2022 Honoway Fishway Monitoring

In part of reporting for FWEF Project 22-010 SVSFE Initiatives and Monitoring of Recreational Fisheries in the Swan Valley Area

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October 2022

Swan Valley Sport Fishing Enhancement

Summary

In spring of 2022, high water resulted in the most successful operational season for the Honoway Fishway. Migrating fish (primarily white sucker) first arrived around May 3rd and continued migrations until around May 29th. A significant spring storm on May 11th raised water levels and lowered water temperatures during peak migrations. This instance slowed fish movement down considerably, which remained as such until the end of May. Overall, species confirmed to utilize the fishway in 2022 include white sucker, shorthead redhorse sucker, creek chub, common shiner, burbot, longnose dace, northern pike, river darter, and logperch.

Consensus amongst stakeholders is that annual fishway monitoring is no longer necessary. The data acquired in the many springs since construction is sufficient to create a long-term maintenance and management plan. Future recommendations are as follows:

- It is imperative that a manager and/or volunteer be trained and willing to manage the fishway each spring. Tasks will include regular visits to the fishway to check on debris build-up and to adjust the gates of the water control structure when necessary. Guidelines and responsibilities are outlined in a the Honoway Fishway Fact Sheet (Appendix).
- Every few years, sedimentation buildup and tree growth need to be remedied. Based on data and observations it is recommended that a fishway clean-out be performed every 5-6 years. With this recommendation the next clean-out should occur in 2023 or 2024. The most recent cleanout and survey was completed by SLWD in 2018.
- The low-flow culvert would without a doubt benefit fish populations, however the primary question is that of economic viability. This project would be expensive and would likely benefit suckers more than any other species. In the many years of monitoring the fishway, walleye do not appear to utilize the fishway with any consistency. For this reason, it is recommended the SLWD consider this only if a feasibility study is complete and there are major renovation plans for the Ford Crossing by the RM of Mintonas-Bowsman. Speaking with Garry Bartel with the RM, the Honoway Ford Crossing has a thorough and regimented maintenance plan. For this reason, he anticipates no major renovations to the Ford in the foreseeable future.

In summary, there will be years and periods where the Honoway Fishway works as intended, and times when it will not. Having a clean-out plan every 5-6 years and a committed fishway manager will ensure successful fish usage for the years to come.

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Background Information

Historically, it was recognized the Honoway Ford Crossing was a barrier to fish during spring migrations. In 2010, the Swan Lake Watershed District (SLWD), in partnership with Manitoba Fisheries, and Swan Valley Sport Fishing Enhancement (SVSFE) applied for funding through the Fisheries Enhancement Fund (FEF) to design and construct a fishway to facilitate spring movement beyond the ford crossing.

The project was ultimately approved and the fishway was built in the winter of 2010/2011. AAE Tech Services was the consulting firm hired for the design, and the first operable season was the spring 2012. SVSFE staff monitored the new bypass and determined fish usage was minimal. It was concluded once water temperatures triggered fish movement, the river had receded and flow through the fishway was inadequate to facilitate fish passage in 2012.

Monitoring by SVSFE continued in the spring of 2013. Results found large congregations of fish (primarily suckers) were unable to penetrate the culverts as waters velocities were too high during critical periods. These observations led to the placement of management boulders to reduce flow within the fishway. The boulders were strategically placed at the entrance of the fishway, which reduced total water volume and therefore water velocity and subsequently enabled fish passage through the culverts. Monitoring in 2013 found evidence of multiple species utilizing the fishway including white sucker, northern pike, walleye, burbot, short-head redhorse sucker, silver redhorse sucker, and creek chub once water velocities dropped to passable levels.

Monitoring continued in 2014 with less intensive effort in comparison to 2013. Reports found the presence of suckers around May 9th when surface temperatures reached ~11°C. Observations found that fish were passing through the fishway without issue, and the fishway was working as intended. By May 14th, water levels had dropped to levels that would not facilitate fish movement. On May 20th, the SLWD removed some management boulders and silt from entrance of the fishway. Shortly after, it was concluded that the spring migrations were completed for 2014.

By the summer of 2014, the SLWD had determined for the fishway to be successful on an annual basis; the installation of a water control structure would be necessary. This structure would be able to increase/decrease flow to allow fish movement each spring. Monitoring did not occur in the springs of 2015, 2016, or 2017.

In the summer of 2017, the SLWD had a custom water control structure installed near the entrance of the fishway. The structure consisted of two gates which can be lifted or lowered, therefore controlling the volume of water entering the fishway. The plan included the installation of a low flow culvert on the south side of the ford crossing in the

drawings to facilitate fish passage on years or periods of low discharge. In 2017, this culvert was considered but was not completed. It was determined that more information would be required to see if this infrastructure would be necessary or not.

2018 marked the first operational spring with the new water control structure, and again SVSFE staff were tasked with monitoring. The objectives were to manage the structure and ensure fish utilization throughout the spring. Results found debris may be an issue as an old cattle fence became lodged in the water control structure. Once fish movement began, the river had receded enough and using the gates was not necessary. Between May 4 - 7th the fishway facilitated fish movement. 2018 recommendations stated additional years of monitoring would be necessary to develop a long-term management strategy. Later that year, years of siltation lead to the decision to clean out, re-slope, and re-survey the fishway. The surveying was completed by SLWD staff in August and was intended to quantify siltation and future clean-outs.

Monitoring in spring of 2019 found that once water temperatures sparked spring migrations, water levels were too low for the fishway to be operable. There was just one day, April 20th, where water levels were high enough to facilitate passage of large-bodied fish through the fishway. 2019 recommendations were to continue low effort monitoring in 2020.

2020 monitoring found the system to successfully facilitate movement from April 27th – May 7th. Following May 7th, water levels became too low to allow movement within the fishway. Congregations of large-bodied fish (primarily white sucker) continued until some point around May 15th. Recommendations were to begin discussions regarding additional infrastructure (low flow culvert) with the SLWD staff and continue low effort monitoring in 2021.

In spring of 2021, drought conditions resulted in an unsuccessful operational season for the Fishway. Migrating fish first arrived around April 17th and continued until May 9th. During this time, the Fishway was dry and did not facilitate fish movement. On April 24th, fish were observed successfully passing through select culverts on the ford crossing itself. Similar observations were made daily from this point forward until migrations were considered complete around May 9th. It was recommended to continue with low effort monitoring in 2022 and continue discussions with stakeholders regarding the feasibility of a low-flow culvert.

Objectives

In 2022, Swan Valley Sport Fishing Enhancement (SVSFE), in partnership with the Swan Lake Watershed District (SLWD), and Manitoba Fisheries set out to maintain and monitor the Honoway Fishway during the spring migrations. The monitoring objectives set out were as follow:

1) To determine if the Honoway fishway and water control structure were providing successful fish passage during spring migrations.
2) To document daily water velocities and depths within the fishway to gain a better understanding of the conditions fish are faced with when travelling through the fishway.
3) Finally, to provide SLWD with suggestions and recommendations to efficiently manage the fishway in future years with special considerations regarding sedimentation and long-term improvements if found necessary.

Study Area

The Honoway Fishway, located at the Honoway Ford Crossing (aka Jersak Ford Crossing) is located approximately 13km northeast of Swan River, Manitoba.

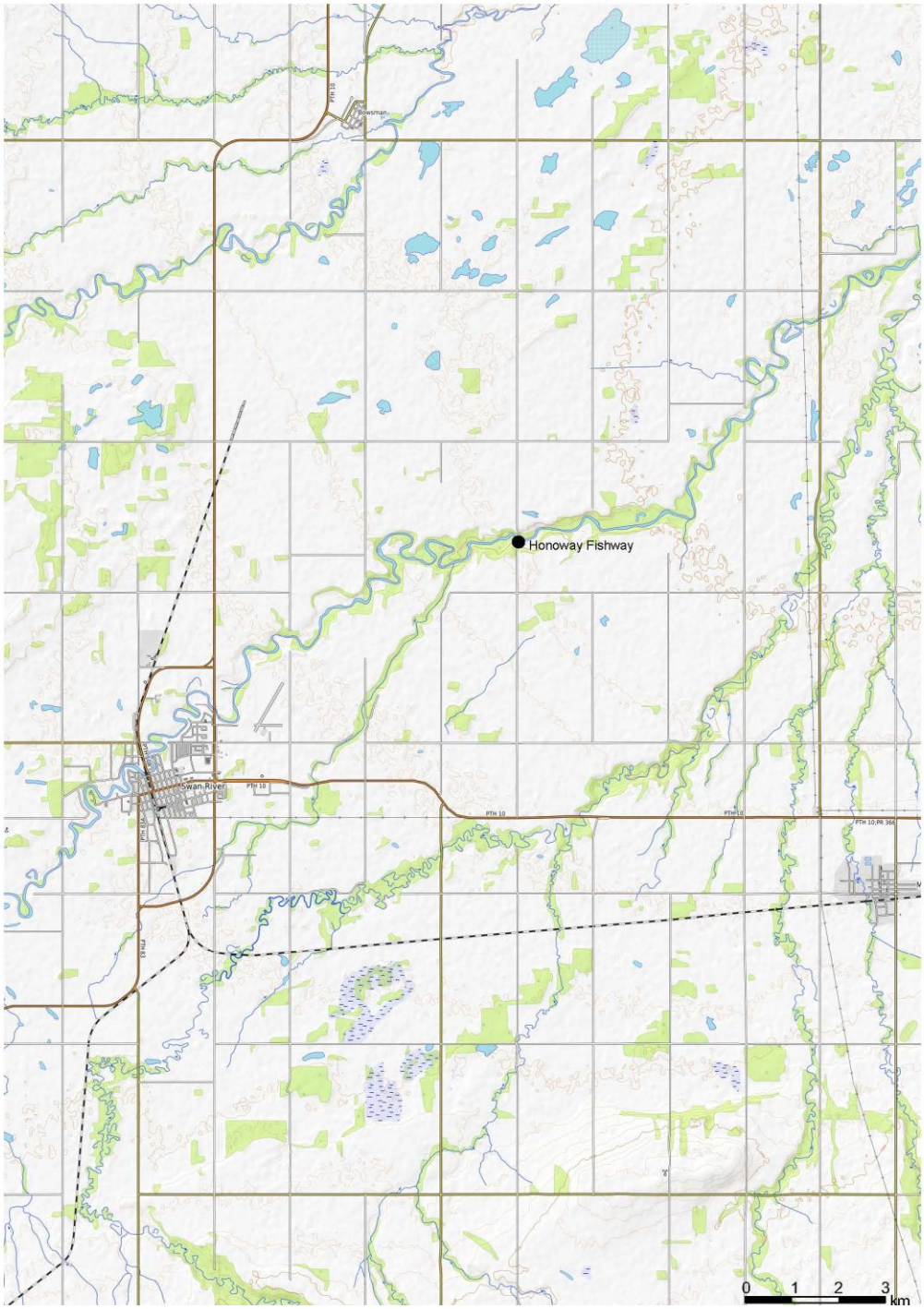


Figure 1: Study Area

Methods

Technicians were to visit the Honoway Fishway daily from the time of break-up until the spring migrations were considered finished. Monitoring began on April 10th and continued until May 26th. A few random visits were completed following May 26th to monitor water levels and fish activity. At each visit, notes were taken on weather parameters, water parameters, mechanical parameters, hydraulic parameters, along with additional comments and a photograph checklist (Figure 2).

Weather parameters monitored included the time of visit, crew, air temperature, cloud cover, wind speed/direction, precipitation, and additional comments. Water temperatures were monitored using a temp logger as well as taken manually at two locations each visit. Unfortunately, freezing temperature compromised the temp logger and was ultimately unretrievable. Photographs were taken at the following locations daily: (1) upstream structure (2) downstream structure (3) agriculture drainage (4) upstream culverts (5) downstream culverts (6) the fishway entrance, (7) ford crossing downstream, and (8) the ford crossing upstream.

Prior to break-up, technicians inspected devices to measure and monitor different mechanical and hydraulic parameters during the assessment. These included water level meters at four locations within the fishway (Figure 3) and the benchmark water level located on the north pillar of Museum Bridge approximately 14.5km upstream from the fishway.

Water velocity stations were pre-determined, and readings were taken using a Global water flow probe hand-help flow meter. Velocity sites were downstream of each gate, downstream of each culvert, and near the fishway entrance. At each of these five sites, velocity readings were taken 20cm below the surface for every 20cm of stream-width (Figure 7). If gates were open or closed (mechanical parameters); water levels and velocities readings were taken again to document changes to the system.

Fish usage was quantified through trap-netting upstream of the control structure. A ridged framed trap net was fastened with a t-post upstream of the structure and wings were used to fish the entire stream width. Nets fished for either one hour or 30 minutes. As an issue of safety, netting was not completed when water levels were >1.4m. Non-game fish were counted, while game fish were measured and sexed to determine ripeness. All fish were released in slack water upstream of the netting location (Figure 6).

SVSFE HONOWAY FISHWAY MONITORING 2022

WEATHER PARAMETERS

Date	Time	Crew	Air (°C)	River (°C)	Cloud Cover	Wind (°/kmh)	Precip	Spectator #	Comments

WATER PARAMETERS (Fishway)

Water Temp (C°)	TDS (ppm)	COND (Us)	pH

PHOTOGRAPH CHECKLIST

Upstream Structure	Downstream Structure	Agricultural Drainage	Upstream Culvert	Downstream Culvert	Fishway Entrance	Ford Crossing

MECHANICAL PARAMETERS

North Gate			South Gate		
A	B	C	A	B	C

HYDRAULIC PARAMETERS (0-30cm)

		Depth (cm)	
		Readings (~20cm)	Average
Site 1 North Gate	A		
	B		
	C		
Site 2 South Gate	A		
	B		
	C		
Site 3 North Culvert	A		
	B		
	C		
Site 4 South Culvert	A		
	B		
	C		
Site 5 Fishway Entrance	A		
	B		
	C		

HYDAULIC PARAMETERS (Water Levels)

Site 1 Upstream Structure	A	
	B	
	C	
Site 2 Downstream Structure	A	
	B	
	C	
Site 3 Upstream Culvert	A	
	B	
	C	
Site 4 Downstream Culvert	A	
	B	
	C	
Site 5 - SR MUSEUM	Benchmark	

Additional Commets/Observations

Figure 2: Daily Checklist

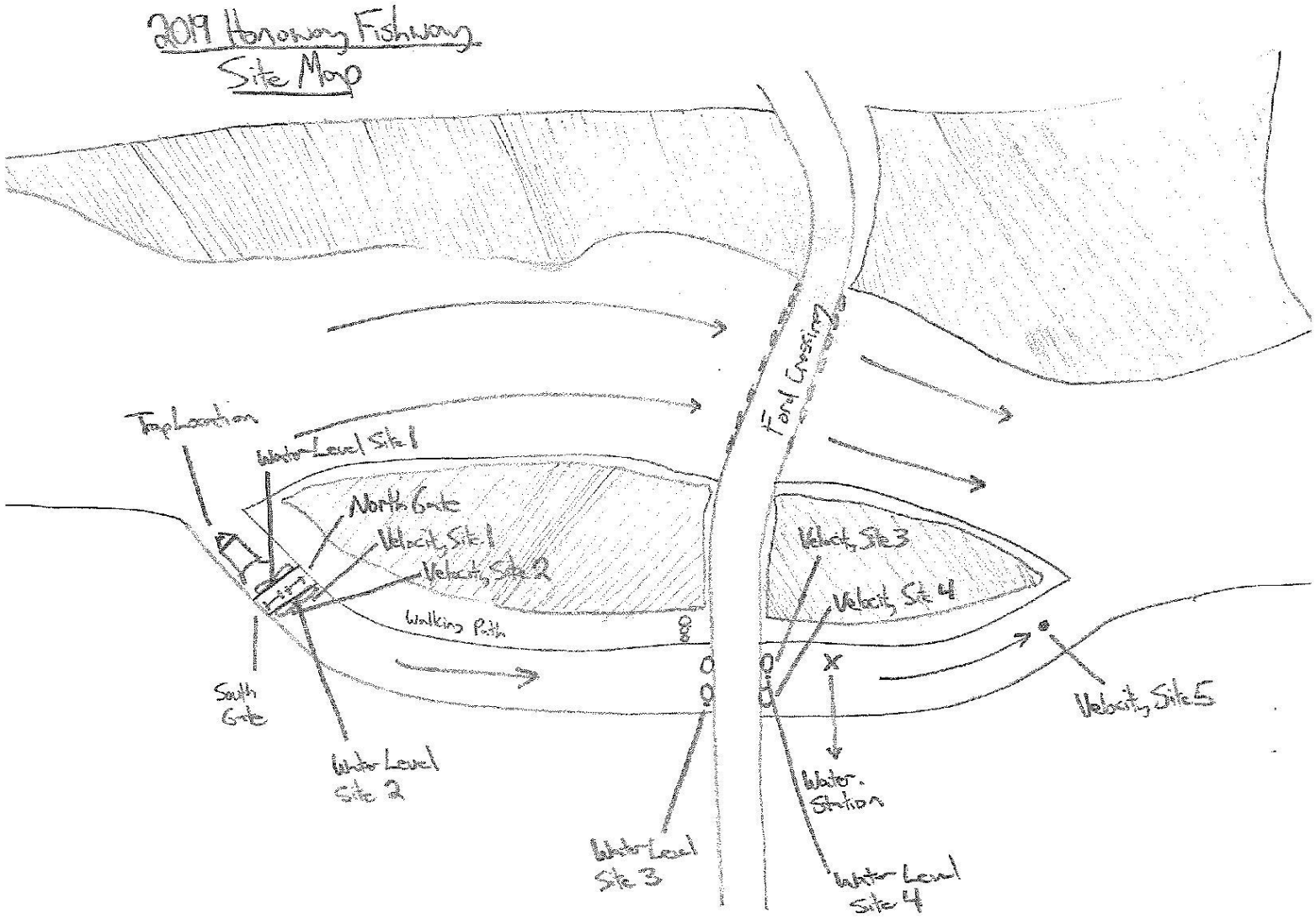


Figure 3: Honoway Fishway Site Map 1

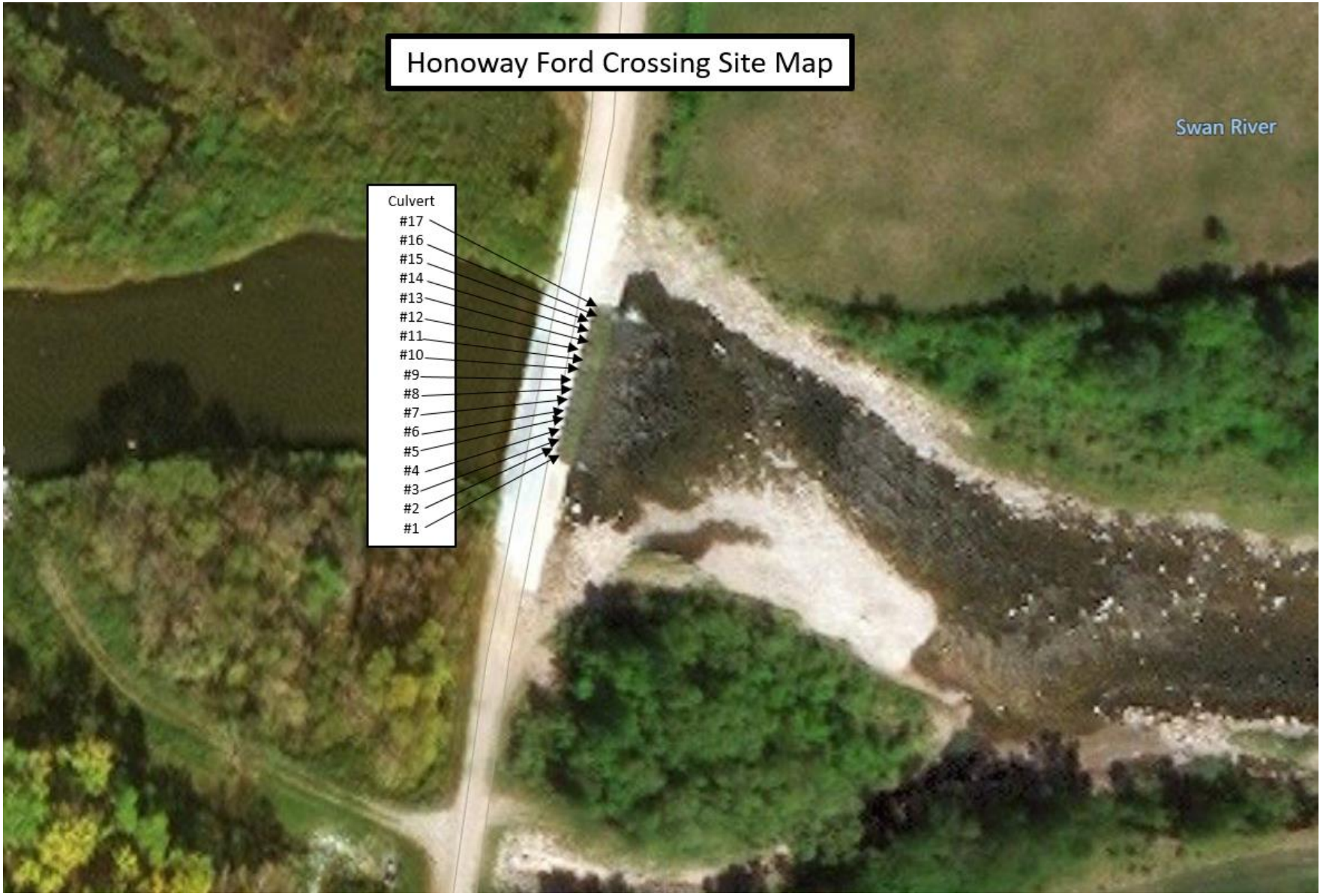
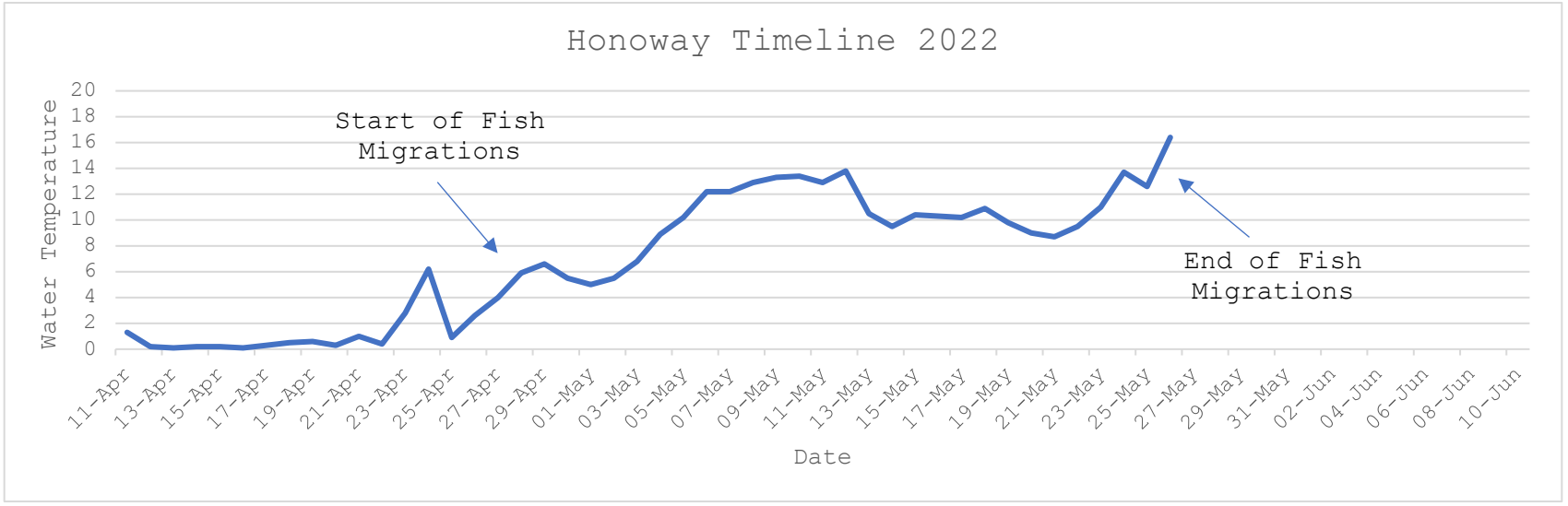


Figure 4: Honoway Ford Crossing Site Map 2

Results

Monitoring began on April 10th and was completed on May 26th, 2022. An unusually wet spring led to a fully functional and operational fishway for the duration of fish migrations. Fish (primarily white sucker) were noted to begin spring migrations at some point around May 3rd, and end at some point around May 26th. In total, spring migrations lasted approximately 23 days in 2022. Species confirmed to utilize the fishway in 2022 include white sucker, shorthead redhorse sucker, creek chub, common shiner, burbot, longnose dace, northern pike, river darter, and logperch.

Figure 5: Honoway Fishway Netting Location – May 19th, 2022



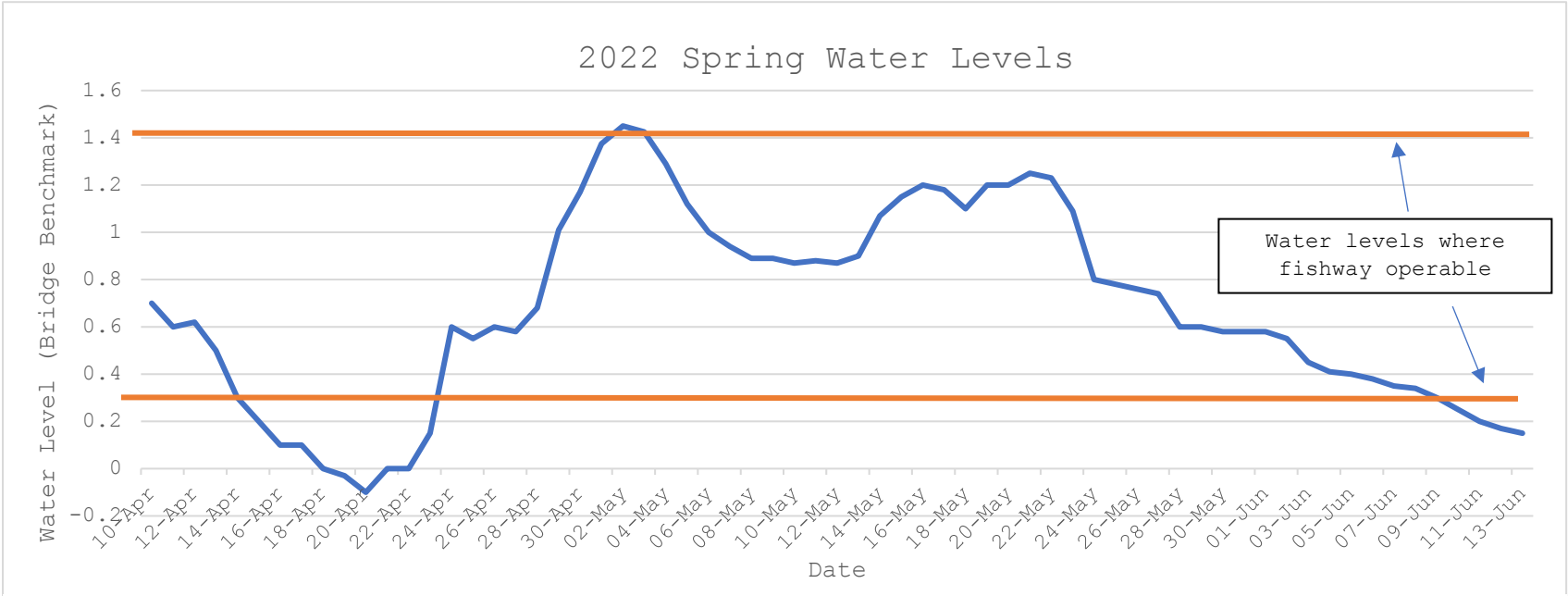


Figure 6: Honoway Timeline & Water Levels

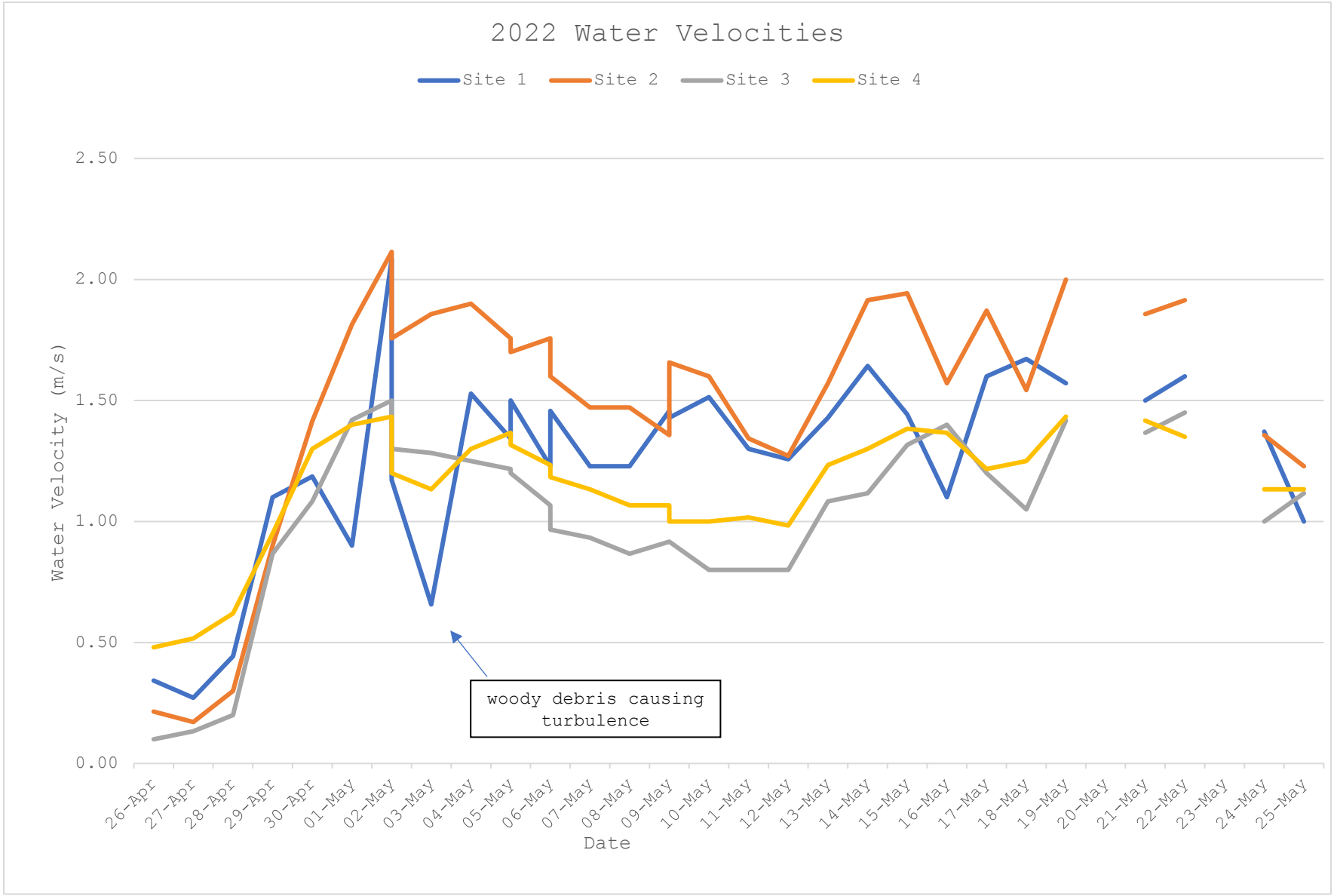


Figure 7: 2022 Water Velocities

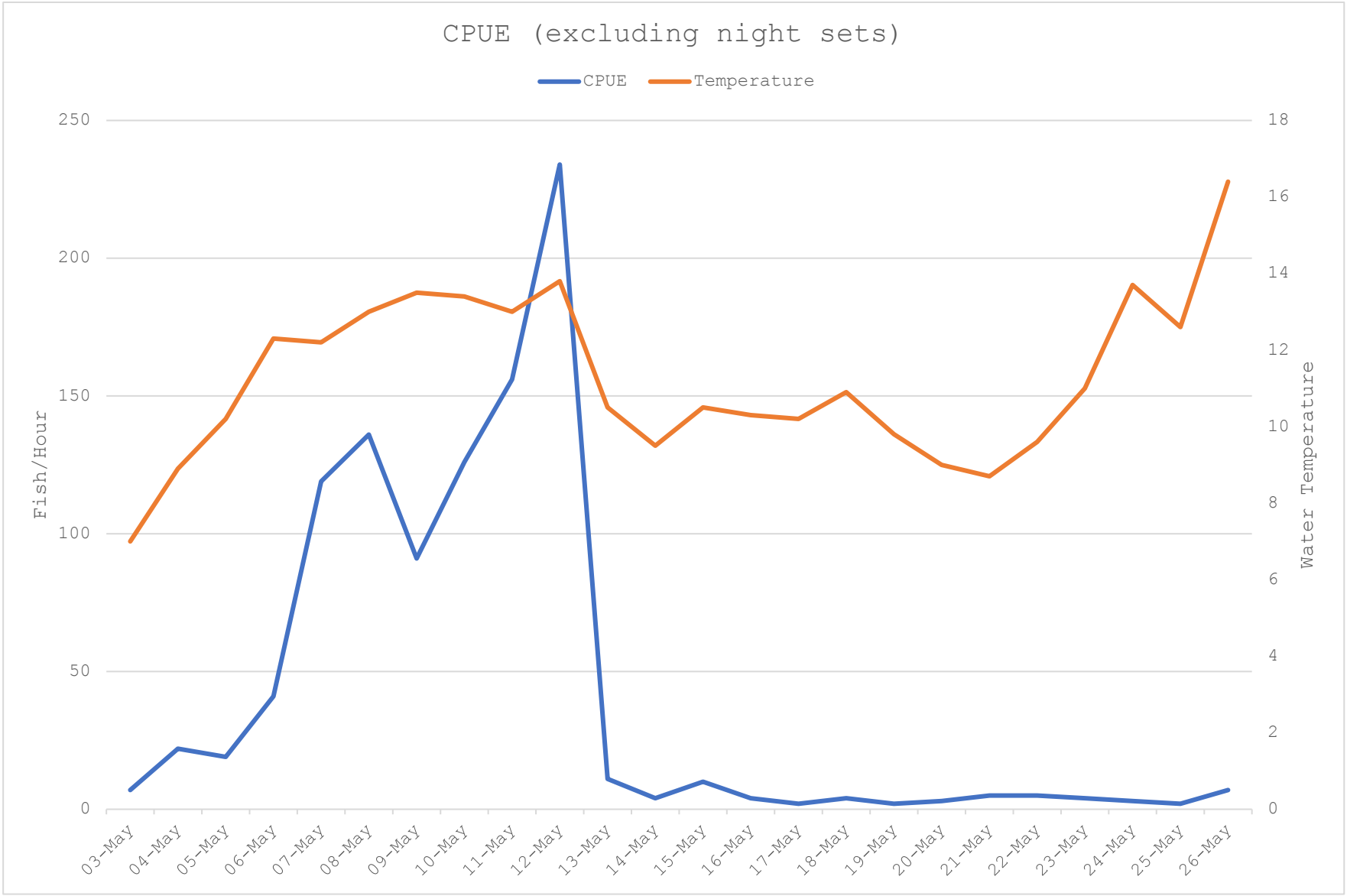


Figure 8: Fish CPUEs

	April														
2012	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2013	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2014	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2018	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2019	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2020	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2021	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2022	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

	May																									
2012	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2014	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2018	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2019	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2020	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2021	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
2022	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Yellow = Duration of migration

Red = Duration where fishways is operable (facilitating movemet)

Figure 9: Fish Migration Duration Chart (2012-2014, 2018-2022)

Discussion

2022 marked the first year where the fishway had enough flow and was operational for the duration of the spring migrations. A significant and irregular (2-3”) rainfall on May 11th provided a third high water event which contributed to this occurrence. Spring migrations lasted from some point around May 3rd and continued until some point around May 26th. Fish usage dropped significantly following the May 11th rainfall which raised water levels and dropped water temperatures. Fish species found to utilize the fishway in 2022 included white sucker, shorthead redhorse sucker, creek chub, common shiner, burbot, longnose dace, norther pike, river darter, and logperch. Walleye were not documented to use the fishway in 2022 despite multiple after dark netting efforts to locate them. In past years, SVSFE found increased walleye occurrence during high water years, however the low water levels and drought conditions going into the 2021/2022 may have influenced walleye numbers downstream. In fact, index netting numbers (CPUE) from Swan Lake found walleye numbers to be the lowest they have been in years in 2022 (Swan Lake Management Plan, 2022).

Low effort monitoring of water levels is the simplest way to monitor the fishway and whether the system is facilitating fish movement or not. Because there are no significant inflows (note: Tamarac Creek) between the Town of Swan River and the Fishway, water levels monitored in town can give fishway managers a pretty good idea of the status of flow through the fishway downstream. The benchmark water level on the north side of the east pillar of the HWY 10 bridge (near the Swan Valley Museum) was used as the primary water level site over the course of the monitoring. Water levels between 0.3m and 1.4m one can expect the fishway to be operating as intended. Levels of 0.3m and lower the fishway is nearly dry and does not facilitate fish movement. Water levels of 1.4m and higher, water velocities through the two mid channel culverts will be too high to facilitate fish movement. It is at this point where the gates within the fishway should be lowered which will decrease water volume going through the fishway and decrease associated water velocities through the culverts. In general, if water velocities through the 22.5m culverts are on average 1.5 m/s or faster, fish are unable to continue upstream.

Lowering the control structure gates will decrease water volume and increase velocities beneath the water control structure itself. During the 2-day period in 2022 where water levels were >1.4m the gates were lowered to decrease water velocities through the culverts to <1.5m/s. In this case it was noted that irregular turbulence caused by lowering the gates in association with woody debris jammed within the structure did not increase water velocities to the point where fish were unable to surpass the water control structure. Of course, additional daily data

on this occurrence would be valuable, however nature did not provide this opportunity in 2022. Regardless, the short distance of high velocity should pose no barrier to migrating fish although it has not been documented in this scenario.

In the history of fishway monitoring, the only time where walleye were found to use the fishway was in 2013. This particular year followed a winter of heavy snowfall and a subsequent spring of high discharge. Each year, however, sucker anglers (dip netters) report the bycatch of walleye at the ford crossing. Swan Lake index netting, and commercial fishing data has shown a consistent rise in walleye numbers since 2007. Since 2019, walleye CPUE has been dropping which may be associated with drought conditions and very low lake levels that occurred during that period.

Walleye are the valuable economic species this infrastructure was designed to facilitate. In 2013, the two 22.5m culverts within the fishway were found the be the greatest barrier to restrict fish passage. It was found that walleye were unable to overcome the culverts when velocities were >1.5m/s. Peak movement of fish (including walleye) occurred when velocities through culverts were between 1 and 1.5m/s in 2013.

Water levels at the bridge benchmark of 1.4m or higher will cause velocities of >1.5m/s. If/when this is the case, fishway managers will have to lower the gates until water levels decrease to a point where these target velocities are achieved. In this case, the SLWD velocimeter should be used. A good indication that the flow is passable if the top of the culverts are visible on the upstream side. However, use the velocimeter to confirm average velocities by taking a measurement 20cm below the surface for every 20cm of stream width in front of the culverts.

Debris is an uncontrolled factor influencing the success of the fishway on any given year. For this reason, it is recommended that the water control structure be always left fully open (100cm) to alleviate debris build-up. Of course, this will not avoid debris build-up, but it will help. A large buildup can cause issues with lowering and lifting the gates, as well as damming at the water control structure. For this reason, fishway operators should visit the fishway every so often and clean out debris using safe methods. Safety should be number one priority when removing debris.

Every few years, sedimentation buildup and tree growth need to be rectified. Based on data and observations it is recommended that a fishway clean-out be performed every 5-6 years. With this recommendation the next clean-out should occur in 2023 or 2024 using the survey data collected by the SLWD in 2018.

The low-flow culvert would without a doubt benefit fish populations, however the primary question is that of economic viability. This project would be expensive and would likely benefit suckers more than any other

species based on available data. In the many years of monitoring the fishway, walleye do not appear to utilize the fishway with any consistency. For this reason, it is recommended the SLWD consider this only if a feasibility study is complete and if there are major renovation plans for the Ford Crossing by the RM of Mintonas-Bowsman. Speaking with Garry Bartel with the RM, the Jersak Ford Crossing has a thorough and regimented maintenance plan at current. For this reason, he anticipates no major renovations to the Ford in the foreseeable future

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Appendices

Appendix 1: Trap Net Used for Fish CPUES

Appendix 2: Control Structure With Debris (May 1, 2022)

Appendix 3: Control Structure Without Debris (May 1, 2022)

Appendix 4: Swan River Benchmark Water Level (HWY 10 Bridge)

Appendix 5: Example of Low Water (0.3m)

Appendix 6: Water Velocity Station (Downstream Fishway Culverts)

Appendix 7: Culverts not visible – a good indication that velocities are too high to allow fish passage (>1.5m/s)

Appendix 8: Culverts visible – a good indication of water levels with velocities tolerable for fish passage (<1.5m/s)

HONOWAY FISHWAY FACT SHEET

The Honoway fishway's first operational season was in 2012. Since then, SVSFE and SLWD staff have been monitoring the system during spring fish migrations.

Over a dozen different species have been documented using the fishway. Fish migrations usually begin once surface temperatures reach 6°C and end around temperatures of 16 °C.

The Swan River water levels can be measured at any time on the HWY 10 bridge (near the Swan Valley Historical Museum). The fishway is operable between water levels of 0.3m and 1.4m. Levels below 0.3m the fishway is dry and levels above 1.4m the water control structure will need to be used to decrease volume of water entering the fishway. Decreasing the water volume entering the fishway will decrease water velocities through the two mid-channel 22.5m culverts within the fishway.

Appendix 9: Honoway Fact Sheet page 1

Water levels >1.4m will cause velocities through the culverts to surpass an average of 1.5m/s, which is the threshold where fish are unable to overcome the culverts. In general, if the top of the culverts can be seen, velocities should be tolerable. If not, the water control structure will have to be used to decrease water levels, and associated velocities through the culverts.

To be sure water velocities are tolerable, use the Global Water Flow Probe velocimeter. Reading should be taken at 20cm depth at every 20cm of stream width in front of each culvert. This equates to 5 readings at each culvert. To ensure fish can overcome the culverts, you want average velocity to read <1.5m/s.

Gates on the water control structure should be left fully open at all times (to alleviate debris build-up) and should only be lowered at times or periods of high water (>1.4m)

Woody debris can cause issues with the fishway and may cause the water control structure to be unusable and also may cause damming if debris buildup is substantial. In order to alleviate these problems, safely remove accumulated debris at each visit to the fishway. If it is unsafe to do so, wait until water levels decrease to safe levels.

Swan Valley Sport Fishing Enhancement Inc.

Appendix 10: Honoway Fact Sheet Page 2