

Columbia River Project Water Use Plan

Arrow Lakes Reservoir Operations Management Plan

CLBWORKS-30B Wildlife Enhancement Program – Wetland Enhancement Program

Implementation Year 3 and 4

Reference: CLBWORKS-30B

*CLBWORKS-30B Burton Flats Fish Stranding Assessment -
2020-2021 Fish Sampling*

Study Period: June 2020 – September 2021

**Masse Environmental Consultants
812 Vernon Street
Nelson, BC, V1L 4G4**

January 18, 2022

Trish Joyce
British Columbia Hydro and Power Authority
6911 Southpoint Drive
Burnaby, BC
V3N 4X8

January 18, 2022

Re: CLBWORKS-30B Wildlife Enhancement Program – Wetland Enhancement Program, Burton Flats. Results of fish sampling in constructed wetlands in 2020 and 2021.

Please find attached a summary of field work completed between June 2020 and September 2021 to document fish species present and the risk of fish stranding in the wetlands constructed as part of the Wetland Enhancement Project at Burton Flats.

If you have any questions or comments on the report or require further information, please contact us. Thank you for the opportunity to work with BC Hydro on this project.

Yours sincerely,



Ico de Zwart. R.P.Bio, P.Chem.
Masse Environmental Consultants
C 250-505-3479
E: ico@masseenvironmental.com

TABLE OF CONTENTS

Table of Contents.....	i
List of Figures.....	i
List of Photos.....	ii
List of Tables.....	ii
List of Appendices.....	iii
1 Project Overview.....	1
1.1 Introduction.....	1
1.2 Study Area.....	2
2 Fish Sampling.....	2
2.1 Schedule.....	2
2.2 Methods.....	3
3 Results.....	3
3.1 2020.....	3
3.1.1 June 18, 2020.....	3
3.1.2 August 14, 2020.....	5
3.1.3 October 8, 2020.....	6
3.2 2021.....	8
3.2.1 August 20, 2021.....	8
3.2.2 September 24, 2021.....	11
3.3 Other sampling.....	13
4 Discussion.....	14
5 Closure.....	19
6 References.....	20

LIST OF FIGURES

Figure 1. Locations of constructed ponds at the Burton Flats wetland enhancement site. Imagery taken on September 20, 2021 (Google Earth). Arrow Lakes Reservoir water elevation = 432.85 m. Approximate full pool water elevation (440 m) indicated by blue line.	2
Figure 2. Arrow Lakes Reservoir average daily water elevation (08NE102) from September 1, 2019 to October 15, 2021. The dates of fish sampling are indicated by black squares. The outlet elevation of ponds A1-A6, D1 and D2 are shown. Ponds B1 and B2 do not have outlets and are not shown.	14
Figure 3. Map of constructed ponds showing fish observations (2020-2021).	16

LIST OF PHOTOS

Photo 1. View of A1 and A2 from Hwy 6 looking north, June 18, 2020.....4

Photo 2. View of A2 and A3 from Hwy 6 looking southwest. Note inundation by reservoir at lower right, June 18, 2020.4

Photo 3. View of A1 outlet looking south, June 18, 2020.4

Photo 4. View of A3 looking north, June 18, 2020.4

Photo 5. Panoramic view of ponds A1 – A4, and the Arrow Lakes Reservoir from Hwy 6, August 14, 2020. Note A4 is inundated by the reservoir.5

Photo 6. View of A1 looking southeast towards Hwy 6, August 14, 2020.6

Photo 7. View of A2 looking east towards Hwy 6, August 14, 2020.6

Photo 8. View of vegetated areas on margin of A3 and small seine used to coral fish, August 14, 2020....6

Photo 9. Schools of fish amongst submerged vegetation, A3, August 14, 2020.6

Photo 10. View of A4 looking southwest, October 8, 2020.7

Photo 11. View of A4 outlet, October 8, 2020.7

Photo 12. View of outlet connecting A4 to reservoir, October 8, 2020. View to the north.....7

Photo 13. View of residual pool in B1, October 8, 2020.7

Photo 14. View of A1 looking to northeast, August 20, 2021.....9

Photo 15. View of A2 looking east towards Hwy 6, August 20, 2021.....9

Photo 16. View of A3 looking north, August 20, 2021.9

Photo 17. Panoramic view of A4 looking west, August 20, 2021.10

Photo 18. View of A6 looking north, August 20, 2021.10

Photo 19. View of A5 looking west , August 20, 2021.10

Photo 20. View of B1 looking south, August 20, 2021.....10

Photo 21. Panoramic view of B2 looking northeast, August 20, 2021.....11

Photo 22. View of Burton wetlands from Highway 6, August 20, 202111

Photo 23. Panoramic view of D1 looking southwest, September 24, 2021.....12

Photo 24. Panoramic view of D2 looking west, September 24, 2021.12

Photo 25. View of D2 outlet looking north, September 24, 2021.13

Photo 26. Channel between D1 and D2 looking southeast, September 24, 2021.13

LIST OF TABLES

Table 1. Design summary.1

Table 2. Sampling schedule.3

Table 3. Summary of environmental conditions and effort, June 18, 2020.3

Table 4. Summary of fish observations, June 18, 2020.	4
Table 5. Summary of environmental conditions and effort, August 14, 2020.	5
Table 6. Summary of fish observations, August 14, 2020.	5
Table 7. Summary of environmental conditions and effort, October 8, 2020.	6
Table 8. Summary of fish observations, October 8, 2020.	7
Table 9. Summary of environmental conditions and effort, August 20, 2021.	8
Table 10. Summary of fish observations, August 20, 2021.	8
Table 11. Summary of environmental conditions and effort, September 24, 2021.	11
Table 12. Summary of fish observations, September 24, 2021.	12
Table 13. Summary of fishes captured during salvage efforts, April 2021.	13
Table 14. Summary of stranding risk for target and observed species.	18

LIST OF APPENDICES

Appendix 1. Individual fish data

1 PROJECT OVERVIEW

1.1 Introduction

BC Hydro’s Lower Arrow Reservoir Wildlife Enhancement Program (CLBWORKS-30B) includes the design and construction of wetlands and deep-water pond features in the drawdown zone of the Lower Arrow Lakes Reservoir at the Burton Flats. The project design contains several excavated ponds that are seasonally inundated (Table 1). Phase 1 of the project was completed in the September-October of 2019 and included the construction of ponds A1-A4 and B1. Phase 2 of the project was completed in March/April of 2021 and included the construction of new ponds (A5, A6, B2, D1, D2) and minor modifications to some of the ponds constructed during Phase 1.

Table 1. Design summary.

Pond	Wetted Area (m ²)	Wetland Bottom Elevation (m)	Outlet elevation (m)
A1	900	437.9	438.4
A2	790	437.3	438.1
A3	372	436.3	437.35
A4	760	435.0	435.5
A5	720	434.6	435.1
A6	870	433.9	434.5
B1	340	434.2	no outlet
B2	610	433.8	no outlet
D1	2,024	432.8	433.5
D2	2,360	431.4	432.4

A fish stranding risk assessment for the project was completed as part of the design process (Nupqu and Hemmera 2018). The risk of stranding for the target species Rainbow Trout (*Oncorhynchus mykiss*), Bull Trout (*Salvelinus confluentus*) and Kokanee (*O. nerka*) was rated as ‘Low’ for all ponds except the lower most pond (D1) based on the habitat requirements and life history of these species. The risk of stranding in D1 was rated as ‘Moderate’ for all three species, higher because this pond was larger, deeper, and would be inundated for longer, compared to other ponds. Note that since the initial assessment, the design was modified to divide the deep-water pond (D1) into two ponds (D1 and D2), and to include an additional disconnected pond (B2). The risk of stranding for non-target species was not assessed. Post-construction surveys were recommended to confirm the assessments.

Masse Environmental Consultants Ltd. was retained by BC Hydro to conduct fish surveys in the completed works to identify species and life stages that use the ponds, and to update the fish stranding risk assessment for the ponds. Sampling was conducted in 2020 after Phase 1 of the project was completed and this information was summarised in an interim report issued on October 27, 2020 (MEC 2020). This report updates the interim report to include information collected after Phase 2 of the project had been constructed.

1.2 Study Area

The Burton Flats wetland enhancement program is located within the drawdown zone of the Arrow Lakes Reservoir on the south side of the Burton Flats. The ponds are designed to be inundated by the Arrows Lakes Reservoir when the reservoir elevation reaches the outlet elevation of each pond (Table 1). Pond A1 is fed by a small groundwater stream and this also supports the downgradient ponds (A2-A6, D1). A map showing the location of ponds is provided in Figure 1.

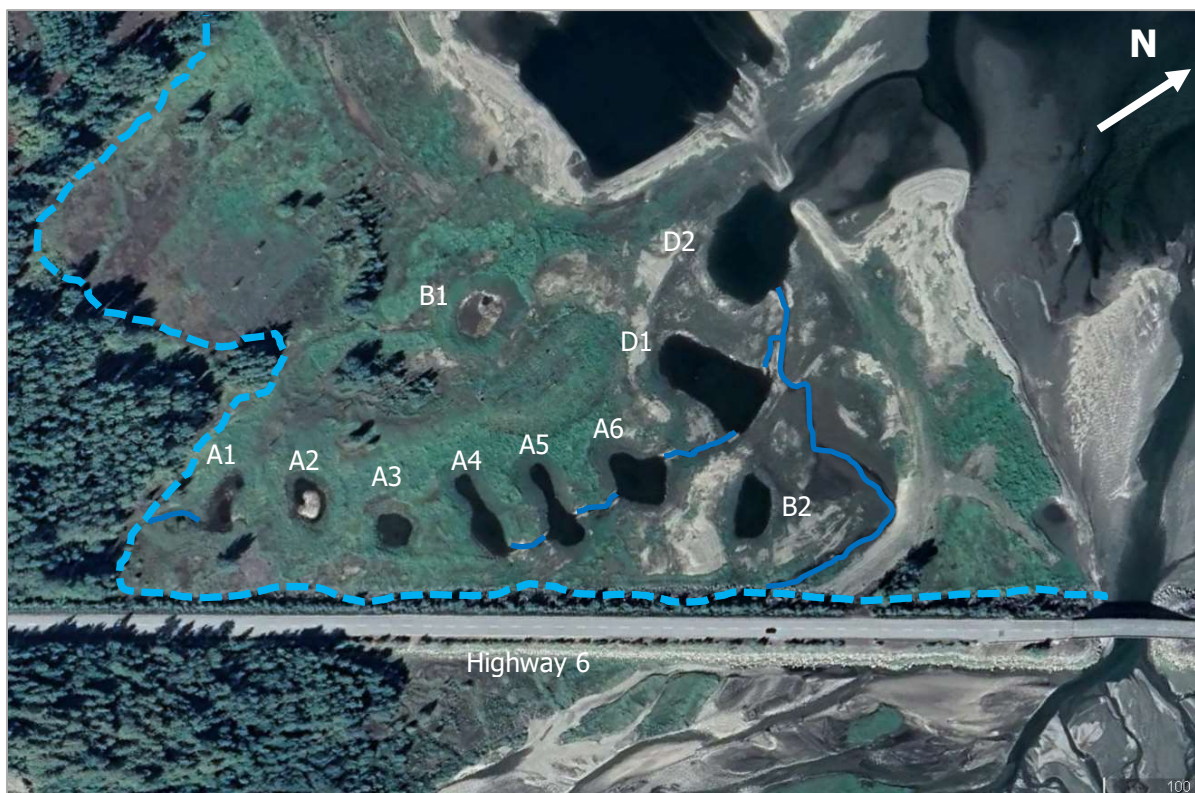


Figure 1. Locations of constructed ponds at the Burton Flats wetland enhancement site. Imagery taken on September 20, 2021 (Google Earth). Arrow Lakes Reservoir water elevation = 432.85 m. Approximate full pool water elevation (440 m) indicated by blue line.

2 FISH SAMPLING

2.1 Schedule

In 2020, sampling of A1 – A3 was conducted on June 18, prior to inundation of these ponds by the reservoir. These ponds were sampled again on August 14, after reservoir levels had receded. Ponds A4 and B1, which are at a lower elevation, were sampled on October 8th.

In 2021, all ponds except D1 and D2, were surveyed on August 20th. The two deep water ponds were sampled on September 24th. Sampling dates are summarised in Table 2.

Table 2. Sampling schedule.

Date	Locations	Water level (m)
June 18, 2020	A1-A3	437.7
August 14, 2020	A1-A3	437.3
October 8, 2020	A4, B1	433.6
August 20, 2021	A1-A6, B1, B2	433.2
September 24, 2021	D1, D2	432.45

2.2 Methods

Fish sampling was completed under scientific fish collection permits CB20-605775, CB20-612814, and CB21-626813. Prior to fish sampling, water temperature, pH and conductivity were recorded using an Oakton PCTestr35 multiparameter meter. Each wetland was systematically sampled using a combination of visual observation (VO), backpack electrofishing (EF), seining (SN), or dipnetting (DN). Electrofishing was conducted using a Smith Root 12B backpack electrofisher. A small stopnet was used in conjunction with electrofishing. Seining was conducted using a 5 m seine with a 1/8" mesh. Dipnetting was conducted using handheld nets. Captured fishes were identified to species and measured (fork length) where possible. Fishes observed visually and/or <25 mm in length could not be identified and were recorded as fry. Individual fish data is provided in Appendix 1.

Water level data for Arrow Lakes Reservoir was obtained from the Water Survey of Canada (Station 08NE102, WSC 2021).

3 RESULTS

3.1 2020

3.1.1 June 18, 2020

On June 18, the water level of the Arrow Lakes Reservoir was 437.7 m and increasing. Pond A3 was just being inundated by the reservoir (Photo 1 & Photo 4). Water temperatures were 16.5°C in A1 and 22°C in A2 and A3. The lower temperature in A1 reflects the cooler water that enters this pond from the small groundwater stream. A combination of visual observation, dipnetting or electrofishing was conducted (Table 5).

Table 3. Summary of environmental conditions and effort, June 18, 2020.

Pond	Temperature (°C)	pH	Conductivity (µS/cm)	Sampling methods
A1	16.5	8.1	164	VO, EF (323 s)
A2	22	7.5	161	VO, EF (436 s)
A3	22	7.7	143	VO, DN

No fish were captured in A1 or A2. Large numbers of small fishes (30 – 60 mm) were observed in the inundated vegetation between A3 and the reservoir. The majority of these were Redside Shiner

(*Richardsonius balteatus*) and Northern Pikeminnow (*Ptychocheilus oregonensis*), with Peamouth Chub (*Mylocheilus caurinus*) and Largescale Sucker (*Catostomus macrocheilus*) also present (Table 4). Individual fish data is provided in Attachment 1.

Table 4. Summary of fish observations, June 18, 2020.

Pond	Fish Species	Count	Comments
A1	No fish captured	-	
A2	No fish captured	-	
A3	Redside Shiner (<i>Richardsonius balteatus</i>)	21	30-60 mm in length. Fish captured in submerged vegetation between A3 and the reservoir.
	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	13	
	Peamouth Chub (<i>Mylocheilus caurinus</i>)	2	
	Largescale Sucker (<i>Catostomus macrocheilus</i>)	2	



Photo 1. View of A1 and A2 from Hwy 6 looking north, June 18, 2020.

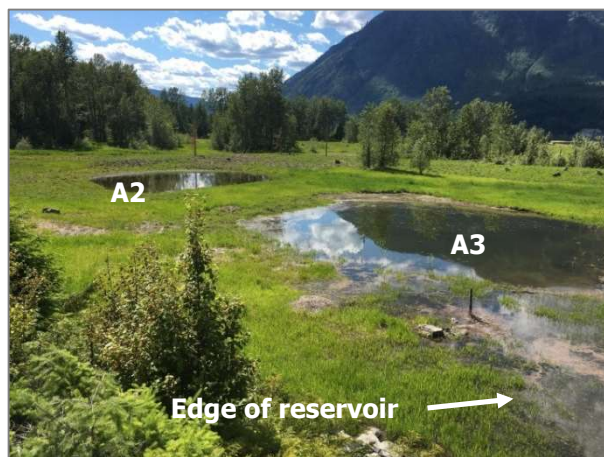


Photo 2. View of A2 and A3 from Hwy 6 looking southwest. Note inundation by reservoir at lower right, June 18, 2020.



Photo 3. View of A1 outlet looking south, June 18, 2020.



Photo 4. View of A3 looking north, June 18, 2020.

3.1.2 August 14, 2020

On August 14, 2020, the water level of the Arrow Lakes Reservoir was 437.3 m and decreasing. At this elevation, ponds A1-A3 were isolated from the reservoir after having been inundated earlier in the summer (Photo 5-Photo 7). Water temperatures were 18°C in A1 and 22°C in A2 and A3. A combination of visual observation, seining, dipnetting and electrofishing was conducted (Table 5).

Table 5. Summary of environmental conditions and effort, August 14, 2020.

Pond	Temperature (°C)	pH	Conductivity (µS/cm)	Sampling methods/effort
A1	18	8.2	130	VO, DN, EF (308 s)
A2	22	7.9	140	VO, DN, EF (845 s)
A3	21	7.7	150	VO, DN, SN, EF (252 s)

Fishes were observed in all three ponds in areas with higher cover (vegetation, woody debris) along the margins of the ponds. Small fry 10 mm in length were observed in A1. In A2, the same fry were observed, although these were slightly longer (15-20 mm). Fry were captured by dipnetting and all appeared to be the same species. In A3, numerous small fishes up to 50 mm in length were observed. Larger individuals were all identified as Peamouth Chub. Fish smaller than 25 mm could not be identified to species, but were assumed to be Peamouth Chub. Based on the size range, all fishes were assumed to be young-of-year. One Sculpin (*Cottus* sp.) was also captured in A3 (Table 6). Fish were observed in vegetated areas along the margins of the ponds (Photo 8), and large numbers of fish were also observed in the vegetated areas between A3 and the main reservoir (Photo 9).

Table 6. Summary of fish observations, August 14, 2020.

Pond	Fish Species	Count	Size range
A1	Fry	8	~ 10 mm
A2	Fry	44	10-15 mm
A3	Peamouth Chub (<i>Mylocheilus caurinus</i>)	17	30-50 mm
	Sculpin (<i>Cottus</i> sp.)	1	15 mm



Photo 5. Panoramic view of ponds A1 – A4, and the Arrow Lakes Reservoir from Hwy 6, August 14, 2020. Note A4 is inundated by the reservoir.



Photo 6. View of A1 looking southeast towards Hwy 6, August 14, 2020.



Photo 7. View of A2 looking east towards Hwy 6, August 14, 2020.



Photo 8. View of vegetated areas on margin of A3 and small seine used to coral fish, August 14, 2020.



Photo 9. Schools of fish amongst submerged vegetation, A3, August 14, 2020.

3.1.3 October 8, 2020

On October 8, 2020, the water level of the Arrow Lakes Reservoir was 433.6 m and decreasing. At this elevation, Pond A4 was connected to the reservoir via a small outlet (Photo 10 - Photo 12). Pond B1 was isolated from the reservoir and a small residual pool ~ 30 cm deep was present (Photo 13). Water temperatures were 15.9°C in B1 and 15.5°C in A4. A combination of visual observation, dipnetting and electrofishing was conducted (Table 7).

Table 7. Summary of environmental conditions and effort, October 8, 2020.

Pond	Temperature (°C)	pH	Conductivity (µS/cm)	Sampling methods/effort
A4	15.5	7.3	122	VO, DN, EF (171 s)
B1	15.9	6.9	170	VO, DN, EF (35 s)

No fish were captured or observed in A4, although Peamouth Chub, Northern Pikeminnow, Rainbow Trout, Largescale Sucker, and Sculpin were captured in the outlet channel which connects to the reservoir. Based on their size, all fishes were assumed to be young-of-year. A school of small fishes up to 55 mm in length was observed in B1 prior to sampling. Redside Shiner, Largescale Sucker and Sculpin were captured using a combination of electrofishing and dipnetting (Table 8). Individual fish data is provided in Attachment 1.

Table 8. Summary of fish observations, October 8, 2020.

Pond	Fish Species	Count	Size range
A4	No fish captured or observed		
A4 outlet	Peamouth Chub (<i>Mylocheilus caurinus</i>)	6	25-30 mm
	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	3	28-30 mm
	Largescale Sucker (<i>Catostomus macrocheilus</i>)	3	27-31 mm
	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	1	60 mm
	Sculpin (<i>Cottus</i> sp.)	1	35 mm
B1	Redside Shiner (<i>Richardsonius balteatus</i>)	40	20-35 mm
	Largescale Sucker (<i>C. macrocheilus</i>)	24	23-50 mm
	Sculpin (<i>Cottus</i> sp.)	17	23-40 mm



Photo 10. View of A4 looking southwest, October 8, 2020.



Photo 11. View of A4 outlet, October 8, 2020.



Photo 12. View of outlet connecting A4 to reservoir, October 8, 2020. View to the north.



Photo 13. View of residual pool in B1, October 8, 2020.

3.2 2021

3.2.1 August 20, 2021

On August 20, 2021, the water level of the Arrow Lakes Reservoir was 433.2 m and decreasing. Ponds A1-A6, and B1 and B2 were surveyed. A summary of environmental conditions and sampling methods for each pond is provided in Table 9. A variety of small fishes were observed in the ponds. Fishes were generally observed in areas where cover was available (vegetation, wood, cobbles). One mortality (a juvenile Largescale Sucker) was observed in A2. A summary of fish observations for each pond is provided in Table 4, Individual fish data is provided in Attachment 1. Photos of each pond are provided in Photo 14-Photo 21.

Table 9. Summary of environmental conditions and effort, August 20, 2021.

Pond	Temperature (°C)	pH	Conductivity (µS/cm)	Sampling methods
A1	17	8.5	151	VO, SN
A2	18	7.7	128	VO, DN
A3	18	7.8	128	VO, SN, DN
A4	19	7.9	124	VO, SN, DN, EF (126 s)
A5	17	8.1	127	VO, SN, DN, EF (129 s)
A6	14	7.9	115	VO, EF (199 s)
B1	20	7.9	179	VO, EF (149 s)
B2	16	8.1	88	VO, EF (239 s)

Table 10. Summary of fish observations, August 20, 2021.

Pond	Fish Species	Count	Size range
A1	Largescale Sucker (<i>Catostomus macrocheilus</i>)	14	25-51 mm
A2	Largescale Sucker (<i>C. macrocheilus</i>)	10	20 mm
	Largescale Sucker (<i>C. macrocheilus</i>)	1	115 mm (mortality)
A3	Sculpin (<i>Cottus</i> sp.)	1	40 mm
	Unidentified species	1	30 mm
A4	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	3	32-39 mm
	Unidentified fry	33	25-39 mm
A5	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	5	25 mm
	Unidentified species	1	50 mm
A6	Largescale Sucker (<i>C. macrocheilus</i>)	3	21-33 mm
	Northern Pikeminnow (<i>P. oregonensis</i>)	3	26-32 mm
	Sculpin (<i>Cottus</i> sp.)	3	27-38 mm
	Lake chub (<i>Couesius plumbeus</i>)	3	25-26 mm
	Rainbow Trout (<i>O. mykiss</i>)	2	25-34 mm
B1	Sculpin (<i>Cottus</i> sp.)	3	25-30 mm
	Carp (<i>Cyprinus carpio</i>)	2	42-50 mm
B2	Lake Chub (<i>C. plumbeus</i>)	9	22-29 mm
	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	3	28-37 mm
	Carp (<i>Cyprinus carpio</i>)	2	33-40 mm



Photo 14. View of A1 looking to northeast, August 20, 2021.



Photo 15. View of A2 looking east towards Hwy 6, August 20, 2021.



Photo 16. View of A3 looking north, August 20, 2021.



Photo 17. Panoramic view of A4 looking west, August 20, 2021.



Photo 18. View of A6 looking north, August 20, 2021.



Photo 19. View of A5 looking west, August 20, 2021.



Photo 20. View of B1 looking south, August 20, 2021.



Photo 21. Panoramic view of B2 looking northeast, August 20, 2021.



Photo 22. View of Burton wetlands from Highway 6, August 20, 2021

3.2.2 September 24, 2021

On September 24, 2021, the water level of the Arrow Lakes Reservoir was 432.45 m and decreasing. Fish sampling was completed in Ponds D1-D2, and in the stream channel that connects these two ponds. A summary of environmental conditions and sampling methods for each pond is provided in Table 11 and a summary of fish observations is provided in Table 12. Individual fish data is provided in Attachment 1. Photos of each pond are provided in Photo 23 – Photo 7.

Table 11. Summary of environmental conditions and effort, September 24, 2021.

Pond	Temperature (°C)	pH	Conductivity (µS/cm)	Sampling methods/effort
D1	11	7.7	122	VO, DN, SN, EF (733 s)
D2	14	7.7	150	VO, DN, SN, EF (316 s)
D1/D2 channel	14	7.7	150	EF (98s)

Table 12. Summary of fish observations, September 24, 2021.

Pond	Fish Species	Count	Size range
D1	Largescale Sucker (<i>Catostomus macrocheilus</i>)	6	36-59 mm
	Prickly Sculpin (<i>Cottus asper</i> .)	16	32-47 mm
	Peamouth Chub (<i>Mylocheilus caurinus</i>)	15	23-37 mm
	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	3	49-54 mm
D2	Peamouth Chub (<i>M. caurinus</i>)	12	21-30 mm
	Prickly Sculpin (<i>C. asper</i> .)	19	26-70 mm
Channel	Lake chub (<i>Couesius plumbeus</i>)	13	25-35 mm
	Peamouth chub (<i>M. caurinus</i>)	11	28-36 mm
	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	1	30 mm
	Prickly Sculpin (<i>Cottus asper</i>)	23	22-40 mm
	Rainbow Trout (<i>O. mykiss</i>)	1	52 mm



Photo 23. Panoramic view of D1 looking southwest, September 24, 2021.



Photo 24. Panoramic view of D2 looking west, September 24, 2021.



Photo 25. View of D2 outlet looking north, September 24, 2021.



Photo 26. Channel between D1 and D2 looking southeast, September 24, 2021.

3.3 Other sampling

During implementation of the Phase 2 works in April 2021, a fish salvage was completed in A2, A3, A4, B1 and the stream channel downstream of A4 to support construction. A summary of fish captured in each area is provided in Table 13.

Table 13. Summary of fishes captured during salvage efforts, April 2021.

Pond	Fish Species	Count	Size range
A2	Largescale Sucker (<i>C. macrocheilus</i>)	51	25-72 mm
	Redside Shiner (<i>Richardsonius balteatus</i>)	51	25-50 mm
	Sculpin (<i>Cottus</i> sp.)	101	30-45 mm
A3	Largescale Sucker (<i>C. macrocheilus</i>)	2	32-40 mm
	Redside Shiner (<i>Richardsonius balteatus</i>)	1	18 mm
	Sculpin (<i>Cottus</i> sp.)	2	34-45 mm
A4	Bull Trout (<i>Salvelinus confluentus</i>)	1	150 mm
	Largescale Sucker (<i>C. macrocheilus</i>)	113	25-63 mm
	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	46	25-45 mm
	Peamouth Chub (<i>M. caurinus</i>)	64	25-47 mm
	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	6	30-85 mm
	Redside Shiner (<i>Richardsonius balteatus</i>)	1	25 mm
	Sculpin (<i>Cottus</i> sp.)	16	30-40 mm
B1	Largescale Sucker (<i>C. macrocheilus</i>)	15	43-55 mm
	Redside Shiner (<i>Richardsonius balteatus</i>)	16	23-27 mm
	Sculpin (<i>Cottus</i> sp.)	24	25-60 mm
Channel below A4	Largescale Sucker (<i>C. macrocheilus</i>)	19	20-60 mm
	Northern Pikeminnow (<i>Ptychocheilus oregonensis</i>)	103	15-48 mm
	Peamouth Chub (<i>M. caurinus</i>)	1	35 mm
	Rainbow Trout (<i>Oncorhynchus mykiss</i>)	53	45-82 mm
	Redside Shiner (<i>Richardsonius balteatus</i>)	7	20-34 mm
	Sculpin (<i>Cottus</i> sp.)	43	20-77 mm

4 DISCUSSION

Phase 1 (ponds A1-A4 and B1) was completed in the fall of 2019. The lowest elevation ponds (A4 and B1) were inundated soon after construction, while ponds A1-A3 were inundated by the Arrow Lakes Reservoir for the first time in the summer of 2020. Phase 2 (A5, A6, B2, D1, and D2) was completed in spring 2021, and were inundated for the first time in the summer of 2021. Fish sampling in the ponds was conducted after they had been inundated by the reservoir to determine what species remained in these ponds once the reservoir was drawn down.

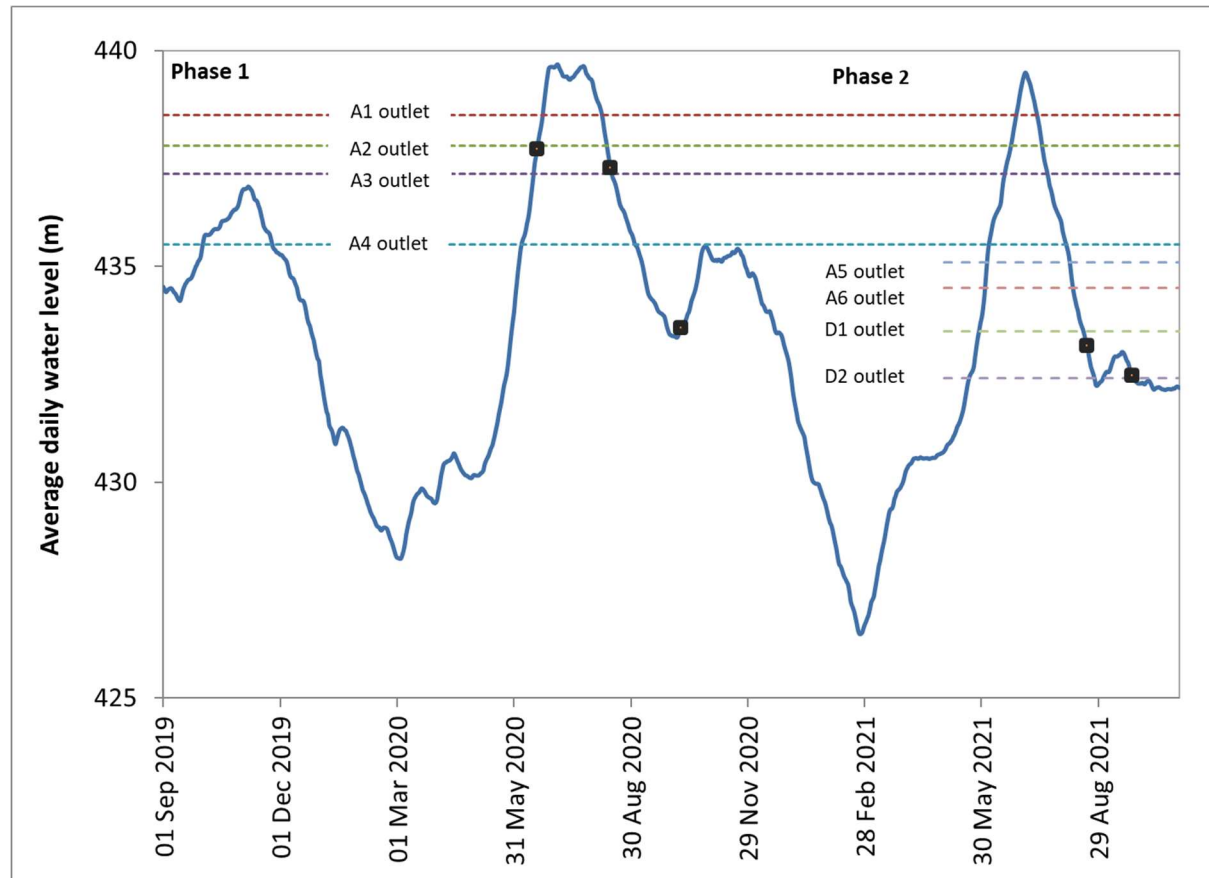


Figure 2. Arrow Lakes Reservoir average daily water elevation (08NE102) from September 1, 2019 to October 15, 2021. The dates of fish sampling are indicated by black squares. The outlet elevation of ponds A1-A6, D1 and D2 are shown. Ponds B1 and B2 do not have outlets and are not shown.

The Phase 1 works were inundated for the first time in June of 2020. Fish sampling conducted on June 18, 2020 occurred as the water level of the reservoir was rising. Pond A4 was already inundated and A3 was just beginning to be inundated. Large numbers of minnows were observed in the submerged vegetation between A3 and the main reservoir. Redside Shiner, Northern Pikeminnow, Peamouth Chub and Largescale Sucker were captured, and species that utilise the shallow littoral zone would be expected to access all the wetlands as the water level of the reservoir increases.

The results of sampling on August 14, 2020, suggest that most species are able to leave ponds A1-A3 as water levels recede, as young of year Peamouth Chub were the only minnow species observed in these ponds immediately after the reservoir had receded. The size of Peamouth Chub observed in the ponds suggests unique Peamouth Chub spawning events occurred in each pond. Peamouth Chub spawn in May and June in shallow lake margins and small streams where gravel is present (McPhail 2007). The smallest individuals were observed in A1, which was inundated last. Fish in A2 were intermediate in size between those in Ponds A1 and A3. Ponds A1-A3 are fed by the small groundwater stream and remain wetted during the summer. These ponds are isolated from each other and from the reservoir until they become inundated as the reservoir nears full pool.

Fish sampling was conducted in A4 and the outlet stream that connects this pond to the reservoir on October 8, 2020, after the reservoir water levels had receded below the outlet of A4. No fish were observed in A4; however, Peamouth Chub, Northern Pikeminnow, Rainbow Trout, Largescale Sucker, and Sculpin were captured in the outlet stream. The outlet stream provides a natural pathway for fishes to follow as the water levels recede and has a gravel/cobble substrate that provides more cover than in the pond.

Phase 2 of the project was completed in April 2021. The results of fish salvages during construction of the Phase 2 works indicate that fish can successfully overwinter in the ponds. At that time of year, the reservoir elevation is low, and any fish present are assumed to have been present since at least the fall. Largescale Sucker and Sculpin were observed in each pond. Redside Shiner, Northern Pikeminnow, Rainbow Trout and Bull Trout were also captured in A4, the lowest elevation pond at the time.

Fish sampling was completed in all ponds in the summer of 2021. In 2021, the reservoir began to draw down as soon as full pool was reached in early July, and as a result the ponds were not inundated for as long as they were in 2020, when the reservoir was maintained at full pool from late June to early August. Young of year Largescale Sucker and Sculpin were observed in ponds A1-A3. Largescale Sucker, Northern Pikeminnow, Lake Chub, Rainbow Trout, Sculpin and one Bull Trout were observed in ponds A4-A6, D1 and D2 and/or in the small stream that connects these ponds. Fishes were generally captured near the inlet or outlets of the ponds, where coarse substrate (small cobble) is present.

Ponds B1 and B2 were designed with no outlets and become isolated as the reservoir recedes below elevations of ~ 436 m and ~ 434 m respectively. The residual pool of B1 had a maximum depth of 0.5 m and a surface area of 20-30 m². Largescale Sucker, Redside Shiner, Sculpin and non-native Carp were captured in this pond. Pond B2 had a residual pool with a surface area of ~ 600 m and a depth of 0.5 m. Lake Chub, Rainbow Trout and Carp were captured in this pond.

A summary of fish observations for each pond is provided in Figure 3.

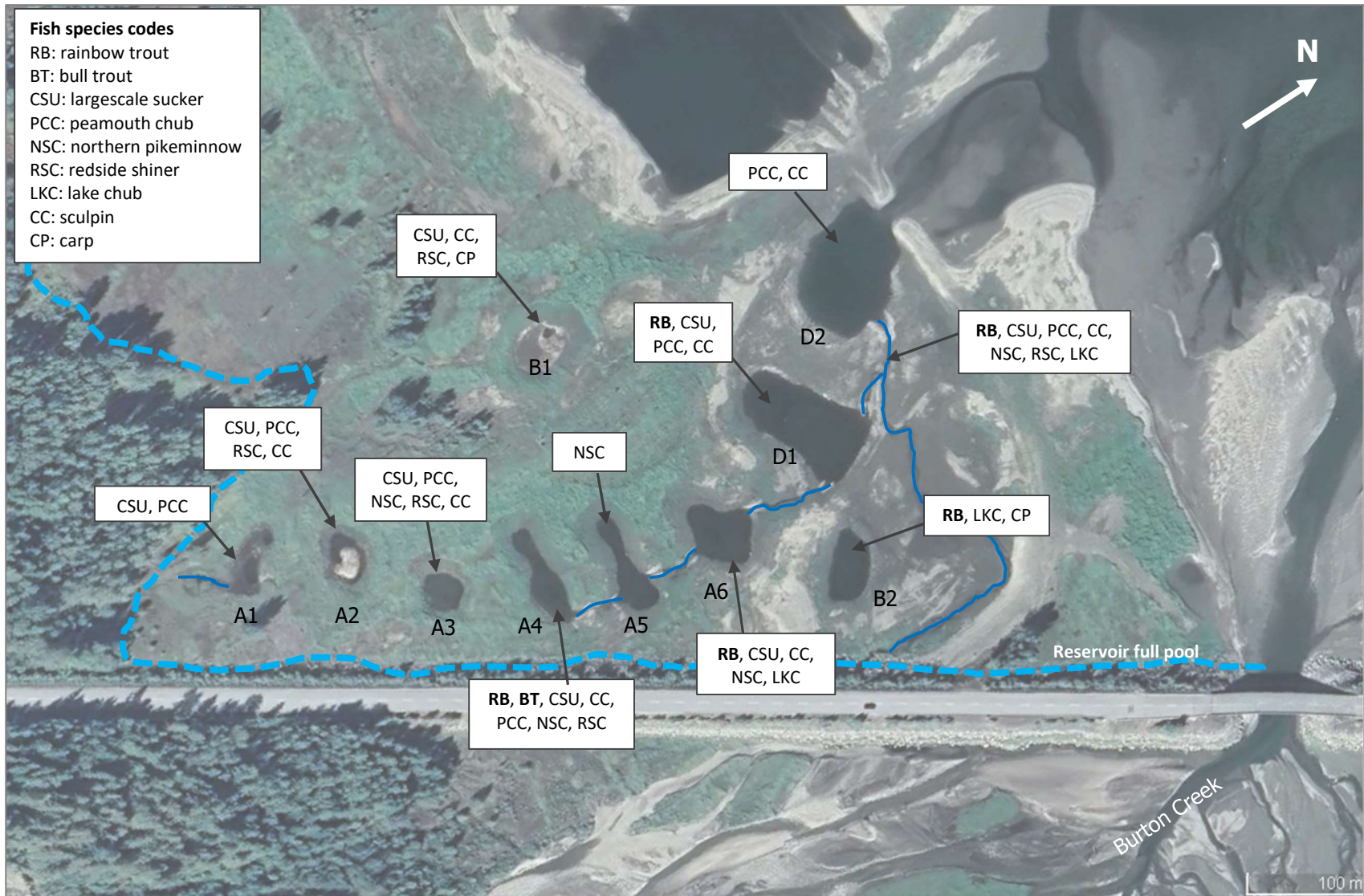


Figure 3. Map of constructed ponds showing fish observations (2020-2021).

The risk of stranding for target and observed species was qualitatively assessed based on habitat present, species life history and inundation timing (Table 9). Stranding risk was rated as low, moderate and high as follows:

- Low no suitable habitat and/or inundation period does not overlap with species life history requirements.
- Moderate suitable habitat is present, species may be present
- High high quality rearing or spawning habitat is present and inundation period coincides with species life history requirements.

For Rainbow Trout, the risk of standing was assessed as moderate for fry, and low for juveniles and adults. Rainbow Trout young-of year were observed in the lowest elevation ponds (A4, A6, D1, B2). The ponds do not provide any spawning habitat for Rainbow Trout, and these individuals are assumed to have outmigrated from the Burton Creek watershed. Rainbow Trout fry out migrating from Burton Creek would enter the reservoir in the early summer when water levels in the reservoir are high, and the ponds are inundated.

For Bull Trout, the risk of stranding was assessed as moderate for juveniles, and low for fry and adults. The ponds do not provide any spawning habitat for Bull Trout, which are known to spawn in the Burton Creek watershed. One juvenile Bull Trout was observed in A4 in the early spring. Bull Trout juveniles typically outmigrate at age 2 or older, with migration usually occurring in the spring or fall (McPhail 2007). Bull Trout typically move into deeper water once in the lake; however, as outmigration can occur when the ponds are inundated, there is potential for juvenile Bull Trout to enter these ponds.

For Kokanee, the risk of stranding was assessed as low for all life stages. No Kokanee were observed, and the life history and habitat requirements of Kokanee preclude use of the ponds. Kokanee fry outmigrate from Burton Creek in the spring (April) when water levels in the reservoir are low, and therefore are unable to access the ponds. Once in the lake, Kokanee utilise pelagic (deep) habitat (McPhail 2007).

A 'moderate' risk of stranding was assessed for young-of-year and juvenile non-target species, and for all life stages of sculpins. Many of these species forage in littoral areas along the margin of reservoir. These species also spawn in littoral areas in the summer when the ponds are inundated. Adults and most juveniles appear to successfully leave the area as water levels recede. A small stream connects the lowest elevation ponds (A4-D2) to the reservoir and provides a pathway that reduces the risk of stranding. Fry are most likely to become stranded in the ponds, as this life stage has limited mobility, and emergence may occur after water levels have already receded.

Although small fishes become isolated in the ponds, this is unlikely to have any biological significance. The species and life stages observed are abundant along the margins of the reservoir and relatively few fishes are observed in the ponds. Most of these species are more tolerant than salmonids of warm water temperatures and lower dissolved oxygen levels that may occur in the ponds in the summer. Based on the observations made in 2020-2021, the habitat available in most of the ponds remains suitable to support

young-of year fish through the summer. Habitat conditions over the winter also appear to be suitable for these species, as evidenced by the fishes captured during fish salvage to support the Phase 2 construction. Habitat conditions in B1 appear to be the least favourable for fishes, as this pond recedes to a small, shallow pool with a surface area of 20-30 m² that has abundant algae. Despite this, some of the fishes (Largescale Sucker, Redside Shiner, Sculpin) stranded in this pond in the summer of 2020 were able to overwinter successfully, as these species were captured during the fish salvage in 2021.

Table 14. Summary of stranding risk for target and observed species.

Pond	Species	Risk of Stranding		
		Young of Year	Juveniles	Adults
A1-A6	Rainbow Trout	Moderate	Low	<i>Low</i>
	Bull Trout	<i>Low</i>	Moderate	<i>Low</i>
	<i>Kokanee</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	Largescale Sucker	Moderate	Moderate	<i>Low</i>
	Lake Chub	Moderate	<i>Moderate</i>	<i>Low</i>
	Northern Pike minnow	Moderate	<i>Moderate</i>	<i>Low</i>
	Peamouth Chub	Moderate	<i>Moderate</i>	<i>Low</i>
	Redside Shiner	Moderate	<i>Moderate</i>	<i>Low</i>
	Sculpin spp	Moderate	Moderate	Moderate
B1	<i>Rainbow Trout</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	<i>Bull Trout</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	<i>Kokanee</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	Largescale Sucker	Moderate	Moderate	<i>Low</i>
	<i>Lake Chub</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	<i>Northern Pike minnow</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	<i>Peamouth Chub</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	Redside Shiner	Moderate	Moderate	<i>Moderate</i>
	Sculpin spp	Moderate	Moderate	Moderate
B2	Rainbow Trout	Moderate	Low	<i>Low</i>
	<i>Bull Trout</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	<i>Kokanee</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>
	Largescale Sucker	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	Lake Chub	Moderate	<i>Moderate</i>	<i>Low</i>
	<i>Northern Pike minnow</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	<i>Peamouth Chub</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>
	Redside Shiner	Moderate	<i>Moderate</i>	<i>Moderate</i>
	Sculpin spp	Moderate	Moderate	<i>Moderate</i>
D1, D2	Rainbow Trout	Moderate	Low	<i>Low</i>
	<i>Bull Trout</i>	<i>Low</i>	<i>None</i>	<i>Low</i>
	<i>Kokanee</i>	<i>Low</i>	<i>None</i>	<i>Low</i>
	Largescale Sucker	Moderate	<i>Moderate</i>	<i>Low</i>
	Lake Chub	Moderate	<i>Moderate</i>	<i>Low</i>
	Northern Pike minnow	Moderate	<i>Moderate</i>	<i>Low</i>
	Peamouth Chub	Moderate	<i>Moderate</i>	<i>Low</i>
	Redside Shiner	Moderate	<i>Moderate</i>	<i>Moderate</i>
	Sculpin spp	Moderate	Moderate	Moderate

¹ *light grey* text indicates species/life stage not observed during sampling

5 CLOSURE

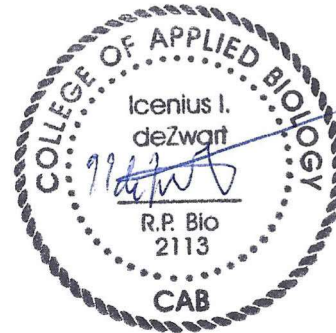
We trust the information provided in this report meets your current requirements. As per the requirements of scientific fish collection permits CB20-605775, CB20-612814, and CB21-626813, the results of fish sampling will be provided to the Province of BC.

If you have any questions or concerns regarding its contents, please contact the undersigned.

This memo was prepared by:



Ico de Zwart. R.P.Bio, P.Chem.
Masse Environmental Consultants



6 REFERENCES

Nupqu & Hemmera 2018. CLBWORKS-30B Burton Flats Fish Stranding Assessment – Risk Analysis and Summary Report, Arrow Lakes Reservoir Wildlife Management Plan, Wildlife Enhancement Program. Report prepared for BC Hydro by Hemmera Envirochem Inc and Nupqu Development Corporation, December 2018.

McPhail, J.D. 2007. The Freshwater Fishes of British Columbia. University of Alberta Press.

MEC [Masse Environmental Consultants] 2020. CLBWORKS-30B Burton Flats Fish Stranding Assessment - 2020 Fish Sampling. CLBWORKS-30B Wildlife Enhancement Program – Wetland Enhancement Program. Implementation Year 3. Report prepared for BC Hydro.

WSC [Water Survey of Canada] 2021. Real-Time Hydrometric Data Graph for Arrow Reservoir at Fauquier (08NE102) BC. https://wateroffice.ec.gc.ca/report/real_time_e.html?stn=08NE102

APPENDIX 1. INDIVIDUAL FISH DATA

Date	Pond	Method	Species	Length (mm)
18-Jun-20	A3	dip netting	Redside Shiner	36
18-Jun-20	A3	dip netting	Redside Shiner	33
18-Jun-20	A3	dip netting	Redside Shiner	37
18-Jun-20	A3	dip netting	Redside Shiner	26
18-Jun-20	A3	dip netting	Redside Shiner	35
18-Jun-20	A3	dip netting	Redside Shiner	37
18-Jun-20	A3	dip netting	Redside Shiner	30
18-Jun-20	A3	dip netting	Redside Shiner	30
18-Jun-20	A3	dip netting	Redside Shiner	35
18-Jun-20	A3	dip netting	Redside Shiner	37
18-Jun-20	A3	dip netting	Redside Shiner	40
18-Jun-20	A3	dip netting	Redside Shiner	35
18-Jun-20	A3	dip netting	Redside Shiner	30
18-Jun-20	A3	dip netting	Redside Shiner	31
18-Jun-20	A3	dip netting	Redside Shiner	30
18-Jun-20	A3	dip netting	Redside Shiner	28
18-Jun-20	A3	dip netting	Redside Shiner	35
18-Jun-20	A3	dip netting	Redside Shiner	50
18-Jun-20	A3	dip netting	Redside Shiner	30
18-Jun-20	A3	dip netting	Redside Shiner	38
18-Jun-20	A3	dip netting	Redside Shiner	33
18-Jun-20	A3	dip netting	Peamouth	50
18-Jun-20	A3	dip netting	Peamouth	41
18-Jun-20	A3	dip netting	Largescale Sucker	62
18-Jun-20	A3	dip netting	Largescale Sucker	55
18-Jun-20	A3	dip netting	Northern Pikeminnow	30
18-Jun-20	A3	dip netting	Northern Pikeminnow	47
18-Jun-20	A3	dip netting	Northern Pikeminnow	30
18-Jun-20	A3	dip netting	Northern Pikeminnow	30
18-Jun-20	A3	dip netting	Northern Pikeminnow	35
18-Jun-20	A3	dip netting	Northern Pikeminnow	36
18-Jun-20	A3	dip netting	Northern Pikeminnow	33
18-Jun-20	A3	dip netting	Northern Pikeminnow	45
18-Jun-20	A3	dip netting	Northern Pikeminnow	36
18-Jun-20	A3	dip netting	Northern Pikeminnow	36
18-Jun-20	A3	dip netting	Northern Pikeminnow	40
18-Jun-20	A3	dip netting	Northern Pikeminnow	33
18-Jun-20	A3	dip netting	Northern Pikeminnow	35
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A1	electrofishing	Unidentified Species	10
14-Aug-20	A2	electrofishing	Unidentified Species	15
14-Aug-20	A2	electrofishing	Unidentified Species	10
14-Aug-20	A2	electrofishing	Unidentified Species	10
14-Aug-20	A2	dip netting	Unidentified Species	12
14-Aug-20	A2	dip netting	Unidentified Species	12

Date	Pond	Method	Species	Length (mm)
14-Aug-20	A3	electrofishing	Peamouth	20
14-Aug-20	A3	electrofishing	Peamouth	15
14-Aug-20	A3	electrofishing	Peamouth	15
14-Aug-20	A3	electrofishing	Sculpin (General)	15
08-Oct-20	A4	electrofishing	Northern Pikeminnow	29
08-Oct-20	A4	electrofishing	Northern Pikeminnow	30
08-Oct-20	A4	electrofishing	Northern Pikeminnow	28
08-Oct-20	A4	electrofishing	Peamouth	28
08-Oct-20	A4	electrofishing	Peamouth	28
08-Oct-20	A4	electrofishing	Peamouth	30
08-Oct-20	A4	electrofishing	Peamouth	29
08-Oct-20	A4	electrofishing	Peamouth	25
08-Oct-20	A4	electrofishing	Peamouth	30
08-Oct-20	A4	electrofishing	Rainbow Trout	60
08-Oct-20	A4	electrofishing	Largescale Sucker	31
08-Oct-20	A4	electrofishing	Largescale Sucker	30
08-Oct-20	A4	electrofishing	Largescale Sucker	27
08-Oct-20	A4	electrofishing	Sculpin (General)	35
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	28
08-Oct-20	B1	electrofishing	Redside Shiner	27
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	30
08-Oct-20	B1	electrofishing	Redside Shiner	30
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	30
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	23
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	21
08-Oct-20	B1	electrofishing	Redside Shiner	28
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	20
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	25
08-Oct-20	B1	electrofishing	Redside Shiner	22
08-Oct-20	B1	electrofishing	Redside Shiner	23
08-Oct-20	B1	electrofishing	Redside Shiner	25

Date	Pond	Method	Species	Length (mm)
08-Oct-20	B1	dip netting	Redside Shiner	24
08-Oct-20	B1	dip netting	Redside Shiner	25
08-Oct-20	B1	dip netting	Redside Shiner	25
08-Oct-20	B1	dip netting	Redside Shiner	24
08-Oct-20	B1	dip netting	Redside Shiner	25
08-Oct-20	B1	dip netting	Redside Shiner	25
08-Oct-20	B1	electrofishing	Sculpin (General)	26
08-Oct-20	B1	electrofishing	Sculpin (General)	28
08-Oct-20	B1	electrofishing	Sculpin (General)	30
08-Oct-20	B1	electrofishing	Sculpin (General)	23
08-Oct-20	B1	electrofishing	Sculpin (General)	30
08-Oct-20	B1	electrofishing	Sculpin (General)	30
08-Oct-20	B1	electrofishing	Sculpin (General)	32
08-Oct-20	B1	electrofishing	Sculpin (General)	30
08-Oct-20	B1	electrofishing	Sculpin (General)	26
08-Oct-20	B1	electrofishing	Sculpin (General)	23
08-Oct-20	B1	electrofishing	Sculpin (General)	40
08-Oct-20	B1	electrofishing	Sculpin (General)	28
08-Oct-20	B1	electrofishing	Sculpin (General)	25
08-Oct-20	B1	electrofishing	Sculpin (General)	27
08-Oct-20	B1	electrofishing	Sculpin (General)	35
08-Oct-20	B1	electrofishing	Sculpin (General)	30
08-Oct-20	B1	dip netting	Sculpin (General)	25
08-Oct-20	B1	electrofishing	Largescale Sucker	55
08-Oct-20	B1	electrofishing	Largescale Sucker	50
08-Oct-20	B1	electrofishing	Largescale Sucker	40
08-Oct-20	B1	electrofishing	Largescale Sucker	55
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	35
08-Oct-20	B1	electrofishing	Largescale Sucker	35
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	38
08-Oct-20	B1	electrofishing	Largescale Sucker	50
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	25
08-Oct-20	B1	electrofishing	Largescale Sucker	50
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	40
08-Oct-20	B1	electrofishing	Largescale Sucker	30
08-Oct-20	B1	electrofishing	Largescale Sucker	30
08-Oct-20	B1	electrofishing	Largescale Sucker	35
08-Oct-20	B1	electrofishing	Largescale Sucker	30
08-Oct-20	B1	electrofishing	Largescale Sucker	45
08-Oct-20	B1	electrofishing	Largescale Sucker	23
20-Aug-21	A1	seining	Largescale Sucker	25
20-Aug-21	A1	seining	Largescale Sucker	25
20-Aug-21	A1	seining	Largescale Sucker	25
20-Aug-21	A1	seining	Largescale Sucker	35
20-Aug-21	A1	seining	Largescale Sucker	39

Date	Pond	Method	Species	Length (mm)
20-Aug-21	A6	electrofishing	Largescale Sucker	21
20-Aug-21	A6	electrofishing	Largescale Sucker	32
20-Aug-21	A6	electrofishing	Northern Pikeminnow	32
20-Aug-21	A6	electrofishing	Lake Chub	25
20-Aug-21	A6	electrofishing	Lake Chub	26
20-Aug-21	A6	electrofishing	Lake Chub	25
20-Aug-21	A6	electrofishing	Northern Pikeminnow	30
20-Aug-21	A6	electrofishing	Northern Pikeminnow	26
20-Aug-21	A6	electrofishing	Rainbow Trout	25
20-Aug-21	A6	electrofishing	Rainbow Trout	34
20-Aug-21	A6	electrofishing	Sculpin (General)	38
20-Aug-21	A6	electrofishing	Lake Chub	25
20-Aug-21	B1	electrofishing	Common Carp	50
20-Aug-21	B1	electrofishing	Common Carp	42
20-Aug-21	B1	electrofishing	Sculpin (General)	30
20-Aug-21	B1	electrofishing	Sculpin (General)	25
20-Aug-21	B1	electrofishing	Sculpin (General)	25
20-Aug-21	B2	electrofishing	Common Carp	33
20-Aug-21	B2	electrofishing	Common Carp	40
20-Aug-21	B2	electrofishing	Rainbow Trout	28
20-Aug-21	B2	electrofishing	Rainbow Trout	37
20-Aug-21	B2	electrofishing	Rainbow Trout	37
20-Aug-21	B2	electrofishing	Lake Chub	22
20-Aug-21	B2	electrofishing	Lake Chub	25
20-Aug-21	B2	electrofishing	Lake Chub	25
20-Aug-21	B2	electrofishing	Lake Chub	17
20-Aug-21	B2	electrofishing	Lake Chub	25
20-Aug-21	B2	electrofishing	Lake Chub	30
20-Aug-21	B2	electrofishing	Lake Chub	20
20-Aug-21	B2	electrofishing	Lake Chub	24
20-Aug-21	B2	electrofishing	Lake Chub	29
24-Sep-21	D1	electrofishing	Largescale Sucker	58
24-Sep-21	D1	electrofishing	Peamouth	33
24-Sep-21	D1	electrofishing	Peamouth	25
24-Sep-21	D1	electrofishing	Peamouth	23
24-Sep-21	D1	electrofishing	Peamouth	24
24-Sep-21	D1	electrofishing	Largescale Sucker	51
24-Sep-21	D1	electrofishing	Largescale Sucker	59
24-Sep-21	D1	electrofishing	Rainbow Trout	49
24-Sep-21	D1	electrofishing	Rainbow Trout	54
24-Sep-21	D1	electrofishing	Prickly Sculpin	45
24-Sep-21	D1	electrofishing	Peamouth	30
24-Sep-21	D1	electrofishing	Rainbow Trout	50
24-Sep-21	D1	electrofishing	Prickly Sculpin	31
24-Sep-21	D1	electrofishing	Prickly Sculpin	47
24-Sep-21	D1	electrofishing	Peamouth	28
24-Sep-21	D1	electrofishing	Largescale Sucker	46
24-Sep-21	D1	electrofishing	Peamouth	32
24-Sep-21	D1	electrofishing	Prickly Sculpin	33
24-Sep-21	D1	electrofishing	Prickly Sculpin	28
24-Sep-21	D1	electrofishing	Prickly Sculpin	30
24-Sep-21	D1	seining	Peamouth	30

