

**Annotated Checklist of the
Introduced Species of Freshwater Fish of British Columbia (2008)**

by Don McPhail

Alosa sapidissima – The American shad. This eastern North American species is anadromous (it breeds in fresh water but lives most of its life in the sea). It was introduced into San Francisco Bay in the late 1800s and spread rapidly in the North Pacific. Although shad occasionally enter the Fraser River (as far upstream as Hope), they have never become established in B.C.. They are not necessarily a warm-water species, they do better at warmer temperatures than salmonines. Consequently, if shad do establish themselves in the Fraser River, it may signal that something is seriously wrong with the river. Their history in the Columbia system suggests that once they become established, they can adapt to new conditions and become very numerous over a relatively short time (about 50 years). What millions of new planktivores would do to the ecological balance in the Strait of Georgia is hard to predict, but it probably would not be good.

Carassius auratus – The goldfish. In B.C., this common aquarium fish is regularly released into the wild; however, it rarely establishes feral populations. Typically, feral populations are associated with small lakes, ponds, or sluggish sloughs in parks, golf courses and housing developments. They often are associated with dense vegetation and waters with a strong diel oxygen pulse. Goldfish can tolerate a wide range of temperatures and are unaffected by ice cover; however, they require water of 15–25°C to breed. Consequently, they are unlikely to establish self-sustaining populations in central or northern B.C.

Cyprinus carpio – The common carp. This Eurasian species first appeared in Okanagan Lake in 1917 and reached the Fraser system (southern Shuswap drainages) by 1928. It is now well established in these systems. Adult carp typically are found in quiet, warm, eutrophic waters (i.e., the shallows of lakes and sluggish, soft-bottomed streams and sloughs).

Pimephales promelas – The fathead minnow. The first B.C. introduction of this Great Plains minnow probably via a “bait bucket” into Two Island Lake near Tupper, B.C. Since the original introduction it has turned up in the Fraser Valley and elsewhere in the province. They are usually associated with heavy vegetation and low oxygen conditions.

Misgurnus anguillicaudatus – The oriental weatherfish. This common aquarium species is the most recent alien species to gain a foothold in BC (in the lower Fraser Valley). It is a native of northeastern Asia and will probably thrive in quiet water habitats in the lower Mainland. It is a small fish and is unlikely to directly effect any of our native species.

Ameiurus melas – The black bullhead. This is an introduced eastern North American species. In B.C., black bullheads typically occur in altered environments that contain a high proportion of non-native species (e.g., the Okanagan drainage system and the Kootenay River near Creston). It is not clear what impacts, if any, the black bullhead has had on our indigenous fishes.

Ameiurus natalis – The yellow bullhead. This introduced eastern North American species was recently recorded from Silvermere Lake near Ruskin. This lake is man-made and mostly contains introduced species. Consequently, the yellow bullhead in Silvermere

Lake probably was not a serious threat to native fishes; however, it has spread downstream into the Fraser River Delta and, presumably, into the intervening waters. Since this species prefers clearer water than either of the other two introduced bullheads, eventually it will probably spread throughout the lower Fraser Valley. It is not clear what effects the yellow bullhead will have on our native species, but they are unlikely to be beneficial.

Ameiurus nebulosus – The brown bullhead. This species is an introduction from eastern North America. For many native species, the introduction of brown bullhead into small lakes has been a disaster. For example, on Vancouver Island, Lasqueti Island, and in the lower Fraser Valley, native populations of threespine stickleback (*Gasterosteus aculeatus*) — including one of the unique benthic–limnetic species pairs — have disappeared following the introduction of brown bullhead. Threespine sticklebacks build their nests on the substrate, and these extirpations probably result from nocturnal predation on their eggs.

Salmo salar – The Atlantic salmon. Historically, sporadic attempts were made to introduce Atlantic salmon into B.C. waters. They all failed. This does not mean that Atlantic salmon could never establish viable populations in our coastal rivers. Most of the early introductions involved delicate life-history stages (e.g., eyed eggs and alevins) that suffer high mortalities even in their native waters. Moreover, our native stocks of salmon and trout, especially those with stream-rearing phases in their life histories, were strong. Consequently, the early introductions were made into highly competitive environments. This has all changed in recent years. Now, populations of our native stream-rearing salmonines (especially coho, *O. kisutch*, Chinook, *O. tshawytscha*, and steelhead, *O. mykiss*) are depressed, and many stocks are either endangered or extirpated. Also, millions of Atlantic salmon are now reared in sea pens along our coast, and thousands of juveniles and adults inevitably escape into the wild. Furthermore, there is concrete evidence that some of these escaped fish have successfully spawned in B.C. rivers, and there is evidence of more than one age class of young in some rivers (e.g., the Tsitika River). Still, it is not certain that any of these successful reproductive events have produced self-sustaining populations. Nonetheless, the possibility that Atlantic salmon could become established on the B.C. coast can no longer be dismissed out of hand. Consequently, it behooves government agencies responsible for the management and conservation of indigenous fishes to seriously examine the potential impacts of Atlantic salmon on native species.

Salmo trutta – The brown trout. This introduced Eurasian species is now well established on Vancouver Island, especially in the Cowichan River system. Although it is an excellent recreational species and, in suitable habitat, is resistant to angling pressure, the time has past when any government agency can in good conscience spread alien species into waters where they do not now occur.

Salvelinus fontinalis – The brook trout. Although introduced brook trout are a popular recreational species, they pose a threat to our native salmonines. They occupy habitats similar to those used by our indigenous trout and char, compete with native species for food and space, and in some cases they displace native species. Additionally, they readily hybridize with Dolly Varden and bull trout. For these native char, competitive interactions with brook trout are exacerbated by genetic contamination through hybridization. Hybrids between brook trout and bull trout are mainly males and are

thought to be partially sterile. Molecular analyses, however, clearly indicate backcrossing. Thus, in the upper Skagit River system, hybrids between bull trout and brook trout are more numerous than “pure” brook trout. Additionally, in small tributary streams, most of the fish that appear to be brook trout are, in fact, hybrids (including backcrosses) between Dolly Varden and brook trout. Given their potential for adverse effects on our native fauna, no further introductions should be made into waters that do not already contain brook trout.

Lepomis gibbosus – The pumpkinseed. This eastern North American fish is an attractive little pest. It competes with native species and has extirpated some scientifically valuable stickleback populations on Vancouver Island. It is still spreading on Vancouver Island and the B.C. mainland. Apparently, people keep small pumpkinseeds as aquarium fish but release them when they get too big or become a nuisance. Thus, in B.C., humans almost always spread this species.

Lepomis macrochirus – The bluegill is another eastern North American species. It is a relatively new introduction into B.C. waters and it is too early to assess their impact on native species. So far, they are confined to the south Okanagan, and the only conservation concern is keeping them from spreading to other drainage systems. Still, except for competitive interactions with native planktivorous species, they probably are not a serious threat to our aquatic biodiversity.

Micropterus dolomieu – The smallmouth bass. This eastern North American species was introduced into B.C. to provide angling opportunities and although it is a popular recreational species, it is not a native species and none of our native fishes have co-evolved with this efficient predator. Consequently, it has a devastating impact on small species. On Vancouver Island, it has eliminated the native fish species and macroinvertebrates in most of the lakes where it has been introduced. Deliberately introducing this species to waters where it does not occur is an inexcusable act of ecological vandalism. The recent illicit introduction of this species into the Fraser system (in the Quesnel area) is cause for concern. If the smallmouth bass spreads in the Fraser system, it could have a serious impact on Pacific salmon populations.

Micropterus salmoides – Largemouth bass. Like the smallmouth bass, this eastern North American species was introduced into B.C. to provide angling opportunities; however, they wreak havoc with native fishes and little can be done to control their spread once they are introduced into an open system like the lower Fraser River. Only time will reveal the full extent of the impact of largemouth bass on aquatic biodiversity in the Fraser Valley; however, illicit introductions of this voracious predator into drainage systems where they do not occur constitute an inexcusable act of ecological vandalism.

Pomoxis nigromaculatus – The black crappie. This is an eastern North American species. It is not a benign addition to our fish fauna: most small native fishes have disappeared in lakes containing black crappie (e.g., Whonnock Lake near Ruskin). It is not clear if these extirpations result from competitive interactions, predation, or both. What is clear is that this species should never be introduced into waters where they do not occur.

Perca flavescens – The yellow perch. Most B.C. populations of this species are introduced; however, it is possible that the Swan Lake population near Tupper in the Peace Region is native. It is indigenous to Peace River drainages in adjacent Alberta and was first recorded from Swan Lake in B.C. in the 1950s.

TRANSLOCATED SPECIES---Species native to BC but that have been transplanted to areas of BC that are outside of their native range. There are two types of these transplants: 1) transplants of BC populations into other areas of BC, and 2) transplants of populations from outside of BC (mostly from central Canada).

Type 1 transplants:

Oncorhynchus clarkii lewisi – The westslope cutthroat trout. The native B.C. range of the westslope cutthroat is the southeast part of the province (especially the Kootenay drainage system). This subspecies has been transplanted to lakes in the Peace River drainage.

Oncorhynchus mykiss – The rainbow trout. This is the most common and popular trout in B.C. It has been widely introduced into barren lakes throughout BC. Unfortunately, it has been introduced into the range (areas in the Kootenays) of the westslope cutthroat. The two species hybridize in these areas and there is evidence that the rainbow displaces the westslope cutthroat in some rivers.

Type 2 transplants

Coregonus clupeaformis – The lake whitefish. This species is native to central and northern B.C.; however, stocks from eastern North America have been introduced into lakes in the Okanagan and Kootenay drainage systems. The taxonomy of this complex of species is still confused. We may have one or, perhaps, two species in B.C.

Salvelinus namaycush – The lake trout is native to the northern half of the province; however, eastern lake trout have been planted in some southern lakes..

Esox lucius – The northern pike. Pike are abundant in suitable habitats in the northeastern part of the province (Mackenzie River system) and in the upper Yukon system. Pike have been introduced into Kootenay and Pend d'Oreille River system. They are now established in the Kootenay River, and it is probably only a matter of time before they disperse downstream into the Pend d'Oreille system in B.C. Although they will provide a different angling experience, their overall impact on native fishes is likely to be negative.

Sander vitreus – The walleye is indigenous to the northeast corner of B.C. but eastern North American walleye have been introduced into the Columbia River system.