Passive Trapping of Western Brook Lamprey (*Lampetra richardsoni*), Morrison Creek population in 2021

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Passive downstream traps were placed in the mainstem of Morrison Creek, Courtenay, British Columbia, as a part of ongoing monitoring of the Western Brook Lamprey (*Lampetra richardsoni*), Morrison Creek population. This species is only found in the Morrison Creek watershed and listed under the *Species at Risk Act* as Endangered. Since monitoring began in 2011, methods have remained consistent with similar trap locations in the mainstem. Total numbers of lamprey caught in 2021 were the lowest since monitoring began. June 2021 was slightly drier than average and correlating water temperatures were also higher than average. In addition, barriers to fish movement were discovered in the mainstem of Morrison Creek, upstream of two of the traps. It is possible that environmental conditions and fish barriers may have played a role in low catching success in 2021.

Recommendations are to continue monitoring the population both in the mainstem and headwaters through trapping studies and ensure the habitat is maintained in a manner which supports the functions of the population, and mitigates the impacts of threats. It is also recommended that a review of the past ten years of trapping, and where possible the trapping data from the 1980s, be conducted to inform a monitoring plan for the population.

RÉSUMÉ

Wade, J., Dealy. L., and Grant, P. 2021. Passive Trapping of Western Brook Lamprey (*Lampetra richardsoni*), Morrison Creek population in 2021. Can. Manuscr. Rep. Fish. Aquat. Sci. 3230: v + 6 p.

Dans le cadre de la surveillance continue de la population de lamproie de l'Ouest (*Lampetra richardson*) du ruisseau Morrison, on a placé des pièges passifs en aval dans le cours principal du ruisseau, à Courtenay (Colombie-Britannique). Cette espèce, présente uniquement dans le bassin hydrographique du ruisseau Morrison, est inscrite comme espèce en voie de disparition en vertu de la *Loi sur les espèces en péril*. Depuis le début de la surveillance en 2011, les méthodes sont restées constantes et les emplacements des pièges sont demeurés similaires dans le cours principal. Le nombre total de lamproies capturées en 2021 est le plus faible depuis le début des activités de surveillance. Le mois de juin 2021 a été légèrement plus sec qu'à la normale et les températures connexes de l'eau ont également été plus élevées qu'à la normale. On a découvert en outre des obstacles au passage du poisson dans le cours principal du ruisseau Morrisson, en amont de deux des casiers. Il est possible que les conditions environnementales et les obstacles au passage du poisson aient joué un rôle dans le faible taux de prise en 2021.

Il est recommandé de continuer à surveiller la population tant dans le cours principal que dans le cours supérieur au moyen d'études par piégeage, et de veiller à ce que l'habitat soit conservé de manière à appuyer les fonctions de la population et à atténuer les effets des menaces. Il est également recommandé de mener un examen des dix dernières années de piégeage et, dans la mesure du possible, des données de piégeage des années 1980 en vue d'étayer un plan de surveillance pour la population.

INTRODUCTION

The Western Brook Lamprey (*Lampetra richardsoni*), Morrison Creek population, is a small, endangered, freshwater lamprey endemic to the Morrison Creek watershed in Courtenay, British Columbia. This species has two distinct life history types in which both a non-parasitic (*L. richardsoni)* and parasitic (*Lampetra richardsoni* var. *marifuga*) type are produced. Both life history types are collectively referred to as Morrison Creek Lamprey, and genetic evidence supports they are part of a single population. The non-parasitic type is recognized by its darker colouration and smaller size, whereas the parasitic type is silver in colour, larger in size and capable of feeding as an adult after metamorphosis (Wade et al., 2015). However, both types are indistinguishable as ammocoetes, prior to metamorphosis. Further details on these two life history types are described elsewhere (Wade et al., 2015; DFO, 2018).

In 2003, Morrison Creek Lamprey was listed under Schedule 1 of the *Species at Risk Act* (SARA). As outlined in the Action Plan (DFO, 2018) for the population, a long term monitoring program is needed to ensure the persistence of the population within its natural range. Additional recovery objectives include maintaining, and where possible enhance, ecological integrity of habitat for the species. Therefore, this work is a contribution to those recovery goals, and is part of ongoing monitoring efforts using the same trapping methods and similar locations over the past ten years.

METHODS

Trapping

Four live-capture downstream traps were installed on June 11, 2021 and all were removed on July 2. All traps were installed in Morrison Creek (Table 1). None were

installed in the headwaters in 2021. Traps 1–3 were installed within 5 m of locations used in previous years; trap 4 was placed in a new location.

Table 1. Location of passive downstream traps in Morrison Creek, 2021. *Remediated area as described in Wade and Beamish, 2014.

Trap #	Location	Description	Latitude	Longitude
1	Marsden Road bridge	Downstream of the bridge	49.674909	-125.038099
2	Roy Morrison Park	Upstream of the bridge	49.681414	-125.019111
3	2nd Street and Willemar Avenue A	Immediately downstream of remediated area mainstem*	49.685519	-125.016081
4	2nd Street and Willemar Avenue B	Side channel near the confluence with the mainstem	49.685463	-125.016317

Traps were the same as used since 2011 for monitoring of Morrison Creek Lamprey (see Wade et al., 2019) and similar to those used in the 1970s and 1980s by Dr. Dick Beamish (Wade and Beamish, 2014).

A schematic of the passive downstream traps which are used in Morrison Creek is provided (Figure 1). Each trap is composed of a modified collection tank (B) (approximately 110 cm long x 50 cm wide x 42 cm high) with mesh windows to allow water to flow though. A funnel (D) made of fine mesh netting is attached via a hose clamp to a 4 inch diameter (approximately 10 cm) piece of PVC pipe which extends into the collection tank. The pipe is held in place with silicone. Wings (E) are attached to the sides of the funnel and held in place with rebar. The wings are made of Vexar® extruded diamond mesh (1 cm diameter) with small plastic fly screen attached below the waterline. The Vexar® provides rigidity to the wings and fly screen decreases the opening to ensure lamprey cannot pass through. The wings and funnel are kept taught to focus the water into the PVC pipe and ultimately the collection tank. The trap is installed to maintain a water level approximately ⅔ to ¾ of the tank depth (A). A small funnel of Vexar® is placed over the PVC pipe extending into the collection tank to ensure that fish do not swim out of the tank and a plywood lid is placed on top of the collection tank and held in place with bull clips to deter terrestrial predators.

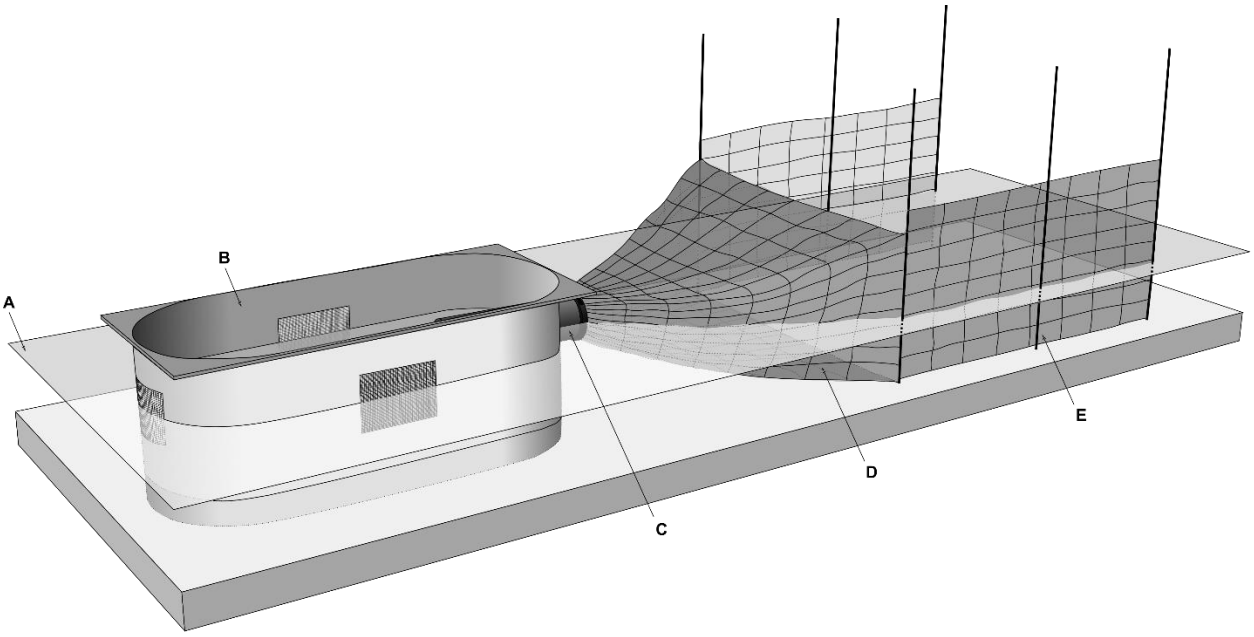

Figure 1. Schematic rendering of the passive downstream trap used for the live capture of Morrison Creek Lamprey. A= waterline, B= collection tank, C= PVC pipe, D= mesh funnel, E= rigid wings with rebar.

Sampling

Once installed, all traps were checked daily for fish. Using a small mesh aquarium dip-net, non-lamprey species were identified, enumerated, and released downstream of the traps. Lamprey were removed using a dip-net and placed in a large bucket filled with water taken directly from the creek. Each lamprey was measured for length and stage of development was determined (i.e., ammocoete, metamorphosing, non-parasitic type adult, parasitic type adult, spawning condition male and spawning condition female). Once the lamprey were sampled, they were released downstream of the trap.

All work was conducted under the authorization of a DFO Species at Risk Scientific permit.

RESULTS

Four traps remained installed for 21 days (total effort 84 fishing days). A total of 13 lamprey were caught; most (10/13) of the lamprey were caught in trap 1 at Marsden Road. Total catch per day was 0.15 lamprey/day. Total length (mm) by stage of development was as follows: ammocoetes, 80, 87, 90, and 106; metamorphosing, 125; non-parasitic type adult, 101, 110, 130; and non-parasitic type spawning condition female, 85 and 114; and two non-parasitic type spawning condition males 102 and undetermined (tail was missing). One parasitic type was captured with a total length of 124 mm.

Other species were caught in the traps, including salmon fry (*Oncorhynchus* spp.) (n = 64), Signal Crayfish (*Pacifastacus leniusculus*) (n = 59), and sculpin (*Cottus* spp.) (n = 2).

Table 2. Number of lamprey captured in passive downstream traps in Morrison Creek, from June 11 to July 14, 2021.

Stage	Trap 1	Trap 2	Trap 3	Trap 4	Total
Ammocoete	3		1		4
Metamorphosing	1				1
L. richardsoni adult	1	1		1	3
Spawning condition male	2				2
Spawning condition female	2				2
Silver	1				1
Total	10	1	1	1	13

DISCUSSION

Lamprey catches in 2021 were the lowest recorded, since 2011. Based on the catch summary for four years (2011–2013 and 2017) in Wade et al. (2019) total lamprey caught per day in the mainstem of Morrison Creek varied from 0.31 in 2013 to 2.57 in 2011. In the same time period, the total number of parasitic type individuals caught per day varied from 0.02 in 2012 to 0.17 in 2011. In 2021, total lamprey catch per day was 0.15, which equates to 0.14 for the non-parasitic type and 0.01 for the parasitic type.

There are several plausible explanations for such low trapping counts including weather conditions and the presence of physical barriers in Morrison Creek. June 2021 was unseasonably hot and dry as compared to recent years.

In June 2019 and 2020, the mean daily average water temperature in Morrison Creek was 14.2 ºC and daily averages ranged between 11.8 and 16.4 ºC; June 2021 had a mean daily average water temperature of 15.0 ºC and daily averages ranged from 11.1 to 21.0 ºC. From 2014 to 2020, the average total rainfall for June was 36.7 mm (range 13.7–67.1 mm); June 2021 was drier than average with a total of 31.7 mm. Water temperature data for Location 08HB0018 – Morrison Creek near the Mouth were exported from Data - AQUARIUS WebPortal (gov.bc.ca). Rainfall data for Courtenay Elementary School was downloaded from the Victoria School-Based Weather Station Network (https://www.victoriaweather.ca/).

In addition, a large log jam and several smaller ones were found on the lower reaches of Morrison Creek in July 2021. It is not known how long these log jams have been in place but it is believed they acted as barriers to habitat and prevented the free movement of lamprey within Morrison Creek which may have contributed to lower than normal counts in the lower reaches of the Creek. Subsequent to this discovery in July, these barriers were removed after approval of a permit, as they are in critical habitat for

the species. This aligns with recovery objectives such as maintaining, and where possible enhance, ecological integrity of habitat for the species.

Figure 2. Large log jam located on Morrison Creek adjacent to Ecole Puntledge Park (July 2021).

The two distinct life history forms of this species, make this population unique, highlighting the importance of conservation activities and monitoring to ensure the persistence of the population within its natural range. It is reasonable to hypothesize that environmental conditions and/or physical barriers played a role in low catches in 2021. We should be vigilant in the identification and removal of barriers such as log jams or hung culverts so that they do not impede the movement of lamprey within their range. It is also recommended that a review of all trapping data (1980s to present) be undertaken to look at trends and design and implement a sound monitoring program (National Recovery Team for Morrison Creek Lamprey, 2007; DFO, 2018).

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REFERENCES

Fisheries and Oceans Canada (DFO). 2018. Action Plan for the Western Brook Lamprey – Morrison Creek Population (*Lampetra richardsoni*) in Canada. *Species at Risk Act* Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 39 pp.

National Recovery Team for Morrison Creek Lamprey. 2007. Recovery Strategy for the Morrison Creek Lamprey (*Lampetra richardsoni* var. *marifuga*) in Canada. *Species at Risk Act* Recovery Strategy Series, Fisheries and Oceans Canada, Ottawa. v + 24 pp.

Wade, J., and Beamish, R. 2014. Identification of barriers affecting the movement of Morrison Creek lamprey (*Lampetra richardsoni marifuga)* within its natural range. Can. Manuscr. Rep. Fish. Aquat. Sci. 3043: iv + 16 p.

Wade, J., Dealy, L., Hodes, V., and MacConnachie, S. 2019. Morrison Creek Lamprey (*Lampetra richardsoni*) trapping survey, June 2017. Can. Manuscr. Rep. Fish. Aquat. Sci. 3183: iv + 6 p.

Wade, J., Pinnell, N. Kosminder, G., and S. MacConnachie. 2015. Information to support the identification of critical habitat for the Morrison Creek Lamprey (*Lampetra richardsoni* var*. marifuga*). DFO Can. Sci. Advis. Sec. Res. Doc. 2015/031. v + 30 p.