

Phillips ID. 2024. Range extension of the non-native northern crayfish *Faxonius virilis* (Hagen, 1870) (Decapoda: Cambaridae) to British Columbia, Canada. Northwest Science 97(3): *in press*.

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4 **Range extension of the non-native northern crayfish *Faxonius virilis* (Hagen, 1870)**
5 **(Decapoda: Cambaridae) to British Columbia, Canada**

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7 Running footer: *Faxonius virilis* Range Expansion

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Accepted Note

11 **Abstract**

12 Here I report the expansion of the northern crayfish *Faxonius virilis* (Hagen, 1870) (Decapoda:
13 Cambaridae) into the Kootenay River Basin in southeastern British Columbia. Observation of
14 this crayfish occurred in late summer 2023 at Moyie Lake, British Columbia based on active
15 search collections from the littoral areas of the north end of the lake. I recorded 12 *F. virilis*
16 individuals in 15 minutes of search, and the abundance and the occurrence of juvenile and adult
17 females and males suggests that they are well established in the lake. As this region has been
18 identified as having high invasion potential and risk for impact, further research on the range in
19 the area and effects on the local ecosystem will be useful to guide management actions.

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26 **Keywords:** northern crayfish, *Faxonius virilis*, Moyie Lake, invasive species

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30 The watersheds west of the continental divide in Canada are known to only host the native
31 signal crayfish (*Pacifastacus leniusculus* [Dana, 1852]), but concern about invasions of
32 competing crayfish species has been growing (Brown and Therriault 2022) and environmental
33 management groups have been highlighting the need to keep watch for and report occurrences of
34 new species introductions (Invasive Species Council of BC 2023). British Columbia is well-
35 connected to populations of potential invading crayfish species in Washington, Idaho, and
36 Montana to the south through the Columbia River watershed (Larson et al. 2010, Larson and
37 Olden 2011, Shaw et al. 2021), but the known distributions have not included Canadian
38 tributaries in this basin (Bondar et al. 2005, Phillips et al. 2009). However, here I document the
39 presence of the northern crayfish *Faxonius virilis* (Hagen, 1870) west of the continental divide in
40 Canada, in Moyie Lake, British Columbia (49°22'4.90"N, 115°50'20.39"W, Figure 1), within the
41 Moyie River watershed that contributes to the Kootenay and Columbia Rivers in the Columbian
42 Glaciate ecoregion (Abell et al. 2008) sustained by the Moyie River.

43 My sampling for this observation involved actively overturning rocks in the cobble dominated
44 littoral area of the north end of the north basin in Moyie Lake and hand-collecting crayfish
45 hiding underneath on 9 August 2023, about 50 m northwest of a boat launch. I waded along a
46 clear-water, cobble-dominated shoreline with little macrophyte growth at depths up to ~ 0.5 m on
47 and searched an area of ~ 30 m² over 15 minutes. I caught 12 *F. virilis*, including two adult male
48 specimens, two adult female specimens, four juvenile male specimens, and four juvenile female
49 specimens. Life-stage designations follow methods of Crocker and Barr (1968). No crayfish
50 were observed to escape without capture and identification during the survey. Two male crayfish
51 were retained, frozen, and returned to the lab to confirm species identification based on the form
52 I copulatory stylets (Crocker and Barr 1968). One crayfish has been vouchered at the Royal

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53 British Columbia Museum, Victoria, British Columbia (Accession #RBCM 024-00009-001), and
54 the second specimen is maintained frozen at the Water Security Agency facility, Saskatoon,
55 Saskatchewan, Canada.

56 These observations represent the first published record of this species in the province of British
57 Columbia as well as a northwestern range extension of its previously known distribution
58 (Phillips et al 2009, Larson and Olden 2011, Williams et al. 2011, Brown and Therriault 2022).
59 *Faxonius virilis* is the most widespread crayfish in Canada, native to Saskatchewan and a small
60 area of the Beaver River watershed in Alberta east to New Brunswick (Phillips et al. 2009). It
61 has expanded its range westward further into Alberta toward British Columbia over the past two
62 decades (Williams et al. 2011). The closest sources for colonization of *F. virilis* in Moyie Lake
63 may have been overland transport from Alberta or instream movement from occupied portions of
64 the Columbia Basin to the south in Washington, Idaho, and Montana (Larson et al. 2010, Larson
65 and Olden 2011, Shaw et al. 2021). The nearest records anywhere for this species are ~100 km to
66 the south in Montana (Larson and Olden 2011) where it has expanded its range from its native
67 from its native range east of the continental divide. Further monitoring and assessment
68 throughout the Kootenay region of British Columbia would be valuable in determining the
69 distribution of *F. virilis* and should likely be paired with genetic analyses to find the most likely
70 source population for this colonization to enable a better understanding of this establishment.

71 Colonization by *F. virilis* could have various ecological impacts. This may justify research on
72 the Moyie Lake itself in the future to understand the composition of the communities present.
73 Through a risk assessment for Canadian waterbodies, Brown and Therriault (2022) found *F.*
74 *virilis* to have a high likelihood for invasion in the Columbian Glaciate ecoregion that includes
75 Moyie Lake and has the highest potential risk for ecological impact based on their invasive

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76 species impact screening tool. *Faxonius virilis* is highly mobile, has rapid reproduction potential
77 (hence its other common name the ‘virile’ crayfish), and has been repeatedly documented to alter
78 the ecology of ecosystems it enters (see Phillips et al. 2009) even altering food-webs and fish
79 trophic position (Prestie et al. 2019). This observation supports the risk assessment provided by
80 Brown and Therriault (2022), and the region may already have further colonized waterbodies
81 that have not yet been assessed.

82

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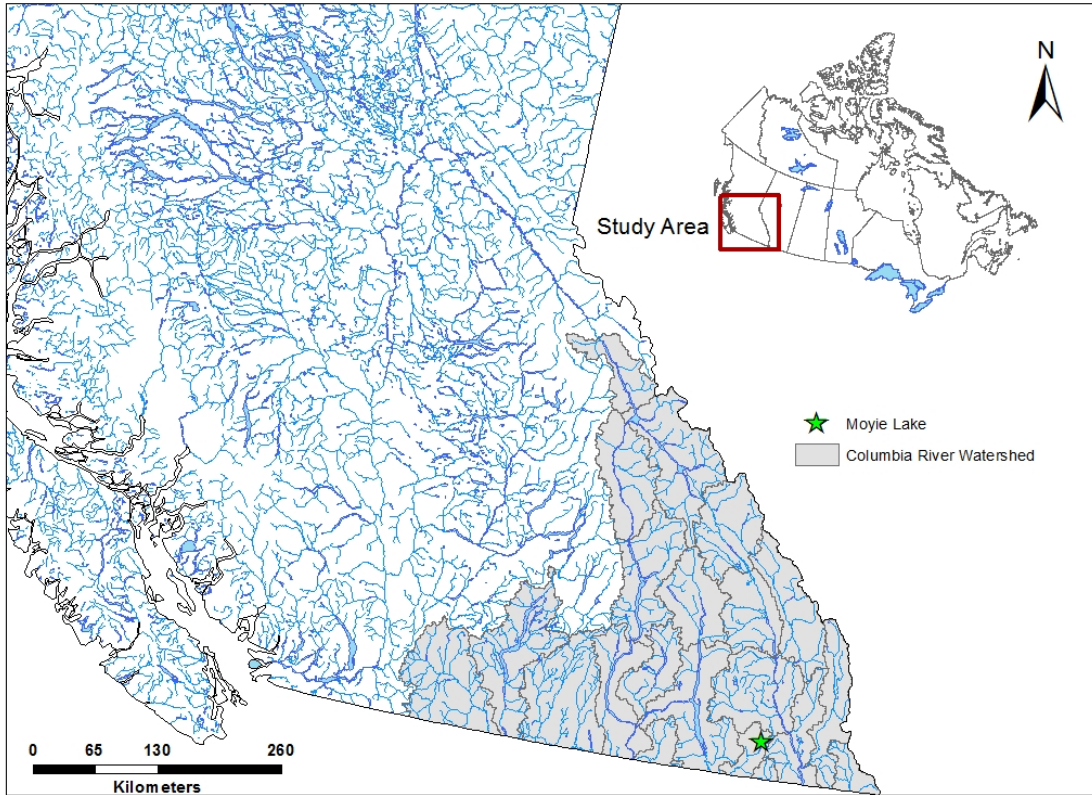
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134 **Figures**



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136 Figure 1. Map of southeastern British Columbia displaying the site of *Faxonius virilis* occurrence
137 at Moyie Lake in the Columbia River watershed.

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