Quatsino Cave Amphipod

Stygobromus quatsinensis

Original prepared by Patrick Shaw

Species Information

Taxonomy

The Quatsino Cave Amphipod is in the order Amphipoda and the family Crangonyctidae. There are 151 recognized *Stygobromus* species in North America, with 50 additional species descriptions in preparation. *Stygobromus quatsinensis* is a member of the largely western *hubbsi* group (Holsinger 1974; Holsinger and Shaw 1987). There are no recognized subspecies.

Description

The Quatsino Cave Amphipod is a translucent, eyeless amphipod crustacean, which ranges from 5 to 7 mm in total body size.

Distribution

Global

Only known from subterranean karstic waters of coastal northwest North America from Vancouver Island to southeastern Alaska, where it was discovered in caves and springs on three offshore islands (Heceta, Dall, and Coronation).

British Columbia

In British Columbia, it is known only from limestone caves in the Quatsino Formation on Vancouver Island.

Forest region and districts

Coast: Campbell River, North Island, South Island

Ecoprovinces and ecosections

COM: LIM, NIM, WIM

GED: NAL, possibly SOG

Biogeoclimatic units

CWH

Broad ecosystem units

N/A (subsurface)

Elevation

100–800 m

Life History

The biology of this species is unstudied, but many aspects are expected to be similar to those of other members of the genus from elsewhere in North America.

Diet and foraging behaviour

Cave habitats tend to be of very low productivity, and potential food sources are sparse. *Stygobromus* amphipods are detritivores, feeding on bacteria, microfungi, organic particles on ingested sediments and possibly on animals (including small insects or other invertebrates) that wash into cave pools.

Reproduction

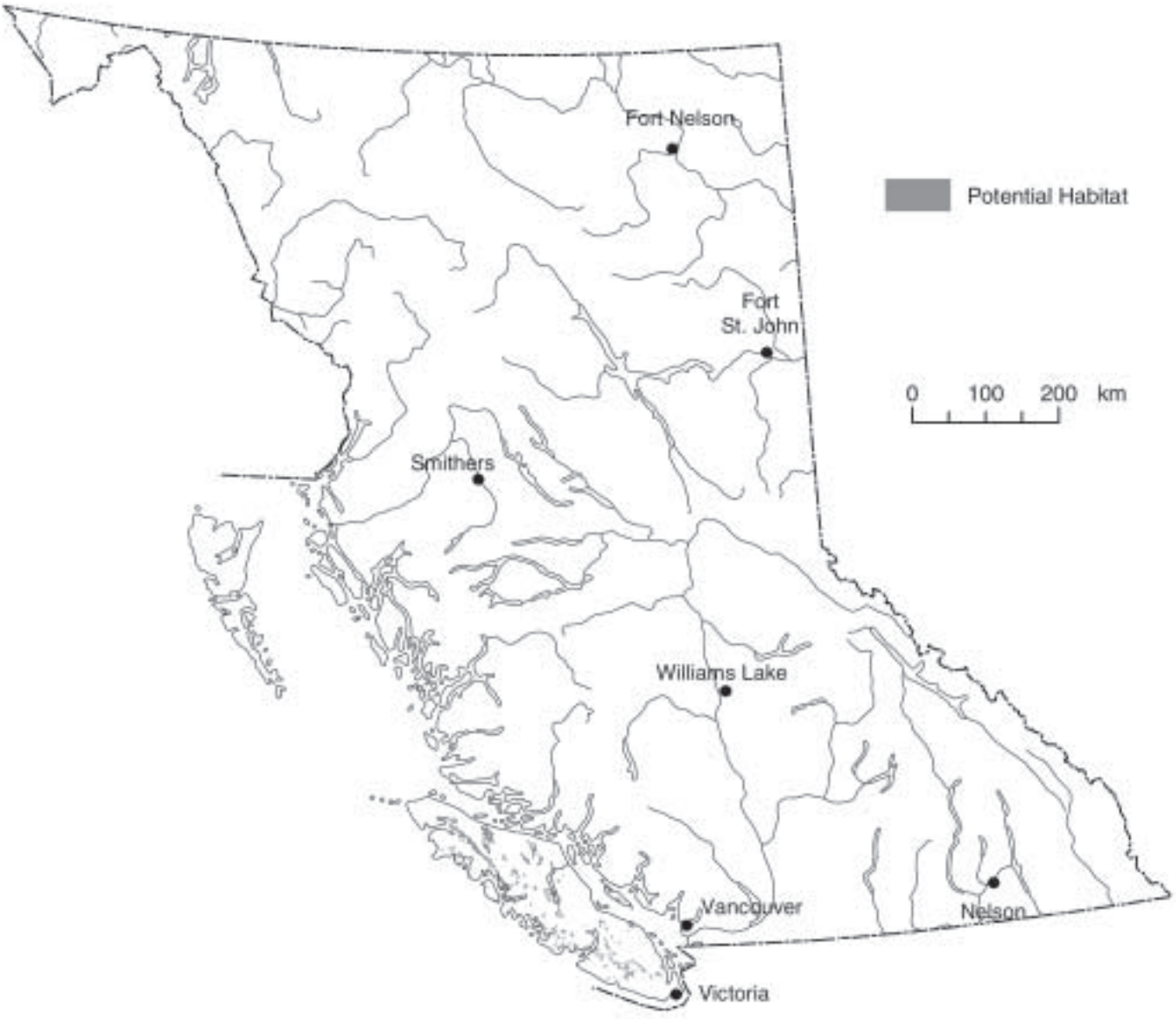
Breeding period or development time is unknown, although ovigerous females have been collected in October. Like all other amphipods, *Stygobromus* females lay a small number of eggs into a ventral brood pouch formed by lateral setose projections of the first segment of the first five of seven legs. Juveniles hatch as miniatures of the adults, and grow to maturity by direct development.

Site fidelity

Unknown.

Quatsino Cave Amphipod

(Stygobromus quatsinensis)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several classifications (Ecoregion and karst topography) as well as current knowledge of the species' habitat preferences.This species may or may not occur in all areas indicated.

Home range

N/A

Dispersal and movements

Dispersal of subterranean aquatic species is through small, continuous water-filled cracks and fissures in suitable bedrock. Both because of the discontinuous nature of carbonate bedrock and the small size of these amphipods, present dispersal is probably limited. In the historical past (pre-glacial, or earlier), conditions must have existed that permitted colonization of widely disparate habitats from Vancouver Island to southeast Alaska.

Habitat

Structural stage

Unknown. Recorded below second-growth forest but highest densities have been found in caves beneath old and mature forest.

Important habitats and habitat features

Inhabits interstitial waters and caves in karst and is known only from coastal regions. Most commonly found in shallow, mud-bottom pools in caves. It has been collected from underground stream gravel. Possible distribution in hyporheic (water between the streambed and groundwater) habitats of surface streams requires further study.

Conservation and Management

Status

The Quatsino Cave Amphipod is on the provincial *Blue List* in British Columbia. Its status in Canada has not been determined (COSEWIC 2002).

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

BC	AK	Canada	Global
S2S3	S?	N3	G3

Trends

Population trends

There are likely 10–20 known occurrences on Vancouver Island. The known occurrences in British Columbia have not been more than one or two individuals, although in one exceptional site, 11 were observed. No studies of population trends have been attempted.

From the known distribution, the present occurrences may represent relic populations that may have been stranded with the recession of continental ice sheets at the close of the Wisconsin Glaciation, approximately 10 000 years before present. Further study in karst of remote areas on mainland British Columbia, on the Queen Charlotte Islands, and at other island exposures of Quatsino Formation limestone may reveal other localities for the species.

Habitat trends

No data.

Threats

Population threats

Only small populations have been found in caves and springs in isolated carbonate karst areas on offshore islands in the Pacific Northwest. A restricted distribution and possible lack of genetic exchange may increase the risk of extirpation.

Habitat threats

This species is threatened by habitat alteration as it is vulnerable to changes in water quality related to surface activity. Forest harvesting and road construction can negatively impact karst areas through infilling from logging debris, changing surface hydrological conditions, increasing soil erosion, and, in some cases, shattering cave roofs (Harding and Ford 1993; Blackwell 1995).

Legal Protection and Habitat Conservation

Currently, this species has no legal protection. Several known localities are within provincial parks or protected areas (e.g., Weymer Creek Karst, Horne Lake Caves) and former forest recreational reserves. Most other known populations are found in the areas designated for "Enhanced Forestry," as described in the Vancouver Island Land Use Plan, including areas in the Tashish drainage, east of Nimpkish Lake, Cowichan Lake (the type locality), and areas surrounding Tahsis.

Adherence to the results based code best management practices for karst features, particularly recommendations for buffers around swallets and harvesting restrictions to minimize soil loss and infilling of epikarst, may provide sufficient protection at sites within the timber harvesting land base.

Identified Wildlife Provisions

Wildlife habitat area

Goal

Maintain long-term, stable habitat sites with good water quality.

Feature

Establish WHAs over swallets where populations have been found.

Size

Typically ≥3 ha but size will depend on site-specific factors.

Design

The WHA should be a minimum 100 m radius around the point where stream goes underground (swallet). Ensure upstream area is provided more protection.

General wildlife measures

Goals

1. Preserve groundwater quality.
2. Prevent habitat loss through infilling and smothering by suspended sediment.
3. Prevent elevated peak flows that would encourage wash out from shallow pools.
4. Minimize sediment and debris transport into swallet streams.
5. Ensure WHA is windfirm.

Measures

Access

- Do not construct roads unless there is no other practicable option and subsurface water quality will not be impacted.

Harvesting and silviculture

- Do not harvest.

Pesticides

- Do not use pesticides.

Recreation

- Do not develop recreation sites or trails.

Additional Management Considerations

Prevent flooding and washout which can remove the amphipods from small habitat pools.

Where populations are prone to wash out from flooding, swallet entrances should be fitted with traps to prevent transport and lodging of wood debris in narrow passages.

Design treatments to open the canopy of second-growth forest in order to increase the quantity and quality of understorey vegetation. This should be done with a minimum of site disturbance and is intended to control surface runoff and siltation.

Maintain riparian reserve zones on any streams entering WHA or directly entering caves and swallets.

Minimize recreational impacts.

Information Needs

1. Detailed distribution information. It is possible that the species is common outside of karst areas in deep gravel interstices and detailed collection in these habitats should be done. In addition, cave sites (such as karst areas on the Queen Charlotte Islands or mainland British Columbia) have not been searched in many areas.
2. Basic life history information. Population densities, site fidelity, and even basic information concerning reproductive periods are unknown.
3. Amongst the 151 *Stygobromus* species, this species is unique in its distribution, which crosses not only geologic but marine barriers. Careful morphological and/or genetic studies should be conducted to establish the relatedness and time of divergence of the disparate populations both in British Columbia and Alaska.

Cross References

Keen's Long-eared Myotis

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