

Columbia Sculpin

Cottus hubbsi

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Disclaimer: The following document was compiled based on a literature review of information currently available for this species as of November 25, 2005. This document can be used to assist with the identification of this species and to support the development of management recommendations as they relate to forestry activities. For more information on this species, please refer to the reference section or consult with a Species at Risk specialist.

Description¹

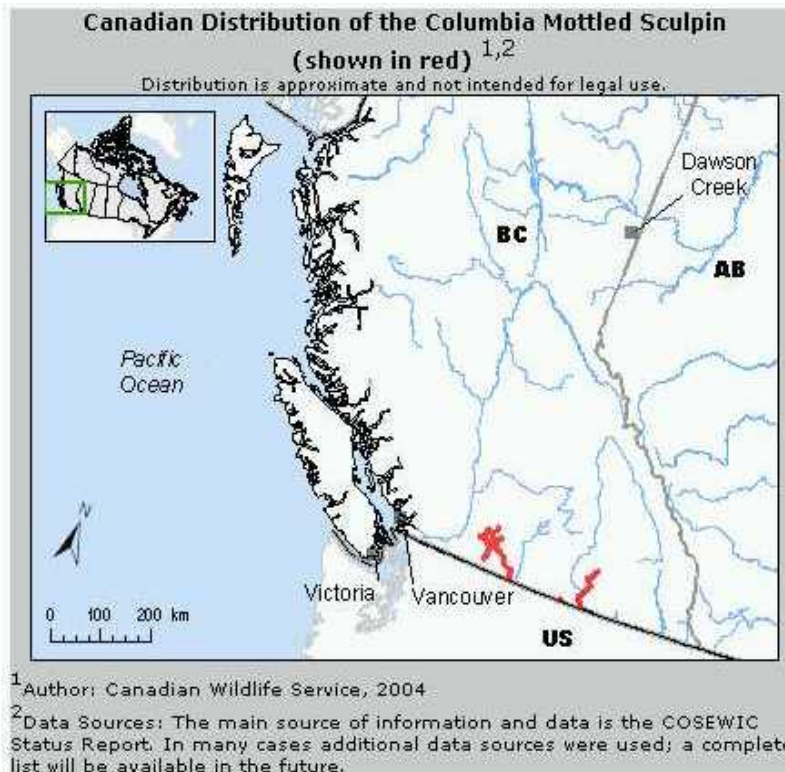
The Columbia sculpin is a small fish that reaches a maximum 10 to 11 cm in length. It is a typically shaped sculpin with dark mottling on the fins, tail and body. It has 15 pectoral fin rays, 3 preopercular spines and 27-29 lateral line pores. In addition, the lateral line extends into the base of the tail fin².

The Columbia sculpin is morphologically distinct from other sculpins in Canada (with the exception of the Shorthead sculpin which is found in the Arrow Forest District) based on several features. These features include the following: (1) no prickles covering the entire body (i.e., only found behind the pectoral fin); (2) well-developed pelvic fin rays; (3) vomerine and palatine teeth; (4) 11-15 anal fin rays; and (5) an upper preopercular spine is not strongly hooked².



Distribution

Restricted to a portion of the Columbia drainage; found in the Similkameen River and its tributaries, the Kettle River below Cascade Falls, the Columbia and Kootenay rivers below Arrow Lakes and Kootenay Lake, and the Flathead River and its lower tributaries³.



Distribution of Columbia sculpin in British Columbia¹.

Ecosections³

- Southern Thompson Upland
- Okanagan Range
- Southern Okanogan Highland
- Selkirk Foothills
- Southern Columbia Mountains
- Border Ranges
- Crown of the Continent

Major Watersheds³

- Okanagan River
- Kettle River
- Columbia River
- Lower Kootenay River
- Pend d'Oreille River

Forest Districts⁴

- Arrow Boundary Forest District (DAB)
- **Cascades Forest District (DCS)**
- Kootenay Lake Forest District (DKL)
- Okanagan Shuswap Forest District (DOS)

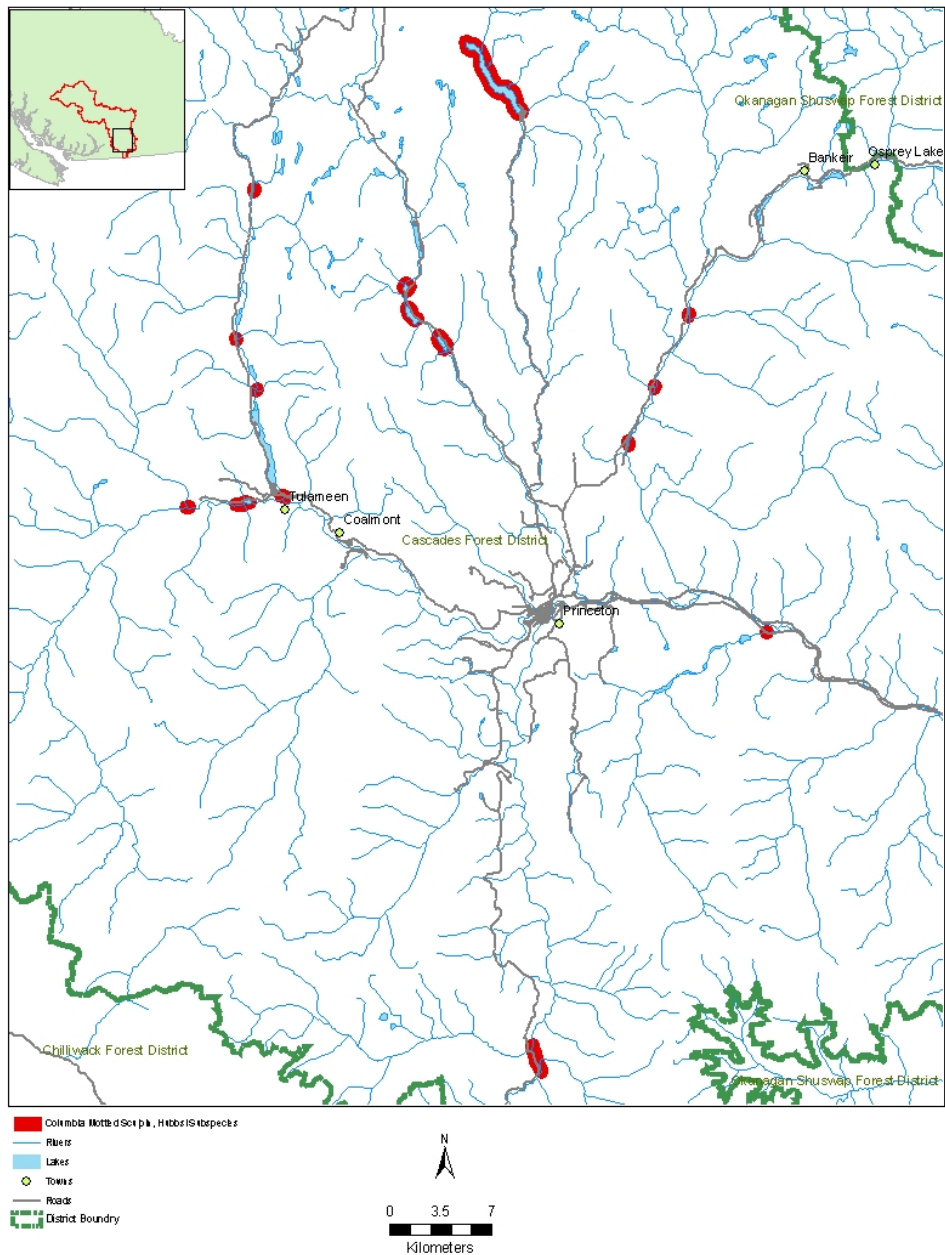
Biogeoclimatic Units⁴

- BG - Bunchgrass
- ICH - Interior Cedar -- Hemlock
- IDF - Interior Douglas-fir
- PP - Ponderosa Pine

Elevation³

370 - 1372 m

Map of Known Locations



Known locations for Columbia sculpin in the Cascades Forest District as of September 2005 (data source: Conservation Data Centre).

Biology

Columbia sculpins spawn in May or June. Females deposit their egg clusters (containing 100-250 eggs) on or under rocks where there is a steady flow of water. Males remain near their nests during egg laying (as long as 5 weeks), incubation (1 to 2 weeks) and through the early fry stage (as long as 2 weeks)¹.

Sculpins are mainly nocturnal foragers. Aquatic insect larvae appear to make up the majority of the diet, but molluscs, fish, and even sculpin eggs may also contribute^{2,5}.

It is unlikely that this species migrate extensively throughout the year, as surveys found specimens at the same sites in British Columbia during spring, summer, fall and winter sampling^{2,5}.

Habitat

Columbia sculpins inhabit river pools in rocky areas below riffles where they disperse to no more than a few hundred metres, only to move back into faster current during the reproductive season.



Photo courtesy of Kim Green

They are generally found in cool streams and lakes, over sandy or rocky bottoms^{3,6,7}. In British Columbia, the species is found in flowing waters ranging in size from small creeks to large rivers, and in montane lakes. In the Flathead River, the species was most abundant in areas of stones where the bottom was not heavily sedimented and there was a slow current, not necessarily in riffles^{3,7,8}. Water temperatures there range as high as 20°C in August. In the Columbia River, sculpins tended to occur in the main river. The inshore area of the swift Columbia River had clean stones, but at depths of 0.6 m or

more the stones were covered in lush green algae; the water was clear and unstained^{3,9}. In the Similkameen drainage, however, the species is common in some of the smaller tributaries^{3,9} and several older collections were made in montane lakes characterized by clear, warm water with (at least in one case) a muddy bottom with some weeds (U.B.C. specimen records).

Important Habitats and Habitat Features¹

The Columbia sculpin generally inhabits rocky riffle habitats in rivers and streams, but may sometimes occur in lakes as well.

Conservation and Management

Status⁴

Provincial Rank: S3 (Rare to uncommon)

CDC List: Blue (Special Concern)

COSEWIC Status: SC (Special Concern) (May 2000)

SARA Schedule: 1 (Special Concern)

Habitat Threats

This species is restricted to portions of rivers that have suitable habitat, and such portions are relatively limited in extent in Canada. In addition, competition with other sculpin species limits the Columbia sculpin to certain portions of rivers; other species are more effective competitors in slower or faster waters¹.

Sculpin populations have been impacted by unnatural fluctuations in water levels, temperature and flow as a result of release of water from hydroelectric and storage reservoirs. Controlled water flow has created conditions more suitable to other species. Dams have eliminated suitable habitats in some areas. Agriculture, mining, logging, pollution from lumber mills, sewage treatment facilities, etc., and other types of human disturbance have had detrimental effects.

Logging influences aquatic habitat through removal of riparian vegetation and roads. The main effects are increased siltation, water temperature and water flow, and changes in productivity. Primary contributors of silt to aquatic habitats include large-scale landslides, bank erosion due to removal of riparian vegetation, and logging roads^{3,10,11,12}. Siltation creates water turbidity and alters bottoms of waterbodies. It can fill up pools and spaces between rocks, or even entirely cover the rock bed.

Riparian vegetation keeps water temperature at suitable levels for many species. The effects of riparian alteration are largest in relatively small, narrow, and shallow waterbodies, such as small cold headwater streams. Removal of riparian vegetation in small streams can increase water temperature by as much as 10 C and be especially harmful to cold-water adapted species. Removal of riparian vegetation has other effects on aquatic habitat including reduced input of downed wood into waterbodies over the long-term, and increased vulnerability to predators and disturbance.

Forest practices can create more barriers to fish movement through inadequately-designed road culverts and debris jams. The effects of such barriers are greatest for species of fish that migrate between overwintering and spawning areas. Removal of riparian vegetation reduces input of downed wood into waterbodies over the long-term.

Downed wood provides habitat by creating large, deep pools which some species use for overwintering and cover from predators, and riffle areas, important habitat for juveniles. It also creates spawning habitat because it traps gravel and breaks up steep areas into areas of deep pools and riffles, overall giving the stream a lower gradient^{10,11,12}.

Management Recommendations

Consult with a Registered Professional Biologist prior to implementing the following management recommendations because information for this species is very limited. Certain situations may require custom solutions based on specific site characteristics.

- Budget permitting, develop a habitat model to help identify high value habitat found within your areas of interest. The complexity of the model, and therefore its accuracy, will be dependent on budgetary constraints.
- Identify locations where this species is known to occur: if available, obtain occurrence data from the Conservation Data Centre (<http://srmwww.gov.bc.ca/cdc/>) and if necessary conduct stream surveys to confirm presence or absence of this species.

In areas where this species has been identified:

- Ensure that roads do not impact stream channel integrity, water quality, groundwater flow, substrate composition, cover, and natural temperature regimes.
- Conduct silvicultural activities in a manner that prevents or minimizes sediment delivery to aquatic habitats where this species may occur (increased silting of substrate reduces habitat quality for this species).
- Consult the Riparian Management Area Guidebook for more information on managing riparian area habitat.
- Do not use pesticides.

References

- ¹ Environment Canada Species at Risk website
http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=624
- ² COSEWIC 2005. COSEWIC assessment and status report on the "eastslope" sculpin (St. Mary and Milk River population) *Cottus* sp. in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 30 pp. Website:
http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Feastslope%5Fsculpin%5Fe%2Epdf
- ³ Cannings, S.G., and J. Ptolemy. 1998. Rare Freshwater Fish of British Columbia. B.C. Minist. Environ., Lands and Parks, Victoria, BC. 214pp.
- ⁴ BC Conservation Data Centre: Website: <http://srmapps.gov.bc.ca/apps/eswp/>
- ⁵ Peden, A.E. 2001. Updated COSEWIC status report on shorthead sculpin (*Cottus confusus*). Committee on the Status of Endangered Wildlife in Canada (COSEWIC), CWS, Ottawa. v + 55 pp.
- ⁶ Scott, W.B., and E.J. Crossman. 1973. Freshwater fishes of Canada. Fish. Res. Board Can., Bull. 184. 966pp.
- ⁷ Peden, A.E., and G.W. Hughes. 1984. Status of the shorthead sculpin, *Cottus confusus*, in the Flathead River, British Columbia. Can. Field-Nat. 98:127-133.
- ⁸ Hughes, G.W., and A.E. Peden. 1984. Life history and status of the shorthead sculpin (*Cottus confusus*: Pisces, Cottidae) in Canada and the sympatric relationship to the slimy sculpin (*Cottus cognatus*). Can. J. Zool. 62:306-311.
- ⁹ Peden, A.E., G.W. Hughes, and W.E. Roberts. 1989. Morphologically distinct populations of the shorthead sculpin, *Cottus confusus*, and mottled sculpin, *Cottus bairdi* (Pisces, Cottidae), near the western border of Canada and the United States. Can. J. Zool. 67:2711-2720. Peden et al.1989.
- ¹⁰ Miller, L.B., D.J. McQueen and L. Chapman. 1997. Impacts of forest harvesting on lake ecosystems: a preliminary literature review. Wildlife Bulletin No. B-84. B.C. Wildlife Branch, B.C. Ministry of Environment, Lands and Parks. Victoria, B.C.
- ¹¹ Porter, M., G. Haas, E. Parkinson. 2000. Sensitivity of British Columbia's freshwater fish to timber harvest: using species traits as predictors of species risk. Fisheries Management Report No. 114, BC Fisheries, Ministry of Agriculture, Food and Fisheries. Victoria, BC.
- ¹² Houde, I., K. Squires, F Bunnell and W Campbell. 2004. Wildlife-Habitat Relationships and Species of Vertebrates at Risk in Operation Areas of Slocan's Divisions. 30pp