Summary of Freshwater Fish Trapping Activities in Interior British Columbia (2020-2021) with a Focus on Speckled Dace (*Rhinichthys osculus*)

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Summary of Freshwater Fish Trapping Activities in Interior British Columbia (2020–2021) with a Focus on Speckled Dace (*Rhinichthys osculus*)

by

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ABSTRACT

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To better understand the distribution of British Columbia's (BC) freshwater Species at Risk, tools such as environmental DNA (eDNA) metabarcoding can be applied once a reference DNA sequence library is developed. This data report summarizes fish trapping effort in watersheds in the interior of BC for the collection of voucher specimens and finclips for these purposes. Efforts were focused on Speckled Dace (*Rhinichthys osculus*) to enable later development of eDNA survey methods for this species, but also included other related and/or co-occurring freshwater fish species.

RÉSUMÉ

Wade, J., Grant, P., Gilmore S.R., Westfall K.M., Stenhouse, L., and Abbott, C.L. 2024. Summary of Freshwater Fish Trapping Activities in Interior British Columbia (2020–2021) with a focus on Speckled Dace (*Rhinichthys osculus*). Can. Data Rep. Fish. Aquat. Sci. 1386 : iv + 6 p.

Pour mieux comprendre la répartition des espèces d'eau douce en péril de la Colombie-Britannique (C.-B.), des outils tels que le métabarcodage de l'ADN environnemental (ADNe) peuvent être appliqués une fois qu'une bibliothèque de séquences d'ADN de référence est développée. Ce rapport de données résume les efforts de piégeage des poissons dans les bassins versants de l'intérieur de la Colombie-Britannique pour la collecte de spécimens témoins et de pinces à nageoires à ces fins. Les efforts ont été concentrés sur le naseux moucheté (*Rhinichthys osculus*) pour permettre le développement ultérieur de méthodes d'enquête sur l'ADNe de cette espèce, mais ont également porté sur d'autres espèces de poissons d'eau douce apparentées et/ou coexistantes.

INTRODUCTION

In British Columbia (BC), there are 15 different freshwater fish species listed under Schedule 1 of Canada's *Species at Risk Act* (SARA), as follows: seven as special concern; three as threatened; and five as endangered. Ten of these 15 listed species have a limited known distribution in BC and/or Canada and are understudied. High sensitivity, multi-species surveys by environmental DNA (eDNA) metabarcoding would be a highly efficient approach for improving our understanding of their distributions.

The application of eDNA surveys to at-risk freshwater fishes to help refine knowledge on their geographic distributions is predicated on the ability to develop eDNA tools that accurately and confidently detect eDNA at the species level. This development requires a reference DNA sequence library containing all target species and, ideally, co-occurring species as well. This is to ensure target species are confidently distinguished from closely-related, non-target species by the eDNA method. To develop a reference DNA sequence library to enable confident identification of eDNA to species level, tissue samples from traceable, vouchered specimens are necessary.

Within a project funded by Genome BC, a reference DNA sequence library for freshwater fish species (native and invasive) in BC was developed (see namers.ca). The purpose was to enable the development of eDNA surveys to generate improved species occurrence data and provide regulators and conservation managers what they need to make sound, evidence- based decisions. This is vital for achieving desired conservation management outcomes.

This data report summarizes catches during sampling efforts in the interior of BC with a focus on habitats known to contain Speckled Dace (*Rhinichthys osculus*) and closely-related fishes. This work was done to obtain voucher specimens for DNA sequencing to populate the reference DNA sequence library, ultimately to enable eDNA surveys for this species. Dace are minnows belonging to the Family Cyprinidae, Order Cypriniformes, which also includes chub, tench, carp, shiner, minnow and goldfish. Speckled Dace is small in length (51–94 mm fork length), with a prominent snout and a sub-terminal mouth (McPhail 2003). In 2006, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed Speckled Dace as endangered because of its limited range and area of occupancy in Canada, perceived sensitivity to threats and habitat loss, and lack of any potential for rescue (COSEWIC 2006). It was listed as endangered under the SARA in 2009. Field studies have confirmed that the range of Speckled Dace in BC includes the West Kettle, Kettle and Granby rivers (see Batty 2010, Andrusak and Andrusak 2011, and MacConnachie et al. 2023). The critical habitat order for the species was issued in 2018 (SOR/2018-218).

Speckled Dace is a difficult species to survey as it exhibits cryptic behaviour and is nocturnal. Coupled with highly variable water conditions and flow rates, this species has rarely been surveyed and, unsurprisingly, many knowledge gaps remain. This paper reports the results of fish trapping effort done for the purpose of collecting DNA samples and fish voucher specimens for use in developing a reference DNA sequence library for all freshwater fish in BC. The goal was to contribute to the development of eDNA tools to

gain a better understanding of the distribution of Speckled Dace, be it seasonally, within or potentially outside the watershed.

METHODS

Fish collection and sampling

With the exception of a few nighttime pole seining attempts, fish were collected using minnow traps. Minnow traps were baited with dry dog food and deployed in varying habitats overnight. As we wished to collect a variety of species, traps were deployed in varying habitats including: shallow water (< 30 cm deep) and deep water (<1 m deep); fast and slow flowing water; and in sand, mud, cobble and rock substrates. Once baited, traps were tied to the shore so as not to get washed downstream. Between five and 10 traps were deployed at each site described in Table 1, depending on site suitability.

In 2020, trapping efforts focused on the Kettle Valley watershed above Cascade Falls at Grand Forks (Table 1), as this is the known range for Speckled Dace in BC. Speckled Dace are the only dace species known to be present above the falls. In 2021, locations outside the Kettle Valley were targeted for similar and related species, including the Kettle River below the falls, Columbia River system, and Okanagan Lake (Table 1).

Table 1. Trapping locations 29th–30th August, 2020 and 18th–28th September, 2021.

Water body	Descriptor	Latitude	Longitude
2020			
Kettle River	Rock Creek	49.050109	-117.985577
	Kettle Rd. bridge	49.057813	-118.944354
	Campground bridge	49.059688	-119.000925
West Kettle River	Approx. 5km south of Beaverdell	49.382629	-119.095455
	Westbridge bridge	49.169658	-118.975456
	Fishing hole	49.317903	-119.038294
2021			
Kootenay River side channel at Columbia River confluence	Castlegar 1- Selkirk College wildlife area	49.312499	-117.648854
		49.31436	-117.649145
Columbia River	Castlegar 2- Boat launch Waterloo Park	49.262484	-117.642375
	Genelle, boat launch at Whispering Pines Manufactured Homes Park	49.212011	-117.682701
	Beaver Creek Kiwanis park boat launch	49.066285	-117.611972
Beaver Creek	Beaver Creek Kiwanis park	49.068982	-117.60942
Kettle River	Accessed via Swanson Road- below the falls	49.024743	-118.208522
	Accessed via 68th road bridge- above the falls	49.028988	-118.430314
Similkameen River	Chopaka Road, Cawston	49.078749	-119.710173
Okanagan Lake	Kinsman Park, Summerland	49.599205	-119.650922

When traps were removed from the water, fish were placed in a bucket with local water, removed using a dipnet, and sorted by species. If fish were needed for either DNA or as a voucher specimen they were placed in a separate bucket of water until all fish had been sorted. Fish that were not needed were returned to the water unharmed. For fish from which finclips were required, but a lethal (voucher) specimen was not, they were anesthetized using TMS (100–125 ppm) until sedated, the finclip was taken, and the fish was put in a separate bucket with water and released once completely recovered. Finclips were placed in leakproof labeled vials in 95% non-denatured ethanol. Voucher specimens were placed in a lethal concentration of TMS until rapid, irreversible death occurred. Each voucher specimen was measured for length and placed in a numbered Whirlpac bag and placed in the freezer.

Not all fish caught in traps were enumerated in order to minimize harm and potential mortality; however, all species caught were recorded.

RESULTS

Fish sampling

Trapping efforts in 2020 and 2021 resulted in 13 different species being caught (Table 2). Finclips and voucher specimens were saved from approximately 10 individuals of each species in each watershed, when available.

Two species, Redside Shiner (*Richardsonius balteatus*) and Northern Pikeminnow (*Ptychocheilus oregonensis*) were caught in all three watersheds. In addition, in the Kettle River watershed above the falls, Speckled Dace, Largescale Sucker (*Catostomus macrocheilus*), Sculpin spp. were caught; below the falls, sculpin spp., Prickly Sculpin (*Cottus asper*), Pumpkinseed (*Lepomis gibbosus*), Tench (*Tinca tinca*), sucker spp., and bass spp. were caught. In Okanagan Lake, sculpin spp., Longnose Sucker, Pricky Sculpin, and Tench were caught. In the Columbia River system, both Largescale and Longnose (*Catostomus Catostomus*) suckers, Prickly Sculpin and Rainbow Trout (*Oncorhynchus mykiss*) were caught.

Table 2. Summary of fish caught (2020–2021). RS= Redside Shiner, SD=Speckled Dace, NP=Northern Pikeminnow, LS=Largescale Sucker, C=Chiselmouth, SC=sculpin spp., LNS=Longnose Sucker, PS=Prickly Sculpin, P=Pumpkinseed, T=Tench, RT= Rainbow Trout; SU=sucker spp., B=bass spp.

Water body	Description	RS	SD	NP	LS	C	SC	LNS	PS	P	T	RT	SU	B
2020														
Kettle River	Rock Creek	x	x	x	x	x	–	–	–	–	–	–	–	–
	Kettle Rd. bridge	x	x	x	x	x		–	–	–	–	–	–	–
	Campground bridge	x		x	–	–	x	–	–	–	–	–	–	–
West Kettle River	Approx. 5km south of Beaverdell	x	x	–	–	–	x	–	–	–	–	–	–	–
	Westbridge bridge	–	x	x	x	–	x	–	–	–	–	–	–	–
	Fishing hole	x	x	–	–	–	x	–	–	–	–	–	–	–
2021														
Okanagan Lake	Kinsman Beach in Summerland	x	–	x	–	–	x	x	x	x	–	–	–	–
Kootenay River side channel at Columbia River confluence	Castlegar 1- Selkirk College wildlife area	x	–	x	x	x	–	–	–	–	–	–	–	–
Columbia River	Castlegar 2- boat launch Waterloo Park	x	–	x	x	–	–	x	x	–	–	x	–	–
	Genelle, boat launch at Whispering Pines Manufactured Homes Park	–	–	–	x	–	–	–	x	–	–	–	–	–
	Beaver Creek Kiwanas Park boat launch	–	–	–	–	–	–	–	x	–	–	–	–	–
Beaver Creek	Beaver Creek Kiwanas Park	–	–	–	–	–	–	–	–	–	–	x	–	–
Kettle River	Accessed via Swanson Road- below the falls	x	–	x	–	–	x	–	x	x	x	–	x	x

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