

# Freshwater fishes of British Columbia

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## **Web Description:**

The Royal BC Museum Handbook series for herpetology and mammalogy is nearly complete, with only Marine mammals yet to be printed. The previous handbook on freshwater fishes was printed in 1967, and with so many changes to the ichthyofauna of BC, it is necessary to print a new handbook to summarise freshwater fish diversity in this province. McPhail (2007) detailed fish diversity in BC but since his publication, one new species has been found here and he does not detail potential invaders from south of the international border. The book now in progress in the museum handbook series details a wide range of fishes (most exotic to Washington) that could make their way to BC in the next 20 years. In addition to the exotic fishes in Washington, the new handbook provides detailed descriptions of native fishes of BC, all exotic fishes known to the date of publication, and adds some estuarine fishes that regularly move into freshwater. The book de-emphasises angling and is a valuable reference on non-game fishes in a format that is far more portable than the large text by McPhail (2007). The book also is written with the general public in mind, and as such, will be accessible to a far wider audience.

## **Detailed project description**

### **Rationale:**

It has become obvious in recent years that many people in British Columbia do not know the non-game fishes of this province. While game fishes of British Columbia are fairly well known, our knowledge base is terribly biased towards research done elsewhere. This book details game fish as well as non-game fishes (i.e., forage fish, coarse fish, or 'bait') to provide a general overview of fishes in this province, extending to our estuarine environments. Since 2004, at least three species of exotic fishes have become established in British Columbia, with several pet fish released from captivity did not establish breeding populations here. Despite long-term efforts to catalogue fish biodiversity, many species are extremely poorly known and we rely on information from Europe (for some exotics), eastern Canada, the United States, and north in the Beringian region.

This book details endangered species, identifies threats to freshwater fishes, and also details fishes which likely should be split into multiple species (i.e., Threespine Stickleback), as well as providing a general account of fish biology in the province. The book details present species ranges, biology as we know it, and provides detailed keys to make sure anyone can identify fishes correctly. Hopefully, this guide will encourage interest in fishes and future students to research more than just game fishes to create a far more clear picture of BC fish biogeography and ecology.

### **Detailed Description:**

This book details fish distribution, ecology and anatomy in a readily transported book for the general public as well as researchers and government officials.

- 1) species and distributions – The strength of the handbook will be its summaries of species anatomy and biology, as well as species distributions as we now know them. Biological communities are dynamic, some populations go extinct or are wiped out by our actions, others move to new areas. The book in progress details where species are at present, and where they have been lost. The book also details past ecological mistakes, which hopefully will guide people to avoid similar errors in the future. The book details interesting facts about each species as well as personal anecdotes, which I hope generates interest in each organism. Each Family

has an introduction, and for each species, there are the following descriptive sections: 1) scientific and common name, 2) colour illustration and an accompanying verbal description of anatomy, 3) diet, 4) habitat, 5) distribution with range map, 6) reproduction, 7) general notes, and 8) references. Presently there are 24 families and 105 species detailed in the text, many of which are in waters adjacent to BC and so could arrive here soon. Black and white stipple-drawings of anatomy are nearly done, and colour illustrations are started. The inclusion of fishes from the south is intentional to keep the book relevant in case of species invasion via international waterways.

2) online taxonomic keys – the identification keys are prepared for all fishes except for two sculpins which require additional study to define species-specific characters. The dichotomous keys generated for this book can easily be converted to match those produced for marine invertebrates (see research plans for M. Frey). Anatomical drawings produced for the handbook also will be invaluable to help supplement written descriptions of anatomical details in the online key.

**Curator:** Gavin Hanke

**Other Participants:**

**Public Benefits:**

This book will enhance public awareness of all freshwater fishes in British Columbia, including all exotics (including one-off released animals). The book is written in language that is accessible to a broad audience, not just university professors and students. The book will be particularly valuable in that it is small enough to be taken into the field by natural resource officers as well as curious fishermen and naturalists. The book contains simple identification keys that can be used to identify species families of freshwater fishes. The keys are aimed at live or freshly killed fishes with emphasis on external features rather than internal anatomy. The identification keys also can be hosted on the RBCM website as a freely accessible tool for both researchers and the general public.

**PARTNERSHIPS:**

DFO – species distribution records.  
MOE – species distribution records.  
UBC – species distribution records.

**Short-Term Outcomes:**

2011-2012: Generate species accounts incorporating information from McPhail (2007), and new information from primary literature since 2007. Complete colour illustrations of fishes and black and white stipple drawings of fishes to supplement identification keys and descriptions of general fish anatomy.

**2012 UPDATE:**

- 1) Introduction to Fish Anatomy
- 2) Biogeography as it relates to fishes in BC
- 3) Glaciation as it relates to fishes in BC ([will need to be shortened/massaged](#))

4) Fish Habitat, Threats, Collecting Methods, Specimen Preservation

5) Species Accounts as follows:

**LAMPREY** (Petromyzontidae), 4 species

**STURGEON** (Acipenseridae), 2 species

**HERRING** (Clupeidae), 1 species

**MOONEYE** (Hiodontidae), 1 species

**MINNOWS** (Cyprinidae), 22 species

**SMELT** (Osmeridae), 4 species (colour pictures done)

**SALMON/WHITEFISH/GRAYLING** (Salmonidae), 23 species

**PIKE** (Esocidae), 2 species

For all of these above 8 families, I'll need to look up new primary literature since 2007, and get maps and colour illustrations done.

That leaves the accounts of the other fishes (6 suckers, 1 loach, 7 catfish, 3 stickleback, 1 troutperch, 1 cod, 11 sculpins, 10 bass, 2 perch, 2 temperate bass, 1 flatfish, 1 tetra, 1 mosquitofish, 1 surfperch, 1 armoured catfish, 1 killifish) mostly done, and only needing addition of new primary literature and notes from McPhail (2007) .

BASICALLY, Text for 59 species is done, with 50 to go. Attached is an example of a species that is still in rough-form – basically I have rough drafts like this for all of the 50 species yet to go, and just need to incorporate recent literature and details from McPhail's book. Things are really moving along.

If I eliminate fishes in Washington that are high-risk to invade here (i.e., chain pickerel, grass carp, killifish, some catfish) and "one-off" arrivals here (i.e., tetras, armoured catfish) then I have 57 done and about 36 to go. Presently I am including a wide range of fishes from Washington that are close to our border just in case they invade, as well as common fishes that invade the lowest reaches of our rivers above tidal influence. If my book covers all them, then it is not obsolete so quickly. Don McPhail's book already is 1 species short of our present diversity.

**Long-Term Outcomes and Completion Date:**

2012-2014: Conduct field work to photograph underwater habitat, representative lakes and streams to supplement habitat descriptions in the book's introduction. Complete species distribution maps, remaining text and illustrations. Submit for review and revisions. Note that the publication date (see Planned Publications below) is an estimate to allow for reviews, text editing, and printing.

**Community Outreach:**

Presently there is no community outreach planned regarding the preparation of the document. The online identification keys will be available to the public through the Royal BC Museum website.

**Collection Work and Acquisitions:**

Fieldwork requiring Collections staff: none

Approximate number of specimens to be collected: none

Approximate number of backlog specimens to be processed: none

**Planned Publications:**

Hanke, G.F. 2015. Museum Handbook 5: Freshwater Fishes of British Columbia. Royal BC Museum, Victoria, (presently is 264 pages without maps and illustrations).