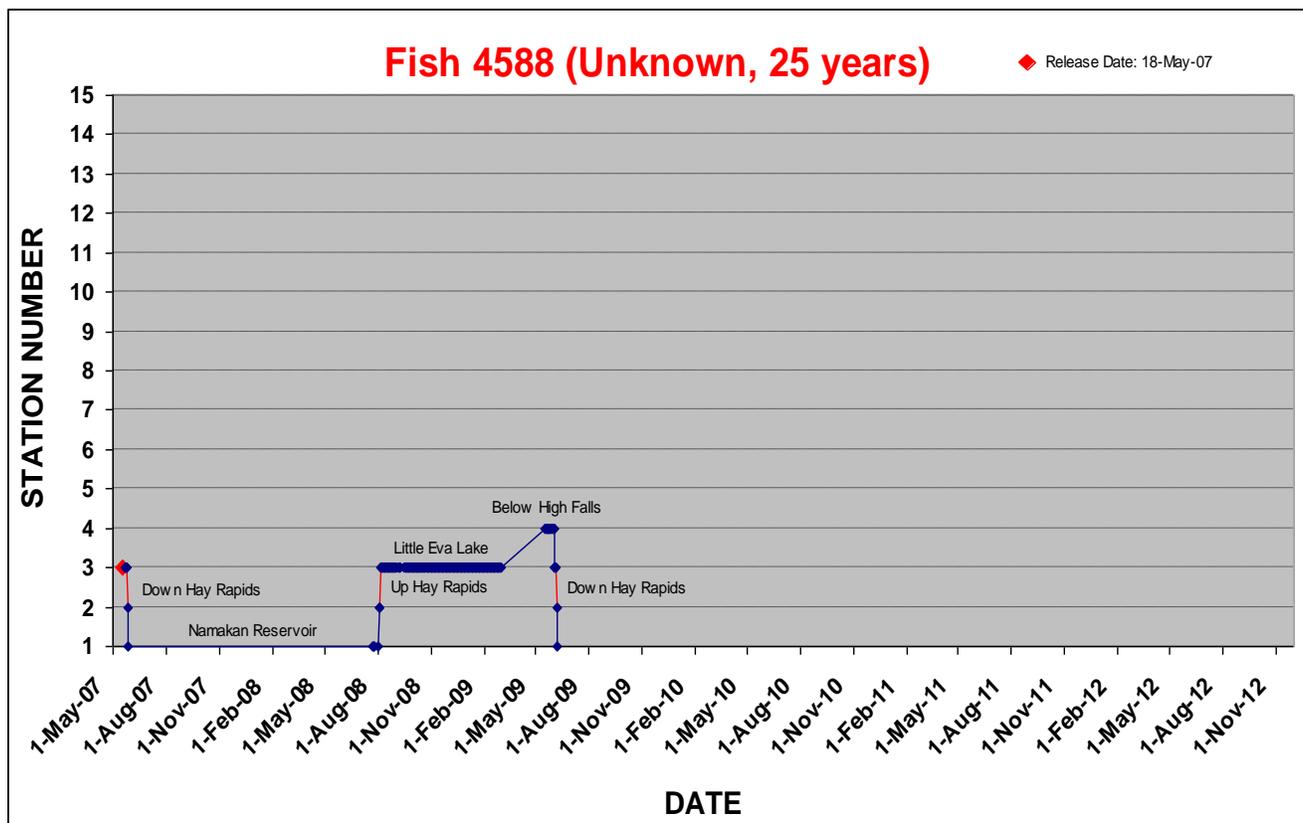


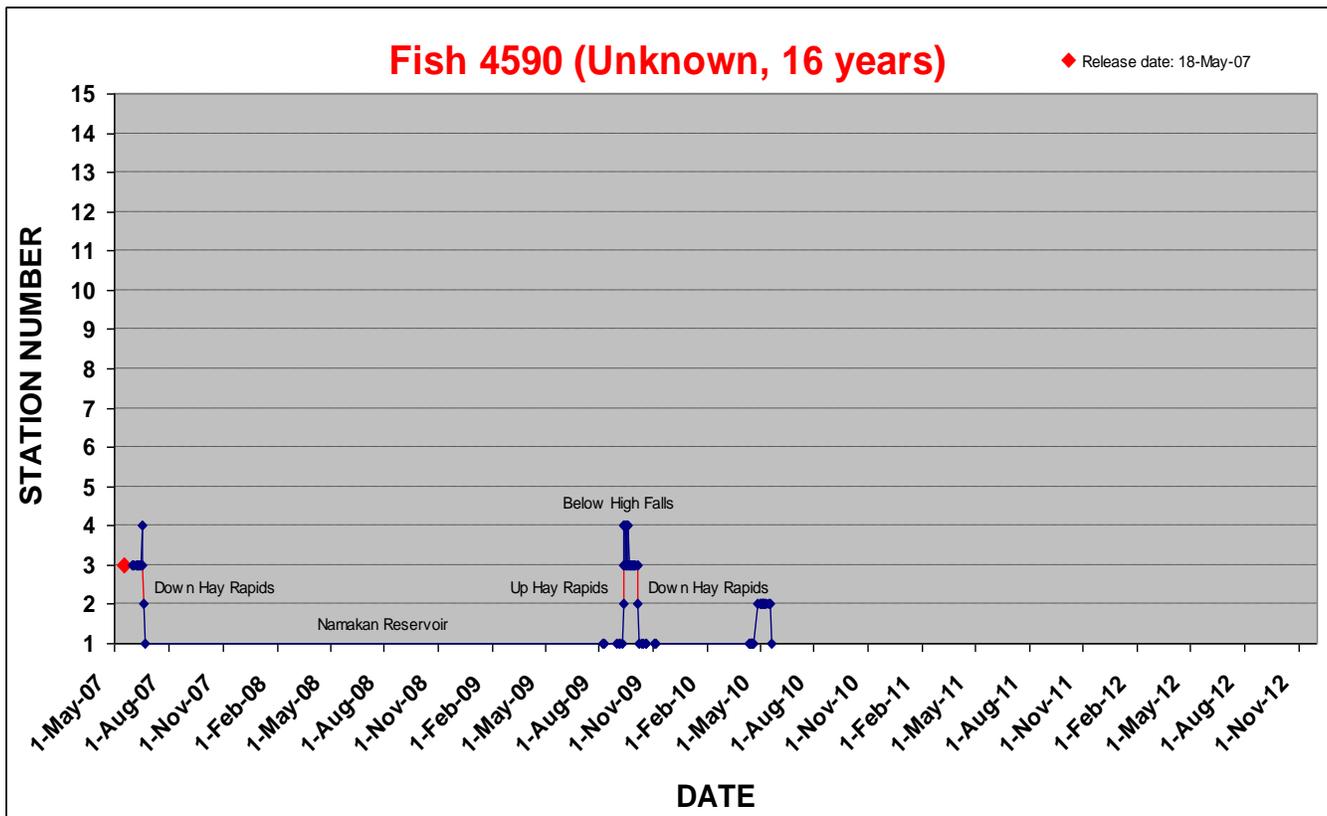
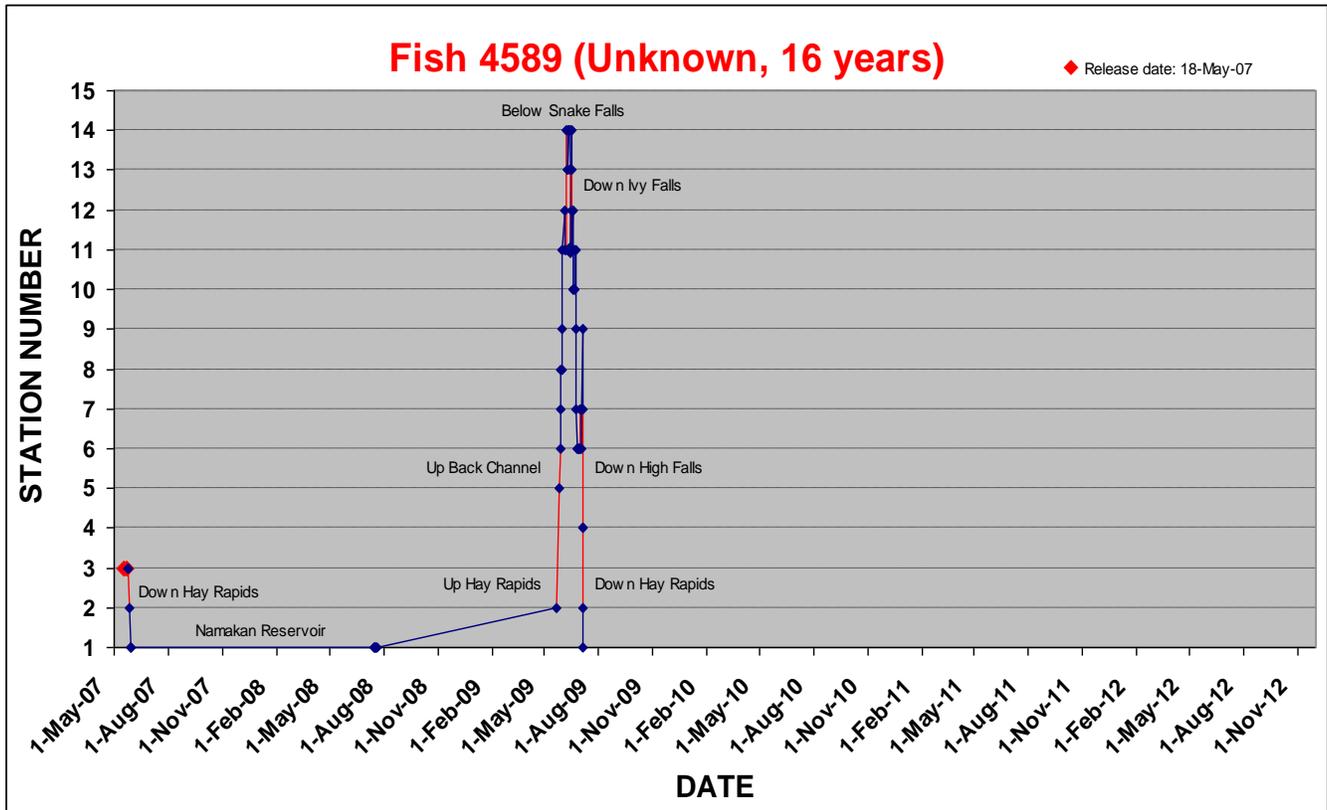
B)

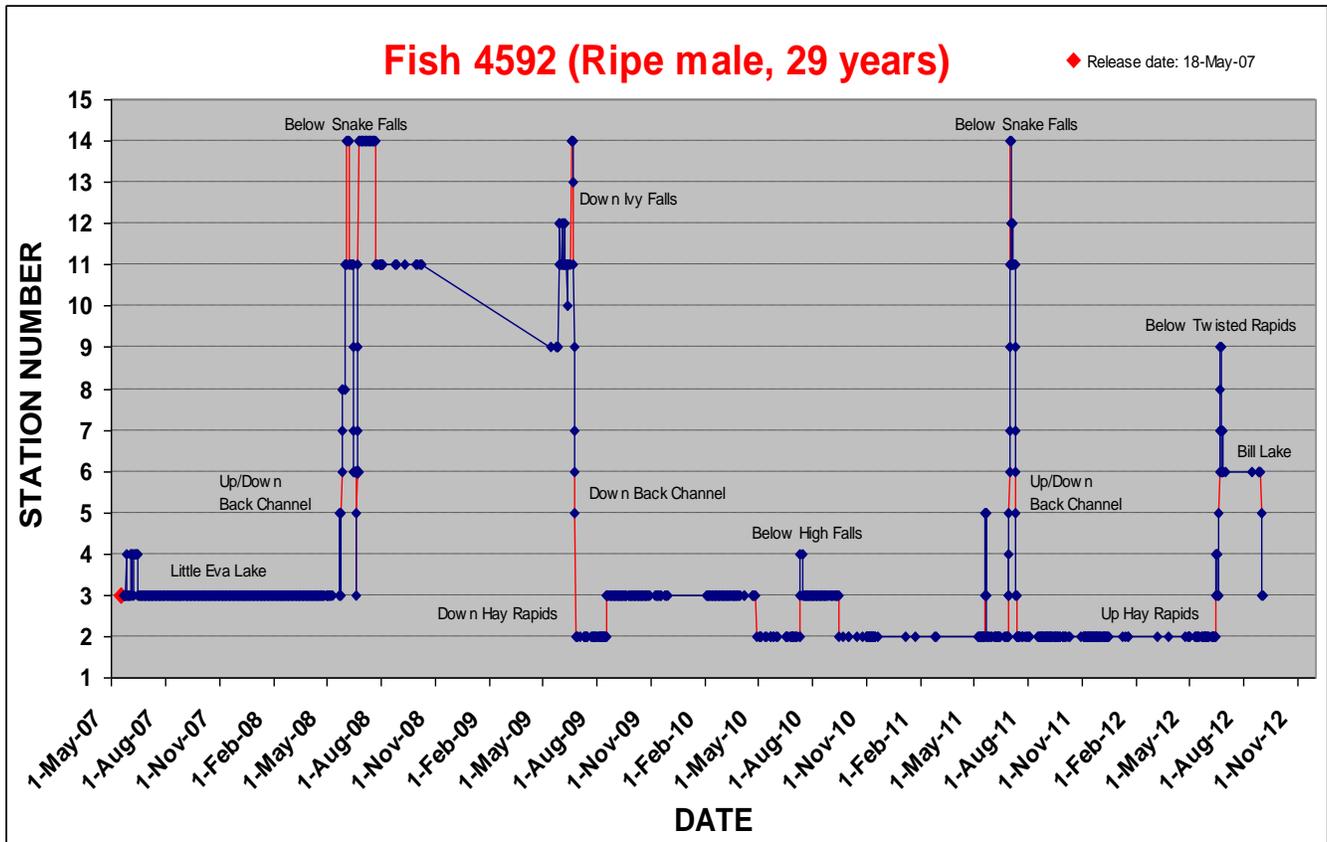
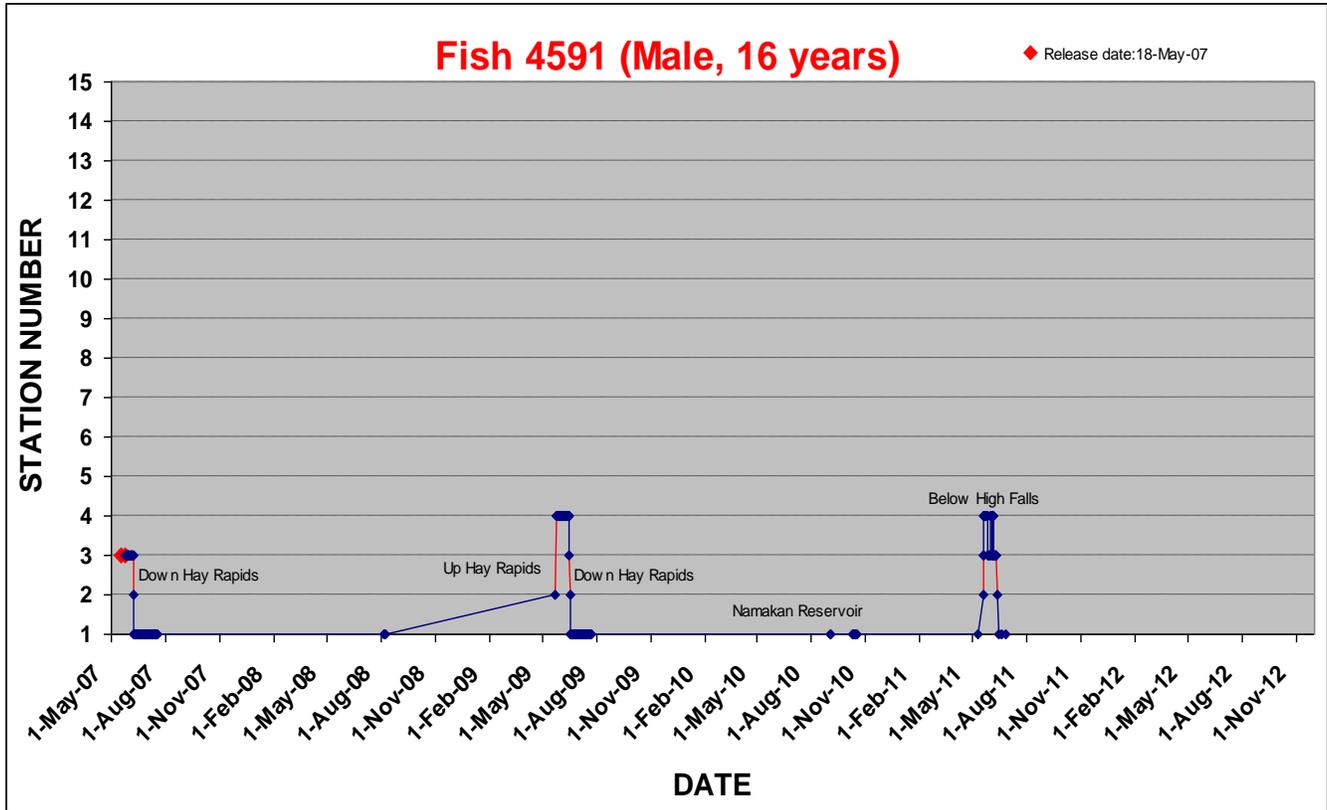


Appendix I: Movement of individual lake sturgeon released in 2007 within the Namakan River, Ontario.

<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)

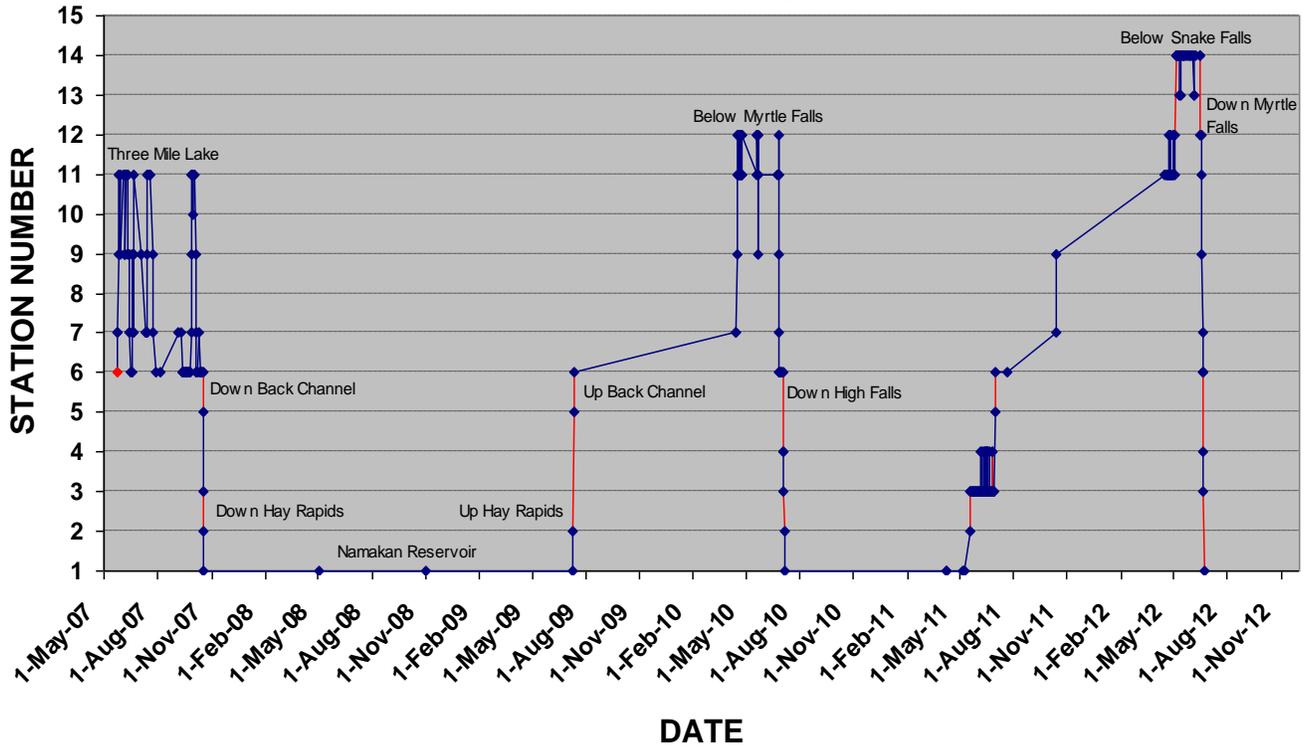






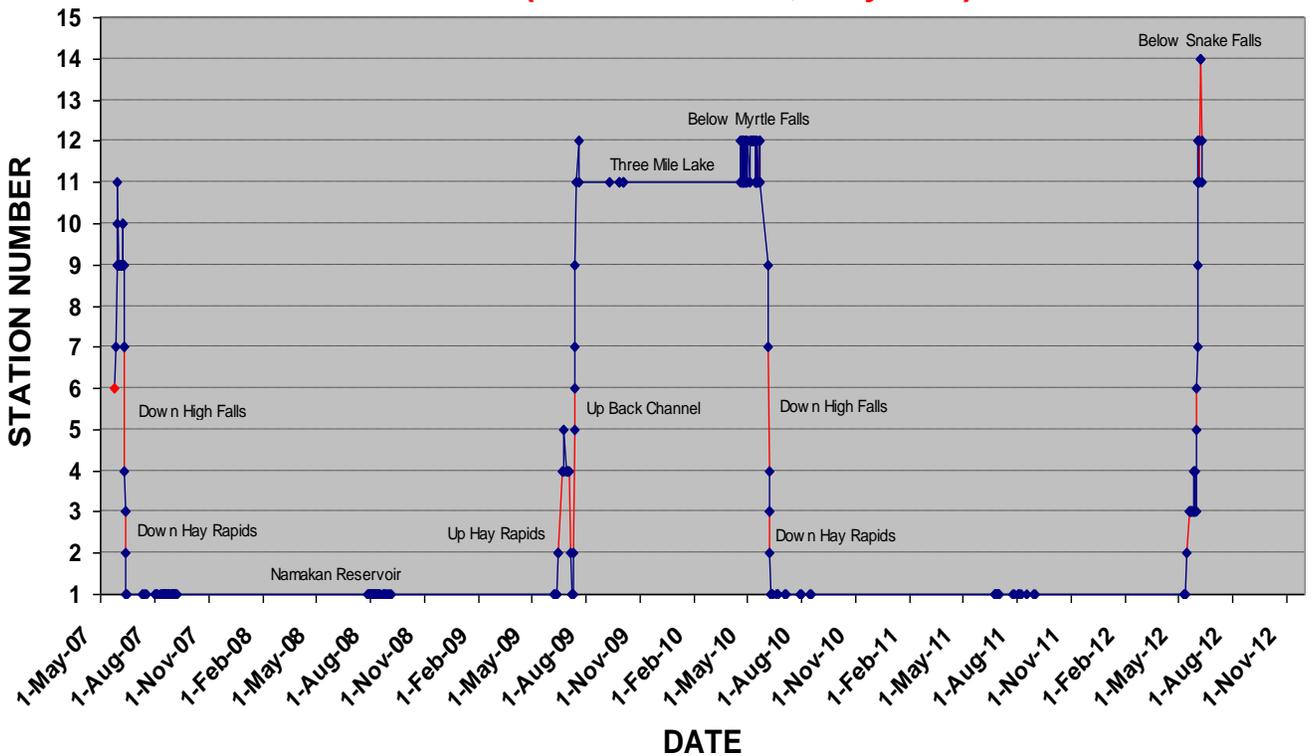
Fish 4593 (Male, 26 years)

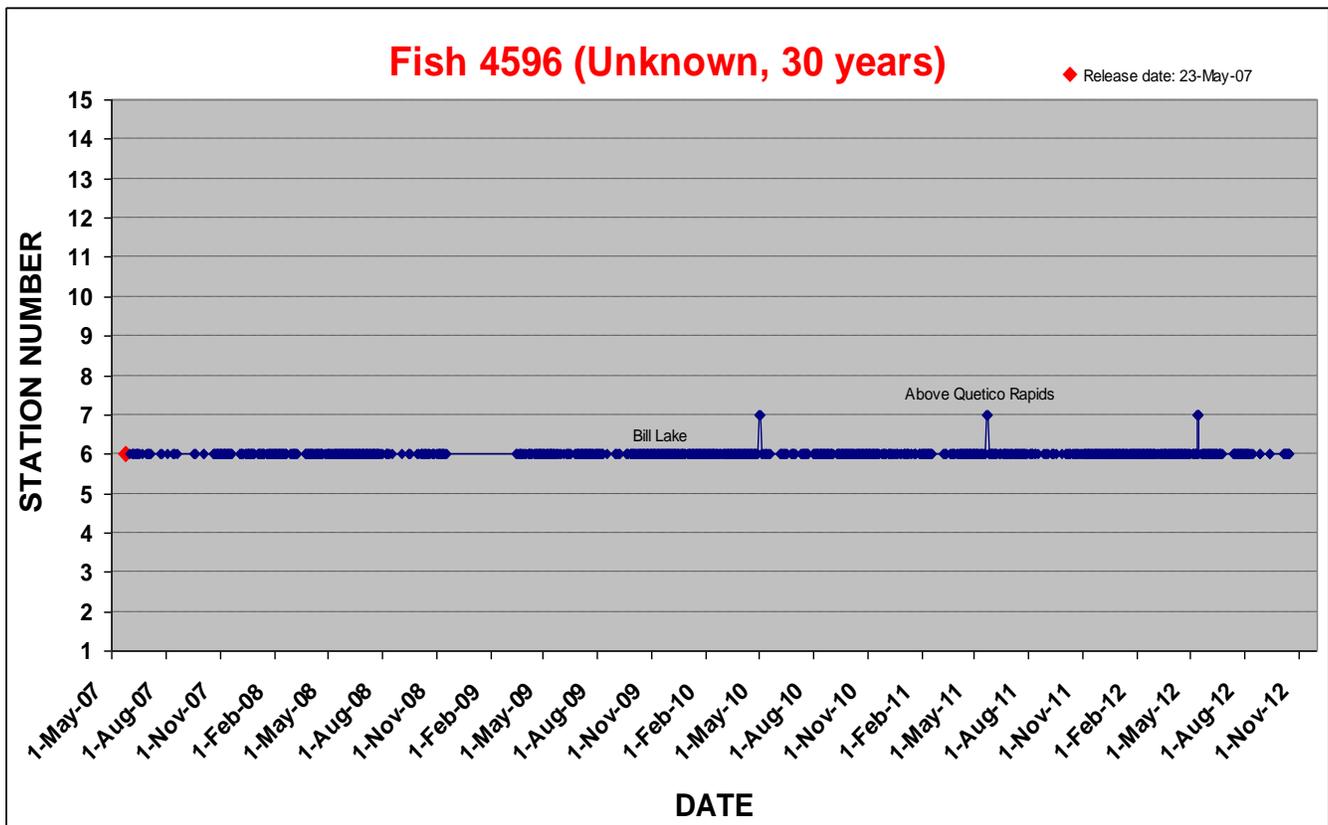
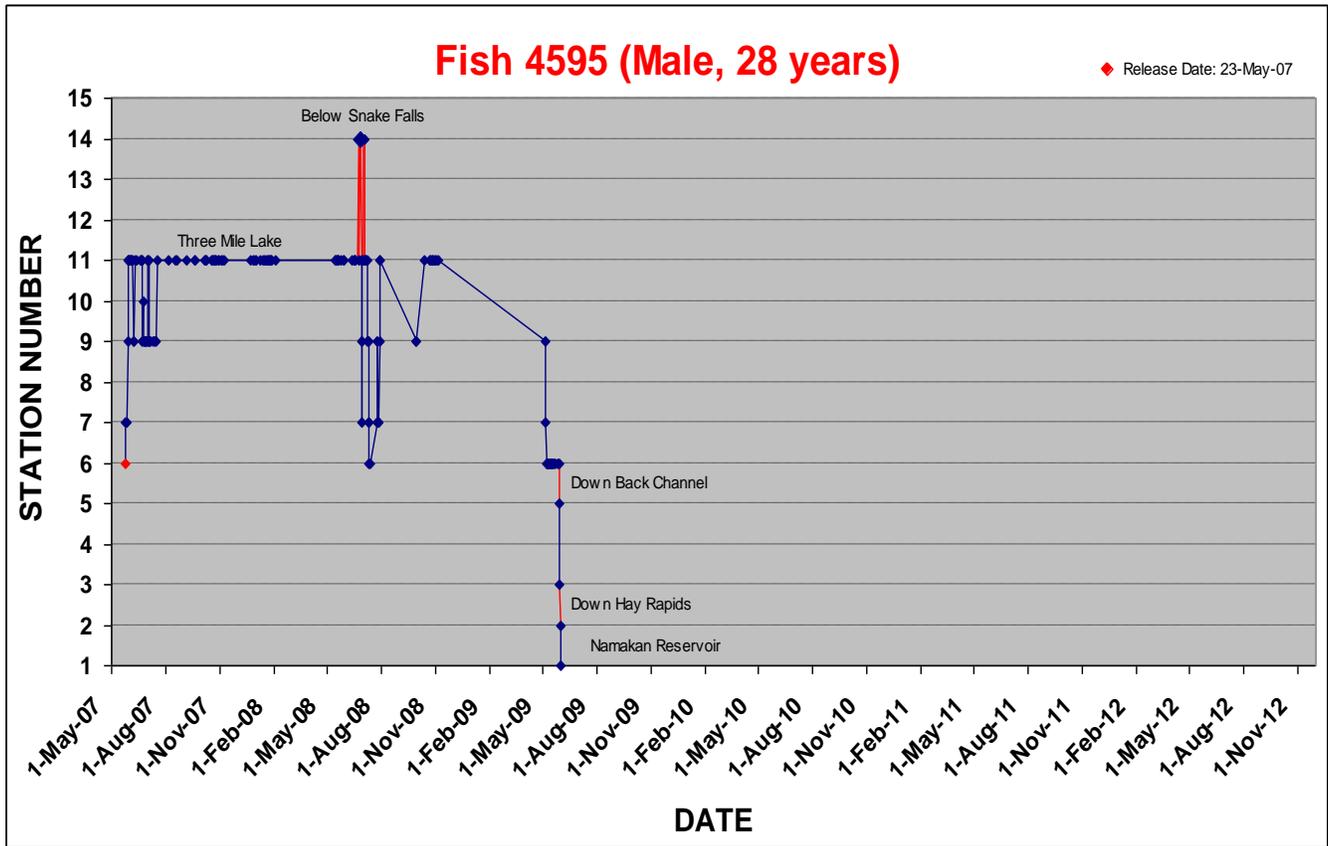
◆ Release Date: 23-May-07



Fish 4594 (Gravid female, 32 years)

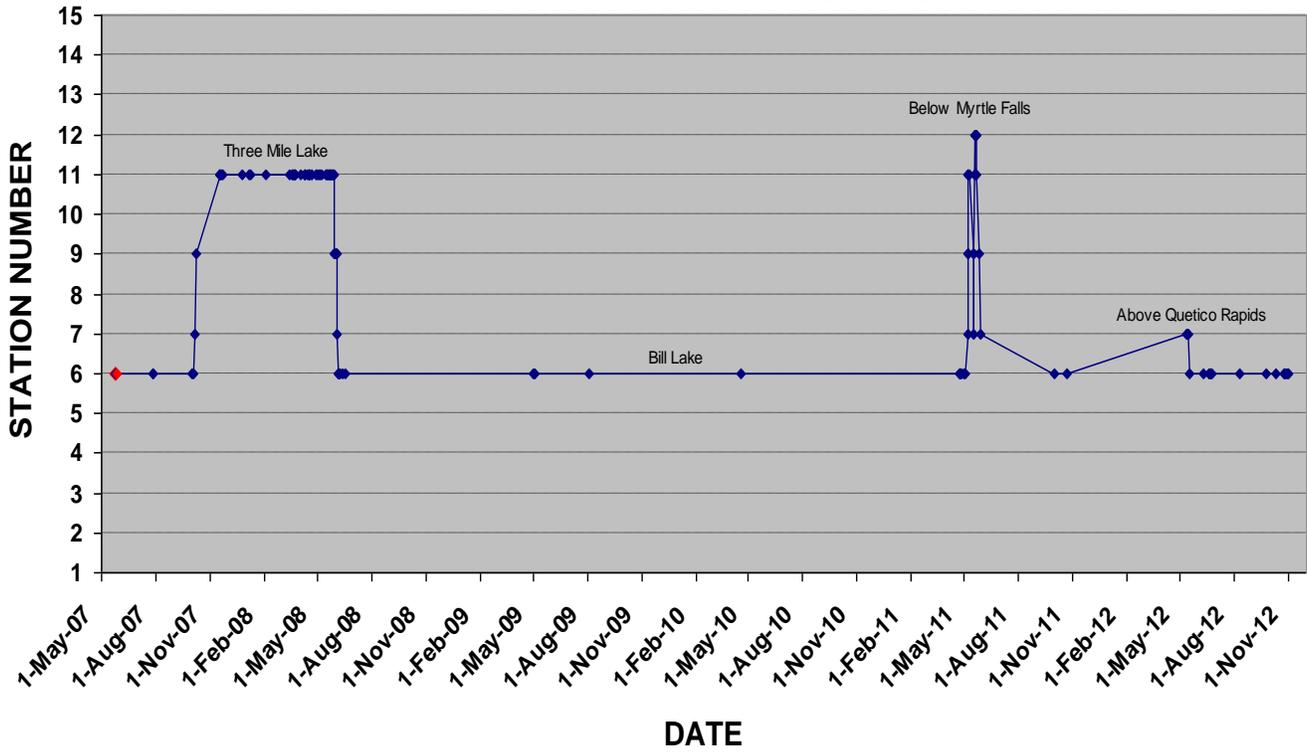
◆ Release Date: 23-May-07





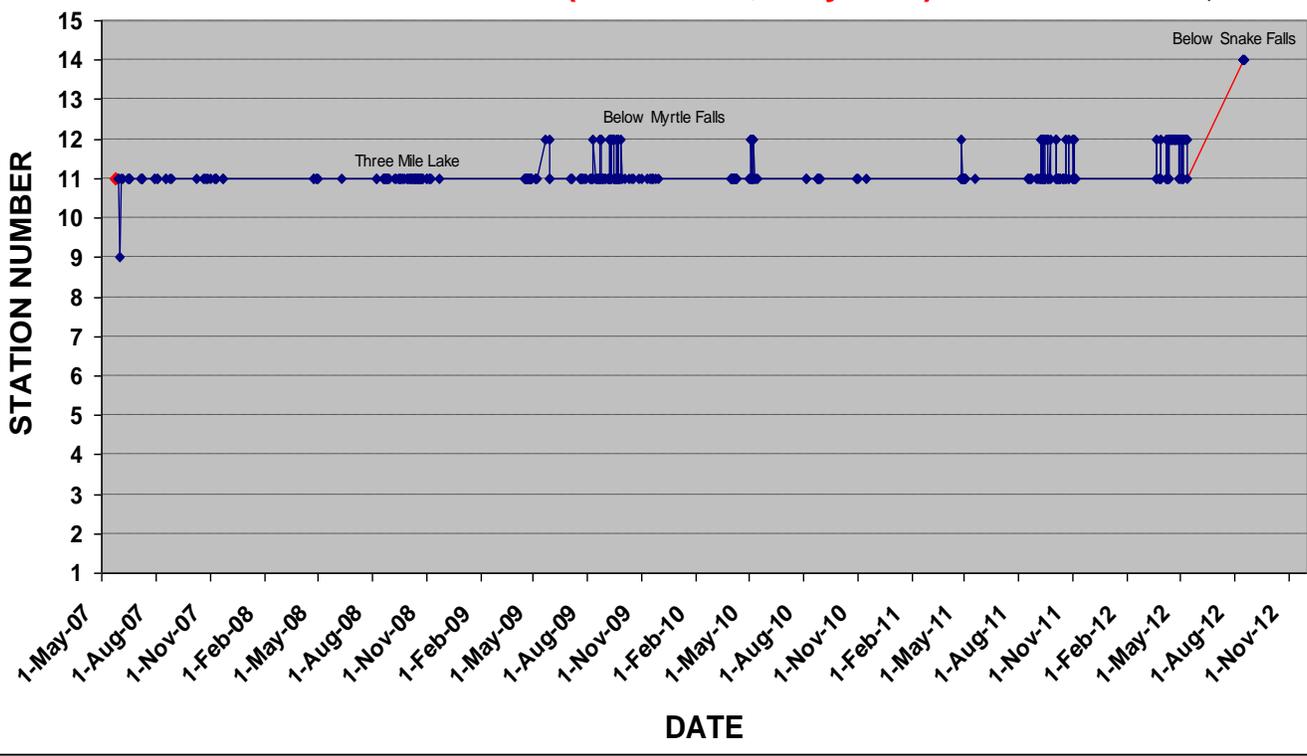
Fish 4597 (Unknown, 34 years)

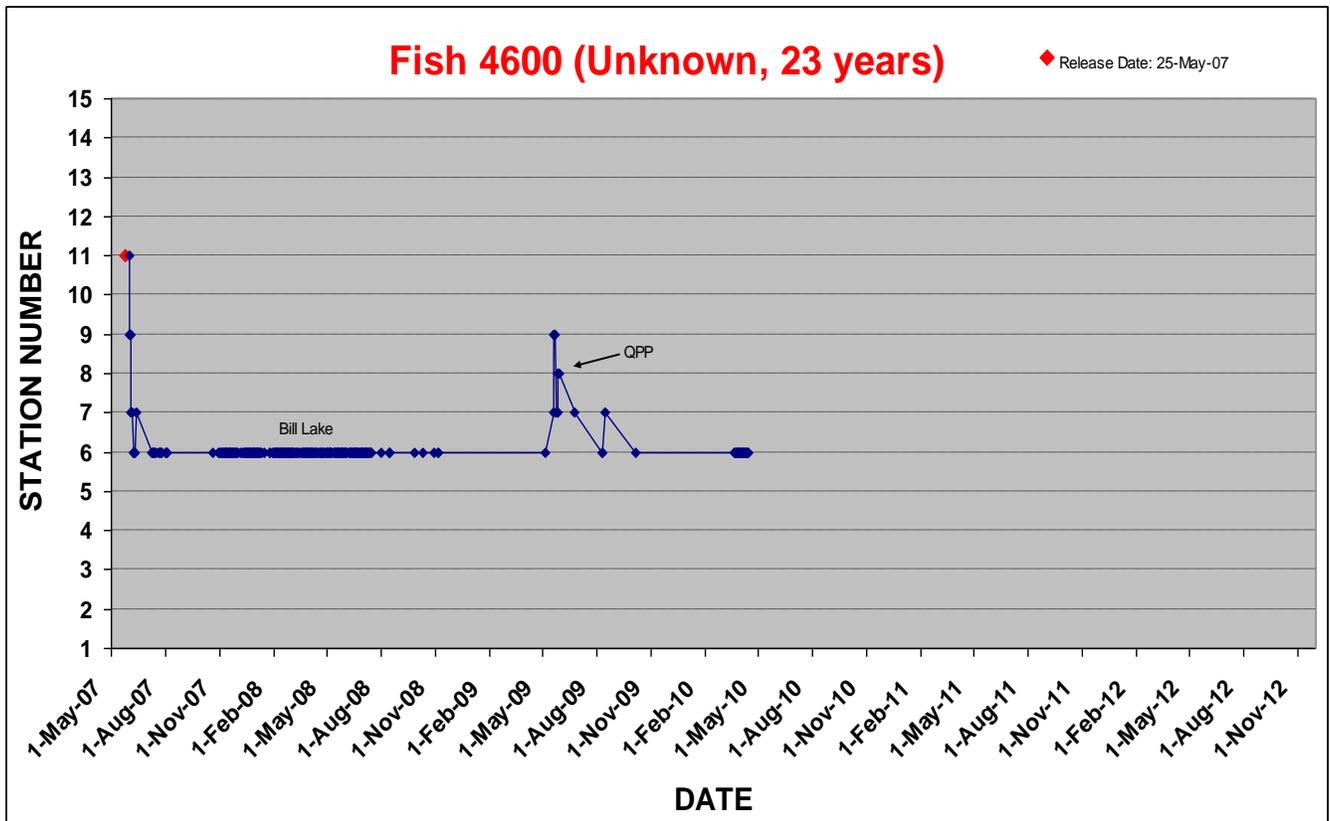
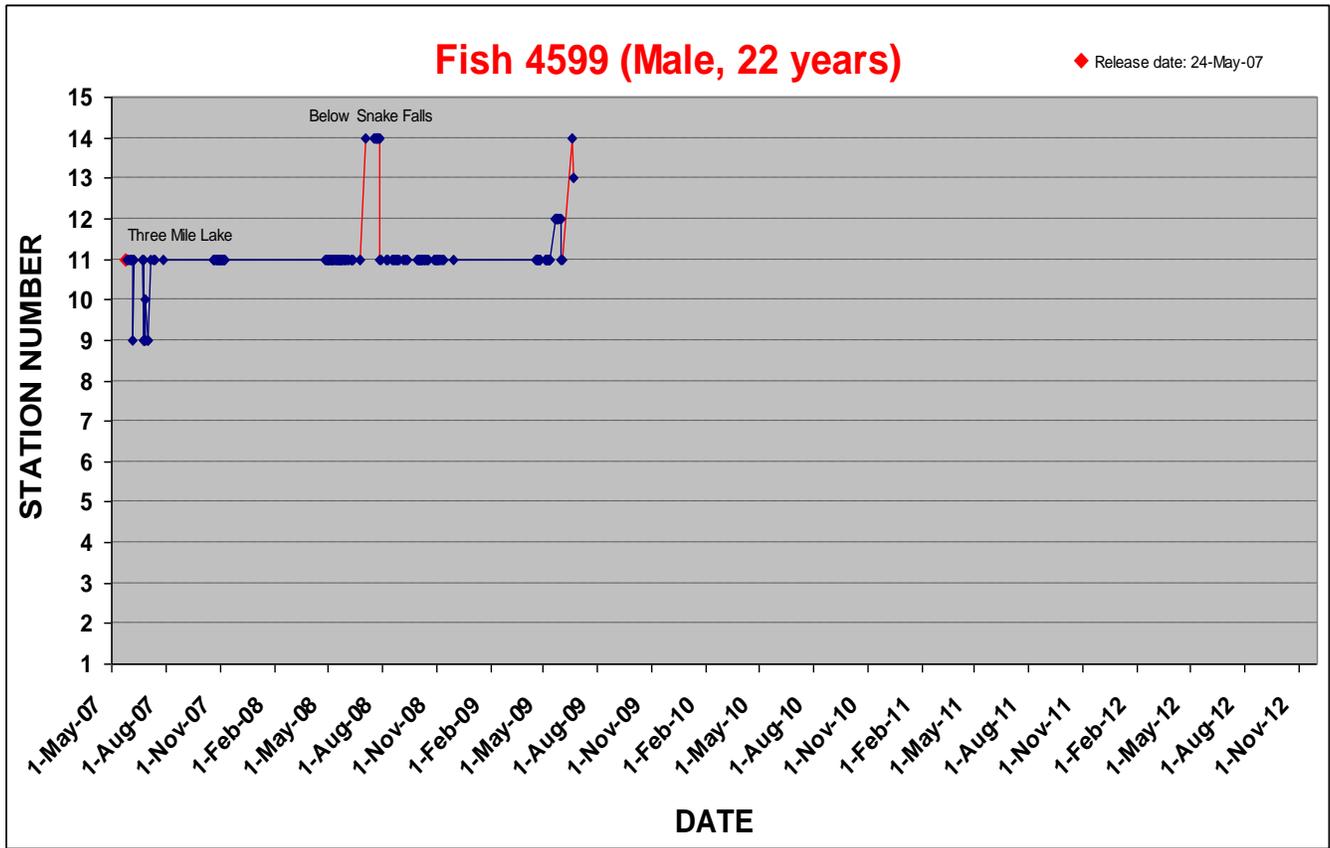
◆ Release date: 23-May-07



Fish 4598 (Unknown, 33 years)

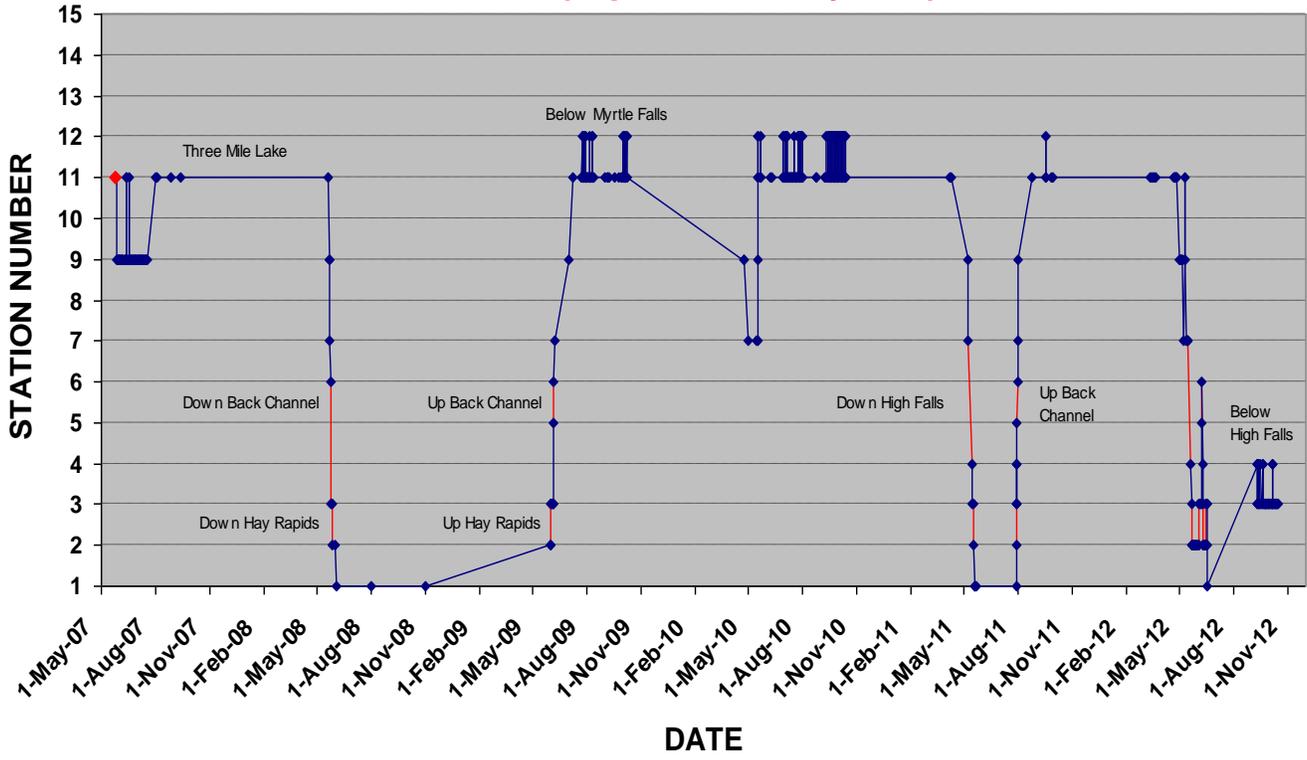
◆ Release date: 24-May-07





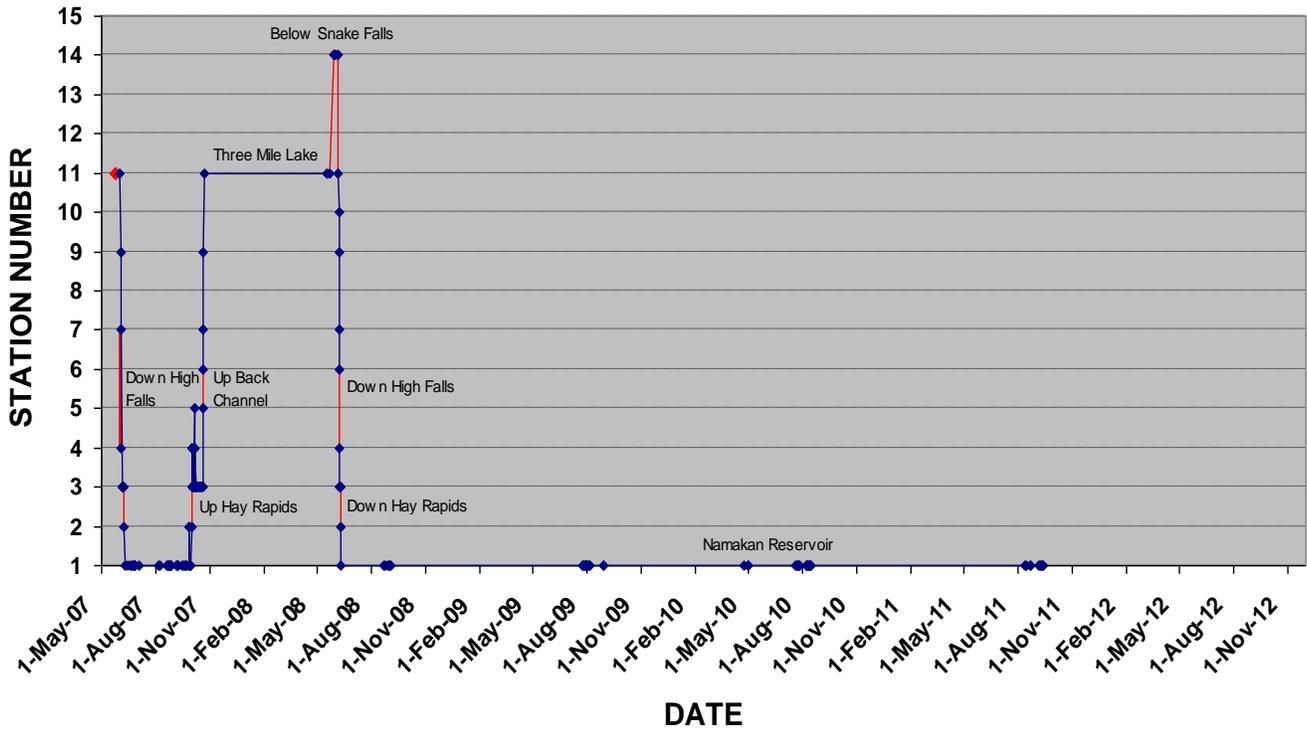
Fish 4601 (Ripe male, 28 years)

◆ Release date: 25-May-07



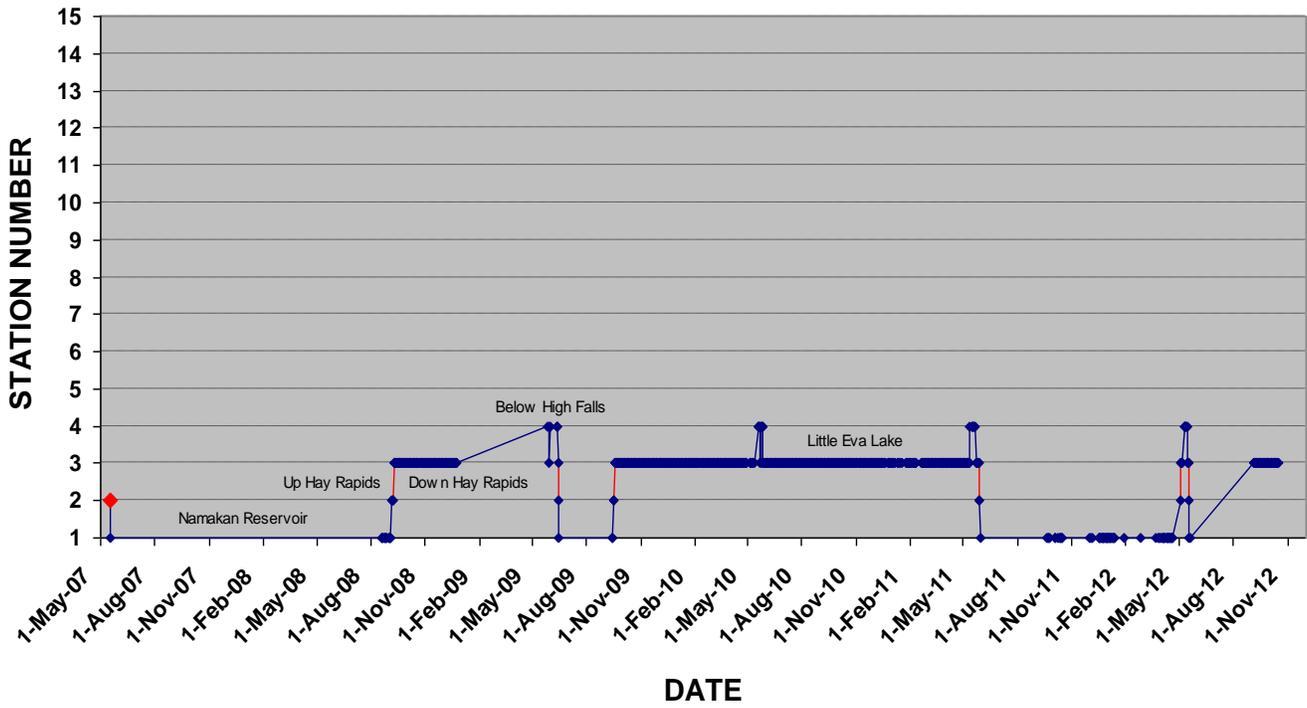
Fish 4602 (Developing female, 27 years)

◆ Release Date: 25-May-07



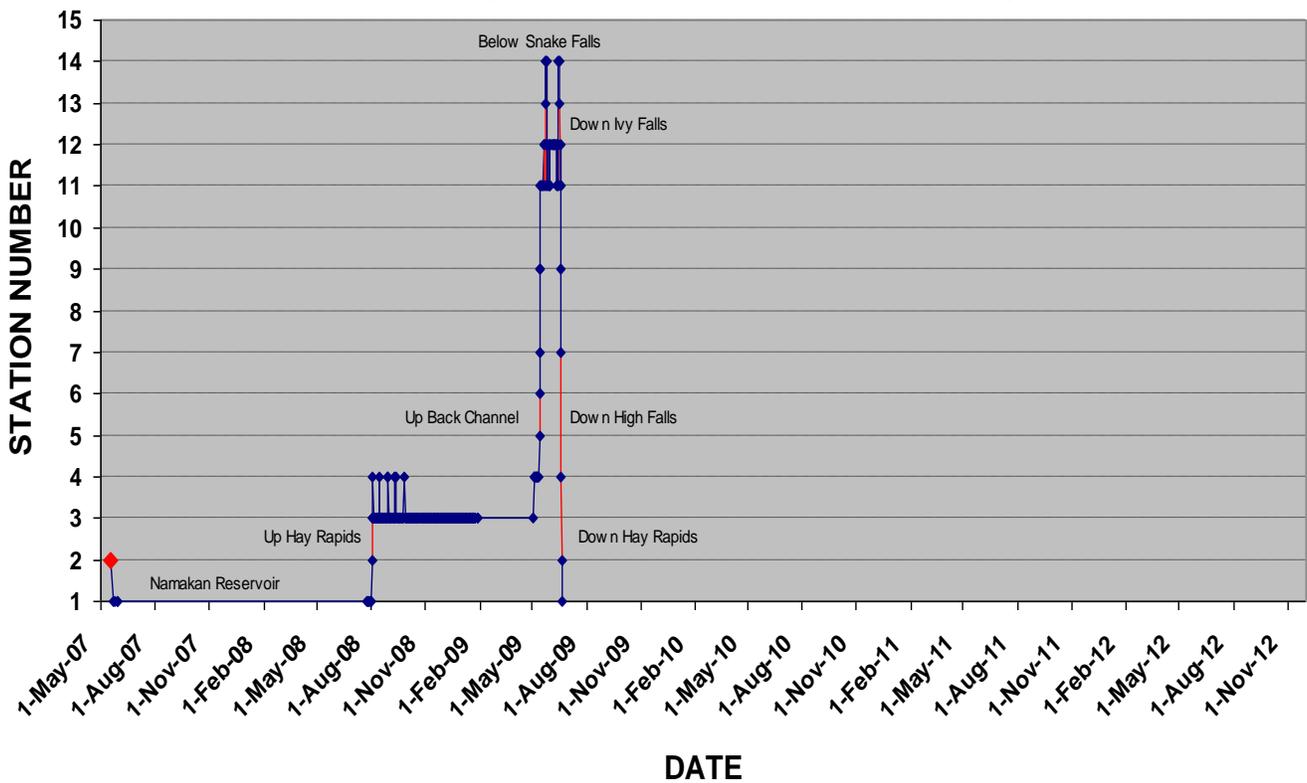
Fish 4739 (Unknown, 21 years)

◆ Release Date: 15-May-07



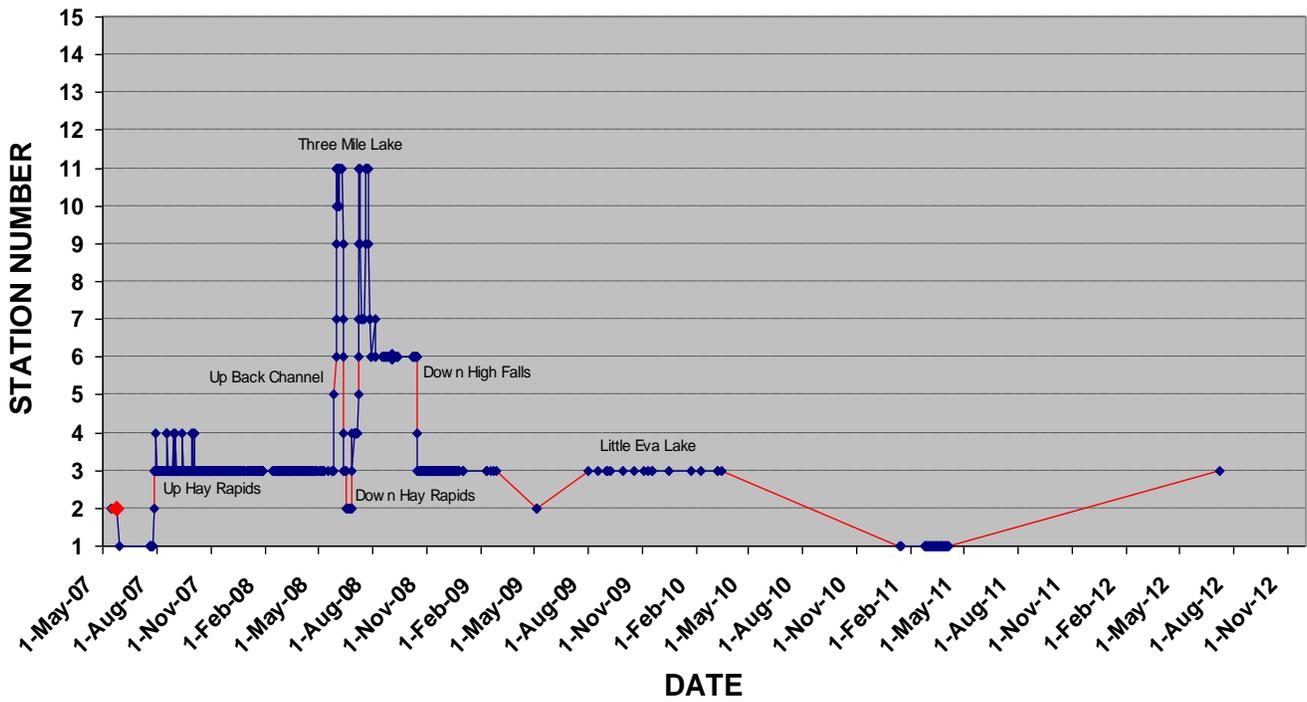
Fish 4740 (Developing female, 29 years)

◆ Release date: 15-May-07



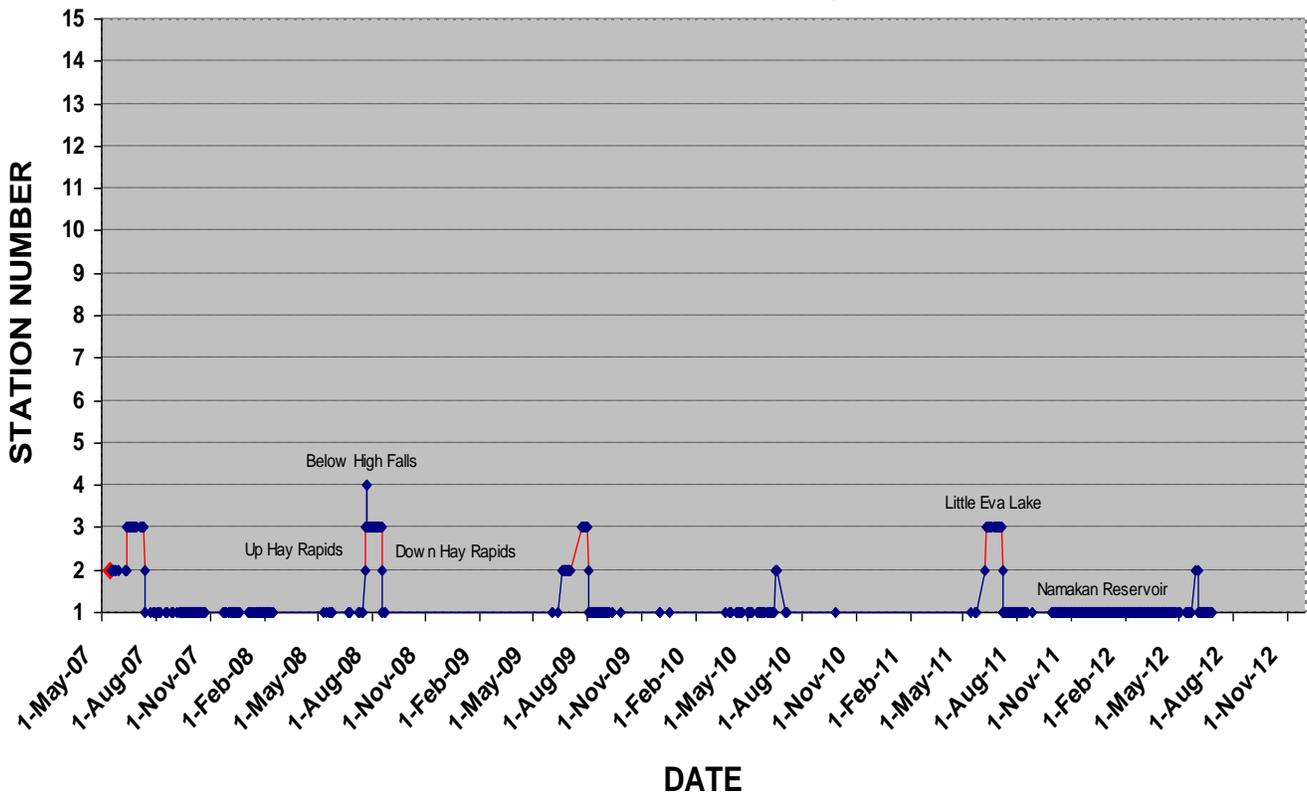
Fish 4741 (Unknown, 27 years)

◆ Release Date: 15-May-07



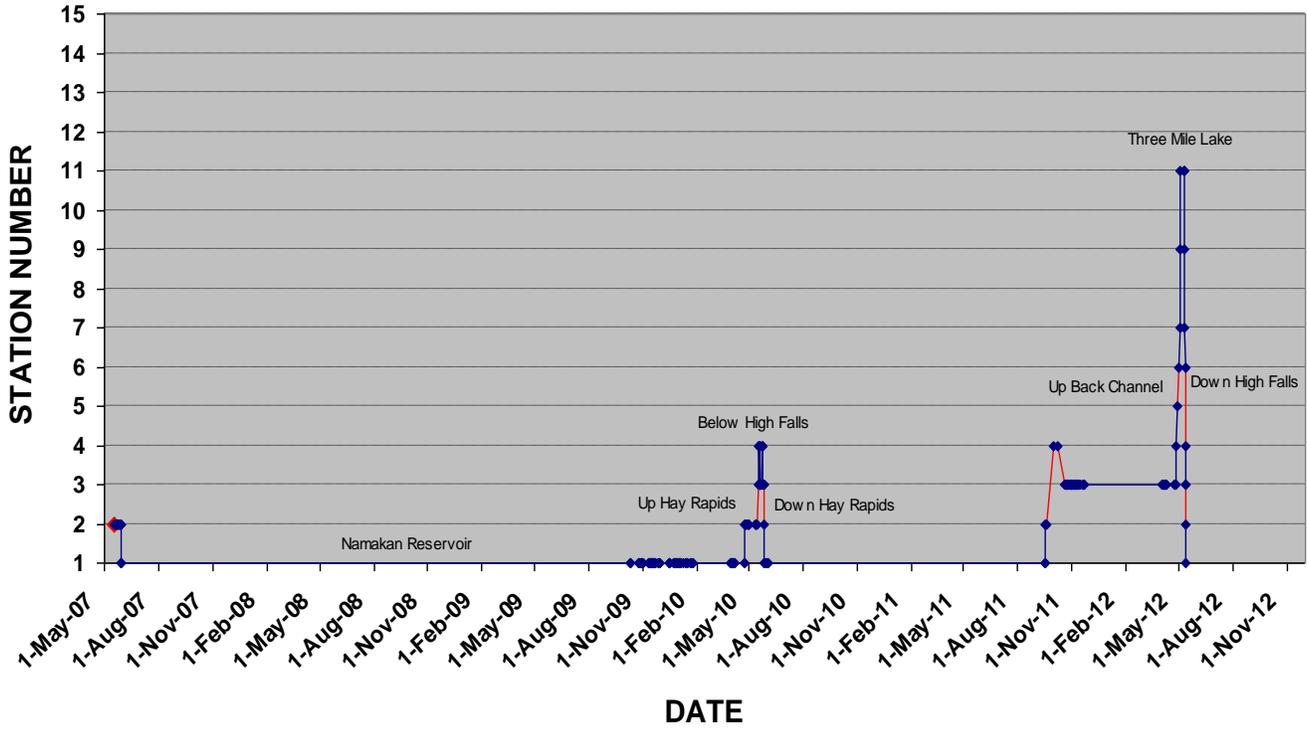
Fish 4742 (Ripe male, 23 years)

◆ Release date: 15-May-07



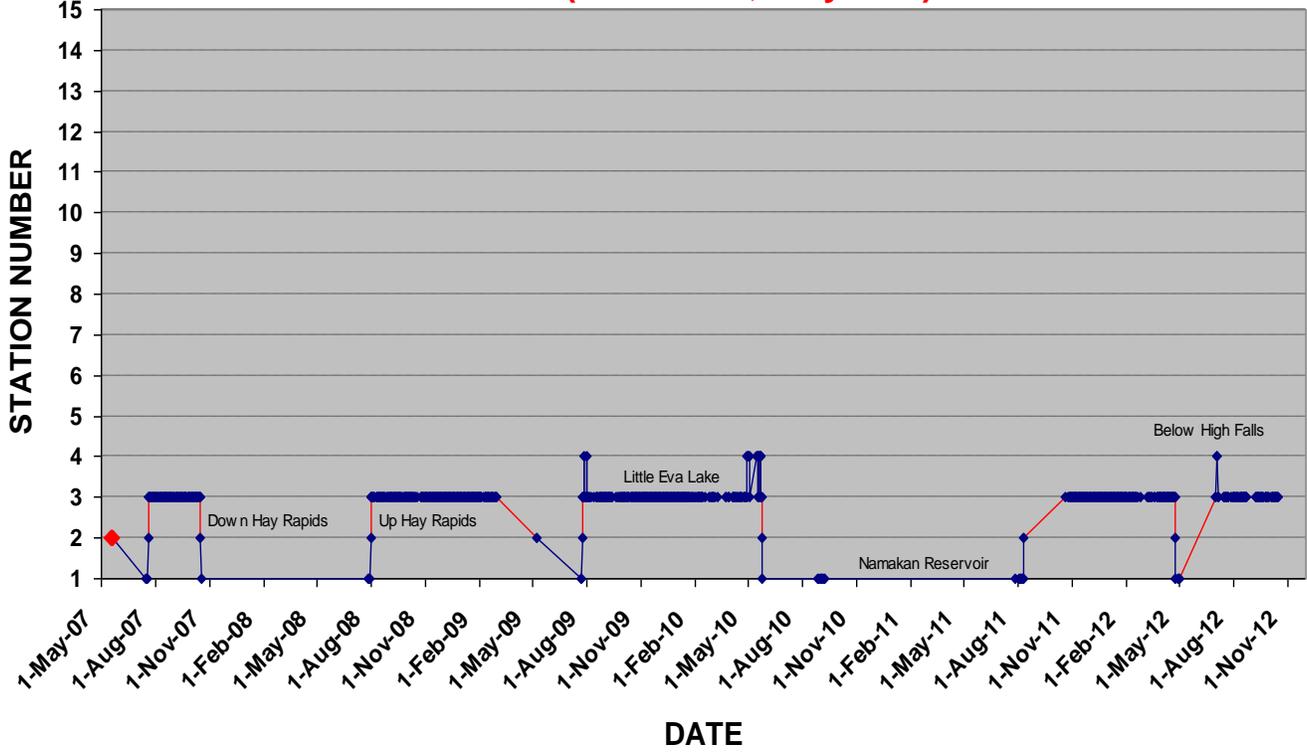
Fish 4743 (Unknown, 27 years)

◆ Release Date: 15-May-07

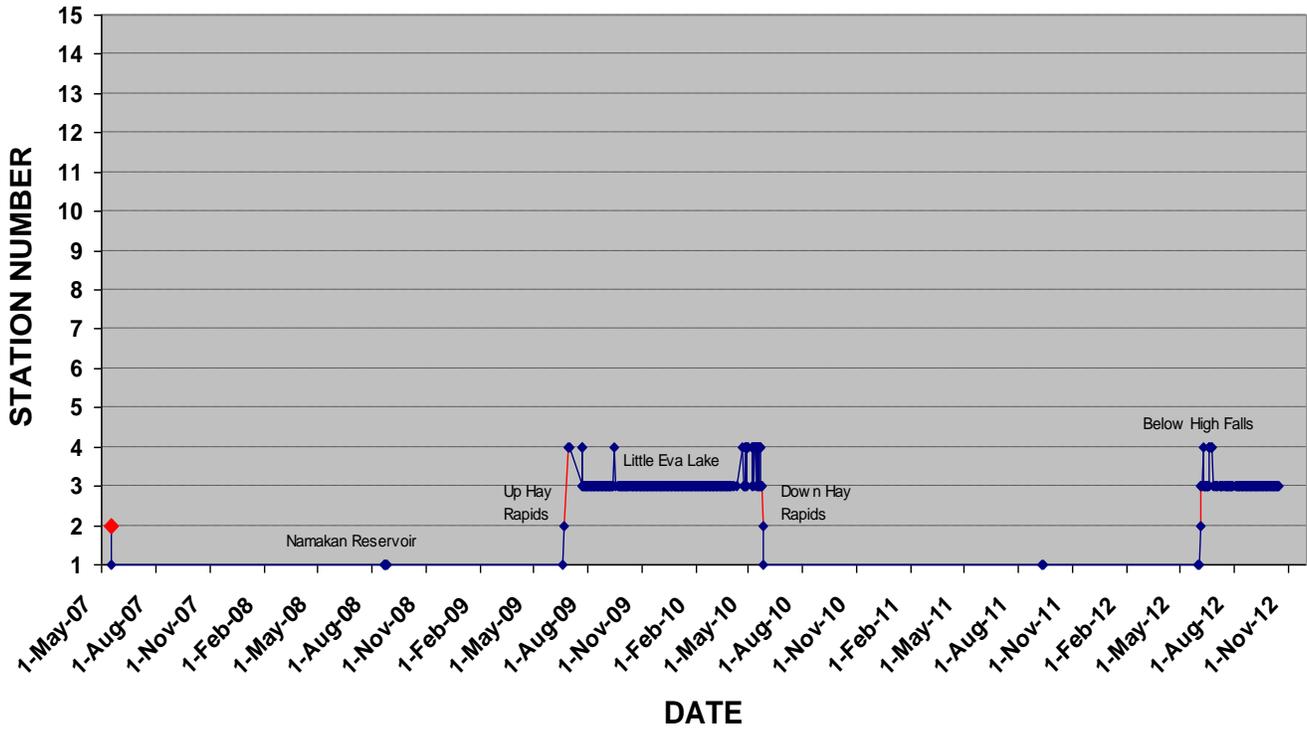


Fish 4744 (Unknown, 44 years)

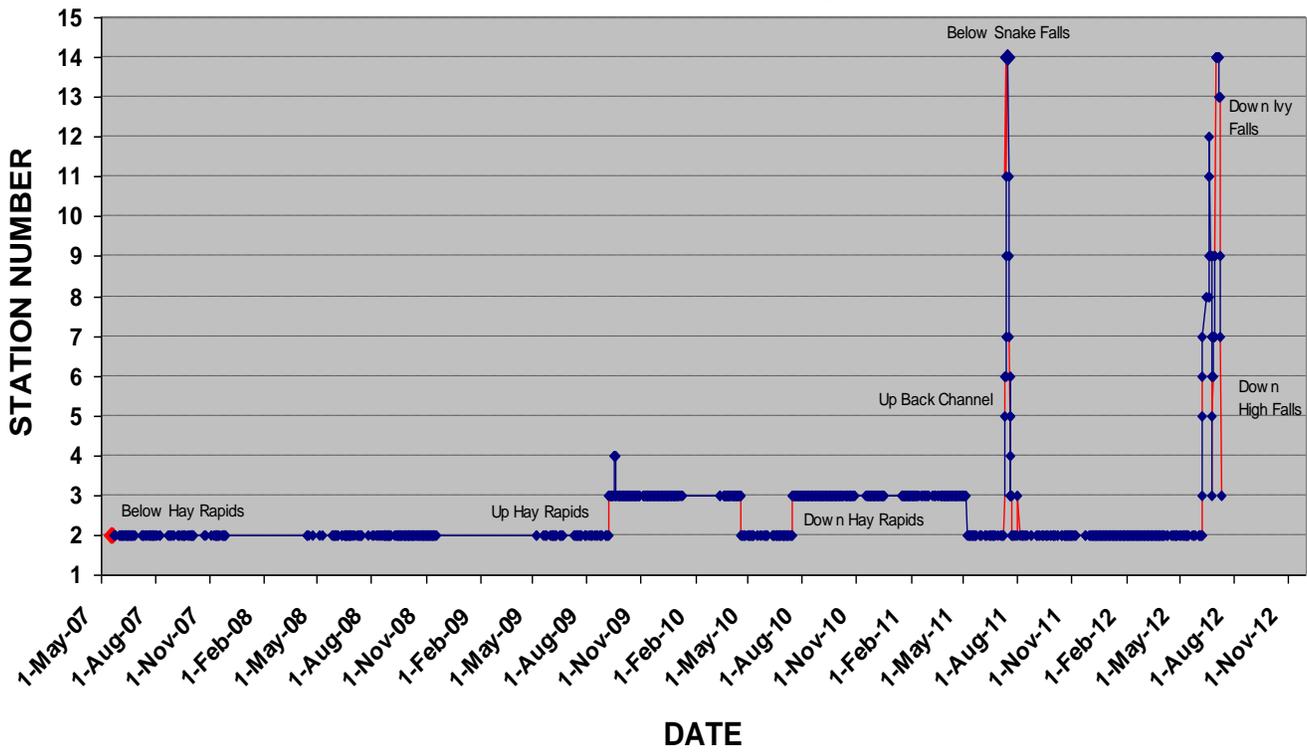
◆ Release date: 16-May-07



Fish 4745 (Developing female, 27 years) ◆ Release date:16-May-07

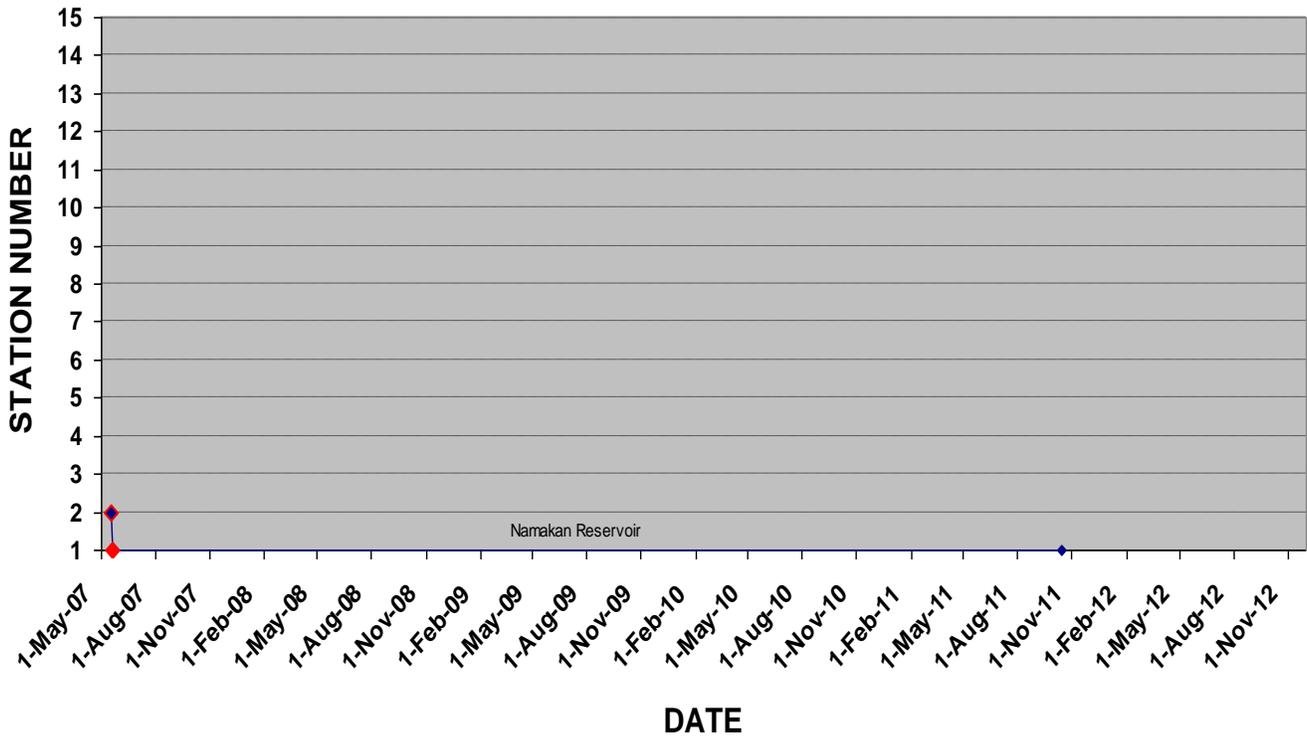


Fish 4746 (Unknown, 20 years) ◆ Release Date: 16-May-07



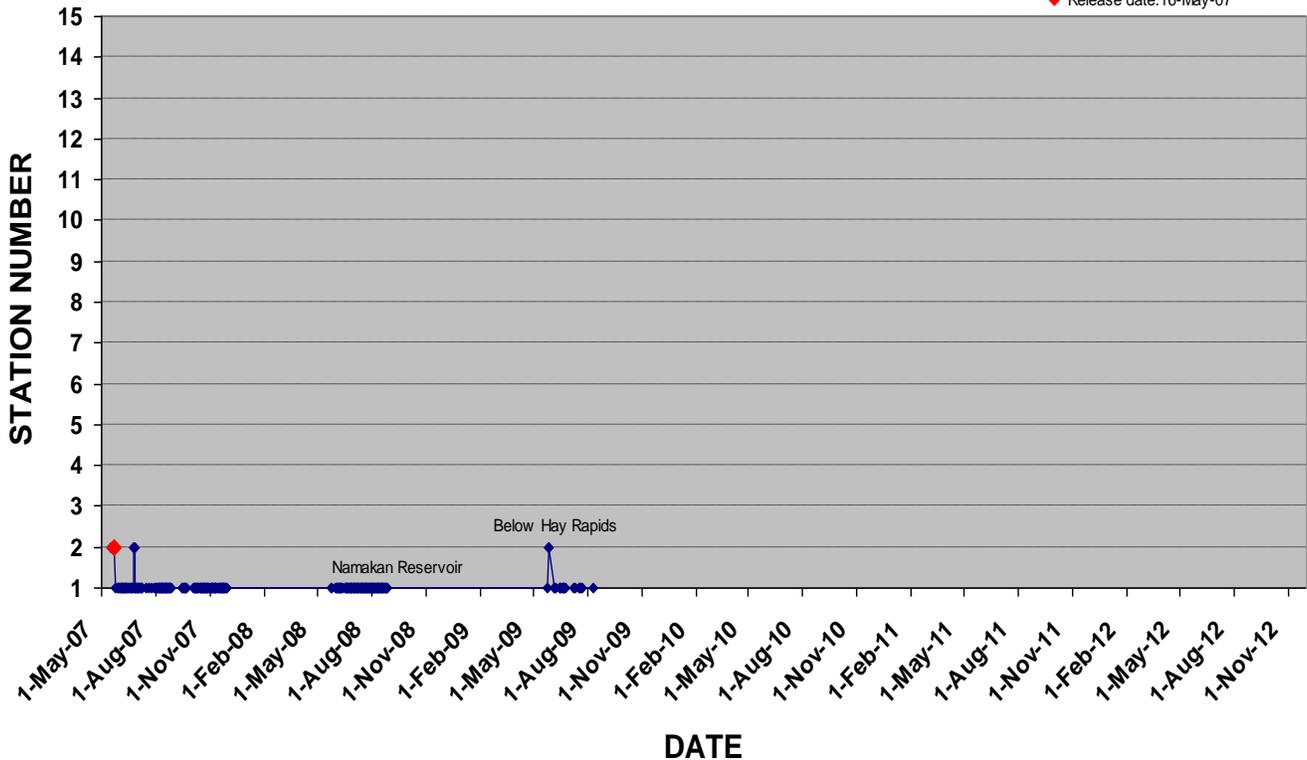
Fish 4747 (Unknown)

◆ Release Date: 16-May-07



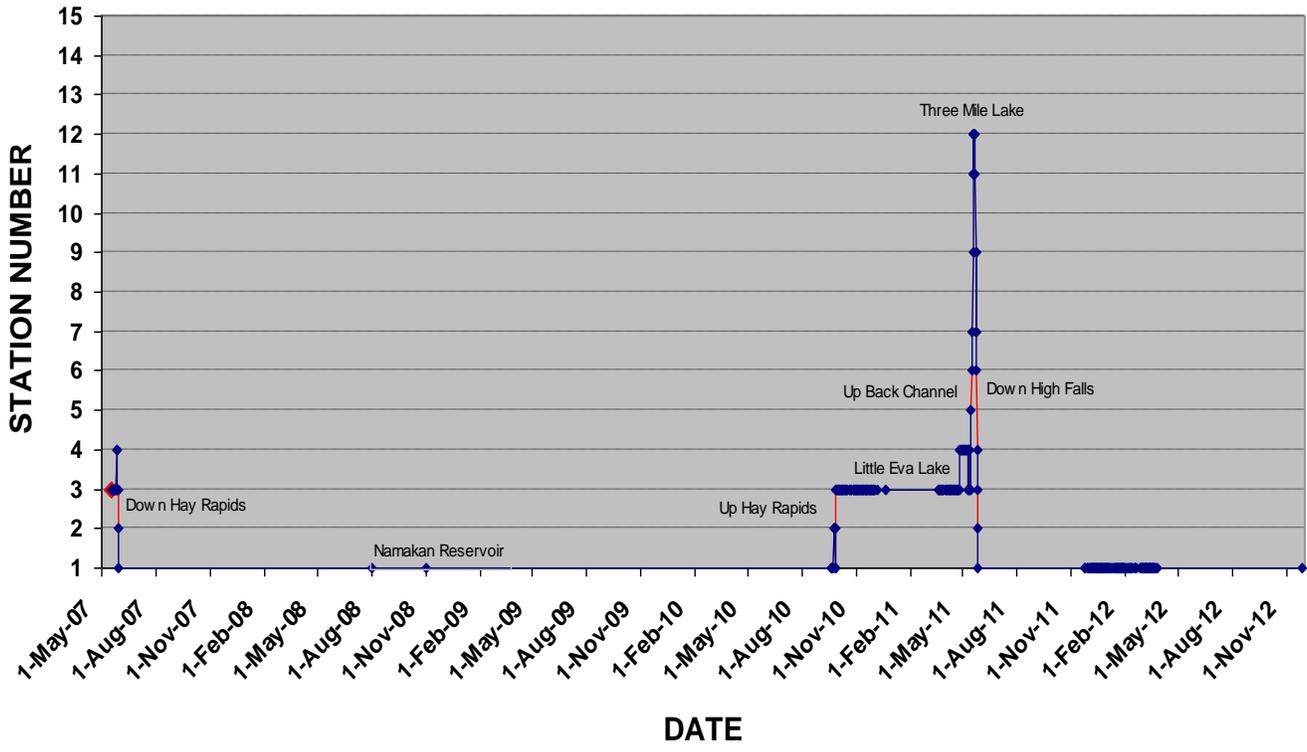
Fish 4748 (Unknown, 34 years)

◆ Release date: 16-May-07



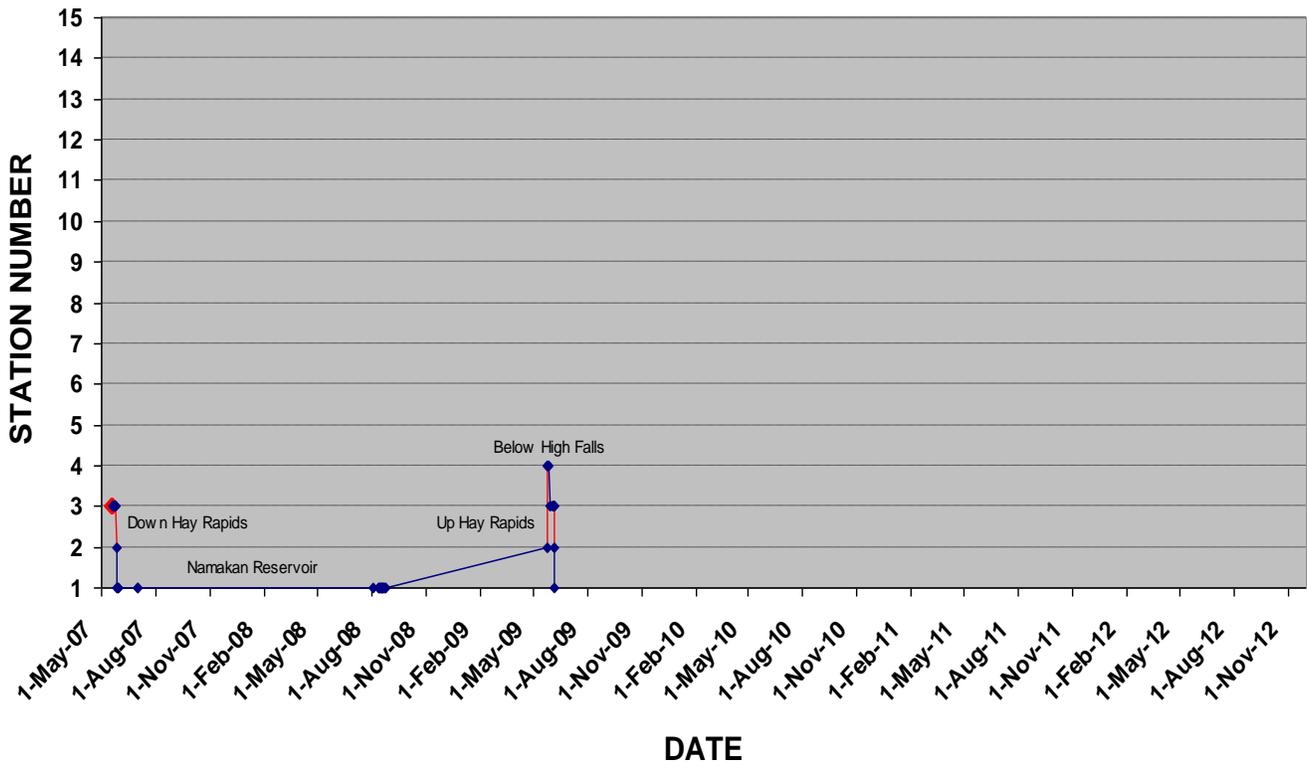
Fish 4749 (Unknown, 42 years)

◆ Release Date: 17-May-07



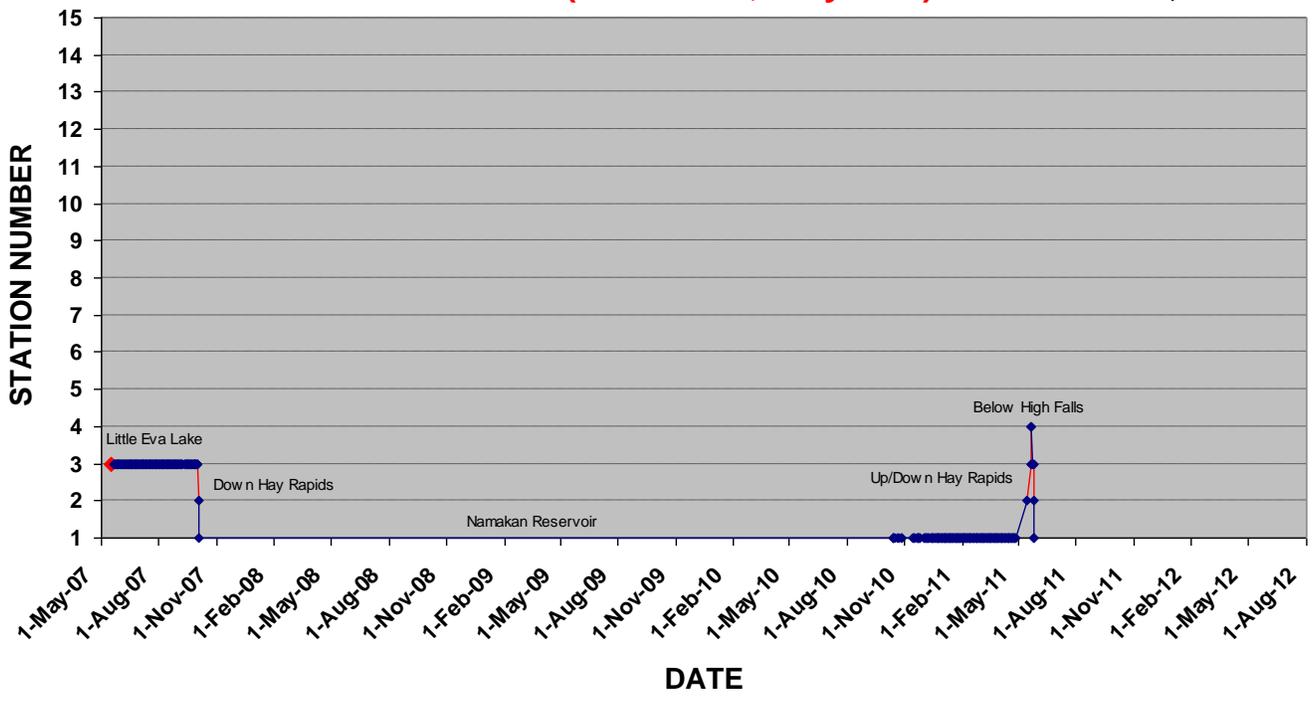
Fish 4750 (Unknown, 25 years)

◆ Release Date: 17-May-07



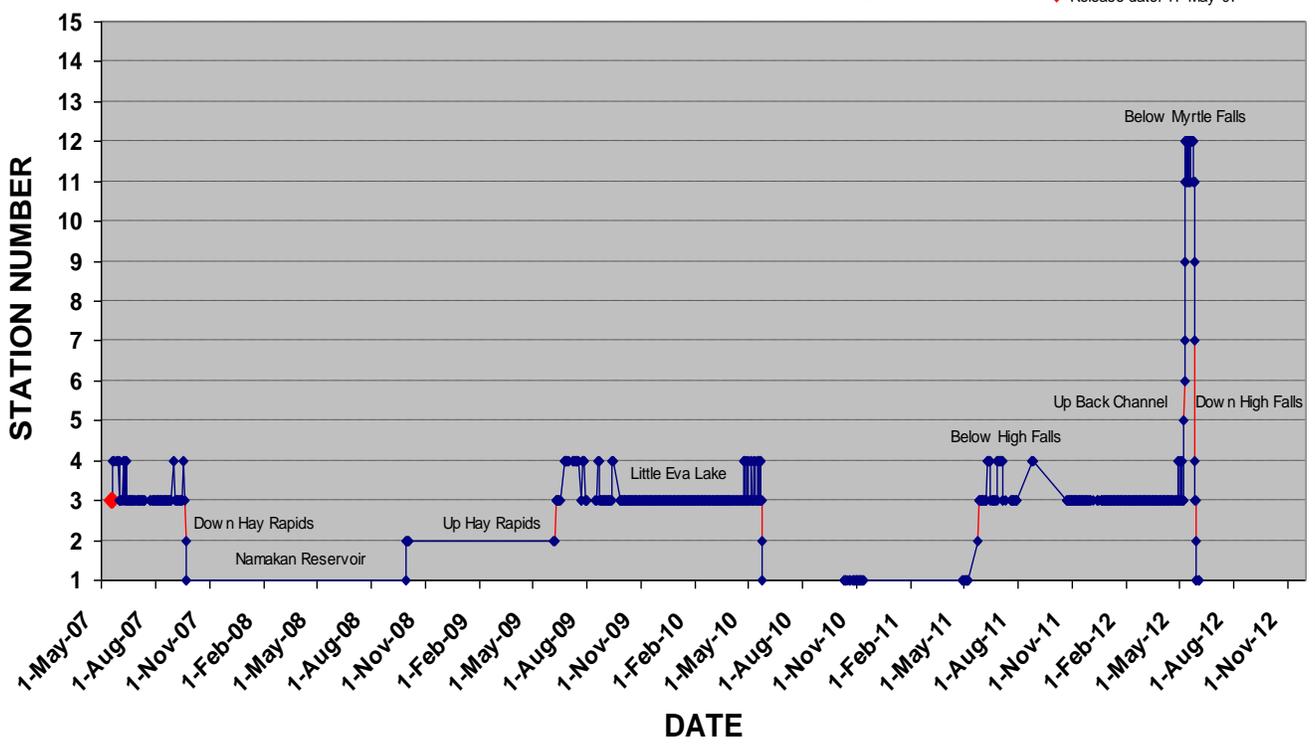
Fish 4751 (Unknown, 21 years)

◆ Release date: 17-May-07



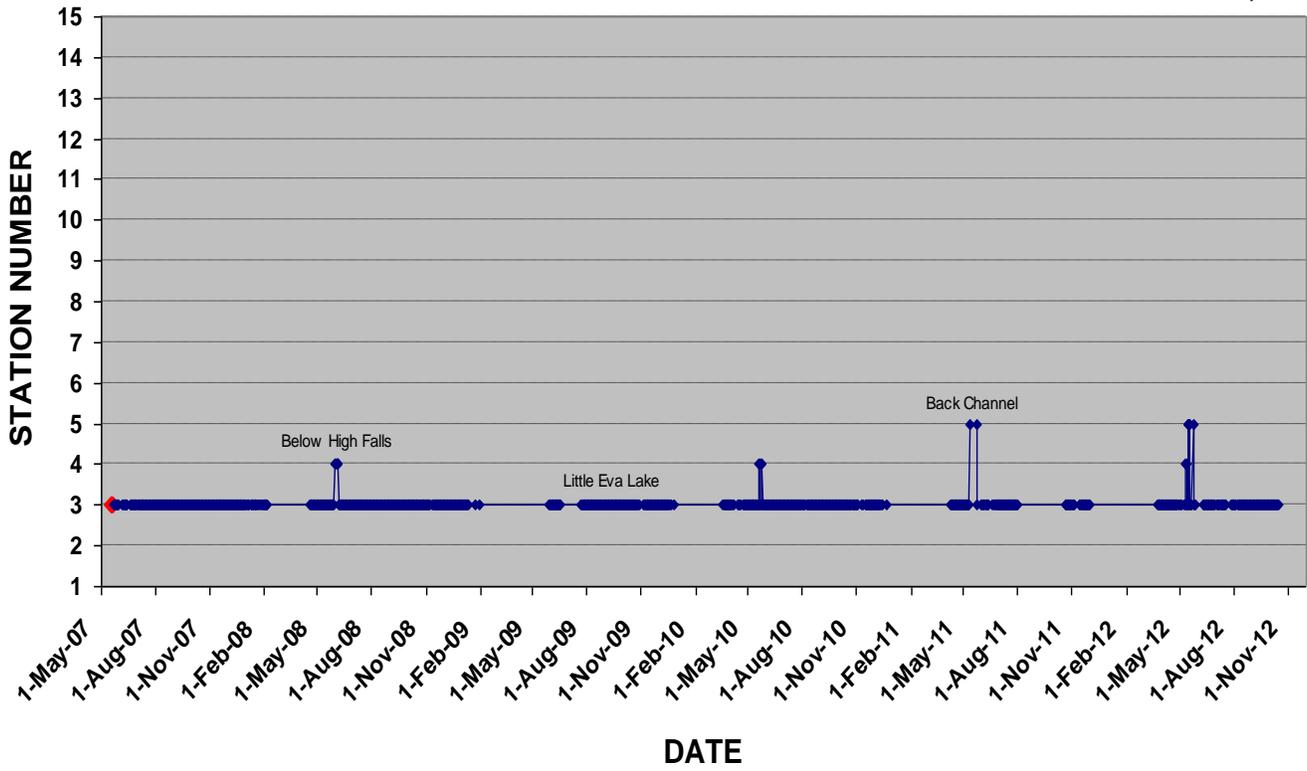
Fish 4752 (Gravid female, 47 years)

◆ Release date: 17-May-07



Fish 4753 (Male, 22 years)

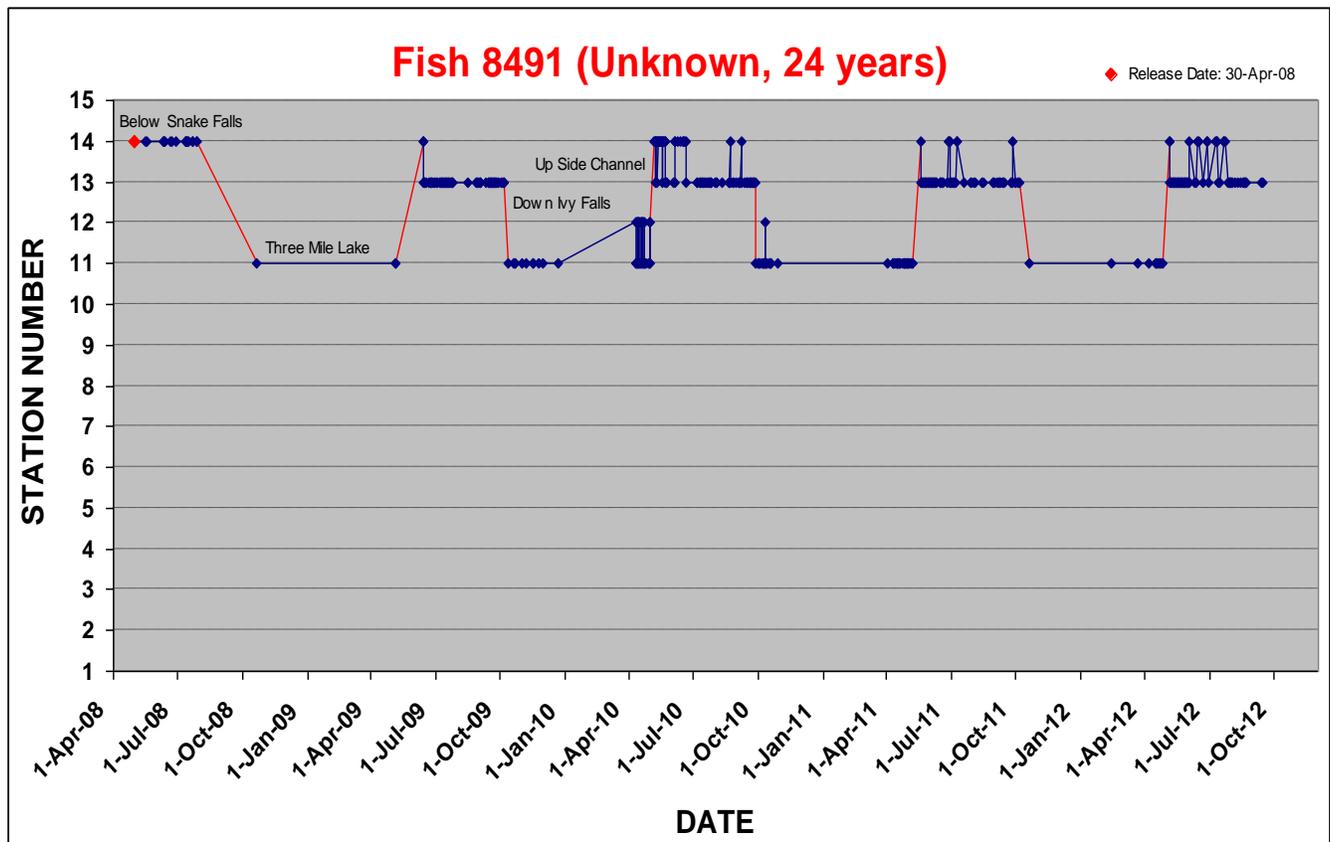
◆ Release Date: 17-May-07



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

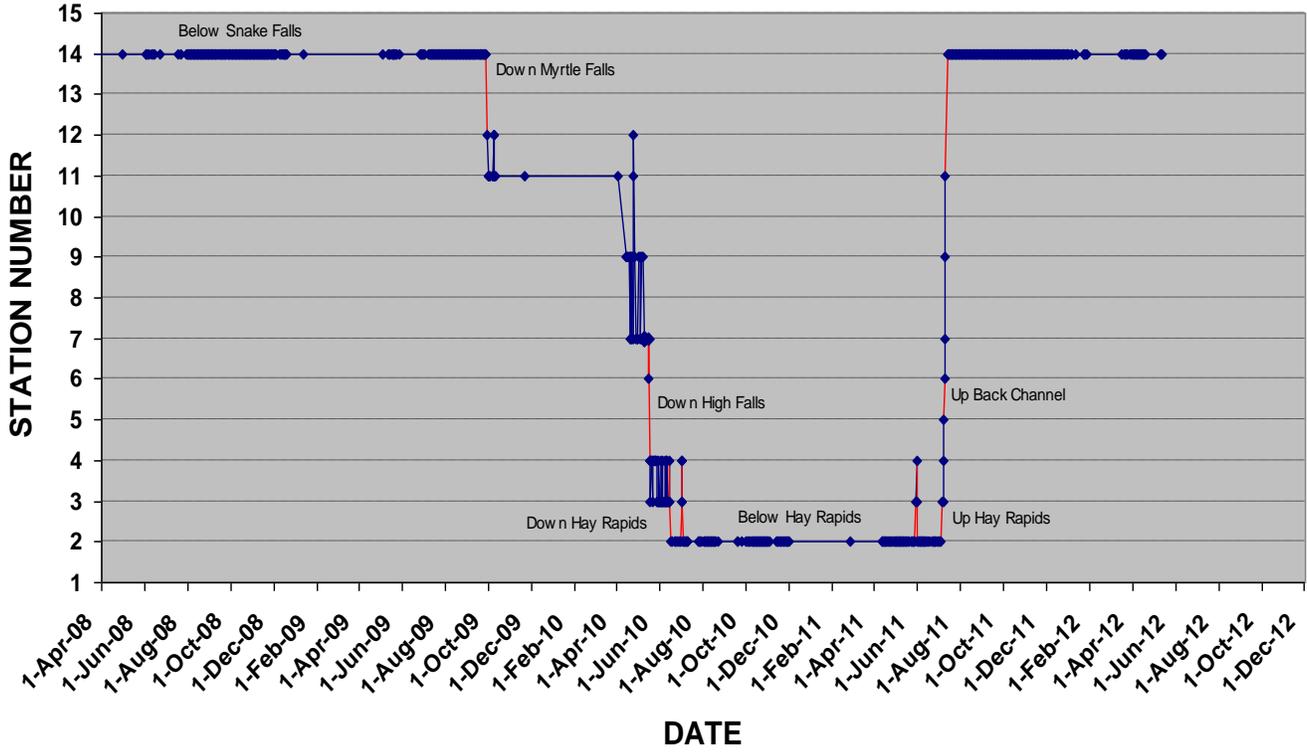
* Red line segments represent movement through proposed development sites.

<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)



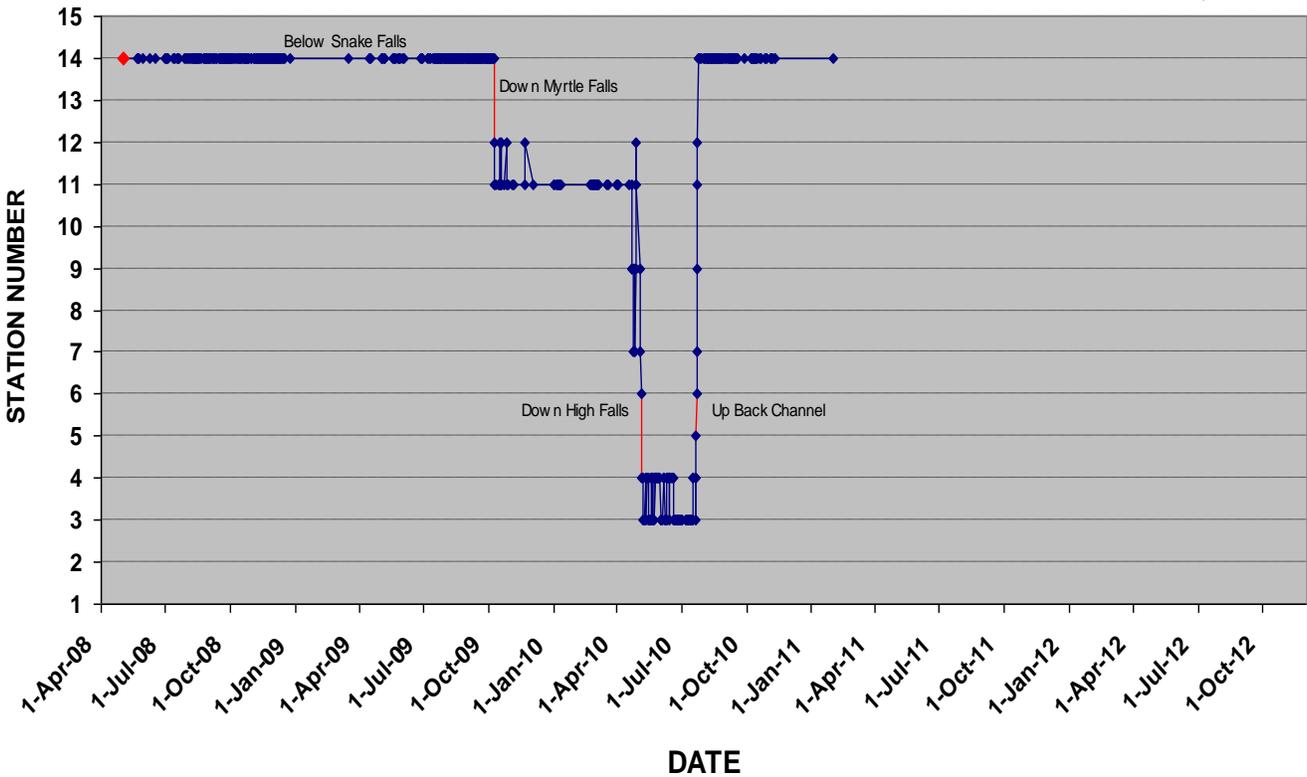
Fish 8492 (Developing female, 38 years)

◆ Release date: 30-Apr-08



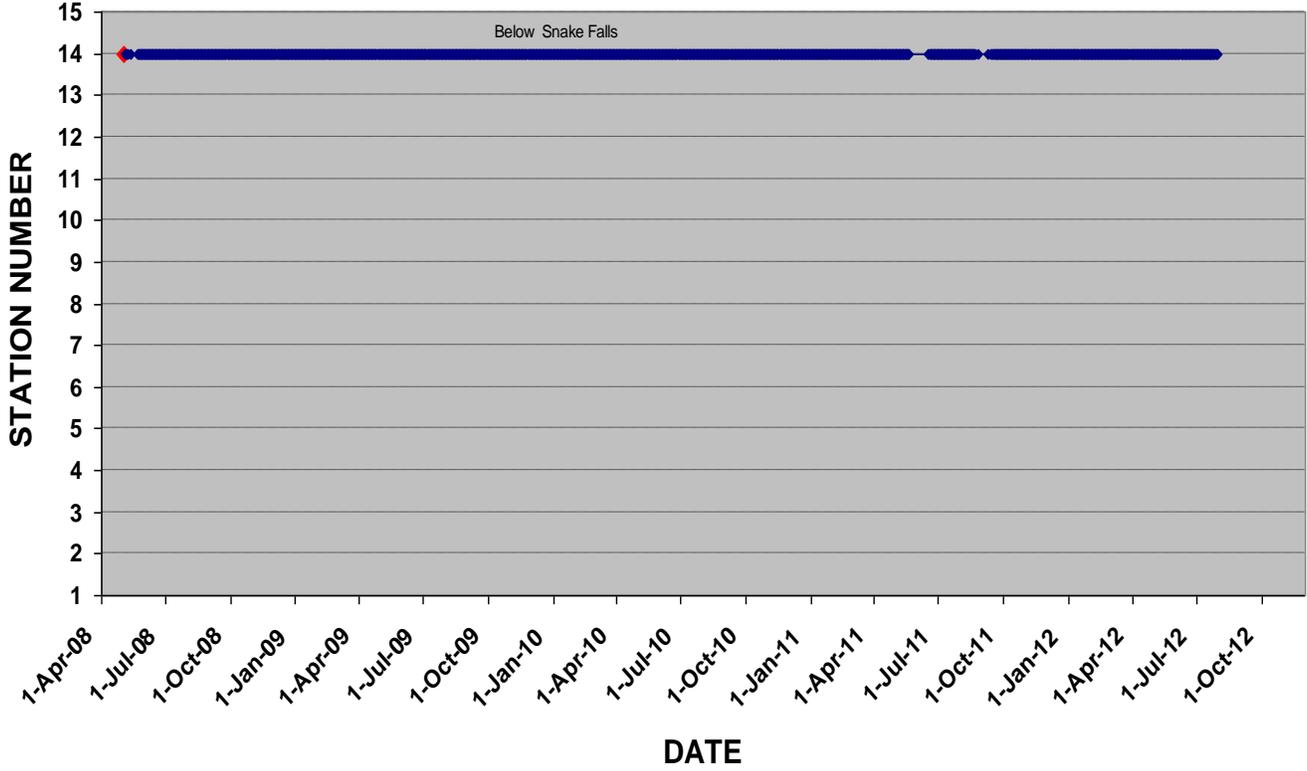
Fish 8493 (Developing female, 38 years)

◆ Release date: 2-May-08



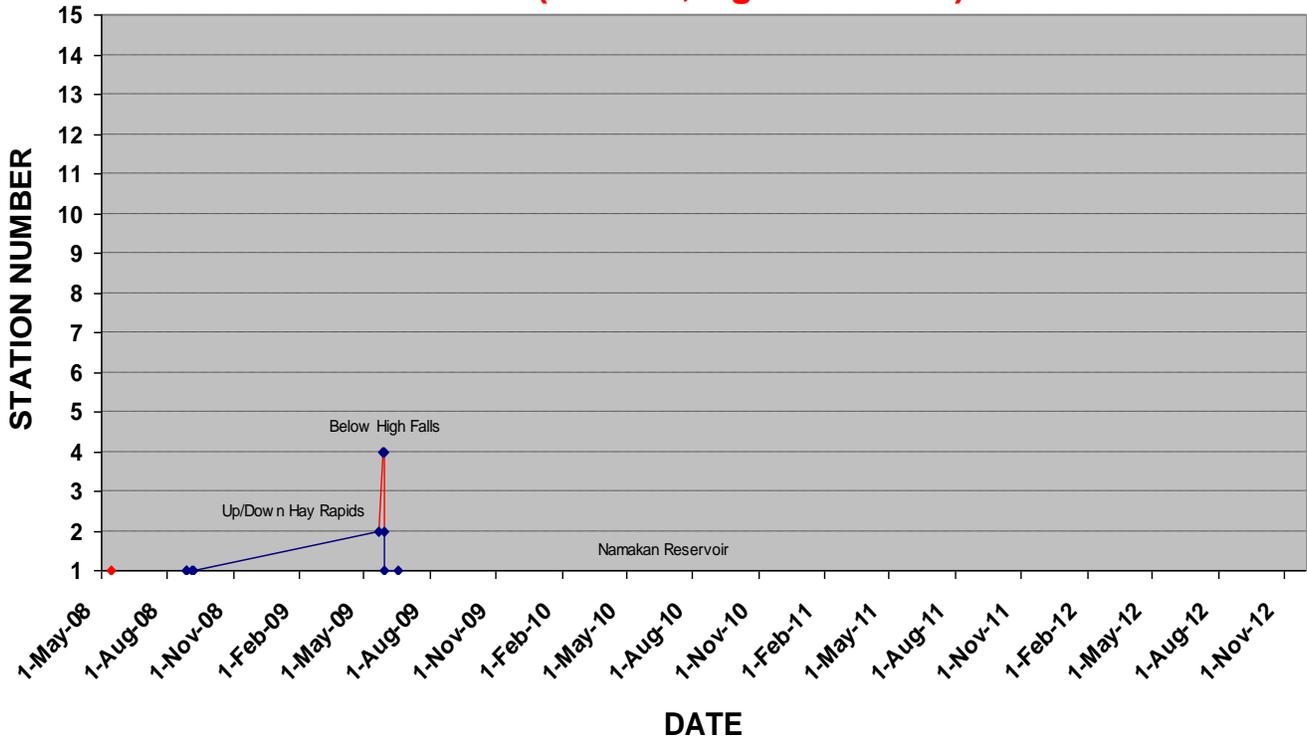
Fish 8494 (Unknown, 28 years)

◆ Release date: 2-May-08



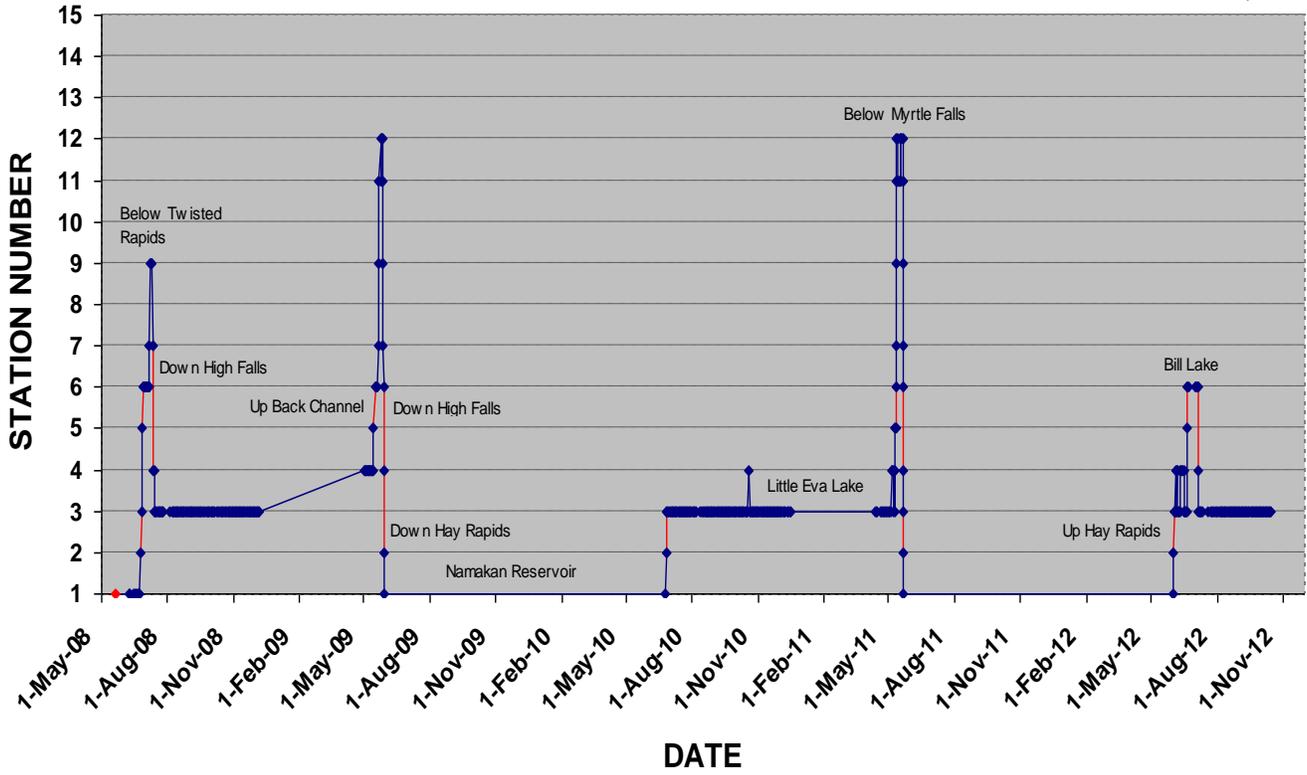
Fish 8495 (Female, Age unknown)

◆ Release date: 14-May-08



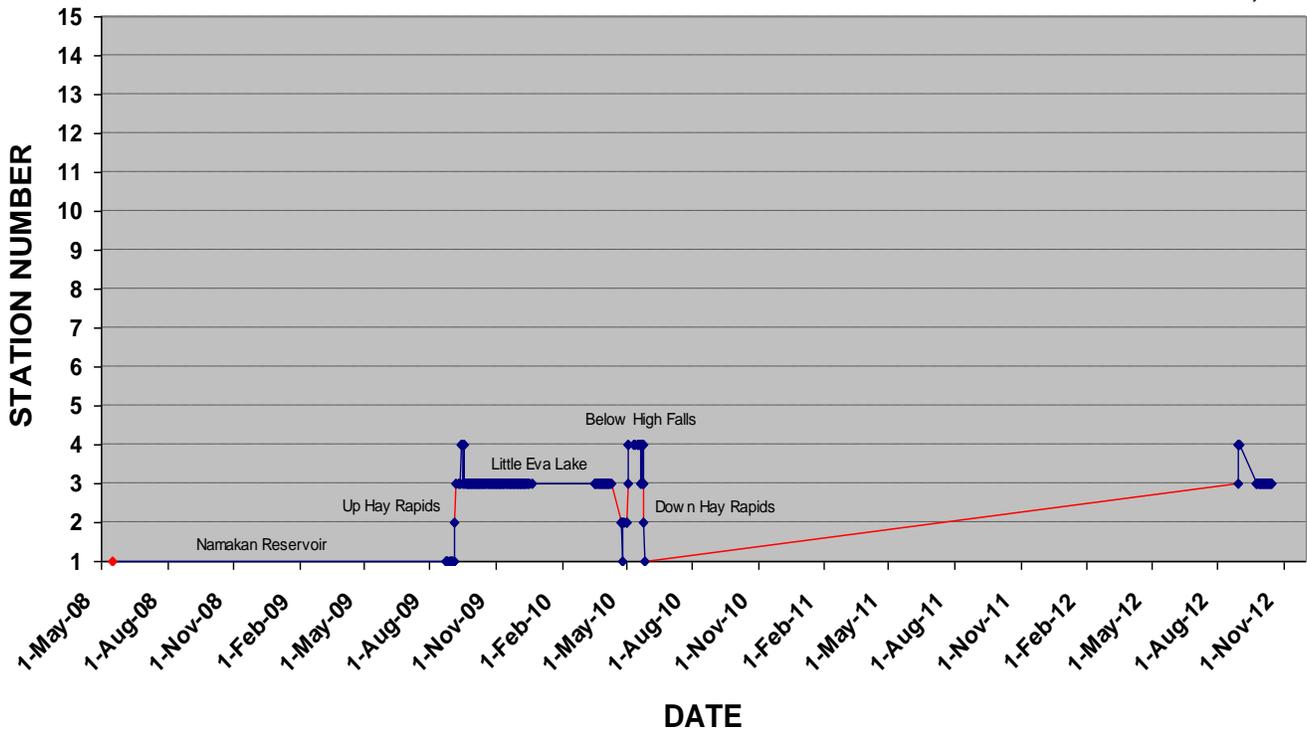
Fish 49630 (Gravid female, 45 years)

◆ Release date: 20-May-08



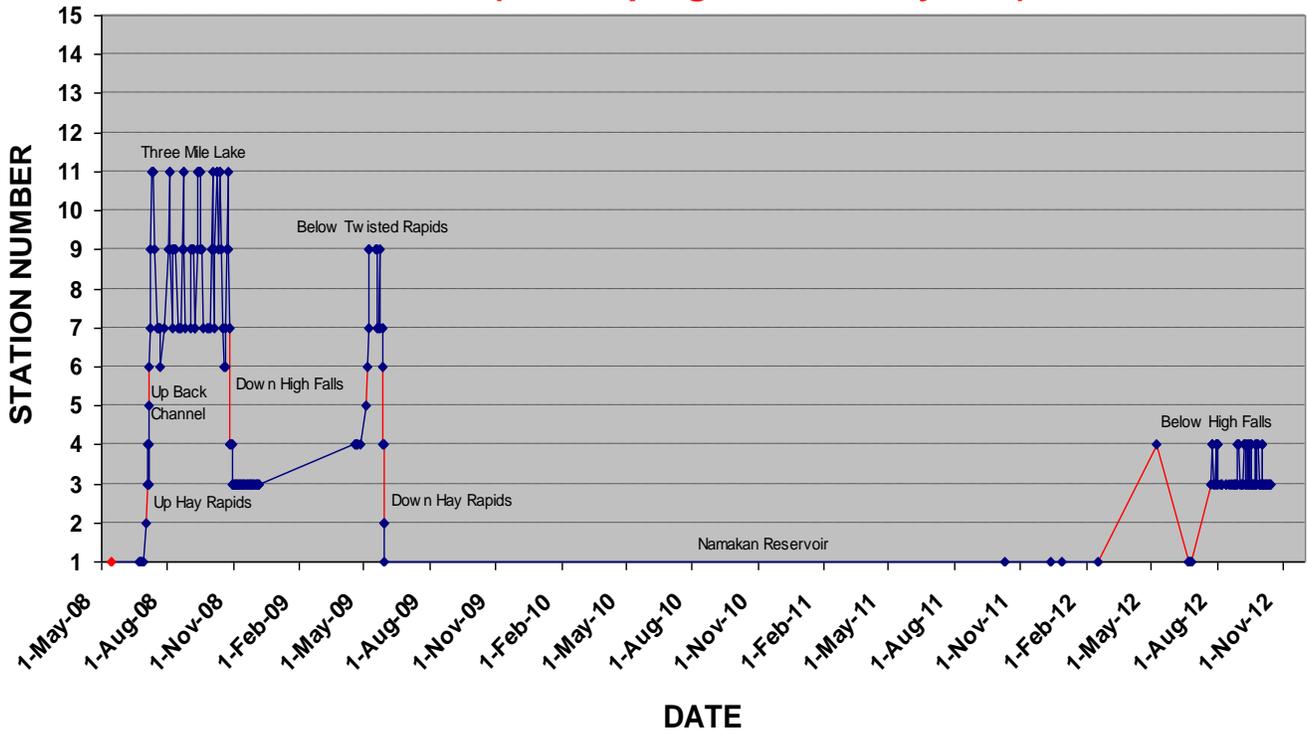
Fish 49631 (Unknown, 24 years)

◆ Release Date: 16-May-08



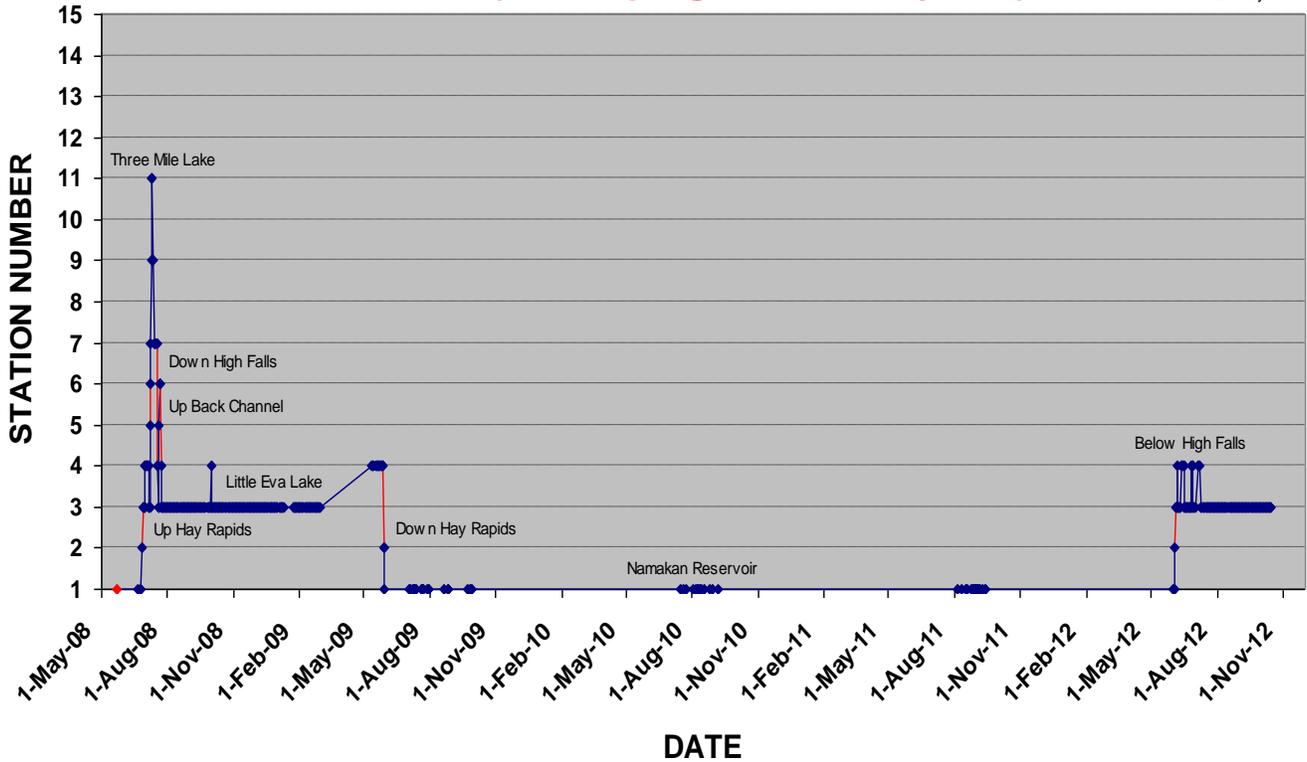
Fish 49632 (Developing female, 34 years)

◆ Release date: 15-May-08



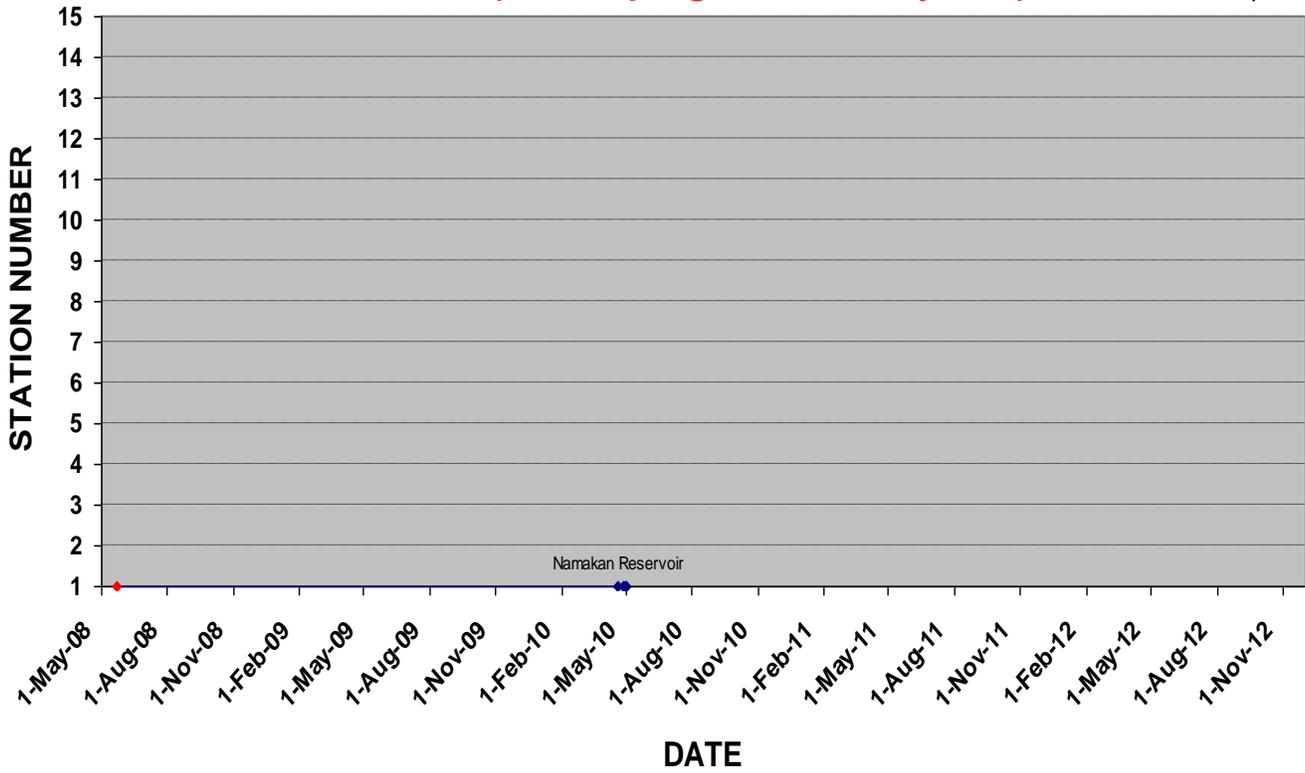
Fish 49633 (Developing female, 35 years)

◆ Release date: 21-May-08



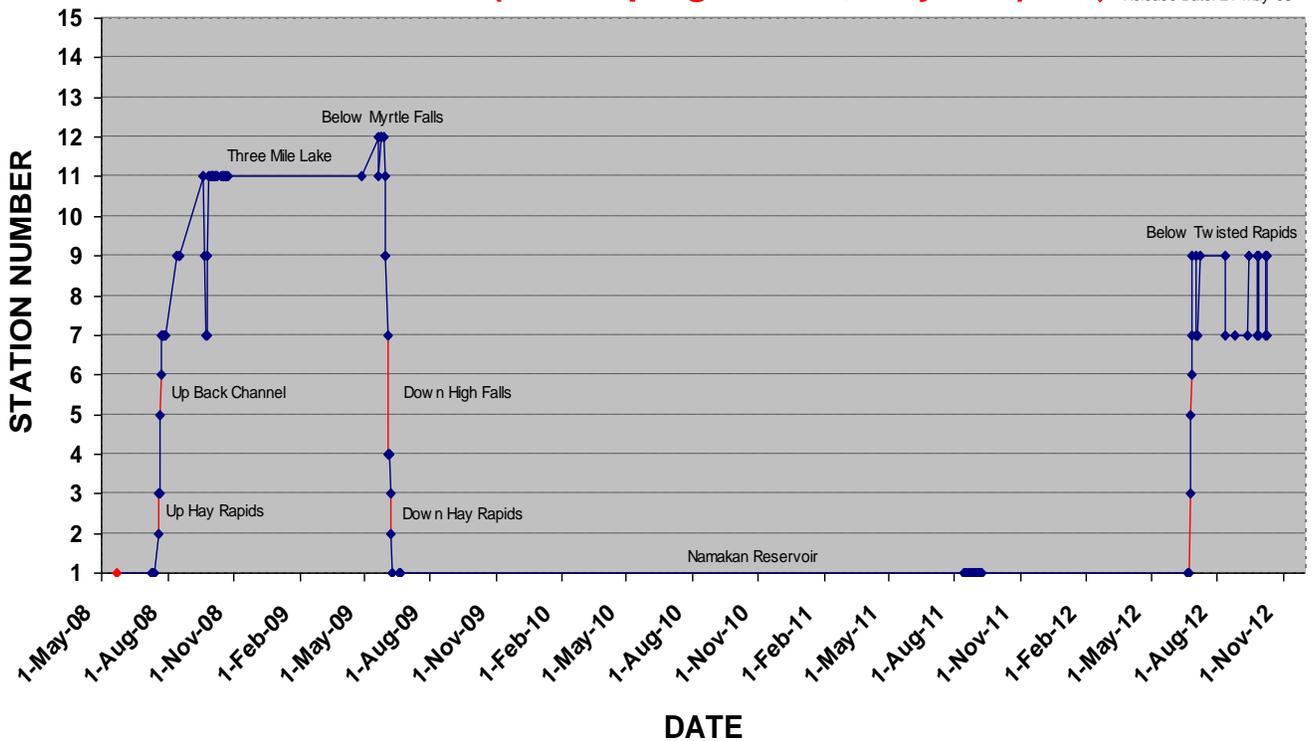
Fish 49636 (Developing female, 32 years)

◆ Release Date: 21-May-08



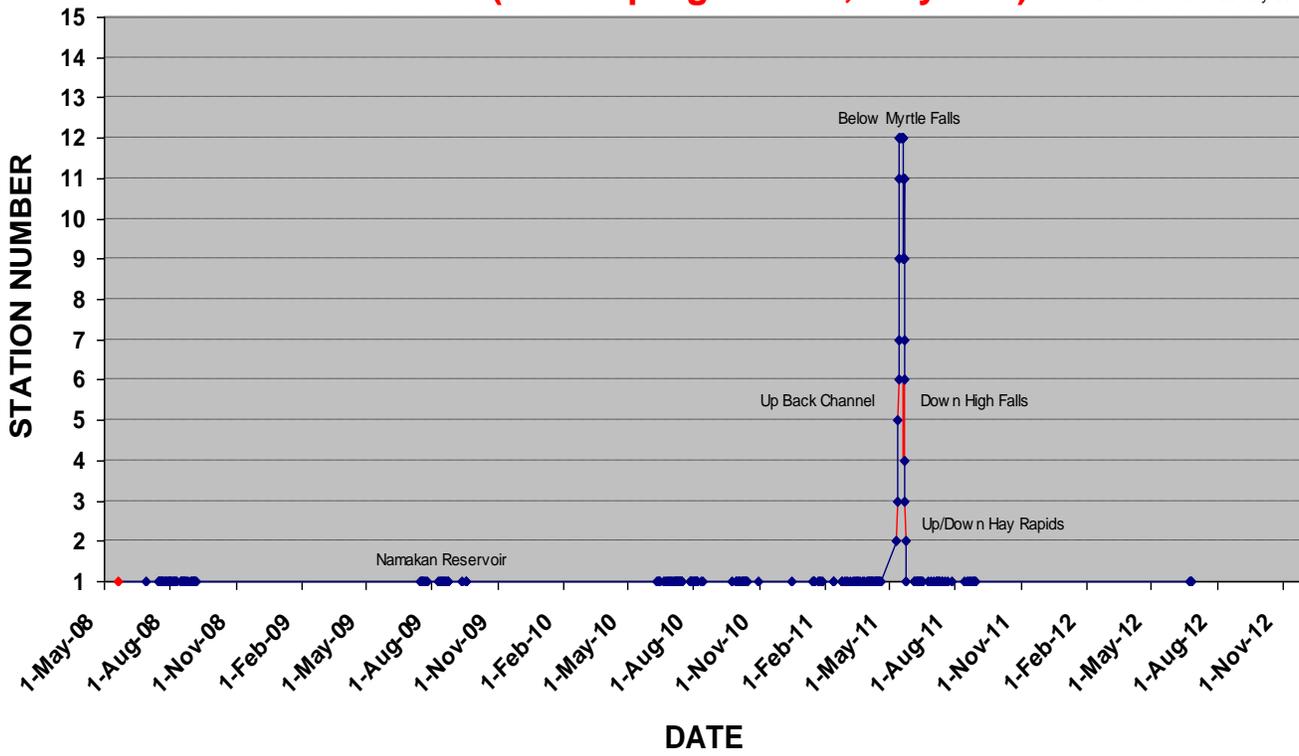
Fish 49637 (Developing female, 38 years)

◆ Release Date: 21-May-08



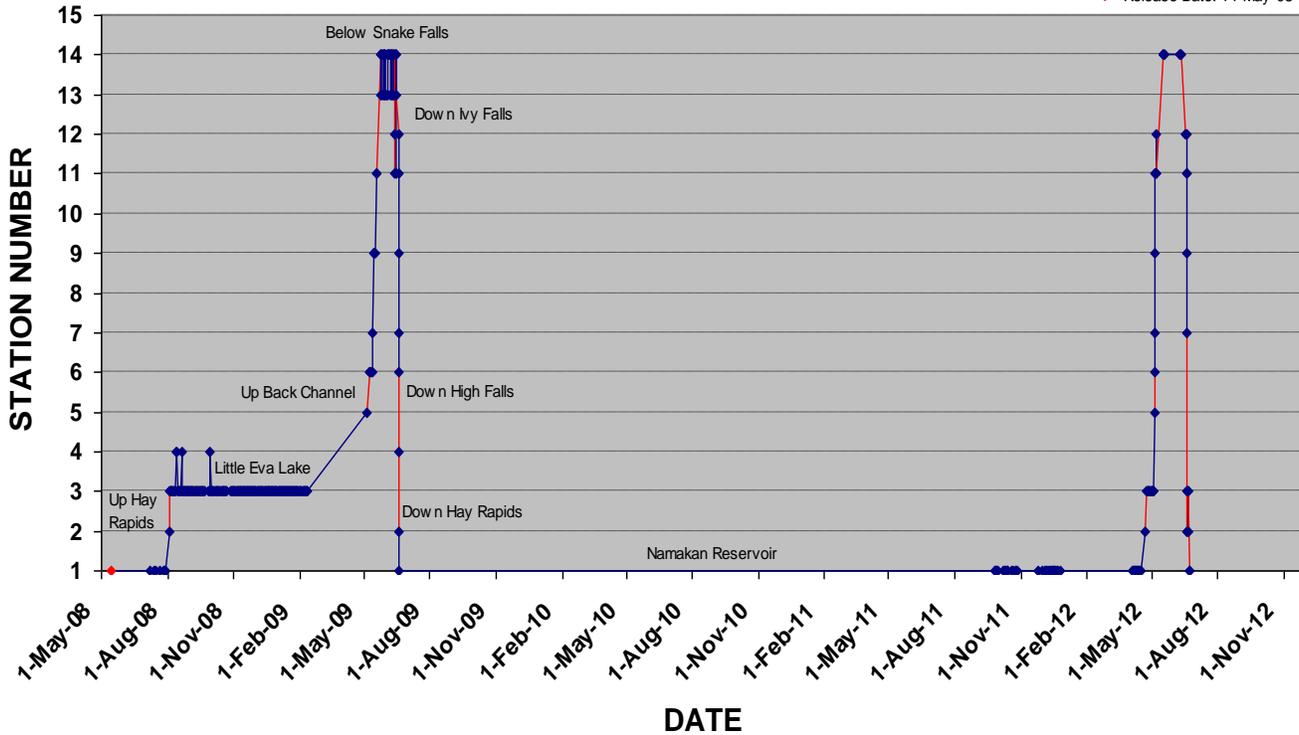
Fish 49638 (Developing female, 48 years)

◆ Release date: 20-May-08



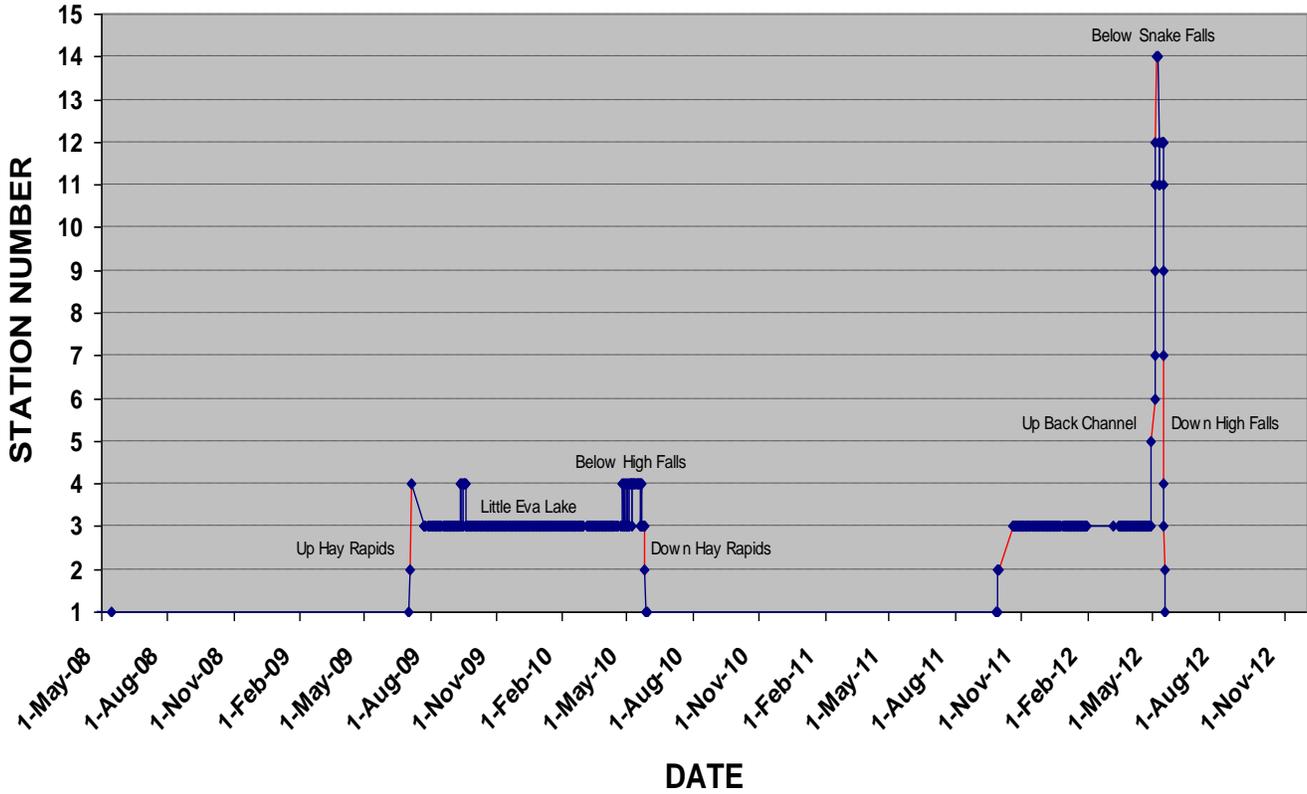
Fish 49640 (Developing male, 34 years)

◆ Release Date: 14-May-08



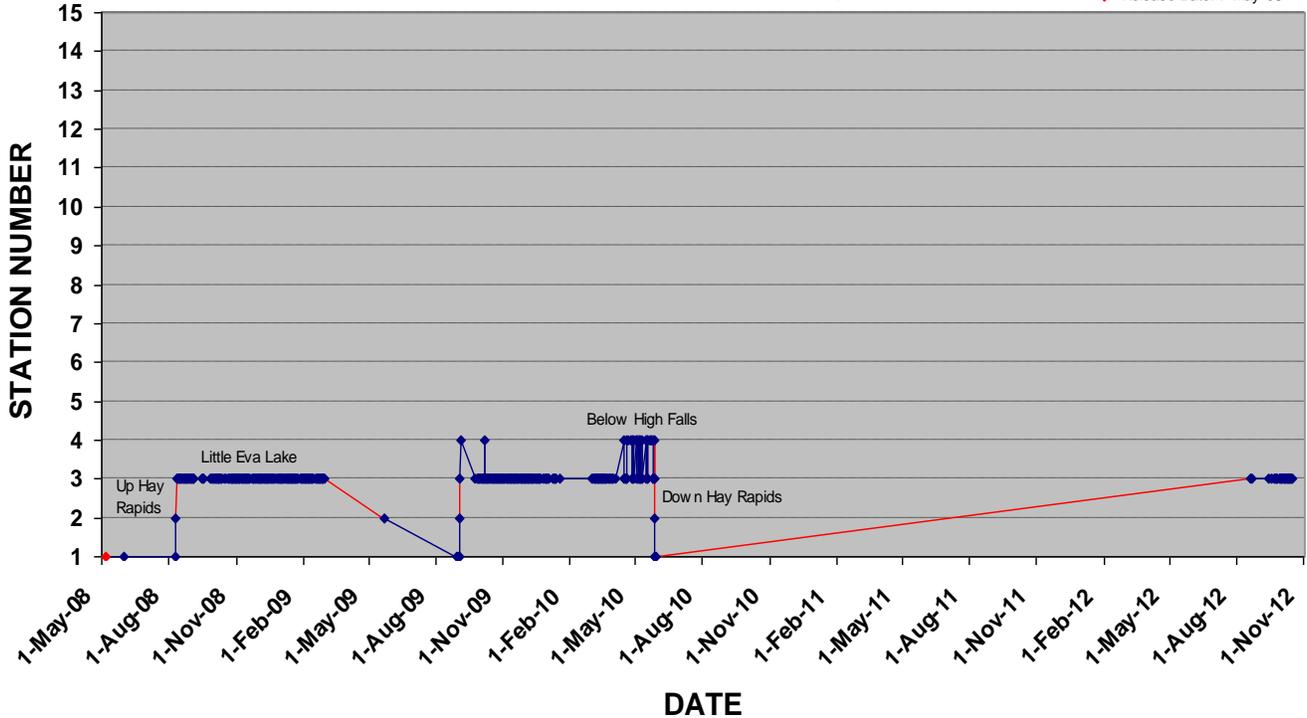
Fish 49641 (Developing female, Age unknown)

◆ Release Date: 14-May-08



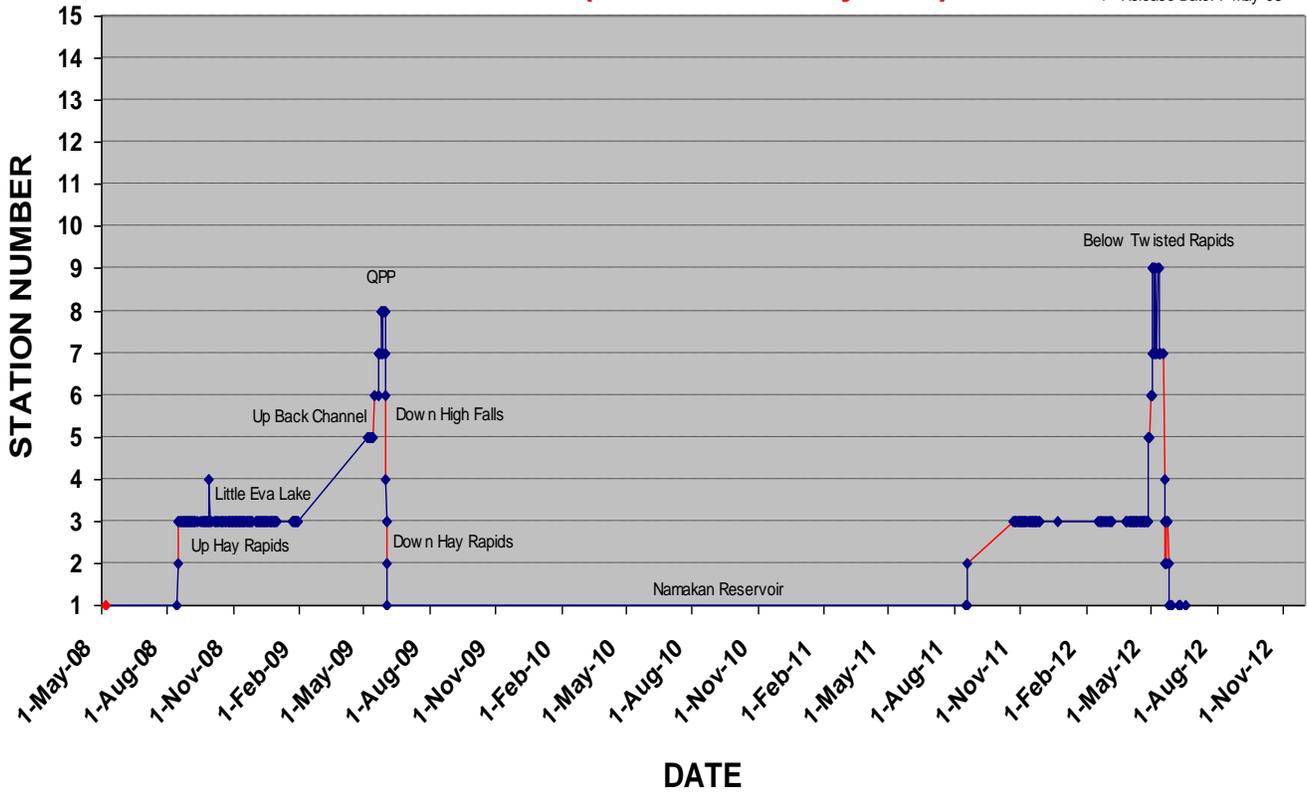
Fish 49642 (Unknown, 42 years)

◆ Release Date: 7-May-08



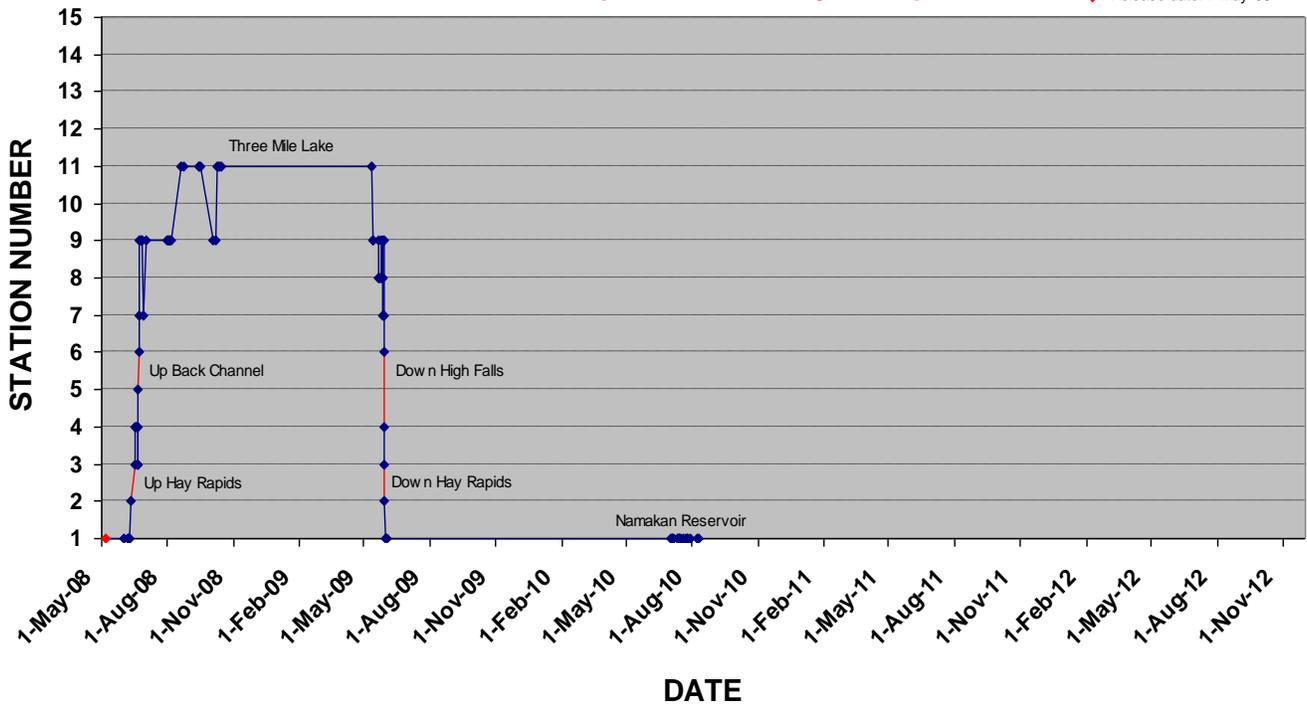
Fish 49643 (Unknown, 37 years)

◆ Release Date: 7-May-08



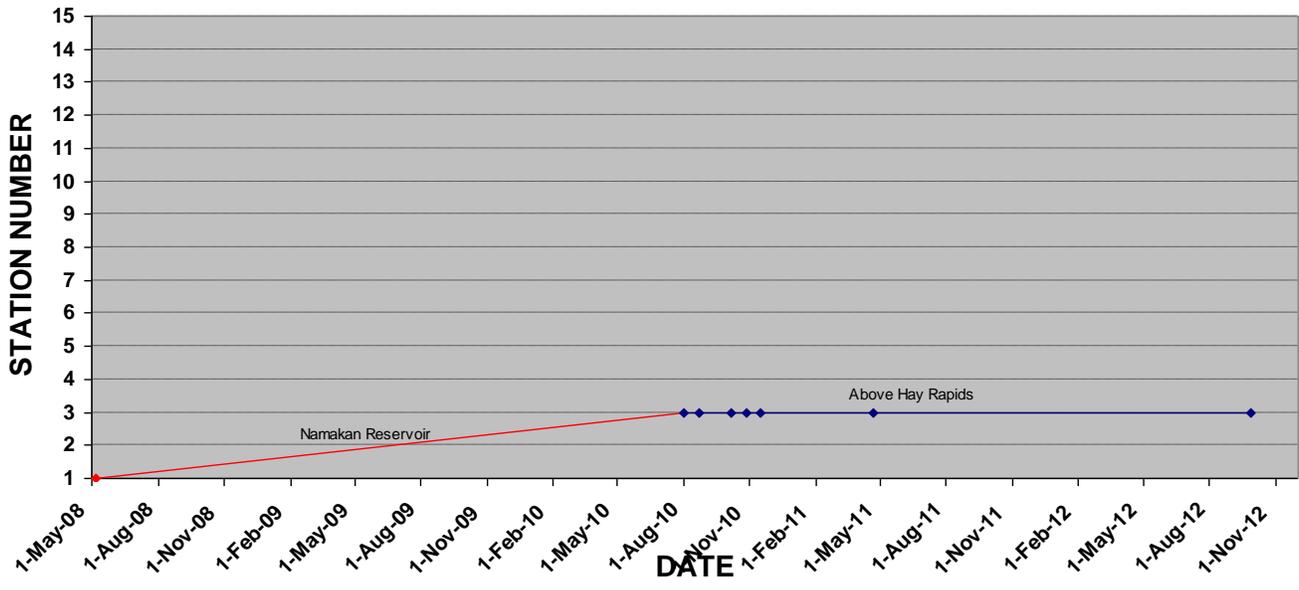
Fish 49644 (Female, 54 years)

◆ Release date: 7-May-08



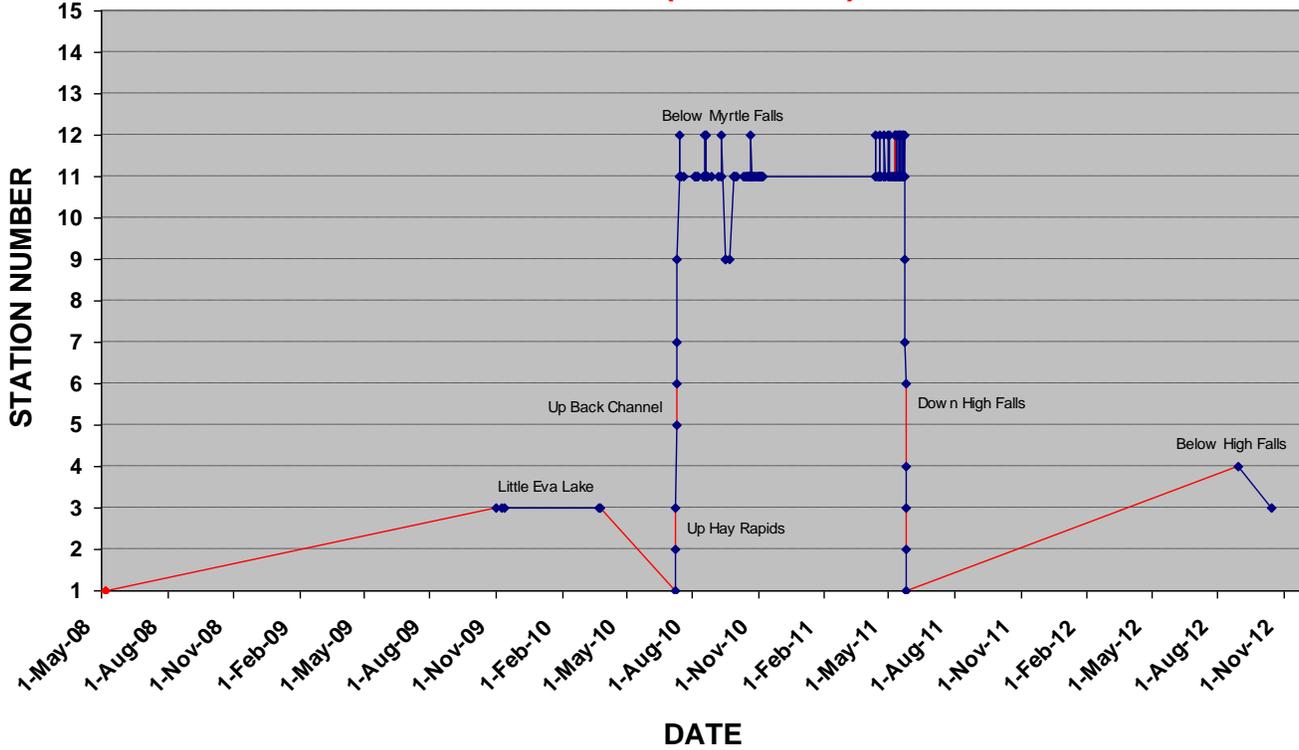
Fish 49645 (Unknown, 48 years)

◆ Release Date: 7-May-08



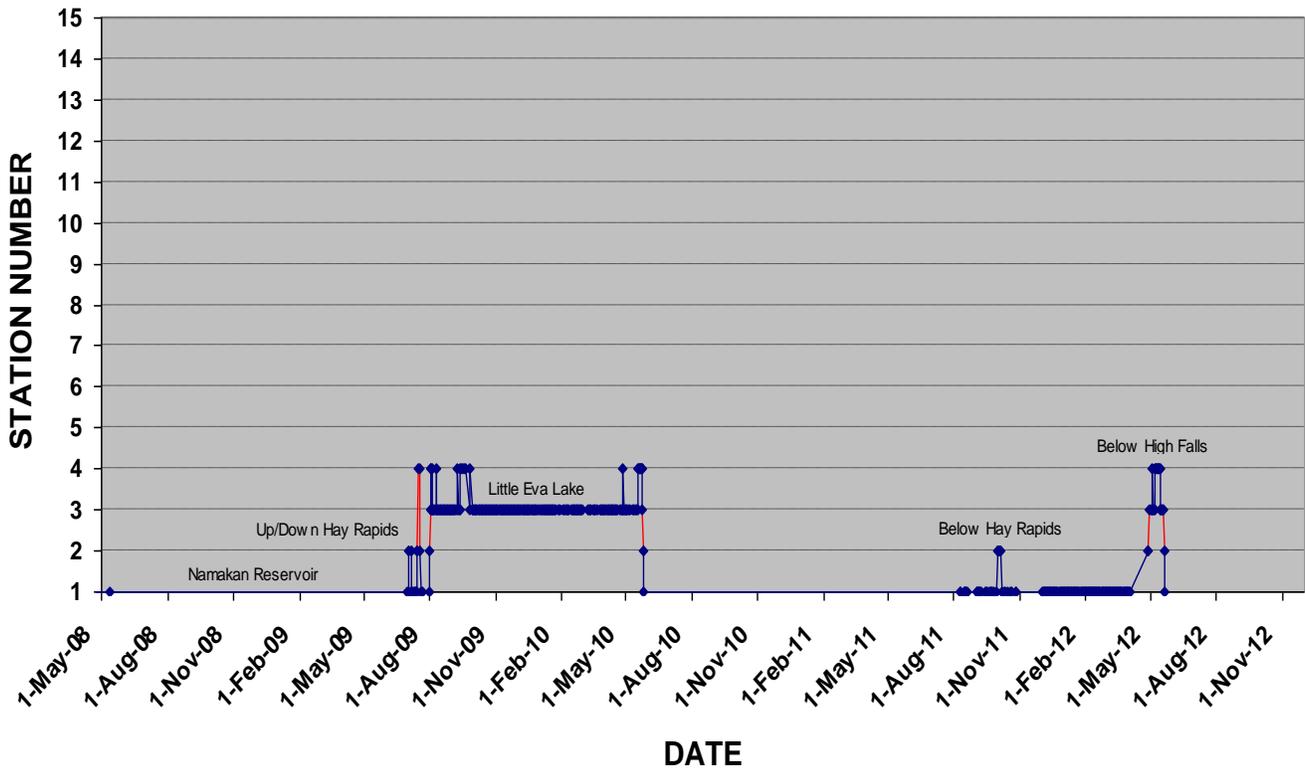
Fish 49646 (Unknown)

◆ Release Date: 7-May-08



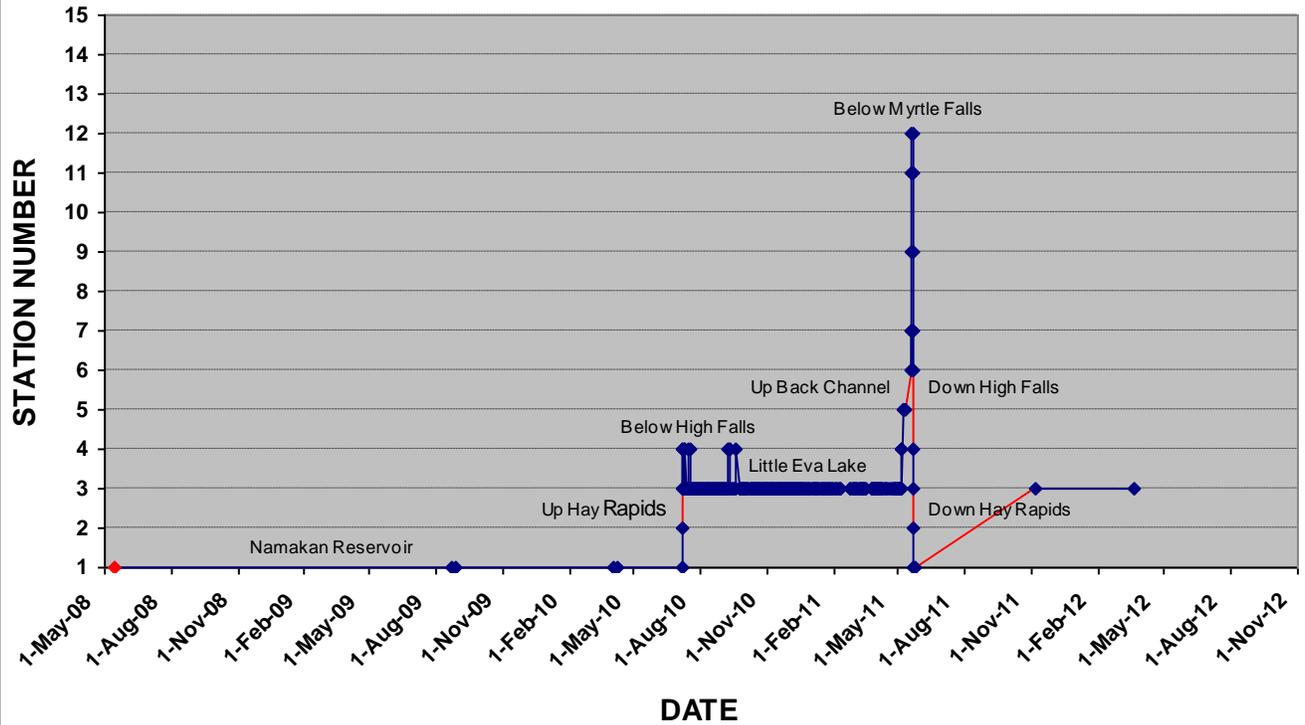
Fish 49647 (Developing female, 31 years)

◆ Release Date: 13-May-08



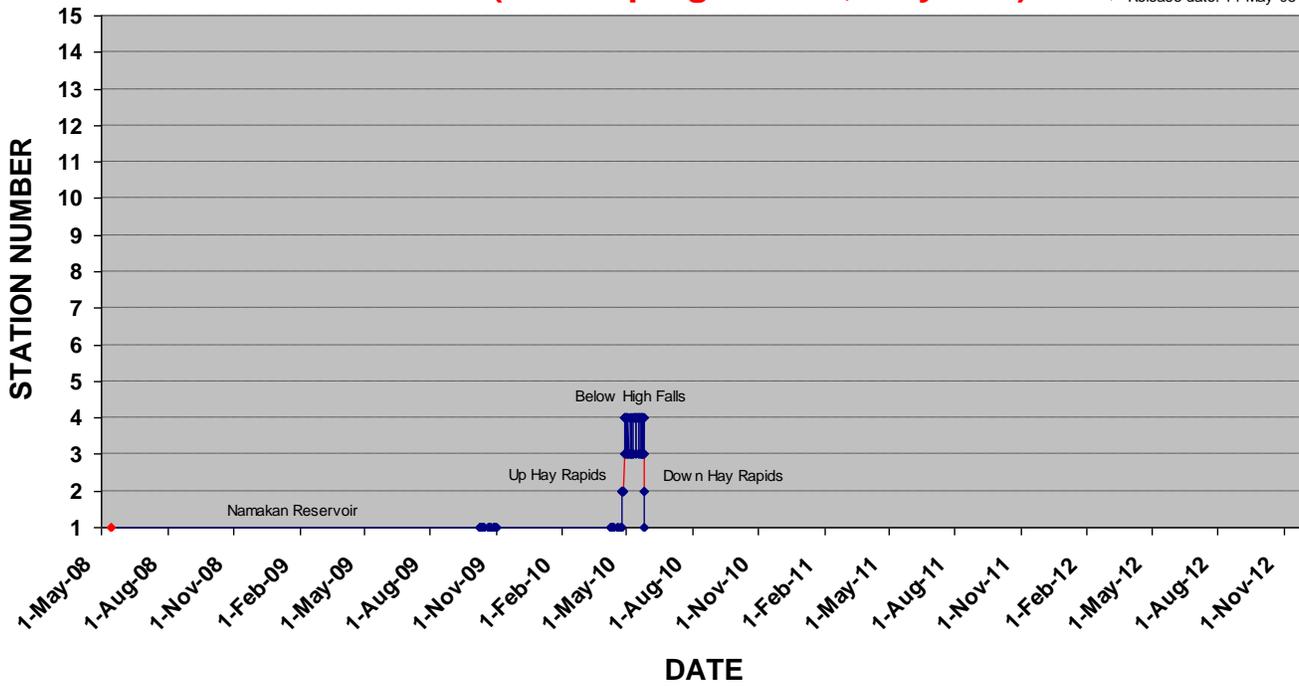
Fish 49650 (Developing female, 33 years)

◆ Release date: 15-May-08



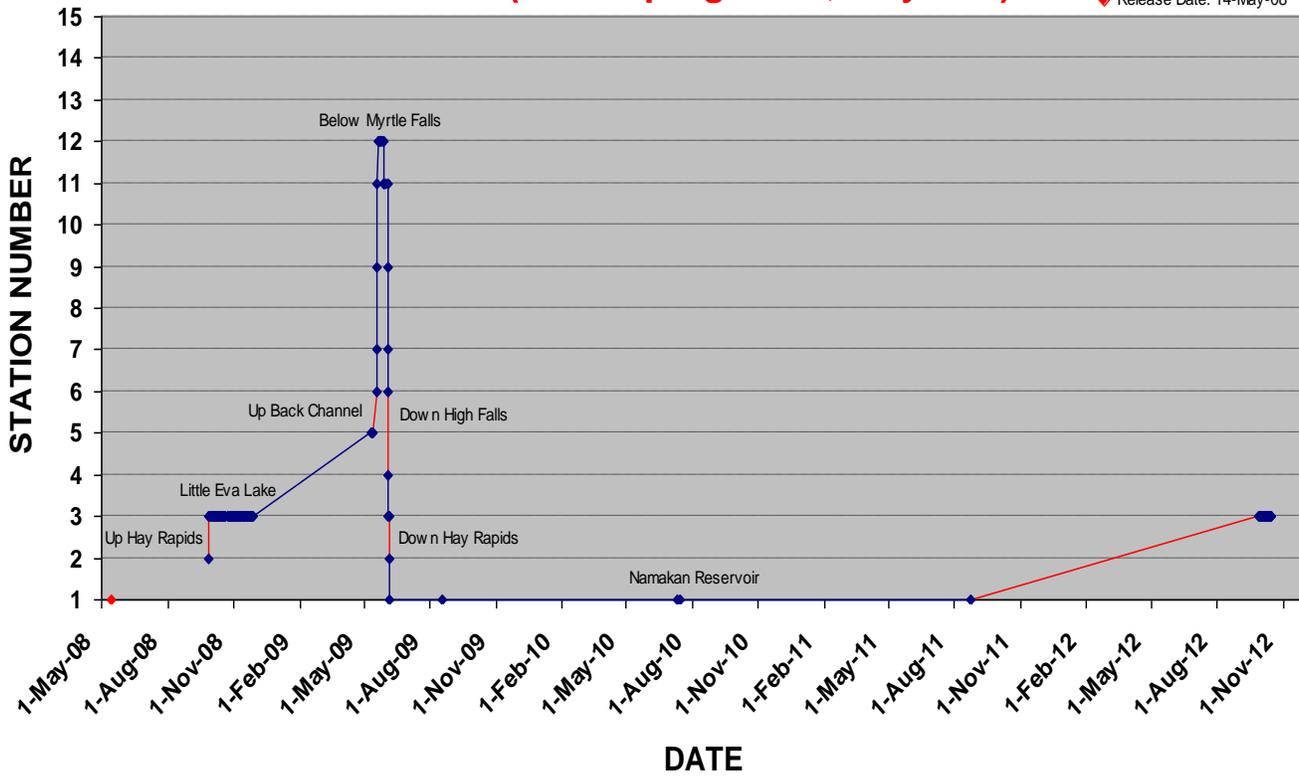
Fish 49652 (Developing female, 44 years)

◆ Release date: 14-May-08



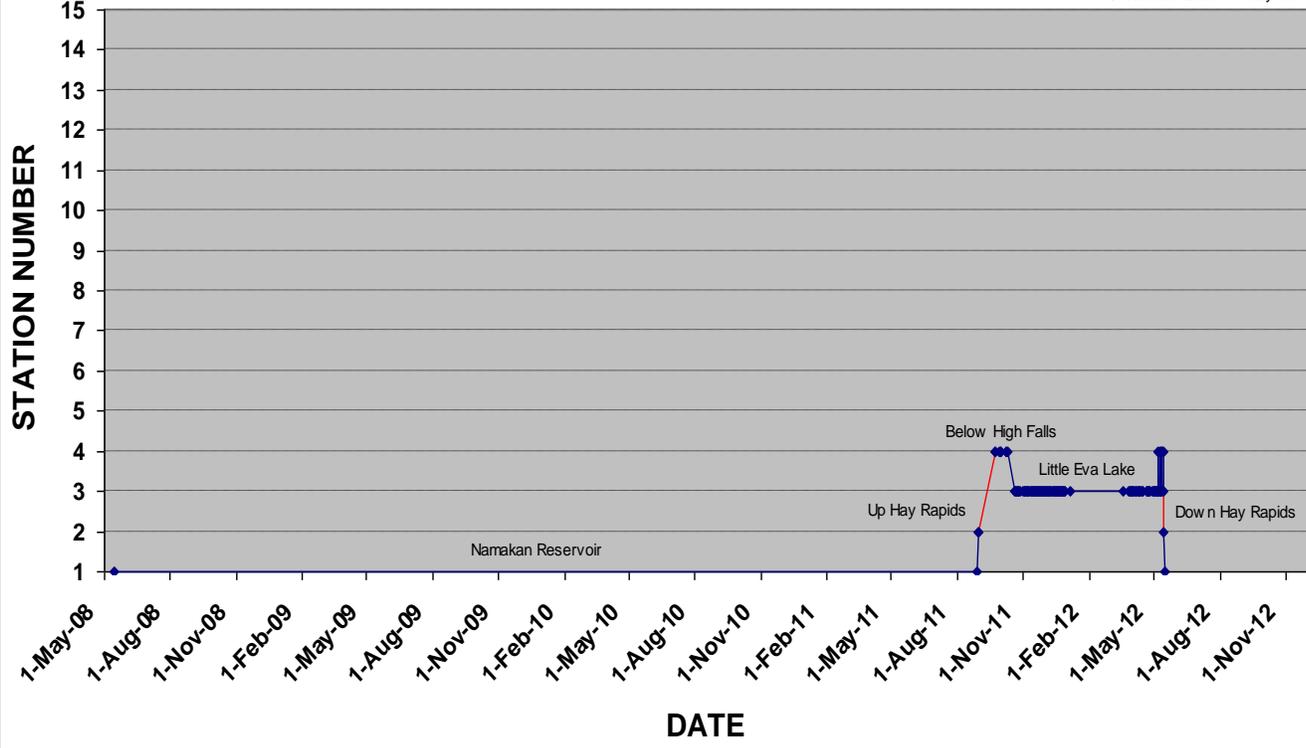
Fish 49653 (Developing male, 37 years)

◆ Release Date: 14-May-08



Fish 49654 (Developing female, 45 years)

◆ Release Date: 14-May-08



Appendix III: Movement of lake sturgeon through proposed hydro development sites (weir locations) on Namakan River, Ontario from 2007 to 2012. 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 ¹	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	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	Sep. 26, 2010 15:14	Sep. 27, 2010 21:33	14.6	61
	8491	Downstream	Oct. 05, 2011 21:02	Oct 19, 2011 03:47	14.6	28
	49635	Downstream	May 13, 2012 16:38	May 13, 2012 19:47	12.7	169
	4746	Downstream	July 8, 2012 01:11	July 9, 2012 04:47	23.6	304
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
	49641	Downstream	May 8, 2012 06:59	May 9, 2012 07:00	11.0	170
	4594	Downstream	June 8, 2012 06:31	June 9, 2012 01:04	20.0	274
	49640	Downstream	June 10, 2012 03:15	June 17, 2012 23:28	19.5	312
	4593	Downstream	June 16, 2012 09:17	June 16, 2012 20:37	19.2	304
	4593	Upstream	May 2, 2012 15:58	May 4, 2012 04:41	10.0	152
	49641	Upstream	May 5, 2012 07:31	May 6, 2012 07:35	10.6	163
Side Channel	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
	8491	Upstream	April 25, 2012 00:00	May 4, 2012 22:48	7.7	120
	49635	Upstream	May 6, 2012 18:33	May 10, 2012 13:24	10.9	165
	49640	Upstream	May 7, 2012 17:42	May 16, 2012 05:18	11.0	167
	4598	Upstream	May 13, 2012 17:33	Aug. 14, 2012 08:48	12.7	169
	4594	Upstream	June 6, 2012 08:37	June 7, 2012 22:33	17.8	248
	4746	Upstream	June 30, 2012 00:29	July 1, 2012 10:34	22.1	309
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
	4743	Downstream	May 11, 2012 07:03	May 11, 2012 21:09	11.8	170
	4601	Downstream	May 16, 2012 13:05	May 20, 2012 23:30	15.5	158
	49641	Downstream	May 16, 2012 15:43	May 16, 2012 18:14	13.4	166
	49643	Downstream	May 17, 2012 20:49	May 18, 2012 00:06	14.2	162
	4752	Downstream	May 28, 2012 15:04	May 28, 2012 21:11	14.6	176
	4601	Downstream	June 7, 2012 22:56	June 9, 2012 05:43	20.0	274
	49640	Downstream	June 19, 2012 15:10	June 19, 2012 18:52	19.5	319
	4593	Downstream	June 21, 2012 02:33	June 21, 2012 05:51	19.2	325
	49630	Downstream	July 5, 2012 13:45	July 6, 2012 03:35	24.0	310
Back Channel	4593	Downstream	Oct. 15, 2007 22:48	Oct. 16, 2007 06:15	11.5	283 / 25
	4601	Downstream	May 23, 2008 21:05	May 24, 2008 17:01	8.5	467 / 48

	4592	Downstream	Jun. 19, 2008 01:41	Jun. 19, 2008 13:05	15.4	409 / 40
	4595	Downstream	May 28, 2009 19:59	May 29, 2009 14:51	11.4	375 / 35
	4592	Downstream	Jun. 23, 2009 18:32	Jun. 24, 2009 17:23	19.8	239 / 20
	49634	Downstream	May 27, 2011 00:22	-	13.3	212/ 17
	4592	Downstream	Jul. 11, 2011 23:42	Jul. 12, 2011 10:02	23.4	144/ 10
	4746	Downstream	Jul. 20, 2011 08:23	Jul. 20, 2011 21:52	24.5	128/ 9
	4746	Downstream	June 25, 2012 03:53	June 25, 2012 07:33	20.4	320/29
	4746	Downstream	July 9, 2012 13:01	July 11, 2012 01:06	24.1	291/26
	4592	Downstream	Aug. 29, 2012 00:08	Sep. 1, 2012 16:59	22.4	97/6
	4602	Upstream	Oct. 04, 2007 19:40	Return to Little Eva Lake	14.8	128 / 9
	4602	Upstream	Oct. 19, 2007 03:28	Oct. 19, 2007 20:27	11.1	320 / 29
	4592	Upstream	May 21, 2008 19:40	Return to Little Eva Lake	7.4	464 / 47
	4592	Upstream	May 23, 2008 00:35	May 25, 2008 03:34	8.5	467 / 47
	4741	Upstream	May 27, 2008 06:18	May 30, 2008 12:38	10.7	444 / 44
	4592	Upstream	Jun. 19, 2008 15:29	Jun. 20, 2008 00:41	15.4	407 / 40
	49644	Upstream	Jun. 20, 2008 17:16	Jun. 21, 2008 03:58	16.0	404 / 39
	49630	Upstream	Jun. 26, 2008 21:10	Jun. 27, 2008 21:55	18.9	383 / 36
	49634	Upstream	Jun. 28, 2008 23:50	Jun. 30, 2008 07:57	19.1	373 / 35
	49632	Upstream	Jul. 05, 2008 17:04	Jul. 06, 2008 13:44	19.9	321 / 29
	4741	Upstream	Jul. 07, 2008 00:30	Jul. 07, 2008 11:26	21.0	315 / 28
	49633	Upstream	Jul. 07, 2008 20:56	Jul. 08, 2008 14:52	21.0	302 / 27
	49633	Upstream	Jul. 19, 2008 23:20	Jul. 20, 2008 19:19	20.3	243 / 20
	49637	Upstream	Jul. 20, 2008 20:48	Jul. 22, 2008 15:59	20.2	232 / 19
	49632	Upstream	May 04, 2009 19:36	May 06, 2009 17:20	6.3	325 / 29
	49640	Upstream	May 04, 2009 22:39	May 08, 2009 10:22	6.3	344 / 32
	49643	Upstream	May 06, 2009 21:36	May 15, 2009 16:54	7.5	392 / 38
	49635	Upstream	May 09, 2009 12:44	May 22, 2009 08:32	7.9	394 / 38
	49653	Upstream	May 11, 2009 23:57	May 18, 2009 12:32	8.2	398 / 38
	4740	Upstream	May 13, 2009 00:28	May 13, 2009 13:26	9.0	383 / 36
	49630	Upstream	May 14, 2009 23:03	May 17, 2009 14:22	9.1	398 / 38
	4589	Upstream	May 25, 2009 01:54	May 29, 2009 16:49	11.5	375 / 35
	4601	Upstream	Jun. 05, 2009 19:54	Jun. 06, 2009 14:15	12.8	334 / 31
	4594	Upstream	Jun. 24, 2009 06:59	Return to Little Eva Lake	20.4	239 / 20
	4593	Upstream	Jul. 11, 2009 17:00	Jul. 12, 2009 04:19	19.8	149 / 11
	4594	Upstream	Jul. 12, 2009 20:43	Jul. 13, 2009 09:48	19.6	145 / 11

	49646	Upstream	Jul. 09, 2010 00:39	Jul. 09, 2010 20:31	23.6	105/ 7
	49634	Upstream	Jul. 11, 2010 23:26	Jul. 13, 2010 08:10	24.4	125/ 9
	8493	Upstream	Jul. 21, 2010 16:16	Jul. 22, 2010 08:45	23.3	162/ 12
	49650	Upstream	May 07, 2011 22:59	May 17, 2011 06:33	6.8	233/ 19
	49630	Upstream	May 09, 2011 22:28	May 11, 2011 04:45	8.0	233/ 19
	4753	Upstream	May 11, 2011 00:12	Return to Little Eva Lake	9.5	233/ 19
	49638	Upstream	May 12, 2011 20:12	May 14, 2011 17:28	10.0	236/ 19
	4749	Upstream	May 14, 2011 20:25	May 17, 2011 02:14	9.1	233/ 19
	4592	Upstream	May 23, 2011 02:42	Return to Little Eva Lake	14.1	223/ 18
	4753	Upstream	May 24, 2011 04:22	Return to Little Eva Lake	13.6	221/ 18
	4593	Upstream	Jun. 30, 2011 00:06	Jul. 01, 2011 01:44	18.7	142/ 10
	4592	Upstream	Jun. 30, 2011 21:21	Jul. 01, 2011 07:27	18.7	142/ 10
	8492	Upstream	Jul. 07, 2011 20:29	Jul. 09, 2011 01:49	22.3	148/ 11
	4746	Upstream	Jul. 10, 2011 09:57	Jul. 10, 2011 22:49	23.0	147/ 11
	4746	Upstream	Jul. 19, 2011 04:43	Jul. 20, 2011 06:24	24.3	128/ 9
	4601	Upstream	Aug. 1, 2011 03:02	Aug. 01, 2011 15:56	23.3	96/ 6
	49650	Upstream	March 30, 2012 16:59	May 4, 2012 23:45	10.8	160/12
	4743	Upstream	April 27, 2012 21:52	May 1, 2012 16:54	9.3	148/11
	49635	Upstream	April 28, 2012 00:59	May 4, 2012 01:29	10.8	160/12
	49641	Upstream	April 28, 2012 23:00	May 4, 2012 00:34	10.8	160/12
	49643	Upstream	April 28, 2012 23:32	May 1, 2012 23:11	9.3	148/11
	49640	Upstream	May 4, 2012 01:49	May 4, 2012 16:57	10.8	160/12
	4752	Upstream	May 9, 2012 01:40	May 10, 2012 12:53	11.5	171/13
	4594	Upstream	June 1, 2012 01:00	June 1, 2012 22:34	15.2	205/16
	4601	Upstream	June 7, 2012 03:17	June 7, 2012 21:11	18.8	258/22
	4746	Upstream	June 8, 2012 23:43	June 9, 2012 17:25	20.0	274/24
	49630	Upstream	June 20, 2012 02:13	June 20, 2012 16:53	19.1	324/29
	4592	Upstream	June 20, 2012 16:15	June 21, 2012 01:04	19.1	325/30
	49637	Upstream	June 24, 2012 02:20	June 25, 2012 03:08	20.4	320/29
	4746	Upstream	June 25, 2012 13:19	June 26, 2012 10:19	20.8	318/29
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
	4744	Downstream	April 24, 2012 01:14	April 25, 2012 01:59	7.7	120
	4743	Downstream	May 13, 2012 02:07	May 13, 2012 05:53	12.7	169

	49654	Downstream	May 14, 2012 08:57	May 14, 2012 13:03	13.1	169
	49635	Downstream	May 14, 2012 15:06	May 14, 2012 18:01	13.1	169
	4739	Downstream	May 16, 2012 01:25	May 17, 2012 01:52	13.7	165
	49641	Downstream	May 16, 2012 23:50	May 17, 2012 02:39	13.7	165
	49647	Downstream	May 19, 2012 23:24	May 20, 2012 02:57	15.5	158
	49643	Downstream	May 20, 2012 11:31	May 20, 2012 17:02	15.5	158
	4601	Downstream	May 21, 2012 21:43	May 22, 2012 04:00	15.8	157
	49643	Downstream	May 24, 2012 22:24	May 25, 2012 02:37	15.6	161
	4752	Downstream	May 29, 2012 05:17	May 29, 2012 11:12	14.8	183
	4601	Downstream	June 9, 2012 19:43	June 10, 2012 04:37	20.6	280
	4601	Downstream	June 17, 2012 03:16	June 17, 2012 08:55	19.5	312
	49640	Downstream	June 19, 2012 19:53	June 19, 2012 22:45	19.5	319
	49640	Downstream	June 20, 2012 20:29	June 21, 2012 00:55	19.2	325
	49632	Downstream	May 9, 2012 16:22	June 21, 2012 14:54	19.2	325
	49640	Downstream	June 21, 2012 18:39	June 22, 2012 19:52	19.4	325
	4593	Downstream	June 21, 2012 20:46	June 22, 2012 06:09	19.4	325
	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
	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
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
49632	Upstream	Feb. 16, 2012 01:33	May 9, 2012 16:22	11.0	170
4741	Upstream	April 5, 2012 01:38	July 7, 2012 10:08	23.6	44
49640	Upstream	April 22, 2012 21:53	April 24, 2012 19:23	7.9	102
49647	Upstream	April 27, 2012 05:20	April 29, 2012 11:45	8.5	132
4744	Upstream	May 2, 2012 05:31	July 1, 2012 15:19	22.1	152
4739	Upstream	May 3, 2012 04:51	May 4, 2012 20:33	10.8	156
4594	Upstream	May 15, 2012 23:58	May 19, 2012 14:08	15.0	166
4739	Upstream	May 19, 2012 07:25	Sep.4, 2012 15:06	22.3	160
49647	Upstream	May 20, 2012 20:22	Sep. 21, 2012 11:58	15.3	158
49643	Upstream	May 21, 2012 20:15	May 22, 2012 01:54	15.8	157
49630	Upstream	June 1, 2012 13:10	June 2, 2012 00:58	15.2	205
49634	Upstream	June 2, 2012 22:45	June 3, 2012 18:49	15.8	211
49633	Upstream	June 3, 2012 07:25	June 4, 2012 00:40	16.3	219
4601	Upstream	June 3, 2012 17:50	June 4, 2012 09:22	16.3	219
4745	Upstream	June 4, 2012 01:58	June 5, 2012 04:09	16.8	228
4746	Upstream	June 8, 2012 03:54	June 8, 2012 17:51	19.5	266
4592	Upstream	June 14, 2012 02:22	June 15, 2012 06:25	18.9	298
4601	Upstream	June 15, 2012 14:08	June 15, 2012 22:24	19.0	301
4601	Upstream	June 18, 2012 03:31	Sept. 10, 2012 02:48	19.8	315
49640	Upstream	June 20, 2012 11:28	June 20, 2012 17:45	19.1	324
49640	Upstream	June 21, 2012 05:05	June 21, 2012 11:40	19.2	325

	49637	Upstream	June 21, 2012 15:30	June 23, 2012 16:50	19.2	325
	49632	Upstream	June 26, 2012 11:01	July 23, 2012 10:09	20.8	318

¹ – Between 2007 and late May 2009, upstream and downstream movements may have occurred through any of Ivy Falls, Myrtle Falls or the associated side channels.

² – There is also a small side channel associated with Myrtle Falls through which Lake Sturgeon may travel during high flows.

Appendix IV: Movement of lake sturgeon through rapids not proposed for development on Namakan River, Ontario from 2007 to 2012. 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, 2009	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
4743	Downstream	May 10, 2012	02:05	May 10, 2012	04:31	11.5	171
4601	Downstream	May 10, 2012	20:03	May 11, 2012	01:08	11.8	170

49635	Downstream	May 14, 2012 00:39	May 14, 2012 03:57	13.1	169
49641	Downstream	May 16, 2012 01:52	May 16, 2012 11:06	13.4	166
4752	Downstream	May 28, 2012 00:18	May 28, 2012 05:35	14.6	176
4593	Downstream	June 17, 2012 16:22	June 18, 2012 13:57	19.8	315
49640	Downstream	June 19, 2012 08:51	June 19, 2012 11:16	19.5	319
4746	Downstream	June 20, 2012 22:18	June 22, 2012 21:27	19.4	325
4746	Downstream	June 24, 2012 07:16	June 24, 2012 11:21	20.1	322
4746	Downstream	July 8, 2012 01:11	July 9, 2012 04:47	23.7	301
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
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
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
4743	Upstream	May 2, 2012	16:05	May 3, 2012	07:38	10.0	152
49635	Upstream	May 4, 2012	08:47	May 4, 2012	13:01	10.8	160
49641	Upstream	May 5, 2012	00:44	May 5, 2012	04:53	10.9	163
49640	Upstream	May 5, 2012	02:37	May 5, 2012	07:23	10.9	163

	4601	Upstream	May 10, 2012 00:55	May 10, 2012 04:08	11.5	171
	4752	Upstream	May 10, 2012 22:55	May 11, 2012 03:09	11.5	171
	4594	Upstream	June 2, 2012 08:38	June 2, 2012 13:56	15.8	211
	4746	Upstream	June 19, 2012 15:10	June 19, 2012 20:57	19.5	319
	4746	Upstream	June 30, 2012 00:29	July 1, 2012 10:34	22.1	309
Quetico River	4592	Downstream	May 30, 2008 21:05	May 31, 2008 05:35	11.7	-
	49644	Downstream	May 23, 2009 16:00	May 24, 2009 03:26	10.7	-
	49643	Downstream	May 25, 2009 12:31	May 27, 2009 13:32	11.5	-
	49644	Downstream	May 26, 2009 04:30	May 27, 2009 14:46	11.3	-
	49644	Downstream	May 27, 2009 17:05	May 27, 2009 20:13	11.1	-
	4600	Downstream	May 28, 2009 13:49	Jun. 24, 2009 08:24	11.4	-
	49643	Downstream	May 30, 2009 20:20	May 30, 2009 22:21	12.1	-
	4589	Downstream	May 30, 2009 20:56	May 31, 2009 00:18	12.1	-
	4746	Downstream	June 19, 2012 03:36	June 19, 2012 14:42	19.5	-
	4592	Downstream	June 21, 2012 10:51	June 21, 2012 20:12	19.2	-
	4592	Upstream	May 25, 2008 23:18	May 26, 2008 02:22	10.9	-
	49644	Upstream	May 21, 2009 04:55	May 21, 2009 20:42	10.2	-
	49644	Upstream	May 24, 2009 06:07	May 24, 2009 11:51	11.2	-
	49643	Upstream	May 24, 2009 18:32	May 24, 2009 20:47	11.2	-
	49644	Upstream	May 27, 2009 14:56	May 27, 2009 16:56	11.1	-
	49643	Upstream	May 27, 2009 15:35	May 27, 2009 18:31	11.1	-
	4600	Upstream	May 27, 2009 18:50	May 27, 2009 21:53	11.1	-
	4589	Upstream	May 29, 2009 20:43	May 29, 2009 23:16	11.9	-
	4746	Upstream	June 9, 2012 23:09	June 16, 2012 03:02	19.2	-
	4592	Upstream	June 21, 2012 05:29	June 21, 2012 10:19	19.2	-
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
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	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
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	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
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	4596	Downstream	May 04, 2010	23:40	May 05, 2010	12:35	10.7	43
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	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
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	4593	Upstream	Sept. 25, 2007 05:43	Sept. 25, 2007 19:18	15.6	65
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	4597	Upstream	Oct. 04, 2007 01:01	Oct. 06, 2007 03:29	14.0	147
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	49644	Upstream	Jun. 21, 2008 05:27	Jun. 21, 2008 19:46	16.4	404
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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
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4600	Upstream	May 05, 2009	06:17	May 19, 2009	14:38	9.4	400
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49635	Upstream	May 22, 2009	09:06	May 22, 2009	13:45	10.6	394
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	4747	Downstream	May 18, 2007 21:17	-	14.7	53
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	4741	Downstream	May 24, 2007 14:49	May 30, 2007 03:55	15.0	56
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	4752	Downstream	Sept. 21, 2007 00:16	Sept. 21, 2007 10:11	14.7	44

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	4742	Downstream	Aug. 03, 2009 05:19	Aug. 03, 2009 21:19	19.0	108
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	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

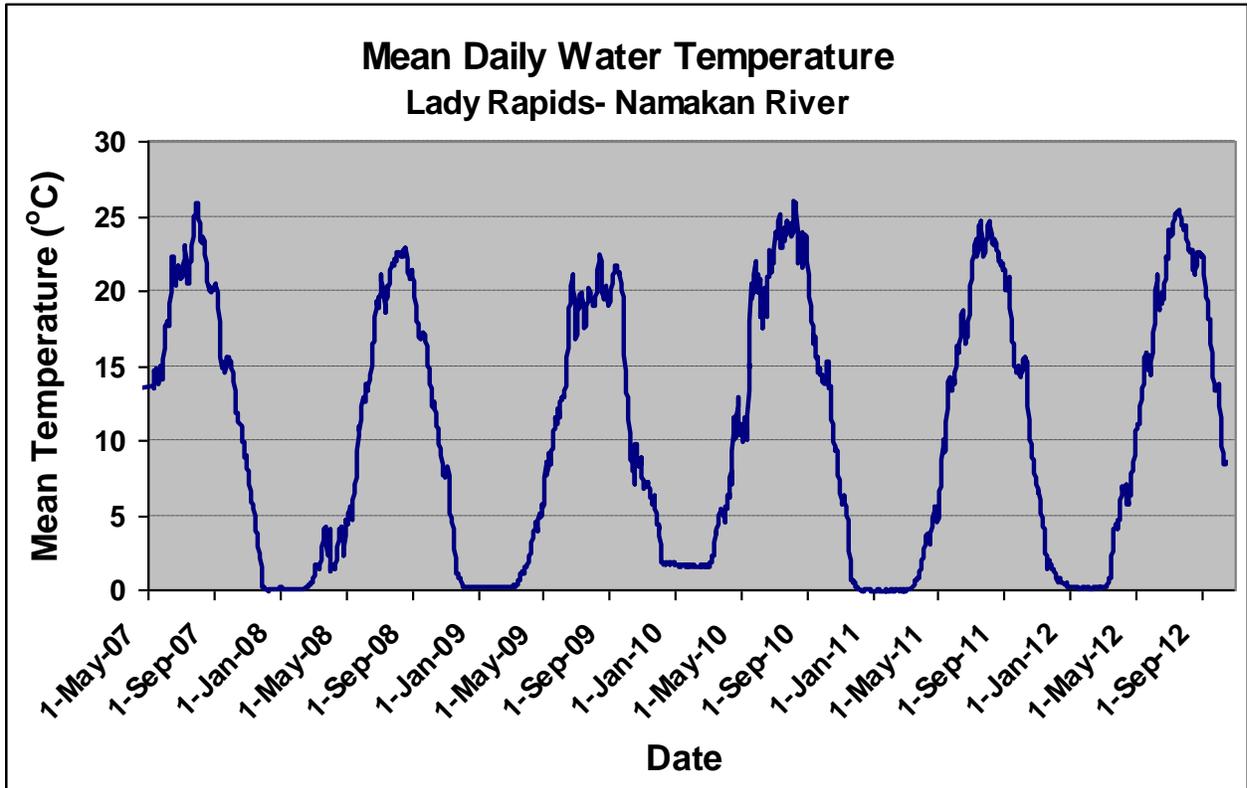
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	4589	Upstream	Jul. 20, 2008 16:49	May 22, 2009 12:36	10.6	394
	4744	Upstream	Jul. 28, 2008 11:07	Jul. 29, 2008 19:54	21.7	191
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	4588	Upstream	Aug. 01, 2008 02:39	Aug. 02, 2008 23:57	22.0	173
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	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

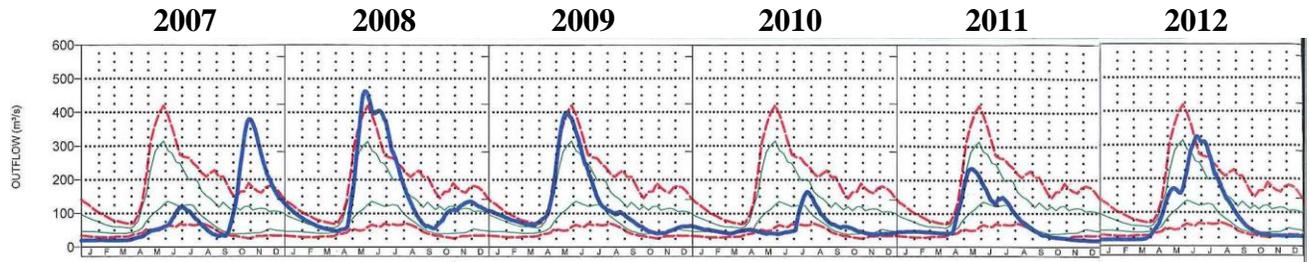
49647	Upstream	Jul. 13, 2009	11:47	Jul. 14, 2009	05:22	19.5	143
4744	Upstream	Jul. 23, 2009	03:46	Jul. 24, 2009	06:58	19.5	118
49647	Upstream	Jul. 31, 2009	20:51	Aug. 01, 2009	19:43	19.0	108
49642	Upstream	Sept. 02, 2009	04:44	Sept. 02, 2009	19:20	19.3	91
49631	Upstream	Sept. 03, 2009	03:44	Sept. 03, 2009	23:32	19.7	90
4590	Upstream	Sept. 09, 2009	15:04	Sept. 10, 2009	02:08	21.2	81
4739	Upstream	Sept. 14, 2009	22:04	Sept. 15, 2009	18:33	21.5	77
4590	Upstream	Apr. 19, 2010	23:05	Apr. 26, 2010	12:18	11.5	47
4743	Upstream	Apr. 23, 2010	22:12	Apr. 24, 2010	17:45	11.6	48
49652	Upstream	Apr. 24, 2010	07:39	Apr. 24, 2010	22:46	11.6	48
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
49634	Upstream	Jun. 22, 2010	21:14	Jun. 23, 2010	12:30	20.8	46
49630	Upstream	Jun. 25, 2010	12:19	Jun. 26, 2010	02:03	22.7	48
49650	Upstream	Jul. 06, 2010	02:59	Jul. 06, 2010	13:42	23.4	82
49646	Upstream	Jul. 07, 2010	22:16	Jul. 08, 2010	07:54	23.6	98
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
4752	Upstream	May 09, 2011	06:34	May 26, 2011	09:43	13.4	216
4593	Upstream	May 10, 2011	02:41	May 18, 2011	09:02	11.2	231
4591	Upstream	May 11, 2011	16:16	May 19, 2011	00:21	12.1	229
4742	Upstream	May 22, 2011	15:02	Jun. 07, 2011	11:12	16.2	179
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
49641	Upstream	Sept. 28, 2011	04:14	Sept. 28, 2011	13:41	15.0	32
49647	Upstream	Sept. 29, 2011	17:24	Sept. 30, 2011	10:43	14.5	31
49632	Upstream	Feb. 16, 2012	01:33	May 9, 2012	04:22	11.0	170
49647	Upstream	April 2, 2012	21:29	April 26, 2012	21:02	7.9	126
4741	Upstream	April 5, 2012	01:38	July 7, 2012	10:08	23.6	307
49640	Upstream	April 15, 2012	00:49	April 22, 2012	21:15	6.3	102
4739	Upstream	April 20, 2012	04:12	May 3, 2012	04:27	10.6	156
4744	Upstream	May 2, 2012	05:31	July 1, 2012	15:19	22.1	309

	4594	Upstream	May 13, 2012 23:25	May 15, 2012 23:30	13.4	166
	4739	Upstream	May 19, 2012 07:25	Sep.4, 2012 15:06	22.3	89
	49647	Upstream	May 20, 2012 20:22	Sep. 21, 2012 11:58	15.3	57
	4742	Upstream	May 21, 2012 11:56	May 29, 2012 00:55	14.8	183
	49634	Upstream	May 29, 2012 23:32	June 2, 2012 21:01	15.8	211
	49630	Upstream	May 31, 2012 12:38	June 1, 2012 11:18	15.2	205
	49633	Upstream	June 2, 2012 03:11	June 3, 2012 06:42	16.2	219
	4745	Upstream	June 2, 2012 07:29	June 4, 2012 01:26	16.8	228
	4601	Upstream	June 18, 2012 03:31	Sept. 10, 2012 02:48	19.6	78
	49637	Upstream	June 21, 2012 15:30	June 23, 2012 16:50	19.7	324
	49632	Upstream	June 26, 2012 11:01	July 23, 2012 10:09	25.2	324

Appendix V: Mean daily water temperature recorded at Lady Rapids in Namakan River, Ontario from May, 2007 to October, 2012.



Appendix VII: Estimated water flow in Namakan River, Ontario from January, 2007 to December, 2012. 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.

