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# NATIVE FISHES OF IDAHO

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# NATIVE FISHES OF IDAHO

*By*

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## Dedication

In memory of Richard L. Wallace: an educator, colleague and friend.

DWZ



*Photo courtesy Ned Horner 2001*

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Many individuals and organizations contributed to the completion of this book. In particular, the following individuals assisted with the preparation of the species descriptions: Karen Pratt, Jody Brostrom, Tim Cochnauer, Fred Partridge, Ned Horner, Bill Horton, Steve Elle, Rob Van Kirk, Ernest Keeley, and Bruce Rieman. The manuscript was improved by the comments of Gerald Smith, Melo Maiolie, Kevin Meyer, Tom Curet, Ryan Hardy, Terry Maret, Jim Fredericks, Scott Grunder, Joe DuPont, Dan Garren, Chip Corsi, Evan Brown and David Parrish.

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# NATIVE FISHES OF IDAHO

## *Preface*

This book is a field guide to the native fishes of Idaho. Our purpose is to raise awareness of native fishes, particularly the non-salmonid species. We view the primary contributions of this book to be updates of the known distributions of native fishes since the development of early taxonomic keys (Stanford and Miller 1951, Simpson 1962, Linder 1970) and the publication of the Fishes of Idaho (Simpson and Wallace 1978, 1982). We hope to document our lack of knowledge concerning the conservation status of native fishes in Idaho. We provide accounts of 44 taxa (species, subspecies and morphotypes) of fish native to Idaho. Of these, 25 have no defined studies of their distribution or ecological attributes in Idaho. The account for each taxon contains descriptions of the physical attributes, distribution, habitat, diet, ecology and Idaho conservation status. By way of comparison, at least 56 taxa (Appendix A) of fish are known to have been introduced into Idaho waters.

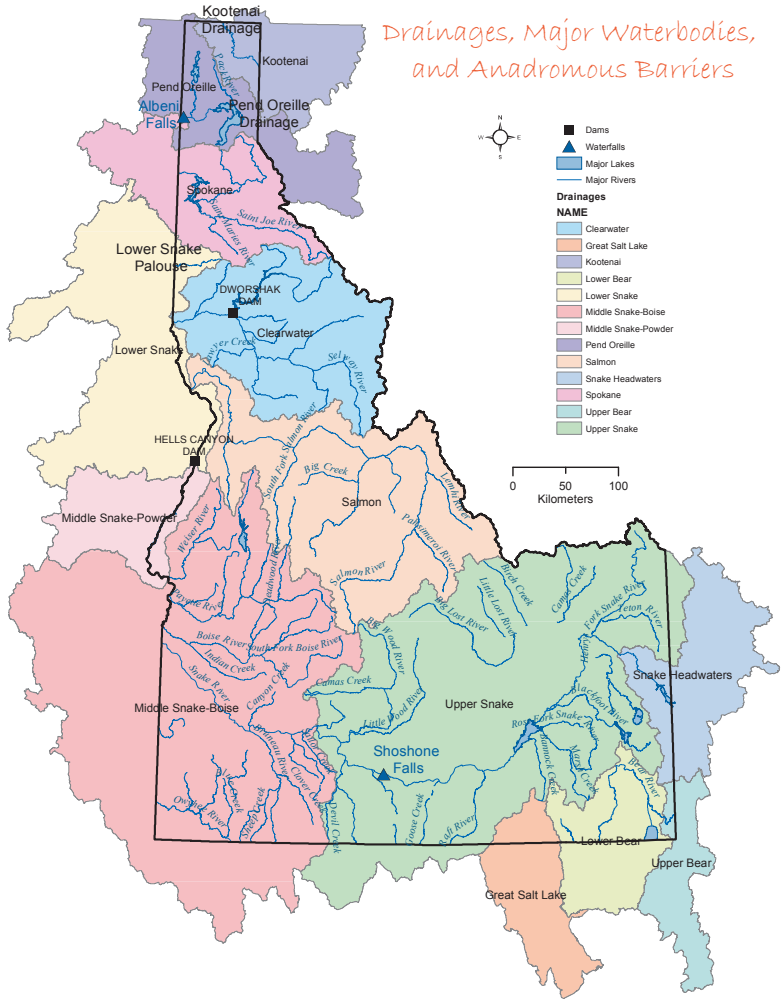
We have estimated the probable range of these fishes at the U.S. Geological Survey cataloging unit scale (HUC4 and sub-drainages). Areas were included based upon specimens housed at the Orma J. Smith Museum of Natural History, and detections reported in the Idaho Department of Fish and Game standard stream survey, fish presence\_streams and fish presence\_lakes, and collecting permit databases. Probable range was also estimated where data were absent from a HUC4, but there were detections in upstream and downstream HUC4s. Additionally, if there was suitable and accessible habitat in between the detections, then we included the area in the probable range. Organizations contributing specimens or data include the Idaho Department of Fish and Game, Idaho Department of Environmental Quality, U.S. Forest Service, U.S. Geological Survey, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Nez Perce Tribe, Shoshone-Bannock Tribe, NOAA Fisheries, Boise State University, Brigham Young University, The College of Idaho, Orma J. Smith Museum of Natural History, Idaho State University, Kootenai Tribe of Idaho and the University of Idaho. We illustrate apparent long term expansions and contractions of native ranges where they are known to have occurred through human activity. For example, we show historic and current anadromous

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range for fishes which may exhibit anadromous life histories. We do not show locations or include areas where fishes have been stocked outside of their native range (e.g. Yellowstone cutthroat trout). We only show locations of vouchered specimens, and do not show locations from all other data sources for the sake of clearly illustrating probable range within historic native range.

Our hope is this book will stimulate a desire in landowners, anglers, natural resource managers, scientists and political leaders to gather the basic ecological information needed for informed management of all the native fishes in Idaho.

# Idaho Surface Water Drainages



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## Zoogeography Of Idaho's Native Fishes

The study of the geographical distribution of animals is called zoogeography. This branch of science is concerned with the distribution of animals in space and time. Zoogeographers not only describe existing patterns of distribution, but also try to explain how and why such patterns were formed. When studying animal distribution, scientists must not only have knowledge of the evolution, paleontology, and ecology of the animals of concern, but they also must know something of the past geology of the area under study. Another concept of importance in studying distribution of animals is that organisms continue to disperse into favorable areas unless they encounter a barrier to this dispersal. Time also is an important factor. Current patterns of distribution evolved over hundreds of thousands, perhaps millions of years. Another important feature of this field of study is that scientists consider only the natural distribution of animals. In our case, we try to only consider the natural distribution of fishes in Idaho. Fishes, especially sport fishes, have been widely introduced all over the world by humans. They and other fishes have been widely introduced into Idaho's waters.

Freshwater fishes are of unique importance in zoogeography because they are as closely confined to land masses as are any terrestrial animals. Indeed, they are inescapably confined to their own river (drainage) systems and can disperse from that drainage to the next mainly by slow changes of the land itself. When studying fish distribution, one can classify fishes into three groups: strictly freshwater fishes, those that are confined to fresh waters and are believed to have an ancient physiological inability to survive and multiply in salt water; mainly freshwater fishes, those fishes that largely are restricted to freshwaters but are salt tolerant and capable of crossing narrow sea barriers; and the rest of the fishes found in fresh water. This latter group includes fishes that regularly migrate between fresh and salt water (anadromous species, such as salmon and many trouts and chars) and fishes that are found in freshwater but belong to marine groups of fishes (such as burbot, the only freshwater member of the cod family).

So, then, what are the barriers to the dispersal of freshwater fishes? The first obvious barrier is salt water itself. Salt water will restrict the dispersal of strictly freshwater fishes. All other fishes found in the fresh waters of the world may have been able to move through

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salt water sometime during their life. The second barrier is the land and associated features. Land itself is a very effective barrier to fish dispersal. Mountain ranges form a combination of barriers. There is a discontinuity of water. Temperature may be an important barrier (the greater the elevation the colder the water temperature, which is a barrier to warm water fishes). The faster current in high elevation streams is a barrier to some fishes. Waterfalls are a significant barrier to the dispersal of fishes in fresh waters.

The fish distribution patterns we observe in Idaho are influenced by glaciation, barrier falls, mountain passes, volcanic and erosional processes. Northern Idaho is drained by the upper Columbia River (Kootenai, Pend Oreille, and Spokane systems). The formation of and release of water from Glacial Lake Missoula formed Kootenai Falls (on the Kootenai River in Montana), Albeni Falls (Pend Oreille River just upstream from the Idaho/Washington border), Spokane Falls (in Spokane, Washington), and Palouse Falls (southeast of Washtucna, Washington) have all modified or prevented the dispersal of anadromous fishes (salmon and steelhead trout) into what is now Idaho.

The Snake River drains most of the rest of Idaho. Shoshone Falls near Twin Falls is the most important barrier falls to fish distribution in Idaho. These waterfalls restrict fish movement, resulting in the possibility of different fish assemblages above and below the falls. This falls has prevented anadromous fishes and other native fish in the main Columbia drainage from dispersing above it and occupying the upper Snake River. The Snake River drainage above Shoshone Falls contains minnows and suckers that also occur in the Bear River drainage of Idaho, Utah and Wyoming. Glacial floods from ancient Lake Bonneville into the upper Snake River allowed an exchange of fish between the Snake and Bear river drainages. The Lost River drainages of southern Idaho were isolated from the Snake River by the Snake River Plains volcanic flows which allowed species like the resident mountain whitefish to evolve into potentially new species. The Little Lost River drainage contains bull trout and shorthead sculpin that are not known to occur elsewhere in the Snake River drainage above Shoshone Falls. One theory of this occurrence is that the headwater capture of portions of Salmon River tributaries allowed these two species to cross into the Snake River drainage. Another theory of how fish may cross a mountain barrier is through a mountain pass. An example of this dispersal method is Two-Ocean

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Pass in Wyoming. In this pass, the headwaters of the Snake River are separated from headwaters of the Yellowstone River by a marshy area containing beaver ponds. During high water episodes, fish may have been able to cross the continental divide through this pass. These theories and examples may explain some of the distribution of native fish we currently see in Idaho.

In addition to these natural barriers, Hells Canyon Dam on the Snake River and Dworshak Dam on the North Fork of the Clearwater now block fish passage in Idaho. These two structures block access to an estimated 55 percent of the historic anadromous stream kilometers in the state.

# Key to Native Idaho Fish Families

- Mouth is a sucking disc, without jaws. No paired fins. Single nostril, seven round gill openings on each side (Figure 1).

## Petromyzontidae – lamprey



Figure 1

Jaws well developed, no sucking disc. Nostrils paired and paired fins present . . . . . 2

- Body has five longitudinal rows of bony plates or scutes, each with a keel or spine. Upper lobe of caudal fin longer than lower lobe (Figure 2).

## Acipenseridae – sturgeon

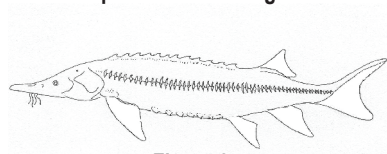


Figure 2

Body without bony plates, but body may be fully scaled. . . . . 3

- Adipose fin present. . . . . 4

Adipose fin absent . . . . . 5

- Pectoral and anal fins with soft rays only. Axillary process present at base of pelvic fin (Figure 3).

## Salmonidae –

### char, salmon, trout and whitefish

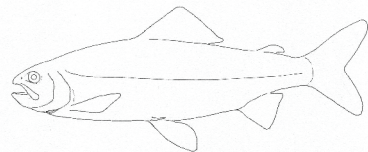


Figure 3

Pectoral and anal fins with one or two spines (Figure 4).

## Percopsidae – trout perch

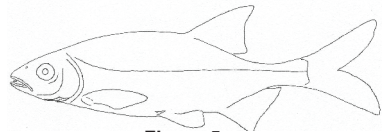


Figure 4

- 
5. Body covered with conspicuous scales .....6  
 Body without scales or scales are greatly reduced .....7

**Cyprinidae – minnows**

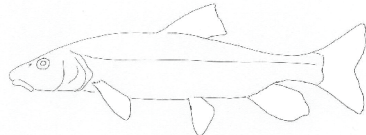
6. Mouth terminal (sub-terminal in dace), pelvic fins even with or slightly ahead of dorsal fin (Figure 5).



**Figure 5**

**Catostomidae – suckers**

Mouth inferior, protractile, consisting of fleshy lobes, pelvic fins behind dorsal fin (Figure 6).



**Figure 6**

**Gadidae - cod**

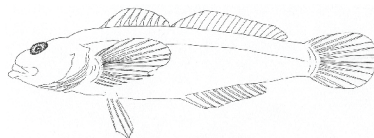
7. Chin with a barbel at the point of the jaw, body is "eel-shaped" (Figure 7).



**Figure 7**

**Cottidae - sculpins**

Chin without a barbel, body tapering strongly from head to tail (Figure 8).



**Figure 8**



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# Key to Native Idaho Fish Species

## Petromyzontidae - lamprey

One species native to Idaho. Main tooth bar above the mouth (supraoral lamina) with three cusps . . . . . ***Entosphenus tridentata* – Pacific lamprey**

## Acipenseridae - sturgeon

One species native to Idaho. Snout elongated into a rostrum, four barbels on the bottom surface of the snout. Bony plates between pelvic fins and anal fin in two rows of 4 to 8 plates . . . . . ***Acipenser transmontanus* – white sturgeon**

## Salmonidae - char, salmon, trout and whitefish

1. Body has light spots on a dark background (excluding parr marks). Genus *Salvelinus* – char. One species native to Idaho. No black speckles or bands in dorsal fin . . . . . ***Salvelinus confluentus* – bull trout**  
Body has dark spots on a light background. Genus *Oncorhynchus* (salmon and trout) or genus *Prosopium* (whitefish) . . . . . 2
2. Scales small, more than 100 in the lateral line; teeth on the jaw are obvious, upper jaw extending to or beyond back edge of the eye.  
***Oncorhynchus* – salmon and trout** . . . . . 3  
Scales large, fewer than 100 in the lateral line; teeth on the jaw not obvious, upper jaw typically not extending beyond the eye. ***Prosopium* – whitefish** . . . 9
3. Anal fin with 12 or fewer rays, trailing edge of anal fin is roughly perpendicular to longitudinal axis of the body. Trout . . . . . 4  
Anal fin with 13 or more fin rays, trailing edge of anal fin is roughly at a 45° angle to the longitudinal axis of the body. Salmon . . . . . 7
4. Bright red slash along lower jaw; typically, no spots or only minute black specks on top of head; nine or fewer pelvic fin rays. Cutthroat trout. Three subspecies currently recognized in Idaho . . . . . 5  
No red slash along lower jaw or only a yellow or orange mark. Typically, numerous spots on the top of the head; ten or more pelvic fin rays. Redband (rainbow) trout. . . . . 6
5. Small irregularly-shaped spots. Typically, no spots on the lower sides or abdomen. Salmon River drainage and north to Canada is native range in Idaho. ***Oncorhynchus clarkii lewisi* – westslope cutthroat trout**  
Large, rounded spots. Sparse spotting on the lower sides or abdomen. Snake River and tributaries above Shoshone Falls, Beaver Creek and Medicine Lodge Creek are native range in Idaho. . . . .  
***Oncorhynchus clarkii bouvieri* – Yellowstone cutthroat trout** . . . . .

---

Small irregularly-shaped spots profusely scattered on the body; dorsal, adipose and caudal fins. Palisades Reservoir, Salt River and tributaries are the known native range in Idaho. . . . .

***Oncorhynchus clarkii bouvieri* – Snake River finespotted cutthroat trout**

Relatively large spots somewhat evenly spread over the sides of the body. Bear River, Bear Lake, Malad River and Deep Creek (southeast Idaho) are native range in Idaho. . . . .

***Oncorhynchus clarkii utah* – Bonneville cutthroat trout**

6. Large profuse spots on the body and band of red pigment along lateral line. Spotting and pigments most pronounced in stream resident form (redband trout), and less pronounced in anadromous, or sea-run form (steelhead). Kootenai, Clearwater, Salmon and Snake River below Shoshone Falls and tributaries are native range in Idaho. ***Oncorhynchus mykiss gairdneri* – redband trout and steelhead**

7. Thirty or more gill rakers (Figure 9). . . . .

***Oncorhynchus nerka* – sockeye salmon and kokanee**

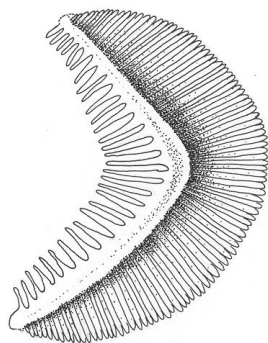


Figure 9

Fewer than 30 gill rakers (Figure 10). . . . . 8

8. Teeth in adults set in black gum line; small black spots on both lobes of the caudal fin. . . . . ***Oncorhynchus tshawytscha* – Chinook salmon**

Teeth in adults set in white gum line; spots on tail absent or present on upper lobe only. ***Oncorhynchus kisutch* – coho salmon**

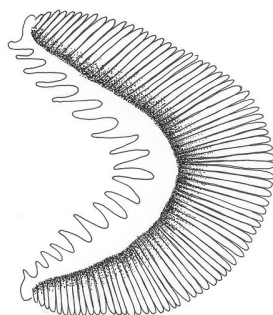


Figure 10

9. Snout long and sharp. Lower jaw extends to or beyond upper jaw when mouth is closed (Figure 11). .  
***Prosopium gemmifer* – Bonneville cisco**



Figure 11

- Snout short and blunt. Lower jaw does not extend to upper jaw when mouth is closed (Figure 12). . .10

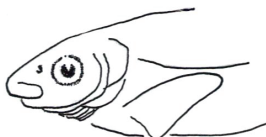


Figure 12

10. Lateral line scales 65 or less. ***Prosopium coulterii* – pygmy whitefish**  
 Lateral line scales more than 65. . . . . 11
11. Lateral line scales 67-78 (typically 69-74). Scales around body forward of dorsal fin 38-43. ***Prosopium abyssicola* – Bear Lake whitefish**  
 Lateral line scales 74-94 (typically 80-90). Scales around body forward of dorsal fin 44 or more. . . . . 12
12. Anal fin rays 12 to 13. Length of the base of the anal fin is approximately one-half (0.5-0.6) the length of the head. ***Prosopium williamsoni* – mountain whitefish**  
 Anal fin rays 9 to 11. Length of the base of the anal fin is approximately one-third (0.4-0.3) the length of the head. ***Prosopium spilonotus* – Bonneville whitefish**

## Key to Cyprinidae – minnows

1. Lower jaw has a straight-edged plate (Figure 13, just developing on juveniles. Narrow caudal peduncle.  
 ..... ***Acrocheilus alutaceus* – chiselmouth**

Lower jaw without straight-edged plate. .... 2

2. Anal fin long, 10-22 rays. Body deep and strongly compressed laterally ..... ***Richardsonius balteatus* – redbreasted shiner**

Anal fin typically with fewer than 10 rays. Body not deep or strongly laterally compressed. .... 3

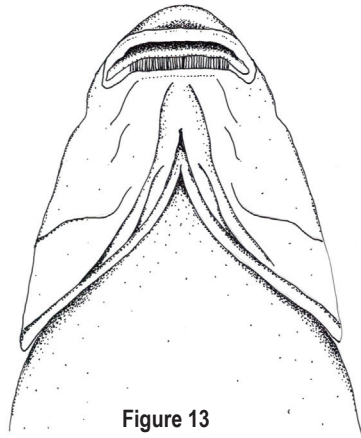


Figure 13

3. Mouth distinctly inferior (Figure 14).  
 ..... 4

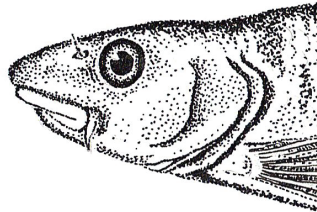


Figure 14

Mouth not distinctly inferior (Figure 15). .... 7

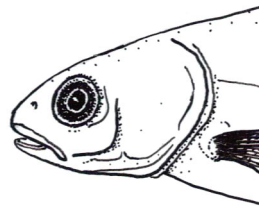


Figure 15

4. Premaxillaries not protractile, a frenum or "bridge" interrupts the upper lip and connects with the snout (Figure 16). . . . .

***Rhinichthys cataractae* – longnose dace**

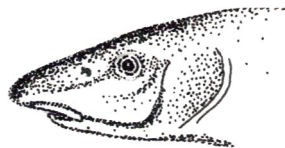


Figure 16

- Premaxillaries protractile. The upper lip is completely separated from the snout (Figure 17). . . . . 5

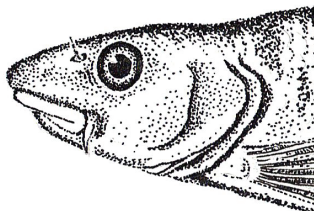


Figure 17

5. Trailing edge of the dorsal and anal fins straight. Thick caudal peduncle, distance from fork to tip of caudal fin is less than half the depth of the caudal peduncle. Short, inconspicuous barbels may or may not be present at the corners of the mouth. . . . . ***Rhinichthys osculus* – speckled dace**

Trailing edge of the dorsal and anal fins concave (falcate). Caudal peduncle depth approximates or is less than the distance from the fork to the tip of the caudal fin. 6

6. Three to four conspicuous fleshy stays (Figure 18) present between pelvic fin rays and body. Long, conspicuous barbels present at corners of mouth (Figure 14). Caudal peduncle depth is less than the distance from the fork of the tail to the tip of the caudal fin . . . . .

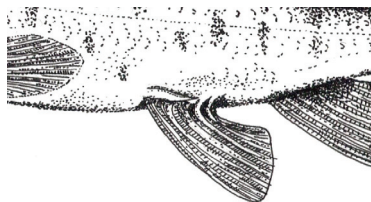


Figure 18

***Rhinichthys falcatus* – leopard dace**

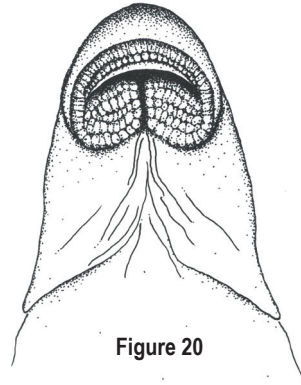
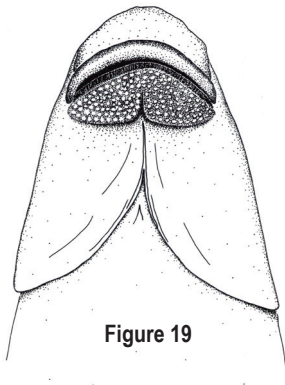
Fleshy stays between pelvic fin rays and body reduced, inconspicuous. Barbels reduced. Caudal peduncle depth about equal to distance from the fork of the tail to the tip of the caudal fin. . . . . ***Rhinichthys umatilla* – Umatilla dace**

- 
7. Body pike-like, head long and slender. Mouth large, extending to or beyond the front margin of the eye. Juveniles with a black spot at the base of the tail. . . . .  
 . . . . . ***Ptychocheilus oregonensis* – northern pikeminnow**  
 Body not pike-like, head short. Mouth small and not extending beyond the front margin of the eye. . . . . 8
8. Small barbel near or at corner of the mouth. . . . . 9  
 Barbel absent. . . . . 10
9. Front of dorsal fin lies forward of or opposite front of pelvic fin base. Scales small, 68 or more in the lateral line. . . . . ***Mylocheilus caurinus* – peamouth**  
 Front of dorsal fin lies behind front of pelvic fin base. Scales larger, less than 68 in the lateral line. . . . . ***Couesius plumbeus* – lake chub**
10. Lateral line scales 75-85. Dark dusky band along the upper side of the body. . . . . ***Lepidomeda copei* – northern leatherside chub**  
 Body robust. Scales larger, 65 or fewer in lateral line. Scales outlined with dark pigment. . . . . ***Gila atraria* – Utah chub**

## Key to Catostomidae – suckers

1. Mouth sub-terminal. Wide, distinct gap between lobes of lower lip. ***Chasmistes muriei* - Snake River sucker**  
 Mouth ventral. Lower lip at least partially incised, without distinct gap . . . . . 2

2. Lips deeply notched at each corner of the mouth (Figure 19). . . . . 3  
 Lips not deeply notched at each corner of the mouth. At most, a groove may be present separating the upper and lower lips (Figure 20). . . . . 4



3. Pelvic axillary process present. Typically, 10 dorsal rays. Caudal pigmentation concentrated on the rays. . . . .  
 . . . . . ***Catostomus platyrhynchus* – mountain sucker**  
 Pelvic axillary process absent. Typically, 11 dorsal rays. Caudal interradial membranes heavily pigmented. . . . .  
 . . . . . ***Catostomus discobolus* – bluehead sucker**
4. Scales in lateral line more than 80. . . . . 5  
 Scales in lateral line less than 80. . . . . 6
5. Lower lip deeply incised with one or two rows of papillae crossing the midline. . . . .  
 . . . . . ***Catostomus catostomus* – longnose sucker**  
 Lower lip shallowly incised with three or four rows of papillae crossing the midline. . . . .  
 . . . . . ***Catostomus columbianus* – bridgelip sucker**
6. Dorsal rays typically 12, occasionally 11 or 13. Depth of caudal peduncle is half its length. Bear River drainage and Snake River drainage above Shoshone Falls. . . . .  
 . . . . . ***Catostomus ardens* – Utah sucker**  
 Dorsal fin rays typically 13, occasionally 12-15. Depth of caudal peduncle two-thirds its length. Snake River and tributaries below Shoshone Falls. . . . .  
 . . . . . ***Catostomus macrocheilus* – largescale sucker**

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## Key to Percopsidae – trout perch

One species native to Idaho. Dorsal and anal fins with two spines. Adipose fin present. Back is arched, peaking at the start of the dorsal fin. . . . .  
. . . . . *Percopsis transmontana* – sand roller

## Key to Gadidae – cod

One species native to Idaho. Body is long and eel-like. A single barbel at the tip of the chin. Back is dark olive to brown, marbled with contrasting brown or black pigment. . . . .  
. . . . . *Lota lota* – burbot

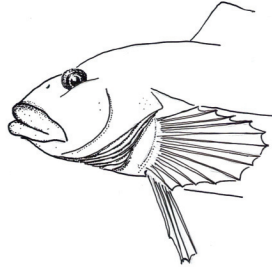


## Key to Cottidae – sculpins

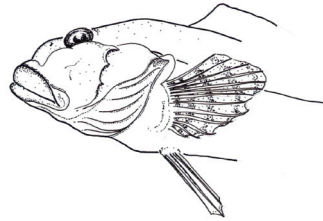
**Note:** species in this family are difficult to identify. They are highly variable in structure and color patterns.

1. Palatine teeth absent, or fewer than five teeth per side. . . . . 2  
    Palatine teeth present. . . . . 4
2. No preopercular spines (Figure 21).  
    Prickles absent. Restricted to Wood River basin. . . . .

***Cottus leiopomus* – Wood River sculpin**



**Figure 21**



**Figure 22**

- Preopercular spines present (Figure 22). . . . . 3
3. Lateral line very short, typically with fewer than 25 pores. Prickles present but sparse on the body. Typically three pelvic fin rays. . . . .  
    . . . . . ***Cottus cognatus* – slimy sculpin**  
    Lateral line typically with more than 25 pores. No prickles on the sides of the body. . . . . ***Cottus beldingii* – Paiute sculpin**
  4. Pelvic fin rays with one spine and three visible soft rays. No prickles on body. Thick caudal peduncle. One preopercular spine. . . . .  
    . . . . . ***Cottus greenei* – Shoshone sculpin**  
    Pelvic fins typically with one spine and four soft rays. Prickles typically present on sides of the body. Preopercular spines typically three, occasionally two or four. . . . . 5

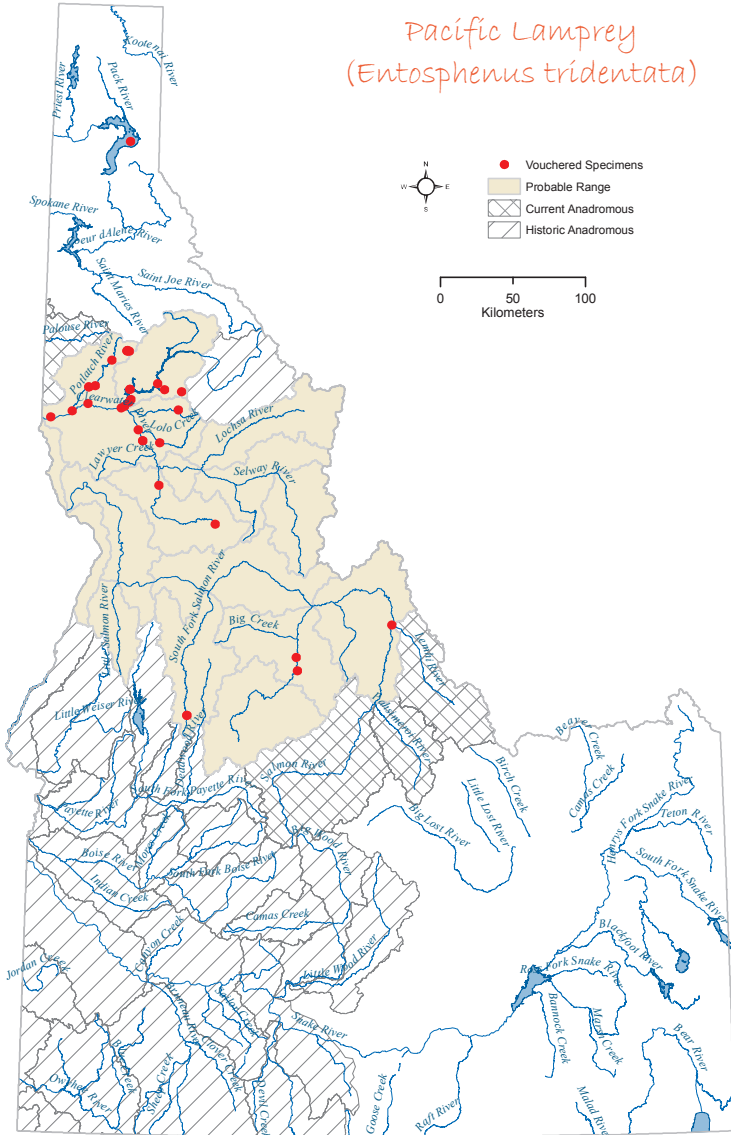
- 
5. Lateral line complete, extending onto base of caudal fin. Two forward-slanting saddles beneath second dorsal fin. Very narrow caudal peduncle. Top of head, including the eyelids, heavily nubbled. Numerous prickles on the sides of the body. Typically found in larger rivers. . . . . ***Cottus rhotheus* – torrent sculpin**  
 Lateral line typically not complete. Forward-slanting saddles absent. Prickles, when present, are typically restricted to a small axial patch behind pectoral fins.  
 6
6. Head short, typically one-third or less of standard length. Preopercular spines reduced, typically two, occasionally three. Palatine teeth reduced to a narrow band of one or two rows. Axial patch of prickles present, but absent in specimens from the Lost River drainages. Pectoral fin rays 13 or 14. . . . .  
 . . . . . ***Cottus confusus* – shorthead sculpin**  
 Three prominent preopercular spines. Well developed palatine teeth. Typically 15 or more pectoral fin rays. . . . . 7
7. Body robust, strongly cottoid. Head wide. Width of mouth greater than body width at the pectoral fins. Three vertical saddles more-or-less distinct above lateral line. Prickles typically restricted to axial patch behind pectoral fins. Lateral line nearly complete. . . . . ***Cottus bairdii* – mottled sculpin**  
 Body slender. Prickles well developed. Pigment patterns indistinct or absent. Restricted to Bear Lake. . . . . ***Cottus extensus* – Bear Lake sculpin**



NATIVE FISHES OF IDAHO

**Species Accounts**

Pacific Lamprey  
(*Entosphenus tridentata*)



**FAMILY PETROMYZONTIDAE**      **lampreys**

Lampreys are characterized by an elongate, cylindrical body, and a mouth formed as a sucking disc without jaws. Lampreys have a single median nostril, seven gill openings per side, and no paired fins. Some 25 species of lamprey are found in waters of the north temperate zone, 18 of which are found in the United States and Canada. One species is native to Idaho. Depending on species, lamprey go through three life forms; ammocoetes, macrophalmia, and adults. Ammocoetes are considered the larval stage and differ significantly from adults. The ammocoete body configuration is similar to adults, however, ammocoetes lack teeth and an oral disc mouth, possess undeveloped eyes, and have only minor caudal fin development. The ammocoete mouth has a well pronounced protruding upper oral hood which facilitates filter feeding. After five to seven years, ammocoetes transform into macrophalmia. Macrophthalmia have the same body configuration including parasitic mouth as adults but are much smaller.

**Pacific lamprey**      *Entosphenus tridentata*  
(adult shown)

body elongate, almost cylindrical,  
more laterally compressed posteriorly

no paired fins or scales



no jaws; mouth a circular disc with teeth  
mouth enclosed in a hood-like flap

**Attributes:** Adult Pacific lamprey are dark bluish gray to dark brown above, paler below. The ammocoetes and macrophalmia are light brown to greenish brown coloration. The lateral line is absent. There are seven pairs of gills and gill openings. Ammocoetes are blind and lack teeth. Adult Pacific lamprey may reach a total length of 762 mm.

**Distribution:** This species is found on the Pacific Coast from Baja, California to Aleutian Islands and Hokkaido, Japan. In Idaho,

Petromyzontidae

the Pacific lamprey was originally distributed in tributaries of the Snake River below Shoshone Falls, but not the Palouse River above Palouse Falls. It is now restricted to the Clearwater and Salmon River drainages, and tributaries to the Snake River below Hells Canyon Dam. It may become landlocked in lakes and impoundments as this species has been reported from Pend Oreille Lake and Dworshak Reservoir (specimens collected prior to or soon after Dworshak Dam construction). Long-term persistence has not been documented.

**Habitat:** Adults spawn in small to modest sized freshwater streams in spring and die after spawning. The ammocoetes hatch, drift downstream and burrow into low velocity silt/sand areas where they live 5 years or more as filter feeders. Ammocoetes begin transformation into macrophthalmia in late summer and early fall at 140-250 mm total length. Upon completion of a number of morphological and physiological changes including formation of eyes, oral disc, rasping teeth, and distinguishable caudal fin, the macrophthalmia begin their downstream migration in late winter and early spring in preparation for residency in the ocean. This species spends about 1.5-3 or more years in the ocean as a parasite on a number of marine vertebrates before beginning their upstream migration into freshwater. Pacific lamprey migrate into their spawning streams in late summer and early fall where they will over winter until the following spring to spawn.

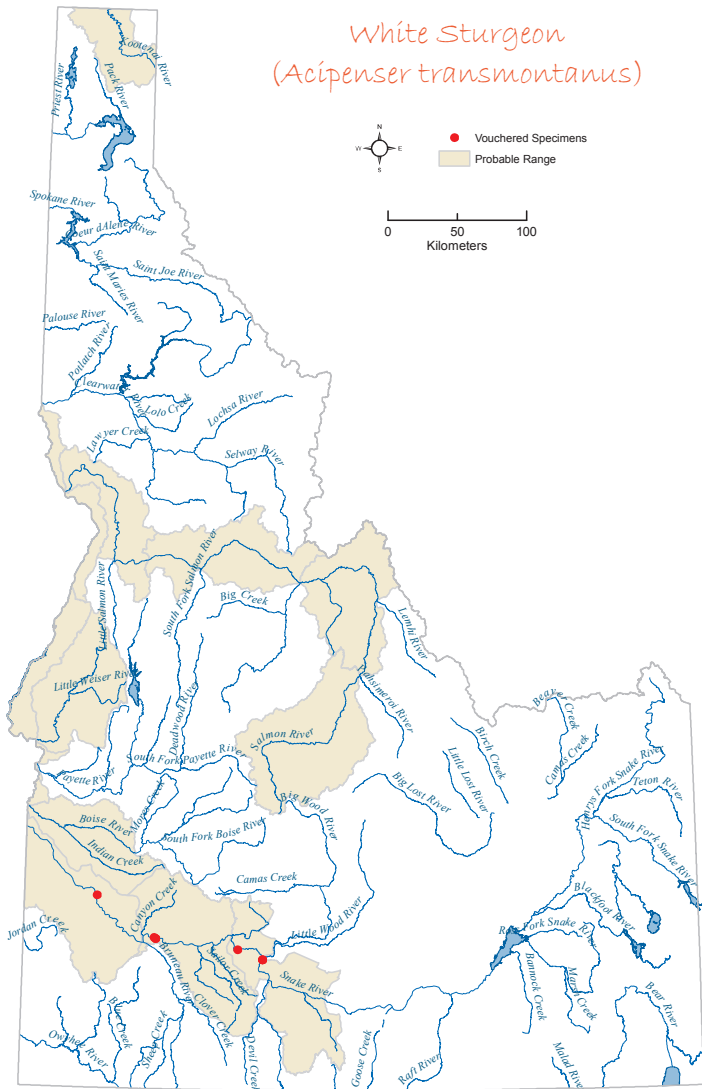
**Diet:** Pacific lamprey are primarily filter feeders during their freshwater life stage. Ammocoetes filter diatoms and other microscopic plants from the water. Transformed individuals become parasitic in the ocean and attach to other fishes and marine mammals. They rasp an opening into the body skin with their sharp teeth, and feed on blood and body fluids of their hosts.

**Ecology:** Pacific lamprey spawning occurs in late April into July within a water temperature range of 10-15° C. The adults build nests in which 30,000 to 230,000 eggs may be laid and fertilized. Pacific lamprey provide an important food source for a wide variety of other fish species. Both ammocoetes and post-spawned adult carcasses are reported to be an important food source for white sturgeon. Pacific lamprey have also been culturally important to Pacific Northwest native American people.

**Idaho Conservation Status:** The Pacific lamprey originally was abundant in Idaho waters occupying the majority of Chinook salmon and steelhead trout spawning and rearing streams. The present range is greatly reduced by migration barriers caused by dams on the Snake and Columbia rivers. In Idaho, Pacific lamprey populations are no longer found upstream of Dworshak Dam on the North Fork Clearwater River and Hells Canyon Dam on the Snake River. Pacific lamprey is considered an endangered species by Idaho. Greatest threats to Pacific lamprey are barriers, effective population size, flow alteration, channelization, and water quality issues.

References: Galbreath 1979; Landeen and Pinkham 1999; Luzier et al. 2011; Scott and Crossman 1998; Simpson and Wallace 1982; Wallace and Ball 1978; Wydoski and Whitney 2003; Zaroban et al. 1999.

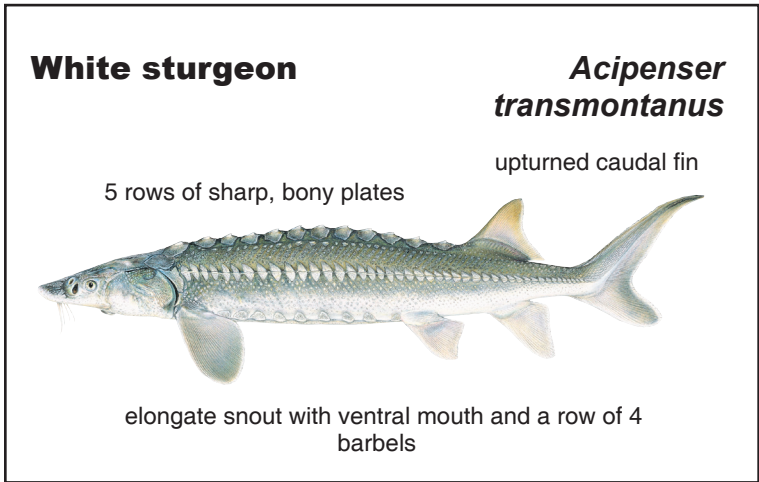
### White Sturgeon (*Acipenser transmontanus*)





**FAMILY ACIPENSERIDAE****sturgeons**

Sturgeons have an elongate body with five rows of sharp bony scutes, an up-turned caudal fin, an elongate snout with barbels on the ventral surface, and an inferior mouth. About 24 species live in the temperate waters of the northern hemisphere. Seven species reside in the United States and Canada. Two species are found west of the Continental Divide with only one found in Idaho waters.



**Attributes:** The white sturgeon is grayish to gray-brown above, slightly lighter to whitish below. The snout is elongated with a completely ventral mouth. The tail is upturned (heterocercal). The eyes are relatively small and the skin has a rough texture to it. Spiracle present (an opening above and behind eye); no lateral line; skeleton is cartilaginous; head is large, broad, and depressed. They are the largest freshwater fish in North America and have been reported to grow to total lengths in excess of six m and to weigh up to 816 kg.

**Distribution:** The white sturgeon is found in streams and rivers from Baja California to the Aleutian Islands in Alaska. In Idaho, this species occurs in the Snake River and some of its tributaries below Shoshone Falls as well as the Kootenai River. They have been introduced into the Snake River above Shoshone Falls upstream as far as Idaho Falls.

## *Acipenseridae*

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**Habitat:** White sturgeon are a benthic (bottom-dwelling) species living in deep holes in large, cool rivers. It is believed that white sturgeon freely migrated throughout the Columbia and Snake rivers before the main stem dams were in place.

**Diet:** White sturgeon are invertivore-piscivores. They are a bottom feeder, eating any available organisms, mostly fish, dead or alive. Juveniles feed largely on larval forms of aquatic insects, crustaceans, and molluscs.

**Ecology:** White sturgeon are a long-lived species with documented ages exceeding 100 years. The males mature as early as seven years of age while females delay maturation as late as 20 years of age. Females may only spawn on a 3-11 year basis. They spawn during the late spring in large rivers at water temperatures from 9-17°C. Females can produce over one million eggs which are released and fertilized in the water column. Growth is relatively slow.

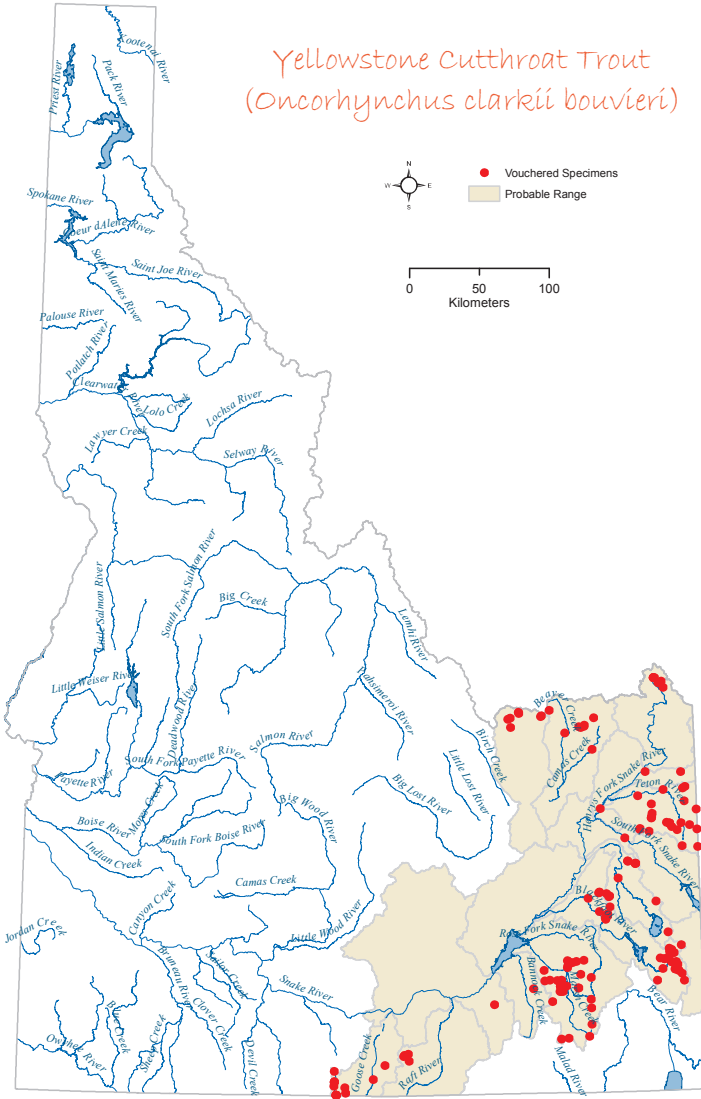
**Idaho Conservation Status:** Once abundant, populations of this species are now greatly reduced by destruction and fragmentation of habitat caused by construction of dams for power, irrigation and flood control. The Kootenai River population is listed as a federally endangered species under the Endangered Species Act. Snake and Salmon river populations are listed as a state species of special concern. Populations are isolated between dams and appear to have minimum downstream movement past dams. There is no angling for the Kootenai population and there is only a catch-and-release fishery for sturgeon in the Snake and Salmon rivers.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

**FAMILY SALMONIDAE****trout, salmon,  
whitefish and char****Cutthroat Trout***Oncorhynchus  
clarkii*

Cutthroat trout are generally distinguished from other trout by the red slash on each side of the lower jaw. They also have black spots on the body concentrated on the posterior part of the body. Coloration is variable both within and across subspecies of cutthroat trout. Small teeth are present on the floor of the mouth behind the tongue. These are variable in number and difficult to see. The cutthroat trout, a polytypic species, is divided into 15 subspecies. One is extinct, and 4 are formally undescribed. In Idaho, there are three commonly recognized and described subspecies of cutthroat trout. Another cutthroat trout, the Snake River fine-spotted cutthroat trout, is generally considered a morphotype of Yellowstone cutthroat trout. Its range overlaps with Yellowstone cutthroat trout, and based on genetic work to date, Yellowstone cutthroat trout and Snake River finespotted cutthroat trout have been indistinguishable. Both morphotypes are described separately here. Cutthroat trout were named Idaho's state fish in 1990.

### Yellowstone Cutthroat Trout (*Oncorhynchus clarkii bouvieri*)



## Yellowstone cutthroat trout

*Oncorhynchus clarkii bouvieri*

large, roundish dark spots more evenly distributed over the body but still slightly concentrated toward the caudal area



red slash under jaws

### Large-spotted morphotype

**Attributes:** The coloration of the Yellowstone cutthroat trout is yellowish-brown, silvery, or bronze. However, some populations exhibit yellow-gold coloration. Orange tints are found on lower fins and rose tints along the lateral line. The bright, yellow-orange or red colors of the westslope cutthroat trout are absent, although rose tints may occur on the body of mature fish. Sides of head and gill covers become intense red in breeding males. The black spots are small to large, pronounced, rounded and concentrated on the posterior part of the body with few, if any, spots on top of the head or snout. Lake residents tend to have the spots more evenly distributed over the sides of the body. The young have about 10 oval parr marks on the sides of the body. Small teeth are present on floor of mouth behind tongue and gill rakers typically number 17-20.

**Distribution:** The historic range of Yellowstone cutthroat trout included the Yellowstone River drainage in Montana and Wyoming and portions of the Snake River drainage in Wyoming, Idaho, Nevada, Utah and perhaps Washington. They are native to the Snake River and tributaries above Shoshone Falls, and to the Yellowstone River system downstream to the Tongue River, Wyoming. Yellowstone cutthroat trout populations have been established outside the historic range in at least seven western states and two Canadian provinces.

In Idaho, the Yellowstone cutthroat trout is native in the Henrys Fork, Teton, Snake, Willow, Blackfoot, Portneuf, Raft, and Goose drainages.

At one time they were widely introduced into most waters in Idaho. Recently, wide-spread introductions have been greatly reduced as the uniqueness of each subspecies of cutthroat trout has become more widely appreciated.

**Habitat:** Yellowstone cutthroat trout occupy diverse habitats, ranging from small headwater streams to large rivers and lakes. They are well adapted to cold, harsh environments with winter water temperatures of 0°C, but have also been found in warm thermal areas in Yellowstone National Park where water temperatures reach 27°C. They prefer water temperatures between 4.5-15.5°C. Yellowstone cutthroat trout flourish in unfertile, high mountain lakes and in productive bodies of water such as Henrys Lake and the main Snake River above Shoshone Falls. Yellowstone cutthroat trout fry seek areas of low velocity and shallow water depths, while older juveniles may be found in deeper water. They also prefer large substrate where they can hide during the day. Yellowstone cutthroat trout typically utilize large deep pools, beaver ponds and other slow velocity areas, especially during winter.

**Diet:** Yellowstone cutthroat trout are invertivores/piscivores. They are opportunistic feeders, consuming food items as they become available. The young feed mainly on aquatic insect larvae and other aquatic invertebrates. Older fish, particularly migratory populations, have a tendency to become more piscivorous as they get larger.

**Ecology:** Yellowstone cutthroat trout are adapted to different environments, resulting in ecotypes displaying variable characteristics. They exhibit adfluvial, fluvial and resident life history forms, which can occur in the same drainage system. While all forms spawn in tributary streams, adfluvial fish migrate to lakes for most of their adult life, fluvial fish spend most of their life in rivers and large streams and resident fish remain near spawning areas in streams. Fluvial Yellowstone cutthroat trout are the dominant form in Idaho.

Growth of Yellowstone cutthroat trout is variable and dependent on the population and environmental conditions. Generally, Yellowstone cutthroat trout grow faster and are larger in lower elevations, and migratory populations grow faster than resident populations. In Henrys Lake, Yellowstone cutthroat trout attain a total length of 457-508 mm, while populations from tributaries above Shoshone Falls on the Snake River reach total lengths greater than 600 mm. In contrast, Yellowstone cutthroat trout may never grow larger than 200 mm in

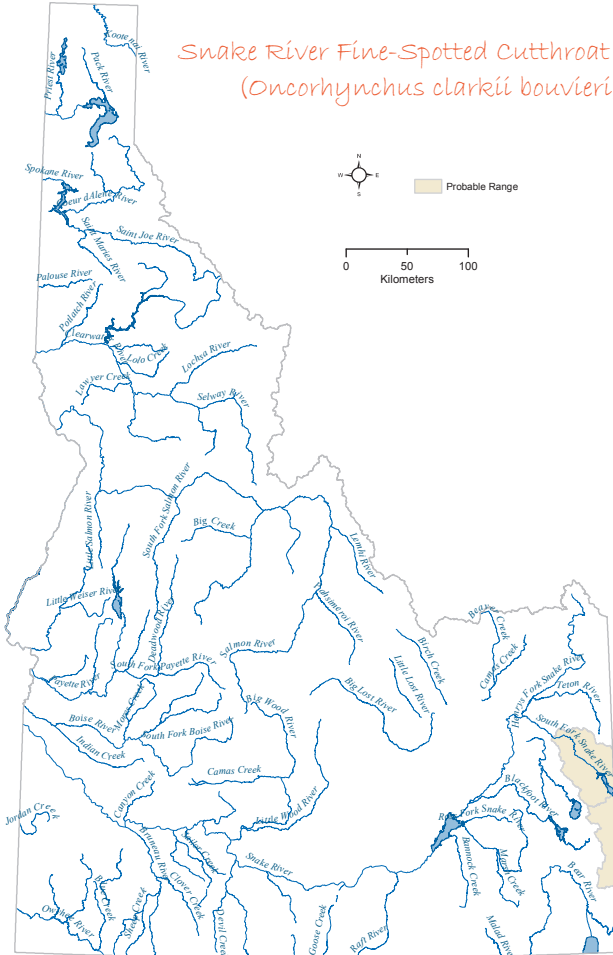
isolated headwater tributaries where temperatures rarely exceed 5°C.

The spawning period for Yellowstone cutthroat trout depends on latitude, altitude, water temperature and streamflow. Spawning can occur from March-early August, with migration starting when water temperatures are between 5-10°C and streamflows subside from spring peaks. Older and larger spawners migrate first, and typically there are more males than females early in the run. Streams selected for spawning are typically low gradient (< 3%) and perennial, with groundwater and snow-fed sources. In intermittent streams, spawning occurs during runoff and fry emigrate in July-August before flows cease. Yellowstone cutthroat trout can spawn more than once, and whether they spawn in consecutive years or alternate years depends on elevation and growth. Alternate year spawning is more common in Yellowstone Lake and higher elevation populations. Spawning typically begins at age 3 when fish are 240 mm total length, with most spawners aged 4-7. In Yellowstone Lake, Yellowstone cutthroat trout less than 250 mm total length are immature. In alpine waters, long-lived slow growing populations mature at 100-130 mm total length. Average fecundity for a 300 mm total length female is 850 eggs. In slow growing, unexploited populations, Yellowstone cutthroat trout live up to 11 years, but in most populations, few fish are older than age 7.

Eggs generally hatch in 25-49 days, with fry emerging from the gravel two weeks later. The period of time juveniles rear in tributaries varies from an immediate emigration of fry in Henrys Lake tributaries to 1-3 years in other tributary systems. Emigration is associated with increasing streamflow in the spring, and rapid declines in water temperature in the fall.

**Idaho Conservation Status:** Yellowstone cutthroat trout were once widely distributed in the Snake River and tributaries above Shoshone Falls. Their abundance and distribution has been greatly reduced due to a combination of factors, including stream dewatering, habitat degradation, introduction of non-native salmonids, exploitation and disease. It is estimated that 43% of the original range is currently inhabited. In Idaho, 35% of the historic range is now inhabited. Idaho classifies Yellowstone cutthroat trout as a game fish, but restrictive angling regulations and sterile hatchery fish planting programs have been implemented to protect populations.

Snake River Fine-Spotted Cutthroat Trout  
(*Oncorhynchus clarkii bouvieri*)





**Snake River fine-spotted cutthroat trout**

*Oncorhynchus clarkii bouvieri*

very small, irregularly shaped spots profusely scattered over the body and on dorsal, adipose and caudal fins



bright reddish orange slash under jaws

pectoral, pelvic and anal fins intense red or orange

**Fine-spotted morphotype**

**Attributes:** The coloration of the Snake River fine-spotted cutthroat trout is yellowish-brown, with dull silver or greenish bronze, and purplish tint. The lower fins are typically bright orange or red. Sides of head and gill covers become intense red in breeding males. The spots are small, irregular and profuse, with the greatest concentration on the caudal peduncle and above the lateral line anterior to the dorsal fin.

**Distribution:** The native distribution has not been totally described. The present distribution of this morphotype is the main Snake River from Jackson Lake downstream to below Palisades Dam in Idaho. It is also found in Snake River tributary streams from the Gros Ventre River downstream to below Palisades Reservoir and in the Salt River and tributaries.

The range of Snake River fine-spotted cutthroat trout overlaps with Yellowstone cutthroat trout. Stocking of each morphotype has resulted in some mixing and variability of characteristics. There are also differences among Snake River fine-spotted cutthroat trout residing in different localities, suggesting that these stocks are reproductively isolated.

**Habitat:** The habitat of the Snake River fine-spotted cutthroat trout is the cool, clear waters in the upper Snake River drainage. The migratory form attains a large size and spends most of the time in large rivers and reservoirs, spawning in smaller streams. The non-migratory form resides in tributary streams.

**Diet:** Snake River fine-spotted cutthroat trout are invertivores/piscivores. They are opportunistic feeders and will consume food items as they become available. The young feed mainly on aquatic insect larvae and other aquatic invertebrates. When they get over 280 mm in length, fish, mainly sculpins, become the main food item. Larger fish also take crawfish, insects, annelids, snails, and small rodents.

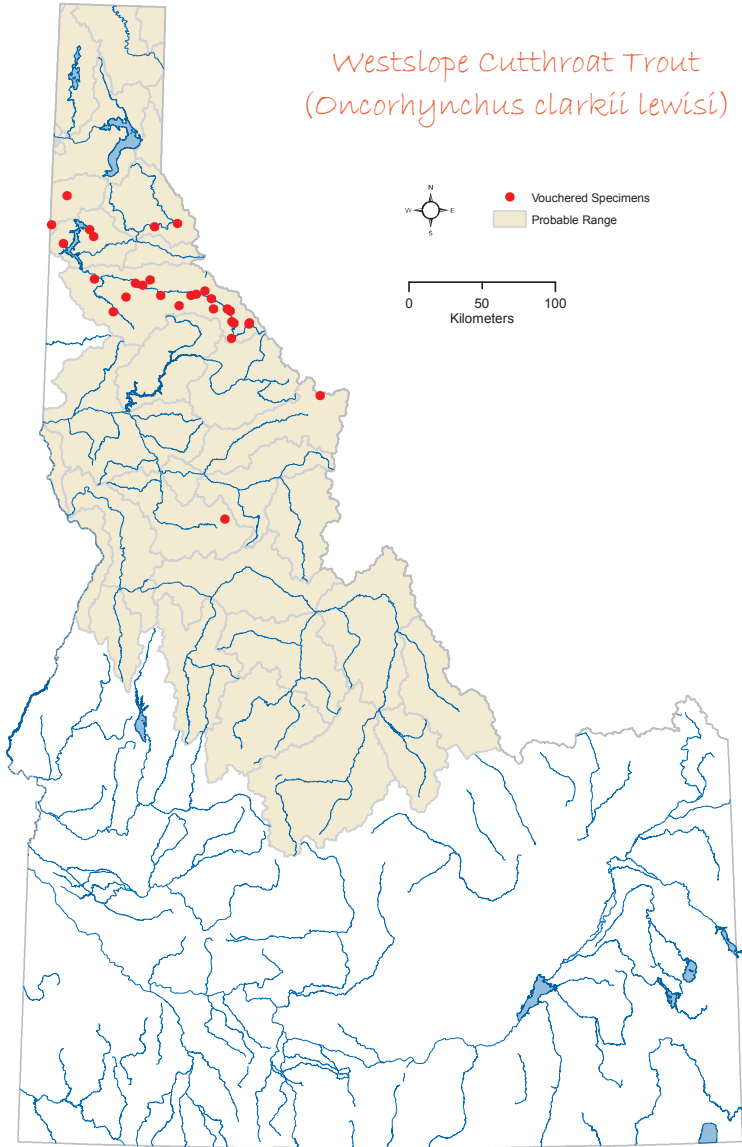
**Ecology:** Snake River fine-spotted cutthroat trout have a similar ecology to Yellowstone cutthroat trout with several isolated populations in tributary streams along with a fluvial population in the Snake River. Individual populations have adapted to different environments, resulting in ecotypes displaying variable characteristics. Fluvial Snake River fine-spotted cutthroat trout represent the dominant form in Idaho.

**Idaho Conservation Status:** Idaho does not differentiate Snake River fine-spotted cutthroat trout from Yellowstone cutthroat trout in their management. It is considered a game fish, but restrictive angling regulations and sterile hatchery fish planting programs have been implemented to protect populations.

References: Ball and Cope 1961, Behnke 1992; Behnke 2002; Meyer et al. 2003; Thurow et al. 1988; Varley and Gresswell 1988; Young 1995.



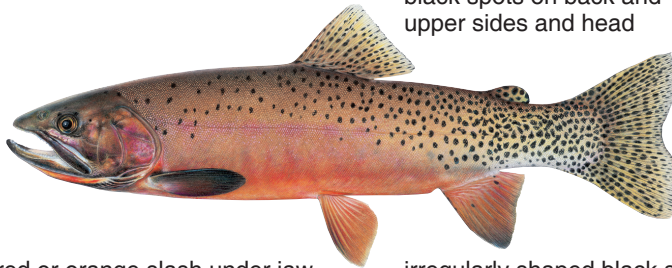
Westslope Cutthroat Trout  
(*Oncorhynchus clarkii lewisi*)



**Westslope  
cutthroat trout**
***Oncorhynchus  
clarkii lewisi***

few, if any black spots on snout

small, irregularly shaped  
black spots on back and  
upper sides and head



red or orange slash under jaw

irregularly shaped black spots  
concentrated in caudal area

**Attributes:** The westslope cutthroat trout is greenish-blue to steel-gray on the back and sides, sometimes silvery. There may be yellowish tints, but bright yellow, orange, and especially red can be expressed to a much greater extent than in the Yellowstone subspecies. The ventral surface is a rose-red color in mature males. In some populations, mature males may have their entire ventral surface and opercles brilliant crimson. Some specimens exhibit white fin tips. This subspecies typically has small, irregular (nearly star-shaped) back spots concentrated on the posterior body. However, the spots are similar to Yellowstone cutthroat trout in some populations. The area within an arc extending from the pectoral fin to a point just above the lateral line and downward to the anal fin typically has very few or no spots. The young have 9-10 oval parr marks along the sides of the body. The number of gill rakers is typically 18-19.

**Distribution:** Westslope cutthroat trout are native to the middle and upper Columbia River basin on the west side of the Continental Divide, the eastern slope of the Canadian Rockies draining to the South Saskatchewan River, and upper Missouri River basin on the east side of the Continental divide.

In Idaho, the westslope cutthroat trout is native in the Kootenai, Pend Oreille, Spokane, Clearwater and Salmon river drainages,

including Coeur d'Alene, Pend Oreille, Priest and other lowland lakes throughout the Idaho panhandle.

**Habitat:** Typically, westslope cutthroat trout inhabit both lakes and streams where water is clear and cool, less than 15°C. They appear to be most abundant in stream reaches with gradients of 1-10%, but may occur in reaches with gradients as high as 27%. Cover in the form of woody debris and surface turbulence and complex habitat with a mixture of pools, riffles, runs and pocketwater are important, particularly for juvenile fish. Deeper pools or those with extensive woody debris and undercut banks are used by larger individuals in winter. Smaller westslope cutthroat trout often move into interstitial spaces in streambed gravels as temperatures drop in the fall, so substrates relatively free of fine particles can be important. Clean substrate is also important for spawning and survival of eggs and fry.

**Diet:** Westslope cutthroat trout are primarily invertivores. Typically their diet includes a variety of aquatic and terrestrial insects, and other aquatic invertebrates, but they are opportunistic and known to occasionally feed on fish and other vertebrates.

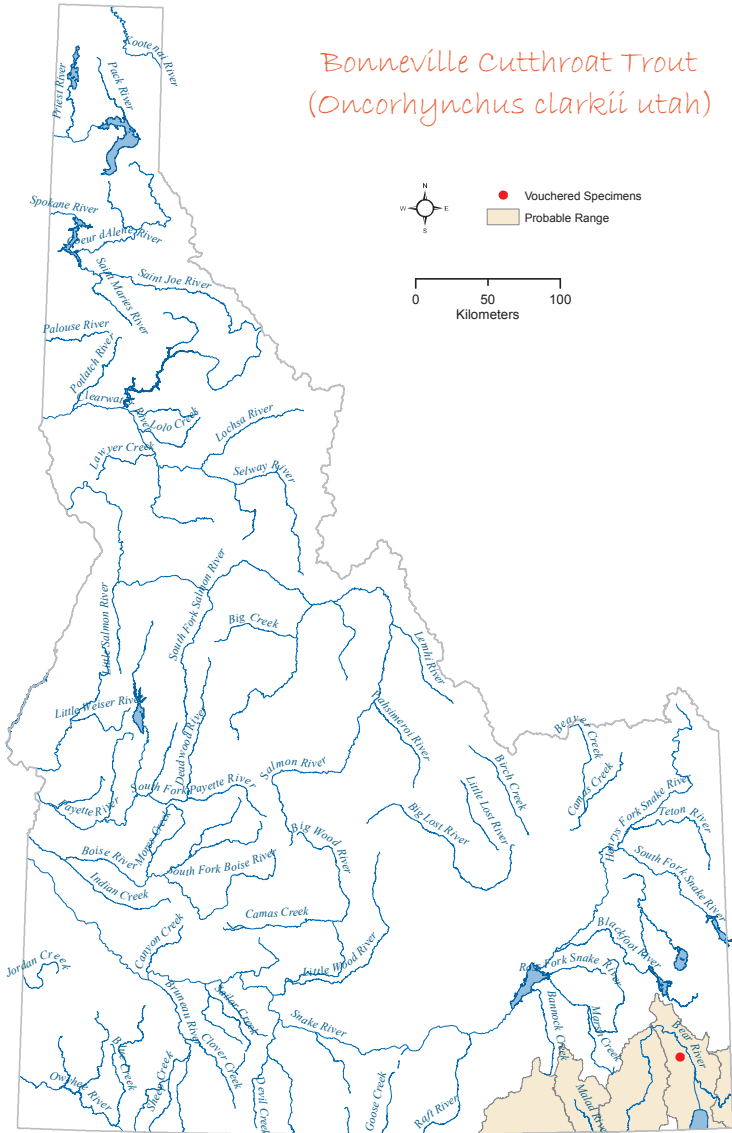
**Ecology:** Westslope cutthroat trout are particularly suited to relatively cold and unproductive environments. They exhibit adfluvial, fluvial and resident life history forms, and multiple life history forms often occur in the same drainage system and even in the same stream. Fluvial westslope cutthroat trout represent the dominant form in Idaho, although historically large lakes in northern Idaho supported abundant populations of westslope cutthroat trout. Adults are typically 150-200 mm total length in small streams and may reach 455-500+ mm in lakes and larger rivers. Growth is influenced by nutrient availability, water temperature and competition with other individuals and species. Westslope cutthroat trout typically mature starting at age 3, with first spawning common at age 4 or 5. Spawning occurs mostly in headwater streams from April into July when water temperature is between 6-9°C. Fecundities typically range from 200-2,000 eggs per female. Fluvial and adfluvial westslope cutthroat trout typically spawn and rear in tributaries. Juveniles in migratory populations may leave tributaries at any age, but most are believed to emigrate between ages 1-4 during the spring or fall. Seasonal movements of subadult and adult westslope cutthroat trout are common, and may exceed 100 km. Most movement is downstream in the fall and back upstream in the spring for spawning, although upstream movements to use wintering

pools have been observed in some river systems. Longevity is variable, and westslope cutthroat trout in small streams typically live to age 4, while fluvial and adfluvial forms can live to age 8 or older.

**Idaho Conservation Status:** Populations of genetically pure westslope cutthroat trout have been greatly reduced by habitat loss and degradation, competition and predation by non-native species, genetic introgression with rainbow trout, and over fishing. Strong populations still exist in Idaho in about 50% of their historic range, in areas that are largely undeveloped. A status review completed in 2003 found that approximately 61% of the currently occupied habitat is in protected and roadless areas. A broad genetic inventory has not been completed in Idaho, so the extent of populations not compromised by genetic introgression remains unknown. Idaho classifies westslope cutthroat trout as a game fish, but restrictive angling regulations and sterile hatchery fish planting programs have been implemented to protect populations.

References: Behnke 1992; Behnke 2002; Liknes and Graham 1988; McIntyre and Reiman 1995, Rieman and Apperson 1989.

Bonneville Cutthroat Trout  
(*Oncorhynchus clarkii utah*)

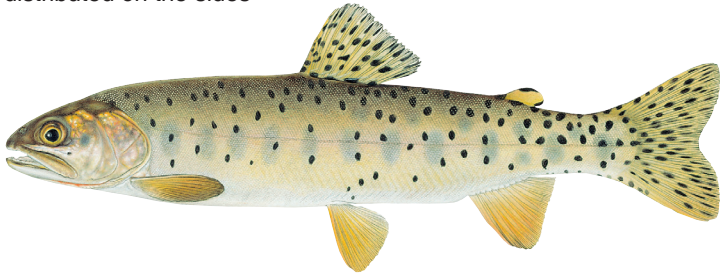




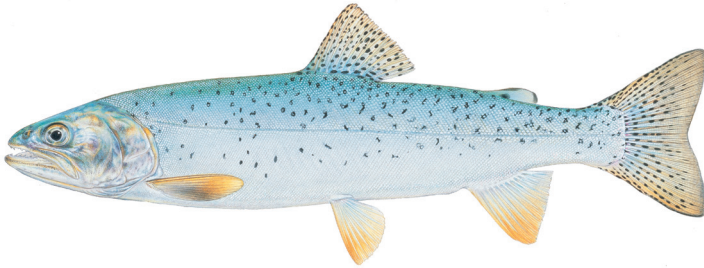
## Bonneville cutthroat trout

## *Oncorhynchus clarkii utah*

Larger, more pronounced spots more evenly distributed on the sides



**Fluvial and resident morphotype**



**Bear Lake morphotype**

**Attributes:** Bonneville cutthroat trout typically have large, evenly distributed spots, but there is a high degree of intra-basin variation. Coloration is generally dull compared to other cutthroat trout subspecies; however it can vary depending on environmental conditions and local genetic composition. The number of gill rakers is typically 18-19, except Snake River valley populations which typically have 20-22. The Snake River valley populations have profuse basibranchial teeth, averaging 20-28, while most other Bonneville cutthroat trout average 5-10.

**Distribution:** The original distribution of Bonneville cutthroat trout was the Pleistocene Lake Bonneville basin, which included portions of Idaho, Nevada, Utah and Wyoming. Currently, isolated and fragmented populations occur in the Bear River Basin in Wyoming,

Idaho and Utah, the Bonneville Basin in Utah and the Snake Valley in Nevada. In Idaho, they are found in the Bear and Malad River drainages including Bear Lake.

**Habitat:** Bonneville cutthroat trout occur in streams with coniferous and deciduous trees at 3,500 m elevation as well as streams in sage-steppe grasslands at 1,000 m elevation. Inhabiting desert environments where the climate can cause fluctuations in water levels, sediment regimes and environmental conditions, Bonneville cutthroat trout are adapted to a wide variety of conditions throughout their range.

Age-0 and age-1 Bonneville cutthroat trout favor pools and runs where there is an abundance of rootwads and woody debris. Fluvial adult Bonneville cutthroat trout prefer deep pools associated with undercut banks and vegetative cover, although shallower runs with these cover features are also used. The availability of this type of habitat may limit resident populations in most streams. In Bear Lake, Bonneville cutthroat trout typically inhabit the littoral and pelagic zones during most of the year, with juveniles found in different zones than older Bonneville cutthroat trout. Water temperature appears to be the major factor determining distribution in Bear Lake.

The temperature tolerance of fluvial Bonneville cutthroat trout is higher than other cutthroat trout subspecies. They have been observed inhabiting streams where the mean water temperature during summer is 17-18°C, and can tolerate temperatures as high as 27°C when a large diel fluctuation of temperature caused by thermal cooling at night occurs. However, there can be significant reductions in feeding and growth when they are subjected to high temperatures for a long period of time.

**Diet:** Bonneville cutthroat trout in stream habitats are insectivorous, feeding on both terrestrial and aquatic insects. Fluvial Bonneville cutthroat trout in the Bear River become piscivorous as they get larger.

In Bear Lake, Bonneville cutthroat trout experience a diet shift as they mature. Juveniles less than 250 mm primarily eat aquatic and terrestrial insects, primarily chironomids and ants. At 225 mm Bonneville cutthroat trout become piscivorous, primarily preying on Bear Lake sculpin until they reach 300 mm in length. At this time, they switch to other fish prey items. Bonneville cutthroat trout longer

than 350 mm prey almost exclusively on fish, preferring Bear Lake cisco in the winter.

**Ecology:** Life strategies exhibited by Bonneville cutthroat trout include stream resident, fluvial, and adfluvial forms. In Idaho, populations within a single stream can comprise multiple life history strategies, and individuals may use mainstem rivers to move between and among drainages when they are not fragmented by water diversions or barriers. The only adfluvial population in Idaho is in Bear Lake.

In general, growth of Bonneville cutthroat trout tends to be slower in high elevation headwater drainages than in lake environments but likely depends on temperatures and diet. Age 4 resident Bonneville cutthroat trout average 197-320 mm total length. In Bear Lake, Bonneville cutthroat trout average 560 mm total length, and adults sampled in Bear River have been over 530 mm total length.

Both the age at maturity and at the time of spawning vary geographically with elevation, temperature and life history strategy. Bonneville cutthroat trout generally spawn from April through June, when water temperature ranges from 4-10°C. Populations in lower elevations spawn first. Large adfluvial Bonneville cutthroat trout typically spawn in large gravels or cobbles, in stream gradients less than 1%, high sinuosity and unlike other cutthroat subspecies, with a high percentage of fine sediment. Smaller, stream resident Bonneville cutthroat trout spawn over coarse sand or small gravels in stream reaches with gradients of 1.5-3%, low sinuosity and sequences of riffles and pools.

Fluvial and resident Bonneville cutthroat trout become sexually mature starting at 2-3 years of age, but Bear Lake Bonneville cutthroat trout mature much later, beginning to mature at 5 years of age and may not spawn until age 10. The average age of spawners from Bear Lake is 6.8 years. Fecundity of Bonneville cutthroat trout is typically 1,800-2,000 eggs per kg of body weight, and is greater in adfluvial populations than in fluvial and resident forms.

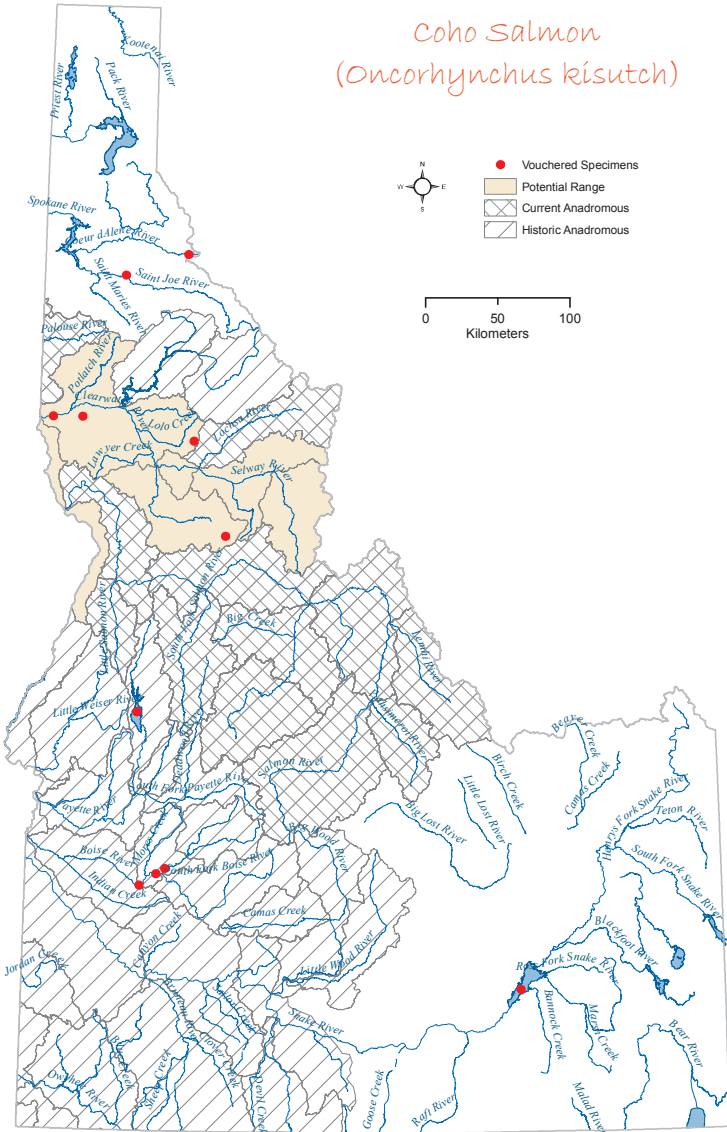
Fry typically emerge in mid-to-late summer. Adfluvial Bonneville cutthroat trout spend 1 or 2 years in streams before migrating to Bear Lake, and progeny of fluvial spawners typically stay in tributaries up to 3 years before migrating to mainstem river reaches. Fluvial adult

Bonneville cutthroat trout display seasonal movements, and have been observed to migrate 82 km downstream from tributaries after spawning, with larger adults moving longer distances. Downstream migration occurs within 30 days after spawning. Once summer locations are reached, they rarely move more than 0.3 km during the summer. When temperatures cool, migrations may occur again in the winter months, as much as 11 km. Most resident Bonneville cutthroat trout move less than 1 km during the year.

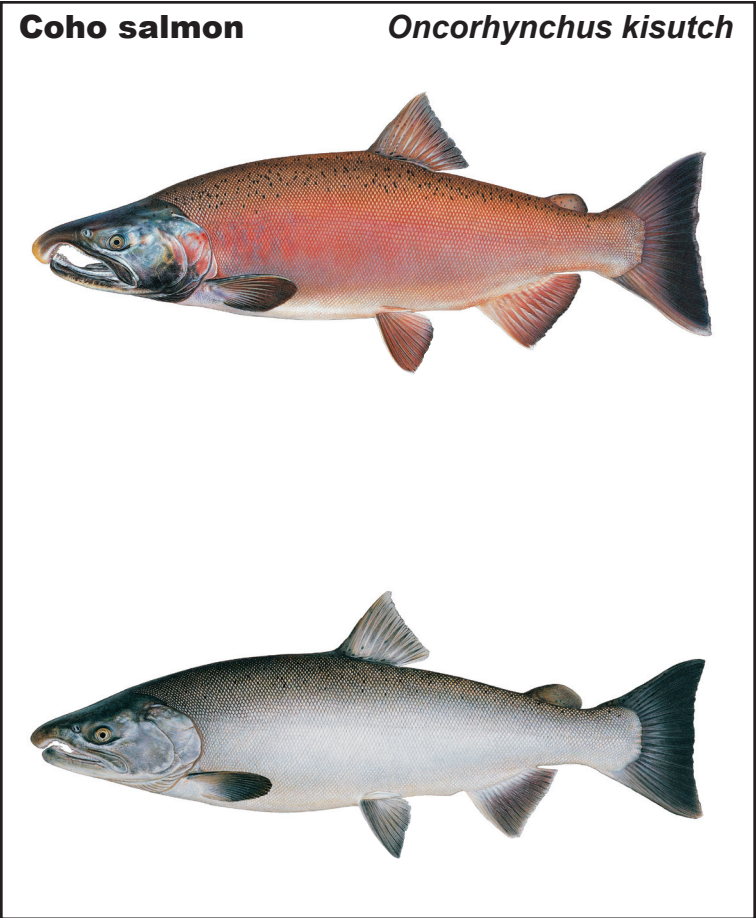
**Idaho Conservation Status:** In the late 1960's, it was believed that Bonneville cutthroat trout were extinct, lost from activities such as water diversion, grazing, timber harvest, road building and hybridization and competition from nonnative species. Surveys conducted since then have identified remnant populations throughout the present range. In 2000, several federal and state agencies along with Native American tribes signed a range-wide Conservation Agreement and Strategy for Bonneville cutthroat trout with the purpose of coordinating the implementation of conservation measures. A status review conducted in 2001 in response to a petition to list Bonneville cutthroat trout under the Endangered Species Act concluded that listing was not warranted. Water diversions, barriers, habitat fragmentation, grazing and other activities are still threats to Bonneville cutthroat trout, but activities identified in the Conservation Strategy are ongoing and have been successful in minimizing impacts. Bonneville cutthroat trout are classified as a game fish in Idaho, but restrictive angling regulations, tributary closures and sterile hatchery fish planting programs have been implemented to protect populations.

References: Behnke 1992; Kershner 1995; Schrank et al. 2003; Schrank and Rahel 2004.





Salmonidae

**Coho salmon*****Oncorhynchus kisutch***

**Attributes:** Coho salmon are metallic blue on dorsal surface, silvery on side and ventral surfaces with numerous black spots on the back and dorsal lobe of the caudal fin. Gums on the lower jaw are white colored. Juvenile fish have 8-12 long narrow parr marks with the pectoral, pelvic and anal fins being tinged with orange. The anal fin is large with the first rays elongate and white with black behind, however this color character is quite variable. The body is elongate, streamlined and somewhat compressed laterally. Scales are cycloid with 121-148 in the lateral line. The head is moderate, conical, snout rounded, mouth large, slightly oblique with well-developed teeth in both jaws. Both jaws are strongly hooked inward in spawning

individuals. There are 19-25 gill rakers on the first gill arch. The dorsal fin has 9-13 rays, adipose fin is small, caudal fin is only slightly forked and the anal fin has 13-16 rays.

**Distribution:** The native range of coho salmon is the northern Pacific Ocean and its numerous tributaries. Its range extended from Monterey Bay, California north to Point Hope, Alaska. It also occurs in northeast Asia. Historically, coho salmon naturally ranged up the Columbia River and into the lower Snake and Clearwater rivers in Idaho. Due to alterations such as splash dams in tributaries, dams for power generation, irrigation and transportation, general habitat degradation and high fishing mortality, coho salmon runs declined and were gone from the lower Snake River and tributaries in Idaho by the mid-1970s. Efforts to enhance and maintain the runs by planting eyed coho eggs in Clearwater River tributaries from 1965 to 1968 resulted in the stocking of over 11 million eggs and fry, however with less than 100 adults returning to the Lewiston Dam annually in the early 1970s, efforts were discontinued and by the mid 1970s coho salmon no longer returned to Idaho. Recent efforts by the Nez Perce Tribe using hatchery outplants in the Clearwater River have shown some success in returning adult coho salmon to Idaho. Coho salmon have been widely distributed into freshwater lakes and reservoirs in North America and self-sustaining stocks have been established in the Great Lakes. In Idaho, coho salmon are an important part of the fishery in Cascade Reservoir as a result of annual releases of fish.

**Habitat:** Coho salmon spawn in gravelly areas of rivers and tributaries where the current is fairly swift. If only coho salmon are present, juveniles will occupy the different habitats of riffles and pools, if steelhead are present, coho salmon will primarily occupy pool habitat and steelhead will be primarily in riffle habitat since coho salmon are more aggressive and are able to dominate pool habitat. Coho salmon generally use the deepest water in pools and woody debris for cover.

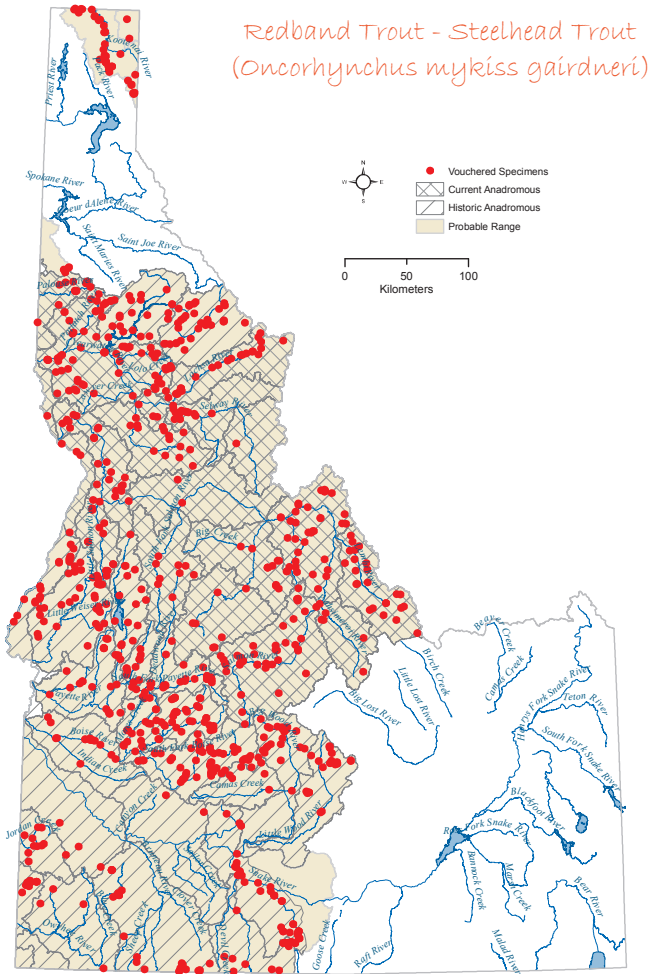
**Diet:** Coho salmon are voracious feeders with juveniles in streams feeding primarily on insects, such as Diptera, mayflies and stoneflies. However, if fish fry are available, they will consume them such as sockeye salmon fry in Alaskan waters. While in salt water, coho salmon feed primarily on available fish, however they will also feed on planktonic invertebrates. Introduced coho salmon in lakes and reservoirs feed on insects and zooplankton, however their weight rarely exceeds 1.5 kg in Idaho waters.



**Ecology:** Coho salmon, like most salmon are anadromous, spawning in freshwater where the young reside for one to two years before migrating to saltwater as smolts. In Washington, natural runs of coho salmon smolts migrate to the ocean between March and late June, peaking in late April to mid-May. Most coho salmon reach sexual maturity in three years, but a few take four years and weigh between 3.5 - 5.5 kg. Coho salmon will spend about 18 months in the ocean before returning to natal rivers and streams during August to September, spawning in October and November. On the spawning grounds, both the males and females are aggressive. A nest, called a redd, is built by the female by lying on her side and with a whipping motion of the tail excavates a long oval to round trough in medium to small gravel. A female may be accompanied to the spawning area by several males but usually the largest is dominant. A female may spawn in as many as three or four redds and probably with different males. The eggs are large and the number varies with the size of each female, but the average number of eggs per female is about 2,000 - 2,500. Both sexes die after spawning. The fry typically emerge from gravel in March or early April and then remain at least one year in freshwater.

**Idaho Conservation Status:** Since native runs into Idaho and the Grande Ronde River in Oregon of coho salmon were lost by the mid 1980s, reintroduced runs do not have any special conservation status. In Idaho, coho salmon are classified as a game fish and fishing rules for anadromous coho salmon are set by the Idaho Fish and Game Commission when setting rules for anadromous Chinook salmon. Due to low numbers returning to Idaho, the Commission has not opened a season targeting anadromous coho salmon. Rules for hatchery-reared coho salmon for lakes and reservoirs are set by the Commission when they set the biennial general fishing rules.

References: Behnke 2002; IDFG 2007; Scott and Crossman 1973; Simpson and Wallace 1982; Wydoski and Whitney 2003.



Salmonidae

**Rainbow trout  
redband trout  
steelhead**

*Oncorhynchus mykiss*

**Redband rainbow  
trout**

*Oncorhynchus  
mykiss gairneri*



**Resident morphotype**



**Anadromous morphotype**

Rainbow trout (*Oncorhynchus mykiss*) are native to many watersheds in western North America and their range extends in the Pacific Basin to the Kamchatka Peninsula of Asia. This species exhibits remarkable variation in life history patterns throughout its range, including differences in morphology, coloration, spotting patterns, spawn timing, and size at maturity. So much variability was first described across rainbow trout populations that biologists had great difficulty deciding if it should be referred to as a single highly 'plastic' species or a complex of many different species or subspecies.

In Idaho, rainbow trout occur as both freshwater resident and anadromous forms that commonly referred to as steelhead trout. There is still some debate about the classification of rainbow trout, but most populations that exhibit distinctive life history characteristics are managed and protected as distinct populations. Two major groups of rainbow trout are described in western North America, the coastal rainbow trout (*O. m. irideus*) and the interior redband trout (*O. m. gairdneri*). By this classification scheme all rainbow trout in the Columbia River drainage are redband trout. Other evaluations of the genetic population structure of rainbow trout suggest that any differences between coastal and interior redband groups are not distinctive enough to provide formal separation of the two groups. For the purposes of this book we consider all native populations of varying life history patterns as redband rainbow trout.

Redband rainbow trout are found in many parts of the state, but large areas that were once accessible to steelhead populations now have only resident rainbow trout. Additional complexity in understanding the natural distribution of rainbow trout in Idaho occurs because rainbow trout have been introduced outside of their native range in many parts of the state. For example, rainbow did not occur naturally above Shoshone Falls, but now dominate major portions of the Snake River. In the Henrys Fork, rainbow trout comprise an economically important sport fishery, but have almost completely replaced the native Yellowstone cutthroat trout.

### Redband Rainbow Trout

**Attributes:** Body elongate, moderately compressed and rather deep. Scales cycloid, with 120-160 in the lateral line. Head short, snout rounded; eye moderate; mouth terminal; small sharp teeth on jaws and tongue, poorly developed on vomer and absent from basibranchial plate between lower ends of gill arches. Dorsal fin rays 11; anal fin rays 11; pelvic fin rays 10 or more; caudal fin slightly forked. Color variable with habitat, normally bluish to olive green on back side; side lighter and silvery with a reddish horizontal band; belly white or silvery; irregular black spots on the back, side and head; dorsal, adipose and caudal fins also spotted. The pelvic and anal fins typically have a narrow white border, most notable near the tip.

**Distribution:** Redband rainbow trout are found in the interior Columbia River basin from east of the cascades upstream to geologic barriers such as Shoshone Falls on the Snake River and Kootenai Falls on the Kootenai River and in the upper Fraser River. They were not in the Pend Oreille or Spokane drainages. Redband rainbow trout are present in the Salmon and Clearwater drainage along with steelhead. Due to difficulties of identifying juveniles of these two life forms, redband trout in these drainages will be included under the steelhead distribution. Current range-wide abundance in Idaho is unknown; however, resident redband trout above the Hells Canyon and Dworshak dams are locally abundant. Rainbow trout of coastal origin have been extensively introduced above Shoshone Falls.

**Habitat:** Resident redband rainbow trout are found in a range of stream habitats from desert areas in southwestern Idaho to forested mountain streams in central and northern Idaho. In all cases they prefer cool streams with temperatures less than 21°C, however, they can survive daily cyclic temperatures up to 27°C for a short period of time.

**Diet:** As visual predators, redband rainbow trout feed in streams primarily by capturing drifting invertebrates both terrestrial and aquatic. Larger fish will occasionally consume other fish. Plankton and insects make up the majority of food items in lakes. In some large, deep lakes where they co-occur with kokanee, rainbow trout can become piscivorous and thereby achieve very large sizes.

**Ecology:** Redband rainbow trout usually spawn in streams between February and June depending on temperature and location. Females excavate redds to prepare spawning locations before male and female pairs deposit embryos to incubate in the gravel until late spring or early summer. Emerging juvenile trout begin feeding on small aquatic invertebrates, and are often aggressive, defending foraging locations against competitors. By the end of the first summer, juvenile trout reach about three inches, but growth can vary tremendously depending on the productivity of the location. Some isolated headwater populations of rainbow trout can reach maturity within a year at small sizes 127-254 mm, whereas individuals that achieve much larger sizes typically delay maturity until 4-7 years. Resident redband rainbow trout may attain a maximum size ranging from 152-157 mm depending on location.

**Idaho Conservation Status:** To date, no formal assessment of redband rainbow trout in Idaho has been completed. However, habitat fragmentation and alteration, the introduction of non-native species, and over-harvest of populations are the primary threats to this species.

## **Steelhead Trout**

**Attributes:** Life span: 4-6 years; typical size: 64-91 cm and 2.7-8.2 kg; maximum size: 1 m and 11.3 kg.

**Distribution:** Steelhead, the anadromous form of rainbow trout, were originally native to the Snake River and its tributaries upstream to Shoshone Falls. Dam construction has now reduced its range to that portion of the Snake River below Hells Canyon Dam, and the Salmon and Clearwater drainages.

Steelhead entering Idaho waters are of two races and are classed as A and B group steelhead. The A-group enters both the Salmon and Clearwater river systems and are quite generally widespread in each system. The B-group steelhead have a more restricted range. They are confined primarily to the North and Middle Forks of the Clearwater River and the South and Middle Forks of the Salmon River. The average size range of A-group steelhead is 1.8-3.6 kg and B-group steelhead is 5.4-9.1 kg. A-group steelhead enter the Columbia River earlier than the B-group.

**Habitat:** Juvenile steelhead have essentially the same habitat requirements as similar-sized resident redband rainbow trout. Clear, cool streams and rivers; lakes; intertidal areas and the Pacific Ocean.

**Diet:** Juvenile steelhead exhibit essentially the same diet and foraging behavior as resident redband rainbow trout.

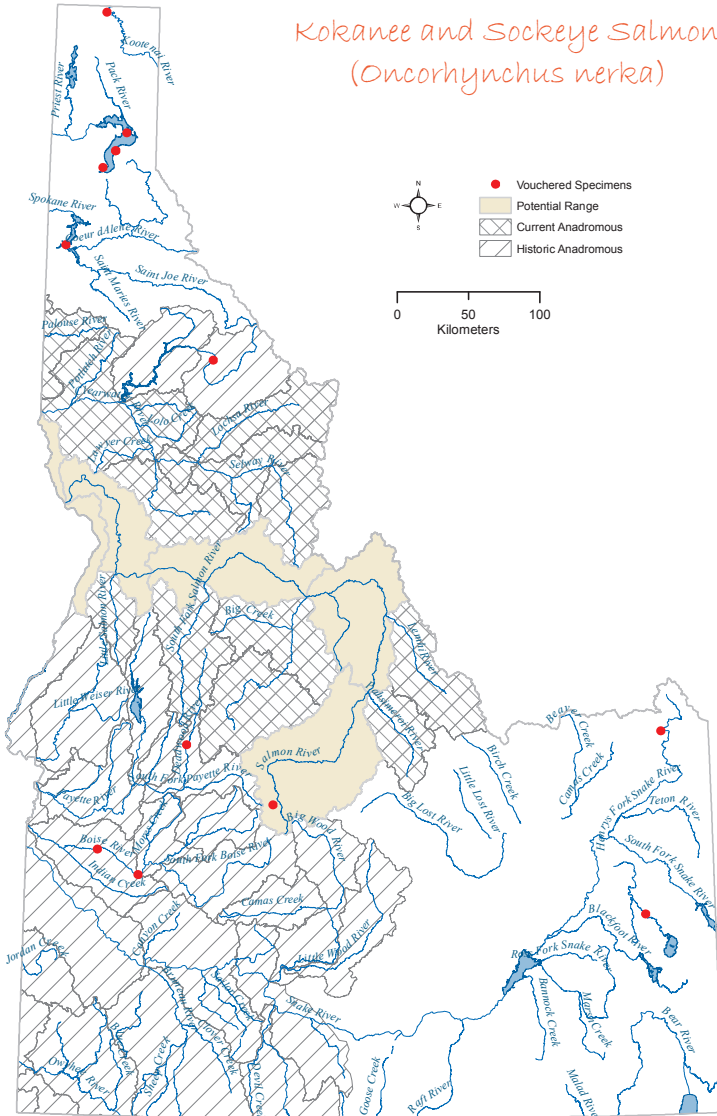
**Ecology:** The main ecological difference between steelhead and redband rainbow trout lies in the physiological transformation, known as smoltification, that allows them to adapt to the high salinity content of sea water. Steelhead spend between 2 and 3 years in freshwater then migrate to the ocean as 'smolts'. Once they reach the ocean, steelhead generally spend between 1 and 3 years feeding and growing to adult size before maturing and returning to natal streams to spawn. Unlike

Pacific salmon, steelhead are not programmed to die after spawning, and may return to the ocean several times in a life span.

**Idaho Conservation Status:** Virtually all wild populations of steelhead in Idaho are of conservation concern. The distribution and abundance of wild steelhead populations in Idaho is not well described. Steelhead populations in many areas of the state are now maintained primarily by hatchery programs. As is the case for other migratory fishes in Idaho, fish passage for returning adults and habitat alteration for juvenile fish are serious threats to the long-term viability of steelhead.

References: Behnke 2002, Simpson and Wallace 1982, Wydoski and Whitney 2003.

Kokanee and Sockeye Salmon  
(*Oncorhynchus nerka*)

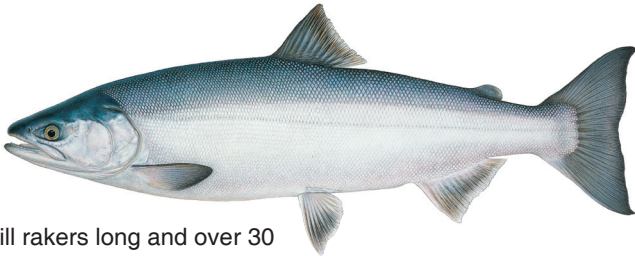


Salmonidae



**Sockeye salmon,  
kokanee*****Oncorhynchus  
nerka***

large eyes set forward, no spotting, tail moderately forked and dark



gill rakers long and over 30

**Immature/prespawn**

fish are bright red with green heads irregular spots on back and tail



males show kyped jaw

**Mature/spawning**

**Attributes:** Immature sockeye salmon and kokanee have bright silvery sides with steely dark blue dorsal surfaces. Spotting is absent. The caudal fin is moderately forked and dark. The head is conical and in smaller kokanee, the eyes are large relative to head size. As sockeye salmon and kokanee mature a dramatic transformation in both body form and coloration take place. Males develop a hooked jaw (kype) and humped back. The bodies of both males and females turn reddish with the head and tail remaining green. Late spawners turn a dirty reddish grey and early spawners turn bright crimson red (hence the common name “red fish”). Irregular-shaped spots become apparent near the tail and dorsal surface in mature fish and the skin becomes leathery as scales are absorbed. Sockeye are the only salmon species with relatively long, fine gill rakers that number more than 30.

**Distribution:** The native distribution of sockeye salmon in North America extends from the Columbia River basin north to the Yukon River. The Bristol Bay area of Alaska, the Fraser River basin of British Columbia and the Kamchatka Peninsula of Russia are the epicenter of sockeye salmon abundance. In Asia, sockeye salmon can be found from Hokkaido Japan to the Anadyr River in Russia. Kokanee are the resident form of anadromous sockeye salmon and their natural distribution is associated with the distribution of sockeye salmon.

In Idaho, sockeye salmon were native to Payette Lake and five lakes in the Stanley Basin. Currently, sockeye salmon return primarily to Redfish Lake in the Stanley basin. This is the furthest southern population of sockeye salmon and longest migration of any remaining population. Native kokanee populations persist in Payette Lake, and four of the Stanley basin lakes. Kokanee also occur during the late summer in the Kootenai River drainage where they migrate into Idaho from Kootenay Lake, British Columbia to spawn. Introduced populations of kokanee have been established in the large natural lakes of north Idaho and some large reservoirs.

**Habitat:** Sockeye salmon and kokanee are a pelagic species which spends almost their entire life in the open water of the ocean or lakes, respectively. Their use of rivers and streams are as migration corridors between rearing and spawning areas. In lakes, they prefer water temperatures near 10°C in summer and will congregate at the thermocline below warmer surface waters.

**Diet:** Young sockeye salmon and kokanee rely almost exclusively on zooplankton when available and are suited for efficiently capturing small crustaceans due to their unique gill rakers. Invertebrates, insect pupae and bottom organisms supplement the diet when plankton is lacking.

**Ecology:** Sockeye salmon and kokanee are the different names given to the two life history forms for this species. Sockeye salmon are the anadromous form spending a portion of their life foraging in the ocean while kokanee remain in freshwater throughout their lives. Sockeye salmon are a relatively small salmon typically ranging in total length from 530-660 mm and weigh 1.8-3.2 kg. Idaho sockeye salmon typically spend 1-2 years in freshwater lakes before migrating to the ocean where they spend 2 years in the ocean prior to returning

to lakes to spawn. Sockeye salmon enter the Columbia River in June or July, migrating over 1,400 km back to Stanley Basin lakes by late July or August. Sockeye salmon spawning takes place on shoreline gravels of Redfish, Pettit, and Alturas lakes in October. Sockeye salmon and kokanee only spawn once, dying shortly after spawning allowing their bodies to decompose and provide nutrients to the oligotrophic alpine lakes and streams.

Kokanee range in size from stunted populations maturing at 190-230 mm and larger individuals reaching 660 mm. Kokanee in the 300-360 mm size range are common in Idaho and fish over 500 mm are considered “trophy” size. Fecundities in kokanee range between about 350 to over 1,700 eggs. There are two distinct spawning periods for kokanee. Native kokanee typically spawned from early September into October (early spawners), but many introduced populations spawn from November through December (late spawners). Early spawning populations tend to be tributary spawners and late spawners tend to utilize lake shore gravels, although kokanee are highly adaptable when utilizing spawning habitat. Early spawners also tend to be brighter in color, both externally and in flesh quality (higher oil content). Maturity in kokanee is variable and largely governed by growth. Faster growing populations can mature at 2 years of age whereas some slower growing populations in unproductive waters do not mature until 5 years. However, most kokanee spawn at 3 or 4 years of age. Kokanee fry from tributary spawning populations do not reside in streams, migrating into lakes shortly after emerging from the gravel during spring runoff. Kokanee are also considered one of the best forage species to grow trophy trout and char throughout their range.

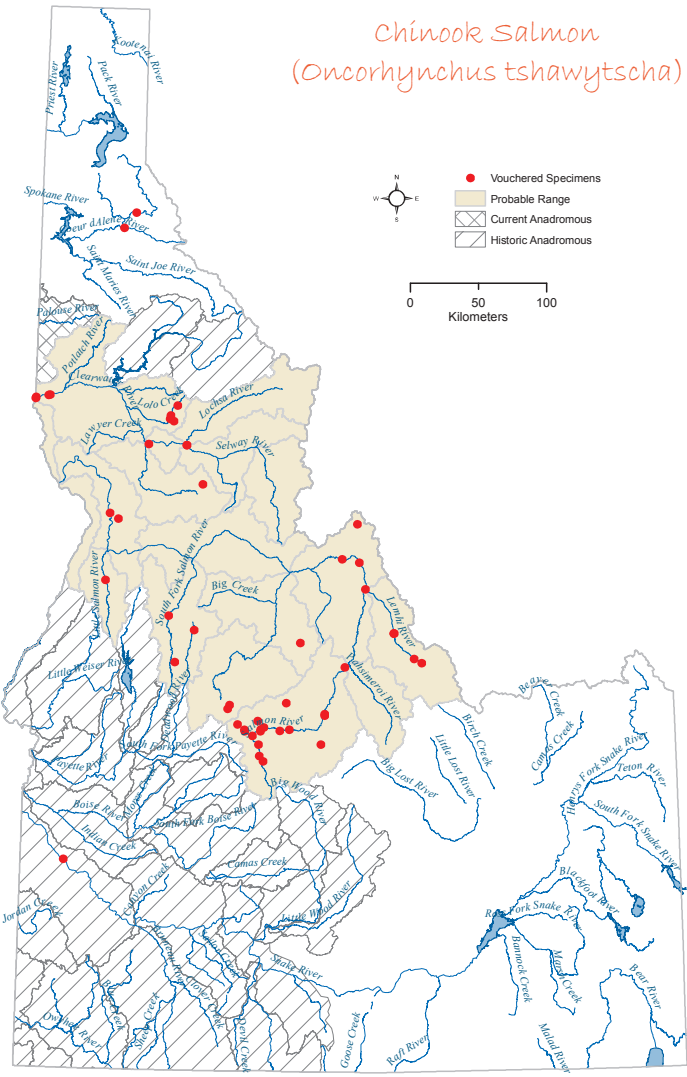
**Idaho Conservation Status:** Sockeye salmon were listed as an endangered species (Federal Register Volume 56, page 51684) in 1991 under authority of the Endangered Species Act by the U.S. Fish and Wildlife Service. A captive broodstock program is being utilized to conserve genetics of this unique population. With support of the sockeye salmon captive broodstock program, there is natural production of sockeye salmon in Redfish, Pettit, and Alturas lakes. Between 1991 and 1998, only 16 wild sockeye returned to Idaho. From 1999 through 2007, returns of sockeye salmon to Idaho totaled 355 and over 600 returned to Redfish Lake in 2008. Native kokanee populations persist in historic habitat.

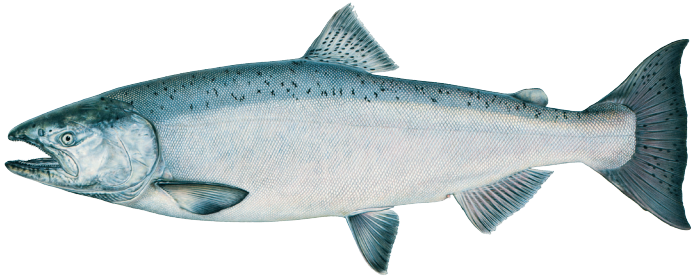
Formerly abundant, introduced kokanee populations in north Idaho lakes have either been lost or greatly reduced through impacts to spawning habitat and predation. Dams on the inlet and outlet of Lake Pend Oreille resulted in lost and altered spawning habitat for kokanee. Cabinet Gorge Hatchery was constructed in 1986 to mitigate the effects of Avista's Cabinet Gorge Dam and Albeni Falls Dam. Dam operations have been modified by the U.S. Army Corps of Engineers to reduce impacts to shoreline spawning gravel. Mysis shrimp establishment in both Priest and Pend Oreille lakes enhanced survival of juvenile lake trout resulting in significant predation on kokanee. Bounties and commercial netting are being utilized to collapse lake trout in Lake Pend Oreille since 2006. The regionally important kokanee fishery in Dworshak Reservoir was being enhanced through a reservoir fertilization effort started in 2008. Kokanee fisheries are supported by hatchery stocking in several lowland lakes and smaller reservoirs throughout the state.

References: Behnke 2002; IDFG 2007; Scott and Crossman 1973; Simpson and Wallace 1982; Wydoski and Whitney 2003.



Chinook Salmon  
(*Oncorhynchus tshawytscha*)



**Chinook salmon** *Oncorhynchus tshawytscha*

black tissue on gumline in adults

**Attributes:** Chinook salmon have a greenish blue to black back with silvery lower sides and a white belly. The lower gums are black, which distinguishes it from coho salmon. The back, top of head, upper sides and all fins have at least a few black spots with the upper lobe of the caudal more heavily spotted than the lower lobe. The body is fusiform, streamlined, and moderately compressed laterally. The head is moderate to large, conical and snout rather blunt. In breeding males, the snout becomes greatly extended, narrowed, and turned down at the tip. Teeth are sharp and well developed on both jaws, head and shaft of vomer, palatines, and tongue. Eye is moderate sized. Scales are cycloid with 130-165 in the lateral line. There are 16-20 gill rakers, which are rough and widely spaced. The dorsal fin has 10-14 rays and anal fin, 14-19. The caudal fin is slightly forked in adults and more deeply forked in juveniles.

**Distribution:** The native range of Chinook salmon is the northern Pacific Ocean and most of the larger tributaries. In North America, Chinook salmon were found from the Ventura River in southern California northward to Point Hope, Alaska. In Asia they are found from northern Hokkaido to Anadyr River in Russia. In Idaho, prior to the construction of dams, Chinook salmon ranged up the Snake River to Shoshone Falls along with its major tributaries. With the construction of dams in the Snake River drainage, over 50 percent of range in Idaho was lost limiting access only to the Snake River up to Hells Canyon Dam and the Salmon River and Clearwater River drainages. With the addition of ladders and the ultimate removal of the Lewiston Dam and the establishment of hatchery programs, Chinook salmon were returned to the Clearwater River drainage except for the North Fork Clearwater River above Dworshak Dam.

**Habitat:** Adult Chinook salmon return to their natal freshwater streams and rivers where they spawn in gravel and cobble riffles depending on their size. Larger fish are able to use larger gravels and cobbles for spawning. Generally, spring Chinook salmon spawn in the upper reaches of tributary streams, summer Chinook salmon spawn in middle and lower reaches and fall Chinook salmon spawn in mainstem rivers. Clean spawning gravels with low amounts of sand and silt result in higher survival rates of emerging fry. Optimal water temperatures range from 12° C for spring Chinook salmon juveniles to 17° C for fall Chinook salmon juveniles. Juvenile Chinook salmon generally prefer pool and run habitats in freshwater streams deeper than one meter, although availability of instream cover, water velocities, food availability, and presence of other fish species influence habitat use. Preferred water velocities are generally less than 0.25 m/sec.

**Diet:** Young Chinook salmon feed on both aquatic and terrestrial insects drifting in the water column. They do not turn to a diet of fish until after they have reached salt water. When first entering salt water, juvenile Chinook salmon feed on small crustaceans and other invertebrates before quickly converting to a diet of fish, squid and euphausiids (krill).

**Ecology:** Chinook salmon are anadromous, spending from a few months to two years in freshwater before migrating to the ocean for one to four years before returning to their natal stream to spawn and die. Most Idaho Chinook salmon spend one year in freshwater and



two to three years in the ocean. Chinook salmon have a variable life history. Chinook salmon are commonly designated as spring, summer, fall and winter runs depending on when adults entered freshwater returning to their home streams to spawn. Spring, summer and fall runs spawn during summer to fall period with spring runs spawning earliest, starting in late July followed in succession with fall runs spawning in October/November. Spawning usually starts within two to three weeks after the fish reach the spawning grounds. The female may dig one or more redds and spawn with one or more males. The eggs are large and orange-red in color. Females may produce up to 10,000 eggs per fish, though 4,000 to 5,000 eggs/fish is typical in Idaho. Like other Pacific salmon, Chinook salmon die after spawning.

Depending on runs, spawning occurs from July to October in Idaho, with eggs typically hatching in April and the fry remaining in gravel for another month until the yolk sac is absorbed. Fall run Chinook salmon typically migrate down river shortly after emerging during summer months. Spring and summer run juvenile fish remain in freshwater for a year before migrating to the ocean during spring high water. Idaho's spring/summer Chinook salmon is one of the most fantastic species of fish on the North American continent. In Idaho, smolts make a migration of 1,450 km from Stanley Basin to the ocean, and then have the amazing ability to retrace their route as adults. Only Alaska's Yukon River, with migrations of about 1,900 km exceeds the length of the Salmon River migration.

**Idaho Conservation Status:** All natural stocks of Chinook salmon in Idaho are listed as threatened under the U.S. Endangered Species Act due to declining population trends and loss of habitat. Fall Chinook salmon and spring/summer Chinook salmon were listed as threatened under ESA in 1992 (Federal Register Vol. 57, page 14653). Historically, spring, summer and fall runs resided in Idaho; however most of the remaining native fall run of over 17,000 fish was lost when the Hells Canyon dam complex was constructed in the late 1950s. Earlier dams such as Swan Falls had already significantly reduced the main river spawning fall Chinook salmon populations in Idaho. While dams that block access to over 50 percent of Idaho's historic spawning and rearing areas are an obvious threat to species survival, they are not the only threat. Major negative impacts to spawning grounds have come from logging, mining, grazing, road development and agricultural practices in the form of increased sediment, stream alterations, loss of cover, increased water

temperatures and dewatering of streams. Additionally, Chinook salmon in Idaho have to pass eight dams and their reservoirs to reach the Pacific Ocean. While passage has been improved for adults returning to Idaho, downstream movement through dams continues to be a significant problem due to both mortalities at the dams and the increased time that it takes for smolts to drift downriver through the reservoirs above the dams. While mitigation efforts are ongoing to improve upriver habitats and passage issues, they are still being evaluated to determine effectiveness. Included in mitigation are annual releases of over 12 million hatchery Chinook salmon juveniles in Idaho which can also impact wild stocks of Chinook salmon through competition and genetic issues.

References: Behnke 2002; IDFG 2005, 2007; Scott and Crossman 1973; Simpson and Wallace 1982; Wydoski and Whitney 2003.

**SUBFAMILY COREGONINAE****Whitefish**

Globally, the subfamily of whitefishes contains about 30 species which are classified in three genera. In Idaho, all five native whitefish species are in the same genus, *Prosopium*, and are distinguished from the other whitefish by having a single nostril flap, rather than two.

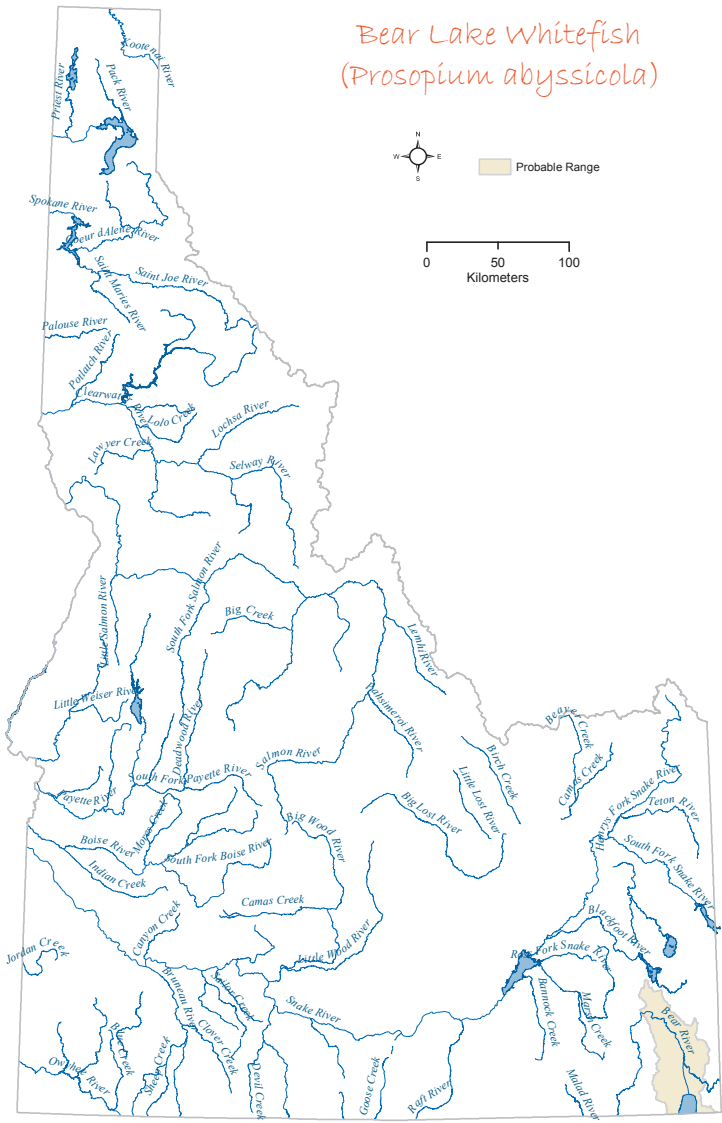
Whitefishes found in Idaho are distinguished from other members of the salmon family by the presence of large scales, lack of spots in the dorsal and caudal fins, and a small mouth (except Bonneville cisco). Teeth on the jaws are not obvious. Whitefish have a short anal fin and juveniles have parr marks along the sides of their body.

Three of Idaho's native whitefish occur only in Bear Lake, and are thought to have evolved from the same ancestor, the mountain whitefish, which today is widely distributed in western North America. Since their isolation in Bear Lake when Lake Bonneville receded, all three species occupy unique niches in the lake. The Bonneville whitefish and Bear Lake whitefish look almost identical but vary in the number of scales found along the lateral line. Despite being morphologically similar, these two species live at different depths and eat different food items, thereby limiting resource competition between them. The third whitefish found in Bear Lake, the Bonneville cisco, is found in shallower water and consumes different prey items than either Bonneville whitefish or Bear Lake whitefish.

Recent genetic work has shown that mountain whitefish have considerable variability across Idaho. In the closed Big Lost River basin, it is believed that mountain whitefish entered the basin through an ancient connection with the upper Snake River somewhere between 150,000-350,000 years ago. The Big Lost mountain whitefish population constitutes a genetically-distinct form of the species.

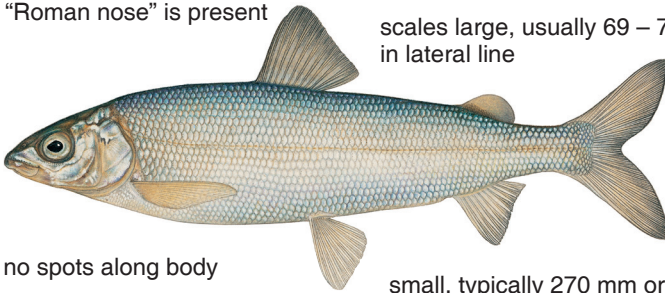
Pygmy whitefish occurrence in northern Idaho's deep lakes is a result of glaciers receding about 10,000 years ago. In 1889, lake whitefish *Coregonus clupeaformis* from the Great Lakes were introduced to Pend Oreille Lake where native pygmy whitefish reside. The two species can be distinguished from each other by the number of nostril flaps. Lake whitefish have two nostril flaps, where pygmy whitefish, like other native Idaho whitefish, have one nostril flap.

Bear Lake Whitefish  
(*Prosopium abyssicola*)



**Bear Lake  
whitefish*****Prosopium abyssicola***

a "Roman nose" is present

scales large, usually 69 – 74  
in lateral line

no spots along body

small, typically 270 mm or less

**Attributes:** Bear Lake whitefish are grayish green above, silvery on sides and white below. The snout is short and bluntly rounded. The eye is large, mouth is small. Scales along lateral line number 67-78, and rows of scales above lateral line no more than 17. The Bear Lake whitefish is considered a dwarf species, seldom exceeding a total length of 270 mm.

**Distribution:** The Bear Lake whitefish is endemic to Bear Lake, Idaho/Utah. It has not been introduced into other localities.

**Habitat:** This is the deep-water form of the whitefish complex in Bear Lake. They are found mainly at depths of 45-55 m where the temperature is a uniform 4°C.

**Diet:** Bear Lake whitefish are invertivores. Their primary food items are ostracods, chironomids, and zooplankton. In the spring, terrestrial insects that drown and sink are commonly found in stomach samples.

**Ecology:** Bear Lake whitefish become sexually mature at three years of age with some males maturing at two years. Large schools are formed during spawning, which takes place from February to May, in water depths of 18-31 m and water temperatures between 2-4°C. A 200 mm total length female produces about 2,000 eggs. Recent information suggests they are a long-lived, slow-growing

species, possibly living 37 years or more.

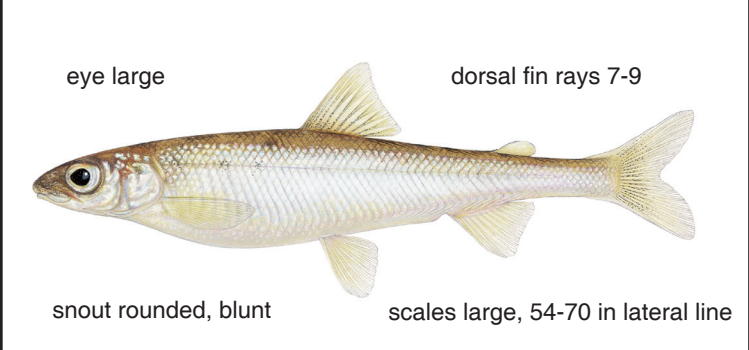
**Idaho Conservation Status:** The Bear Lake whitefish is found only in Bear Lake. It is classified as a game fish by Idaho and Utah. Sampling indicates the population is abundant and stable. Bear Lake whitefish are an important forage fish for Bear Lake cutthroat trout. Because of its deep distribution in Bear Lake, this species is seldom taken by hook and line, although they were harvested commercially during the early colonization of the Bear Lake territory and used as a bait fish on set lines which were used to take cutthroat trout. Threats include the loss of spawning habitat when the lake water level is lowered by irrigation, changes in water quality with increased development around the lake and introductions of non-native species.

References: Kennedy et al. 2006; Sigler and Sigler 1987; Simpson and Wallace 1982; Thompson 2003; Tolentino and Thompson 2004; Zaroban et al. 1999.







**Pygmy whitefish*****Prosopium coulterii***

**Attributes:** Pygmy whitefish are brownish above, silvery on the sides, and white below. The head is short, snout blunt and rounded. The mouth is subterminal. Scales along lateral line number 54-70. There are 8-12 dark, round or oval parr marks along sides of juveniles and subadults which are typically faint on adults. The body is almost round in cross section. This is a small whitefish, seldom exceeding 200 mm total length.

**Distribution:** Pygmy whitefish have a discontinuous distribution across northern North America. They are found in the headwaters of the Columbia River in Washington, Idaho, Montana, and British Columbia, and in coastal drainages north to Bristol Bay, Alaska. They also occur in Lake Superior and the Yukon Territory. In Idaho, they are native to Priest Lake, Upper Priest Lake, Lake Pend Oreille and Spirit Lake in the Pend Oreille River drainage.

**Habitat:** Pygmy whitefish inhabit lakes and cool streams. They seem to prefer lakes where they typically occur in water deeper than 6 m. However, in winter they have been taken in shallow water. In Idaho, pygmy whitefish have been found only in lakes, where they typically occur in deep, cold-water areas. Pygmy whitefish have been netted during summer at depths over 300 m in Lake Pend Oreille, but are more typically found at depths of 20-50 m in other Idaho lakes.

**Diet:** Pygmy whitefish are invertivores. They feed on a variety of benthic aquatic invertebrates, including insect larvae, crustaceans and molluscs. In Idaho, zooplankton and aquatic insect larvae, mainly midges, are the primary food items found in the stomachs of fish from

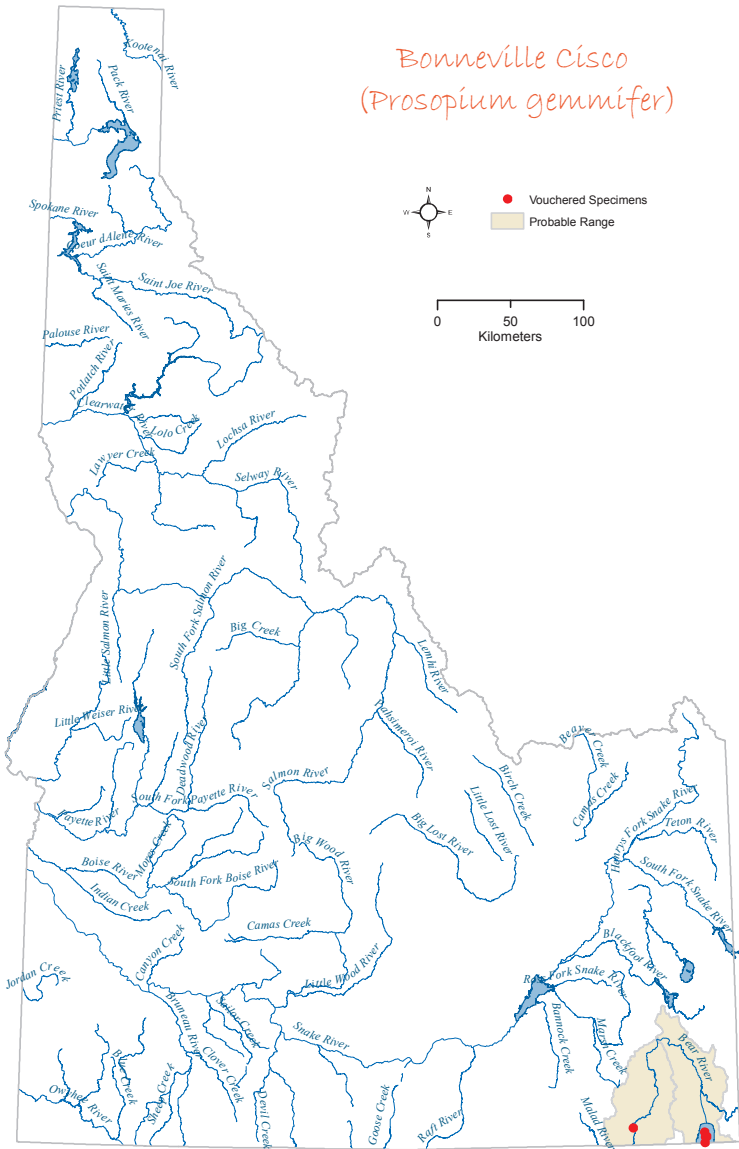
Pend Oreille Lake. They feed almost exclusively during daylight hours.

**Ecology:** During most of its life, the pygmy whitefish lives in deeper water. However, it enters shallow water along the shoreline or in tributary streams in late October or early November to spawn when water temperatures are 0-4°C. Eggs are broadcast over rock or gravel substrate. In Priest Lake, they were observed in late October moving into shallow water during late afternoon and early evening hours to spawn during the night. They return to deeper water during the day. Pygmy whitefish become sexually mature at two to three years of age and produce 400-600 eggs per female. They rarely live longer than seven years.

**Idaho Conservation Status:** Unknown. Idaho lists pygmy whitefish as a species of greatest conservation need, but in a category of species that lack essential information pertaining to status. Pygmy whitefish are classified as a game fish in Idaho although they are seldom caught by anglers. A few studies have been conducted to determine population status. In 2011 bottom trawling was used to estimate a mean density of 73 pygmy whitefish/ha in Spirit Lake yielding an expanded estimate of about 43,000 pygmy whitefish in the lake. A hydroacoustic survey with bottom trawling yielded density estimates of 357 pygmy white fish/ha in Upper Priest Lake with an expanded estimate of about 150,000 pygmy whitefish in the lake. Pygmy whitefish have also been collected in recent years in Lake Pend Oreille and Priest Lake where, along with Upper Priest Lake, they coexist with non-native lake trout. Pygmy whitefish probably serve as a forage fish for deep water predators, and thus might be an important link in the food chain between zooplankton, insects and game fish. They have been observed in the stomachs of lake trout from Priest Lake and Kamloops rainbow trout from Lake Pend Oreille. They also have been found in the stomachs of bull trout from in Idaho and Washington.

References: Maiolie and Fredericks 2011; Maiolie and Fredericks in preparation; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

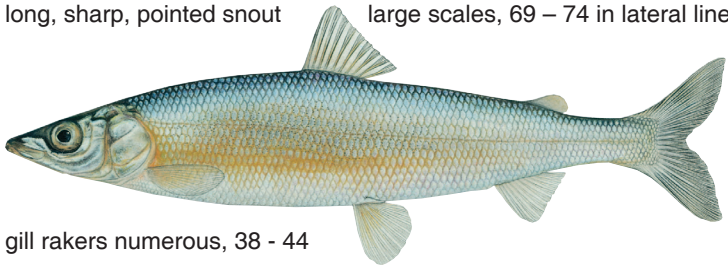




**Bonneville cisco*****Prosopium gemmifer***

long, sharp, pointed snout

large scales, 69 – 74 in lateral line



gill rakers numerous, 38 - 44

**Attributes:** The dorsal surface of this whitefish is dark, varying from green to blue, with some black pigment. The sides are silvery and the belly white. During spawning season, a streak of gold and yellow extends backward from the pectoral fin to the anal region. The body is thin. The eye is large, and the lower jaw projects beyond the upper jaw. Dorsal fin rays number 10-12 and anal fin rays 11-12. This is a small pelagic (open-water) species, seldom exceeding 200 mm total length.

**Distribution:** The Bonneville cisco is endemic to Bear Lake, Idaho/Utah. It has been introduced into a few lakes, mainly in the western United States, but no persistence has been documented.

**Habitat:** The Bonneville cisco is typically found in mid-water schools during the day, generally preferring water temperatures below 15°C. In summer, when water temperatures are warm, this species descends to deeper, cooler water between generally 15-30 m. During the rest of the year, it is widely scattered throughout Bear Lake.

**Diet:** The Bonneville cisco is an invertivore. They are filter feeders, straining zooplankton from the water. Midge larvae are also eaten.

**Ecology:** The Bonneville cisco becomes sexually mature at three years. Spawning occurs during a two-week time frame in late January or early February when water temperatures are 2-4°C. Spawning typically takes place in water 0.5-1.0 m deep along the shoreline and aquatic vegetation, but may extend down to 20 m. Eggs are broadcast, gradually settle to the bottom and become attached to

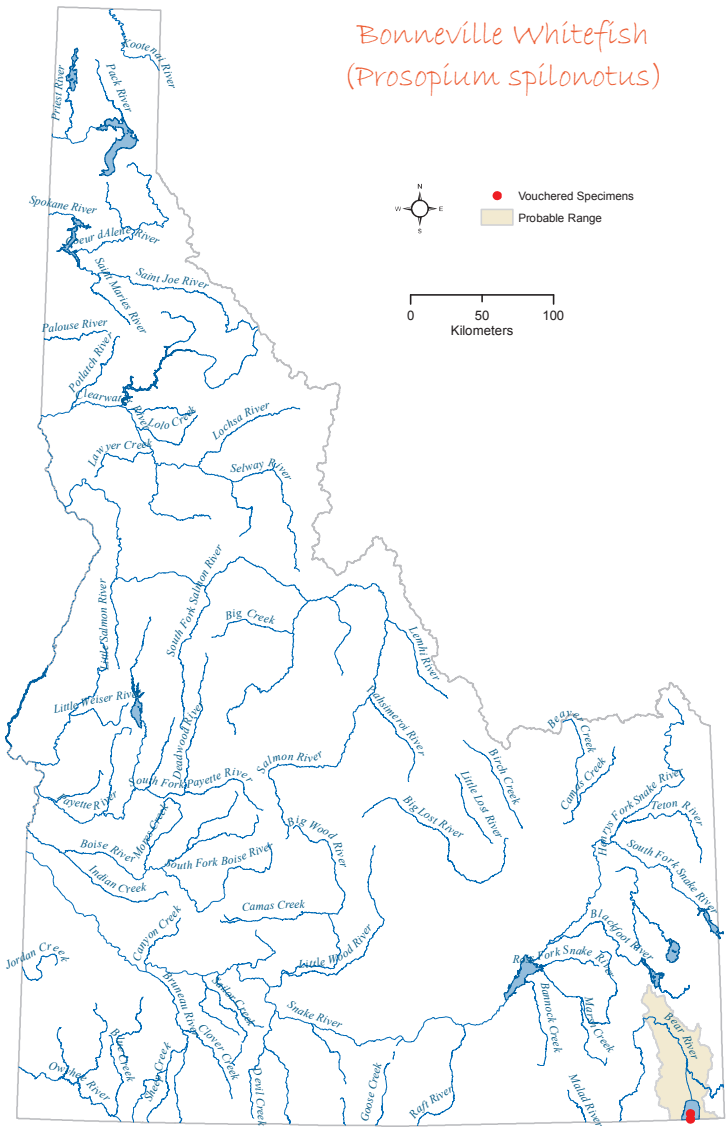
the substrate. Males typically outnumber females on the spawning grounds. A 150 mm female may produce around 2,600 eggs. Growth of Bonneville cisco is rapid the first two years of life but is much slower during the remainder of life. They live up to seven years. Surveys have found that during full moon phases, Bonneville cisco inhabit deeper water at night than during darker, new moon phases. This may be behavior to avoid predators such as Bonneville cutthroat and lake trout.

**Idaho Conservation Status:** The Bonneville cisco is classified as a game fish by Idaho and Utah. Sampling indicates the population is abundant and stable. A popular winter dip-net fishery has been established to catch Bonneville cisco when they move into shallow water to spawn. They are seldom caught on hook and line. The Bonneville cisco is the most abundant fish in Bear Lake and is important in the diet of Bear Lake cutthroat trout. Threats include the loss of spawning habitat when the lake water level is lowered by irrigation, changes in water quality with increased development around the lake, and introduction of non-native species.

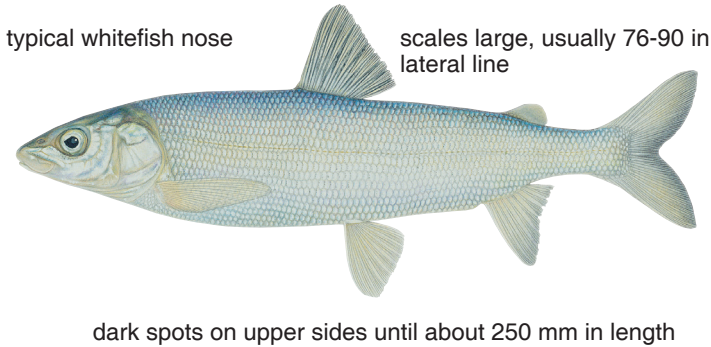
References: Luecke and Wurtsbaugh 1993; Sigler and Sigler 1987; Simpson and Wallace 1982; Zaroban et al. 1999.



Bonneville Whitefish  
(*Prosopium silonotus*)





**Bonneville whitefish*****Prosopium  
silonotus***

**Attributes:** The Bonneville whitefish is grayish on the back and upper sides, silvery on most of the sides, and white below. Dark spots on the back and upper sides persist until individuals are about 250 mm total length. Thereafter, spots may or may not be present. The head is short and pointed, snout extending slightly beyond lower jaw. Lateral line scales typically number 76-90; dorsal fin rays 10-12; anal fin rays 9-11 with length of anal fin base 2.4 - 3.5 times into head length. This is the largest of the endemic whitefishes of Bear Lake, adults attaining total lengths of 457-559 mm, although most are 356-406 mm. Bonneville whitefish that are 250-300 mm total length are five and six years old and can live 20 years.

**Distribution:** The Bonneville whitefish is endemic to Bear Lake, Idaho/Utah. It has not been introduced into other localities.

**Habitat:** Bonneville whitefish the most wide-ranging of the three endemic whitefishes of Bear Lake. They are found in 5-30 m of water, but adults enter shallow water in winter and summer (more so than Bonneville cisco or Bear Lake whitefish). They are often found in water with temperatures between 14-18°C. Young Bonneville whitefish are seldom taken from shallow water.

**Diet:** Bonneville whitefish are invertivores. They feed on a variety of aquatic and terrestrial insects, and other aquatic invertebrates,

although midge larvae and pupae form the bulk of the diet. Individuals become piscivorous once they reach a total length of 300 mm, with the diet exclusively made up of sculpin.

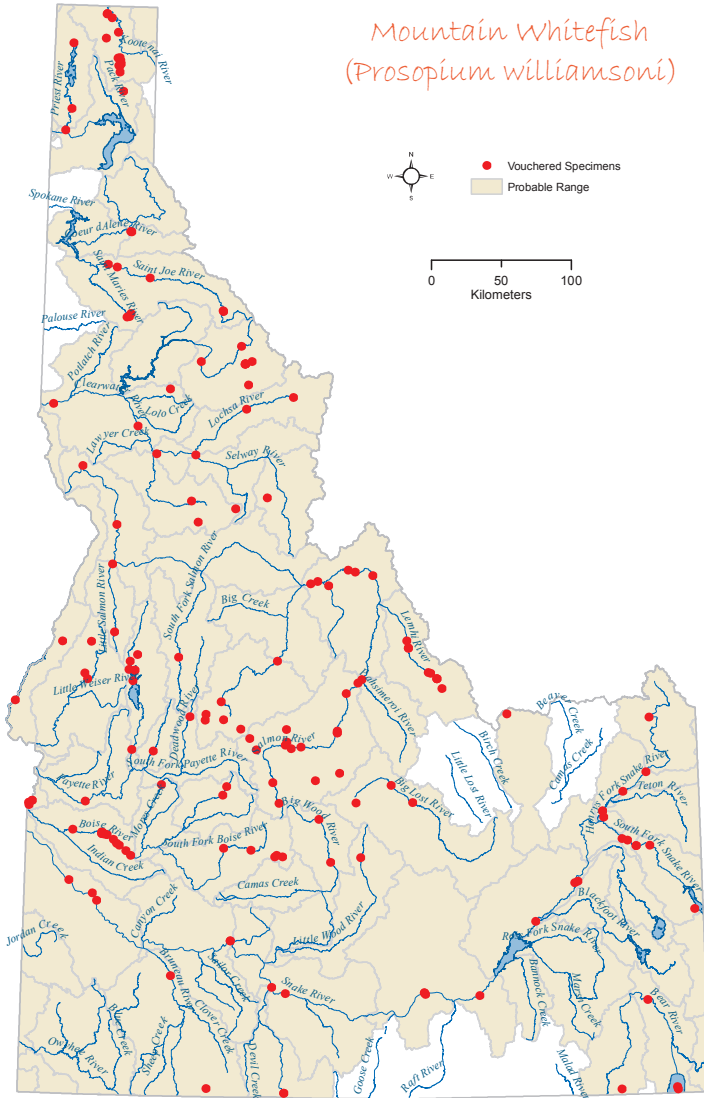
**Ecology:** Bonneville whitefish become sexually mature at ages three and four. They typically spawn in late November and early December in shallow areas where the eggs are deposited in rocky or sandy bars. Most spawners are 200-230 mm total length. Females of this size produce 600-900 eggs. Growth is rapid the first two years but is much slower thereafter.

**Idaho Conservation Status:** The Bonneville whitefish is classified as a game fish by Idaho and Utah. Sampling indicates the population is abundant and stable. Bonneville whitefish are taken in limited numbers by hook and line, but the fish is not favored by most anglers. They are an important prey for Bear Lake cutthroat trout. Threats include the loss of spawning habitat when the lake water level is lowered by irrigation, changes in water quality with increased development around the lake, and introduction of non-native species.

References: Kennedy et al. 2006; Sigler and Sigler 1987; Simpson and Wallace 1982; Thompson 2003; Tolentino and Thompson 2004; Zaroban et al. 1999.



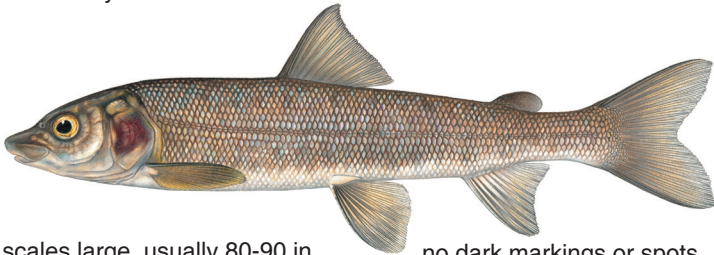
Mountain Whitefish  
(*Prosopium williamsoni*)



**Mountain whitefish*****Prosopium  
williamsoni***

head short and  
relatively small mouth

body slender, round in cross  
section



scales large, usually 80-90 in  
lateral line

no dark markings or spots  
on body of adults (round  
parr marks on juveniles)

**“Pinnocchio” form with elongated snout****Rounded-snout form**

**Attributes:** The body color of mountain whitefish typically ranges from brown or olive to silvery gray on the back. The sides are silver, grading to white on the lower sides and belly. Adults lack dark markings anywhere on the body. The young have several round to diamond-shaped parr marks on their sides. They typically have 80-90 lateral line scales; 11-15 dorsal fin rays; 10-13 anal fin rays. The length of anal fin base is 1.8-2.1 times the head length. Two different snout types occur in mountain whitefish, an elongated snout (“Pinnocchio” form) and one that is more rounded. The reason for this is not understood, but likely influences how the whitefish forage for food. The “Pinnocchio” form is represented in a number of populations across southern Idaho, occurring in larger (400-500 mm total length) specimens.

Recently, morphological differences within the species have been found across its distribution in Idaho, suggesting adaptations to its environment. For example, mountain whitefish in the Big Lost River basin typically have a very short, blunt snout and an orange color along the side whereas mountain whitefish from the Salmon River typically have a more pointed snout and silver or white color along the sides.

**Distribution:** The mountain whitefish is widely distributed in western North America. They occur east and west of the Continental Divide, from the Lahontan basin of Nevada/California, north through the northwestern states of Utah, Wyoming, Colorado, Idaho, Montana, Washington and Oregon. In Canada, they occur north to the Yukon/British Columbia border and into the Northwest Territories. High water temperature apparently limits its downstream distribution in southern parts of its range to elevations of about 1400 m. In Idaho, it is widely distributed in most major river drainages, including the Big Lost River drainage, which is a closed system in the south central part of the State. It does not occur in the Palouse River drainage.

**Habitat:** Mountain whitefish are typically found in larger streams, rivers, and large lakes. In Idaho, they seem to prefer cold mountain rivers and streams where they reside at the bottom of pools, deep runs and open channels. They are typically found near substrates consisting primarily of cobble and large gravels. Young mountain whitefish use shallow backwater areas, very shallow riffles, protected pools and stream margins with low water velocities. As they get bigger, they move into deeper water mid-channel.

**Diet:** Mountain whitefish are typically invertivores. They are mainly benthic feeders, taking aquatic insect larvae and other benthic invertebrates. Occasionally they will take aquatic and adult terrestrial insects on the surface, especially in open pools and deep runs where the current is slow. Mountain whitefish also eat fish eggs and occasionally small fish. They are active feeders in winter as well as summer.

**Ecology:** Mountain whitefish inhabit a wide range of elevations, land types and stream sizes in Idaho. They often make complex annual migrations for feeding, spawning and overwintering. Typically, adult whitefish overwinter in deep pools in the lower reaches of rivers. Beginning in May and June, they migrate upstream to summer feeding

areas in headwater tributaries where water temperatures are less than 15°C. In the Lochsa and North Fork Clearwater rivers, migrations as long as 88 km are known. Other mountain whitefish populations in Idaho are blocked from migration by dams or loss of stream connectivity. These populations are represented by all life stages in relatively restricted geographic reaches, typically exhibiting only short migrations for spawning and rearing.

Mountain whitefish display strong homing to their summer feeding areas, returning year after year to the same tributary. In the Lochsa River, as water flows recede and water temperatures drop to 4-6°C in mid-August, adults move downstream in the tributaries or upper mainstem to spawn. In the Big Lost River, there is an upstream migration in August. Spawning typically occurs from September through November when water temperatures range 0-11°C. Unlike trout that build redds, mountain whitefish disperse their eggs into rocky, gravel substrate in riffle areas, primarily at night. After spawning they quickly migrate downstream to overwintering areas. Eggs hatch in late winter or early spring, depending on water temperature. Young mountain whitefish in the North Fork Clearwater River were observed in their natal streams until August, when they moved downstream into the lower mainstem. It is thought they remain in the lower river for a few years until they become sexually mature. However, in other streams juveniles migrate only short distances between feeding and overwintering areas. Not much is known about mountain whitefish residing in lakes, but they are known to spawn in tributary streams as well as shallow gravel shorelines.

Growth of mountain whitefish varies with the productivity of their environment. A study on the North Fork Clearwater River found that growth is fairly rapid the first two years of life, with mountain whitefish reaching 100-130 mm total length in their first year and 178-209 mm the second year. Growth rate is then fairly constant for older mountain whitefish. Reproductive maturity is typically reached at three years when they are 200-250 mm total length. In the Big Lost River basin, sexual maturity is reached at two or three years and total lengths of 250-300 mm are attained. Females produce an average of 5,000 eggs, with large females having 20,000-35,000 eggs. Mountain whitefish are relatively long-lived, with 10-20 year old individuals present in most populations. One mountain whitefish sampled in the Henrys Fork was 446 mm total length and 17 years old. A 498 mm total length mountain whitefish from the South Fork Payette River was aged at 24 years. The oldest reported age of mountain whitefish is 29 years.

**Idaho Conservation Status:** Mountain whitefish are classified as a game fish in Idaho, and are considered abundant over most of their range. However, genetically distinct populations in the Big Lost River basin have declined due to drought conditions, stream flow alteration and barriers. Due to the uniqueness and isolation of this population, they are protected from harvest. Abundance of mountain whitefish is declining in the Wood River basin. Adfluvial mountain whitefish were once abundant in the large lakes of northern Idaho, supporting commercial fisheries during their fall migration runs. North Idaho populations today are much reduced from historic levels.

The degree to which mountain whitefish are valued as a sportfish varies across the state. Fishing for mountain whitefish is most popular in the winter when they feed more actively than trout. They readily take bait during this time, but in summer they also are caught on small flies and artificial lures. Mountain whitefish often have been reported to prey on and compete with trout, but there is little evidence that this species has any detrimental effects on trout or salmon populations.

References: Behnke 2002; Elle 2006; Horner 2006; Northcote and Ennis 1994; Pettit and Wallace 1975; Rockhold and Berg 1995; Scott and Crossman 1998; Simpson and Wallace 1982; Whitely 2005; Wydoski and Whitney 2003; Zaroban et al. 1999.



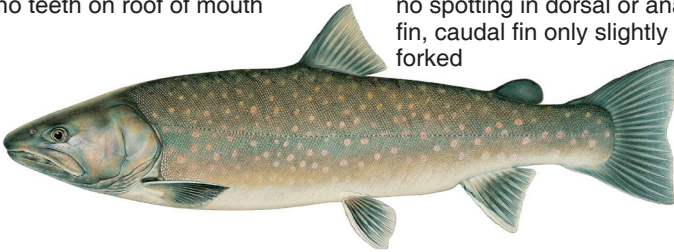




**Bull trout*****Salvelinus confluentus***

no teeth on roof of mouth

no spotting in dorsal or anal fin, caudal fin only slightly forked



dark background, light colored yellow, orange, pink or reddish spots on sides

white leading edges on paired fins

**Attributes:** Bull trout, more accurately bull char, were known as Dolly Varden prior to being recognized as a separate species by the American Fisheries Society in 1980. Bull trout, similar to other char, are distinguished from other salmonids by having light spots on a dark background and no teeth on the roof of their mouth. Bull trout are distinguished from other char in Idaho by having no spotting in their dorsal or caudal fins. Lateral spotting is typically pale yellow or white along the back intermingled with spots in shades of yellow, orange, pink or red along the sides. Body color is variable in intensity depending on fluvial or lacustrine residence and spawning condition. Body coloration in river fish is typically olive greenish gray with a dusky or whitish ventral surface and spots can be distinct. Lake fish tend to be more silvery greenish gray overall and spotting is less distinct. Mature male bull trout can exhibit bright orange to reddish sides and belly during the fall spawning season. Paired ventral fins have white leading edges. Young bull trout have 8-12 dark colored parr marks. Gill rakers number 11-26.

**Distribution:** Bull trout are native to western North America, but the precise historic range is unknown due to confusion with Dolly Varden and Arctic char in the past. Bull trout are found in the headwaters of the Mackenzie and Yukon rivers in the north, other coastal rivers of British Columbia draining into the Pacific, Puget Sound, the Columbia River basin west to Montana, the Klamath River basin of Oregon and the Jarbidge River in north-central Nevada in the south.

In Idaho, bull trout are native to portions of the Kootenai, Priest, Pend Oreille, Spokane, Clearwater, and Salmon rivers, and the Snake River basin below Shoshone Falls. It is unknown if bull trout in the Little Lost River and Beaver-Camas drainages above Shoshone Falls are native due to natural headwater capture events or were introduced.

There is evidence the Beaver-Camas sampling event information may be incorrect. Correspondence between Jim Simpson and Dick Wallace in 1977 indicates this event occurred on Beaver Creek, a tributary to Marsh Creek in the Middle Fork Salmon River drainage. However, this location was not used in the two editions (1978 and 1982) of the *Fishes of Idaho*. Therefore, this sampling point has been retained on our distribution map even though it is controversial.

**Habitat:** Bull trout are found in both lakes and rivers, preferring clean, cold water in the 10-12°C range. Water temperatures exceeding 15°C are thought to limit juvenile survival. Their preference for cold water and complex habitat restricts bull trout to headwater streams, large undeveloped river systems, or deep, cold lakes and reservoirs. Both juvenile and adult bull trout tend to be benthic oriented. Complex habitat including riffles with clean spawning gravel in areas of ground water upwelling, deep pools with large substrate, large submerged woody debris and undercut banks are important to provide habitat for all life stages.

**Diet:** Bull trout are opportunistic feeders, but they are known for being highly piscivorous. Young bull trout feed on a variety of aquatic and terrestrial invertebrates available in streams, but convert primarily to a fish diet if available. Bull trout feed on other species of trout, char and especially salmon smolts, as well as whitefish, minnows, suckers, and sculpins.

**Ecology:** Bull trout were likely never very numerous relative to other native salmonids due to their preference for cold water. Despite this preference, bull trout are able to reach large sizes in very unproductive water due to their piscivory and longevity. Both resident and migratory (fluvial and adfluvial) forms exist throughout their range. Adfluvial forms are common in the large, natural lakes of north Idaho. Naturally fluvial forms found in reservoir systems like Dworshak on the North Fork Clearwater River and Arrowrock and Anderson Ranch reservoirs in the Boise River drainage maintain more of a fluvial life history than adfluvial, migrating upriver annually

instead of spending summers in the reservoirs. Resident bull trout populations typically exist in the headwaters where some migratory forms are present and in waters isolated by habitat loss such as the headwaters of the Weiser River. Adult bull trout reach sizes exceeding 9 kg depending on food availability. Exceptional growth (14.5 kg in Lake Pend Oreille) has been achieved in lakes and reservoirs where introduced kokanee have provided forage. Bull trout first spawn at age 4 to 7. Spawning occurs mostly in headwater streams from September into October when water temperatures fall below 9°C. Fecundities can range from 1,300-8,000 eggs per female depending on size. Fluvial and adfluvial bull trout depend on tributaries for spawning and early juvenile rearing habitat. Juveniles in migratory populations emigrate between ages 1-4 during the spring or fall. Seasonal movements of adult bull trout to spawning tributaries and may exceed 160 km. Longevity is variable, but bull trout tend to be some of the oldest salmonids in a system. Resident fish can be 8-10 years old and only 250mm long, while adfluvial bull trout can reach ages of 12 or older.

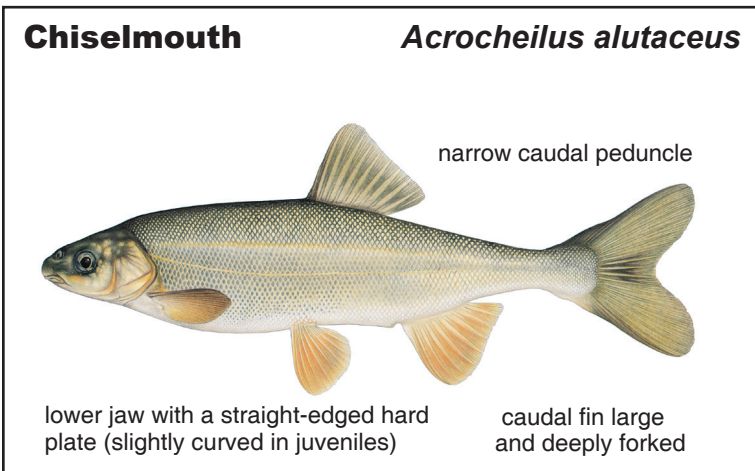
**Idaho Conservation Status:** Bull trout were listed as a threatened species (Federal Register Volume 63, page 31647) in 1998 under authority of the Endangered Species Act by the U.S. Fish and Wildlife Service. Bull trout abundance has declined from historic levels due to a combination of habitat loss and degradation, harvest, loss of connectivity, and the impacts of non-native species through competition, predation and hybridization. Bull trout distribution remains widespread throughout Idaho with some of the best remaining populations located in wilderness and roadless areas. A statewide harvest closure has been in effect on bull trout since 1994 (1996 on Pend Oreille Lake). Hybridization with brook trout and competition and predation from lake trout have compounded problems associated with habitat loss. Liberal harvest regulations have been implemented to reduce brook trout and lake trout populations to aid bull trout.

References: Behnke 2002; High et al. 2008; Needham and Vaughan 1952; Scott and Crossman 1973; USFWS 2008.



**FAMILY CYPRINIDAE****minnows**

The cyprinids are characterized by having cycloid scales, abdominal pelvic fins, and fins with soft rays without true spines. The mouth is not sucker-like, but may be subterminal or inferior. The anal fin is positioned more anteriorly than in the sucker family. Pelvic fins are typically even with or anterior to the dorsal fin. This family contains over 2,000 species found mainly in the tropic and temperate fresh waters of the world except South America, Australia and Madagascar. About 250 species live in the United States and Canada, mostly east of the Continental Divide.



**Attributes:** The chiselmouth is rather drab, being dark grayish brown above and lighter below. They often have orange coloration in axils of pelvic and pectoral fins. The young have a black spot at the caudal fin base. The body is robust with embedded cycloid scales. The head is blunt with a rounded snout. There are 85-93 scales in the lateral line, and anal fin rays number 9-10. Adult chiselmouth may reach 300-325 mm total length.

**Distribution:** The chiselmouth occurs in streams of the Columbia River and Fraser River systems as well as the Harney basin of the Malheur Lake drainage in Oregon. In Idaho, this species occurs in the Snake River and tributaries below Shoshone Falls.

**Habitat:** The chiselmouth is found in warmer reaches of streams and rivers in moderate to slow moving water. They also occur in lakes. Chiselmouth are found over pebble to boulder substrates. Juvenile chiselmouth inhabit shallow pools.

**Diet:** Chiselmouth are herbivores. Young chiselmouth, 25-100 mm total length, will feed on surface insects, but larger fish use the chisel-like lower jaw to scrap algae from rocks or other bottom substrate. Although both diatoms and filamentous algae are ingested, it appears diatoms are the major food of adults. The hard, cartilaginous sheath on the lower jaw, the grinding teeth in the pharynx, and the long intestine are adaptations for feeding on plant matter.

**Ecology:** Individuals of a variety of sizes have been taken from the same general area, but it is not known if they have a schooling habit. The chiselmouth spawns during late spring or early summer at water temperatures of 13-18°C over rocky substrates in tributary streams. Larger females may produce up to 6,000 eggs.

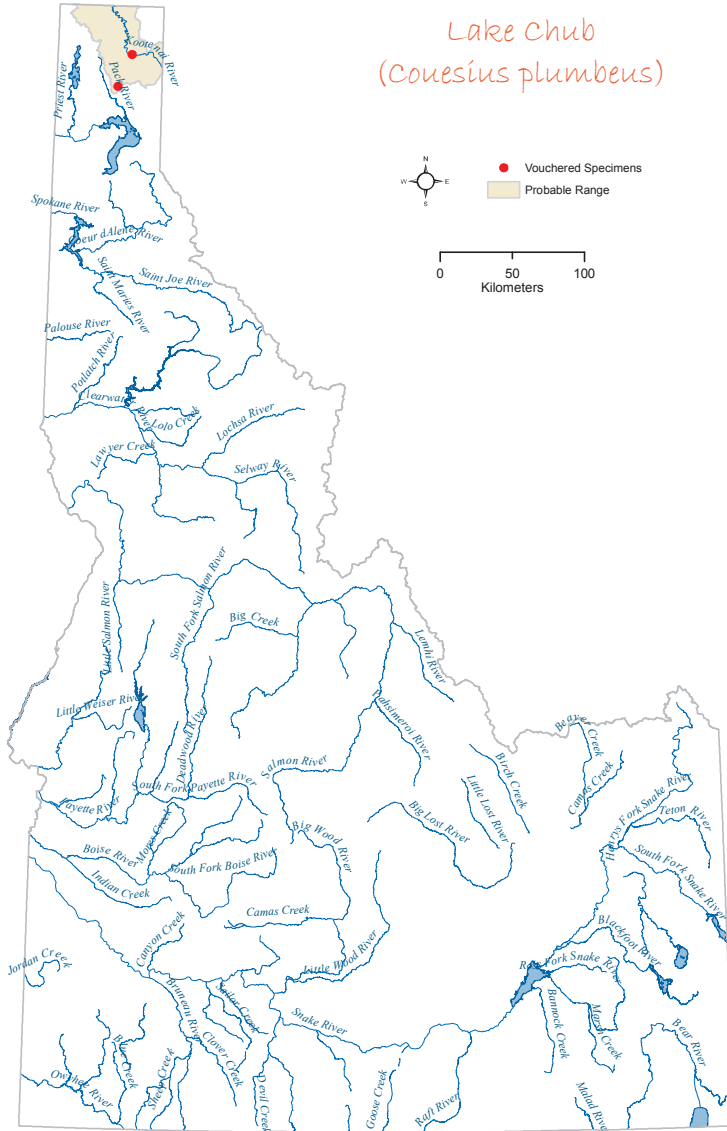
**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.





Lake Chub  
(*Couesius plumbeus*)



**Lake chub*****Couesius plumbeus***

small rounded barbel slightly above corners of mouth

dorsal fin with 8 rays



mouth small, overhung slightly by snout

anal fin with 8 rays

**Attributes:** Lake chub are dark bluish gray on the back and upper sides and silvery white below. A dark lead-colored median stripe becoming less evident with age is present along the sides. Scattered small, dark cycloid scales may be present on the body. There are 58-70 scales on lateral line. Total lengths of older individuals range between 100-200 mm.

**Distribution:** The natural range of the lake chub extends from Alaska through Canada, and the northern United States from New England west to central Wyoming. In Idaho, it is native only to the Kootenai River and its tributaries.

**Habitat:** The lake chub is found in a variety of habitats in lakes, rivers and streams. In Canada they are reported to inhabit lakes when available, but also live in large rivers.

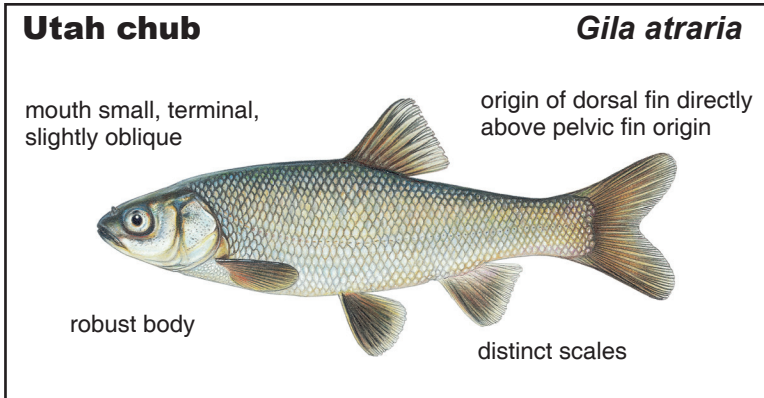
**Diet:** Lake chub are primarily invertivores, feeding on insect larvae, but they also occasionally take zooplankton and algae.

**Ecology:** This species spawns in late spring or early summer in water temperatures ranging from 13-18°C. They are broadcast spawners utilizing gravel to rubble substrate.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status. The last reported sightings in Idaho were in the 1980s.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Stasiak 2006; Wydoski and Whitney 2003; Zaroban et al. 1999.





**Attributes:** Color of the Utah chub is quite variable and changes with age and habitat. The back is black to dark olive-brown, sometimes bluish, the sides silvery or brassy to golden. The belly is silvery to whitish, sometimes yellowish. Often there is a narrow golden stripe along the upper sides that is brighter in males than females. The fins may be dull olive, yellow, or golden in color. There are 45-65 scales in the lateral line. The dorsal fin has 9 rays, while the anal fin has 8 rays. The average total length of adult Utah chub in Idaho is 175-250 mm. In Bear Lake, they have been reported to reach a size of 500 mm, but seldom exceed 400 mm total length.

**Distribution:** The native range is the ancient Lake Bonneville basin in Utah, Idaho, Wyoming, and Nevada. In Idaho, this species is currently found in the Bear River drainage and the Snake River above Shoshone Falls. It is also found in the lower Wood River system which was connected to the upper Snake River by canals in the early 1900's. Its range was restricted to the area below Mesa Falls on Henrys Fork Snake River (river mile 64), but recently it has been transplanted by minnow fishermen to Island Park Reservoir and other small reservoirs in the area. It also has been reported in the Snake River near Boise. Utah chub have been accidentally introduced into a variety of waters in Montana, Wyoming, Colorado, and Utah.

**Habitat:** Typically, Utah chub are lake, pond, or reservoir inhabitants, especially where there are large areas of aquatic vegetation. However, they can be found in a wide range of habitats including irrigation ditches, ponds, sloughs, creeks and large rivers. In rivers, they prosper over bottoms of clay, mud, or sand to gravel, peat rubble, and marl.

**Diet:** Utah chubs are omnivores. Juvenile Utah chubs feed on zooplankton until 150-175 mm total length, then become omnivorous utilizing aquatic vegetation, insects, snails, and crustaceans. They occasionally they feed on small fish and fish eggs.

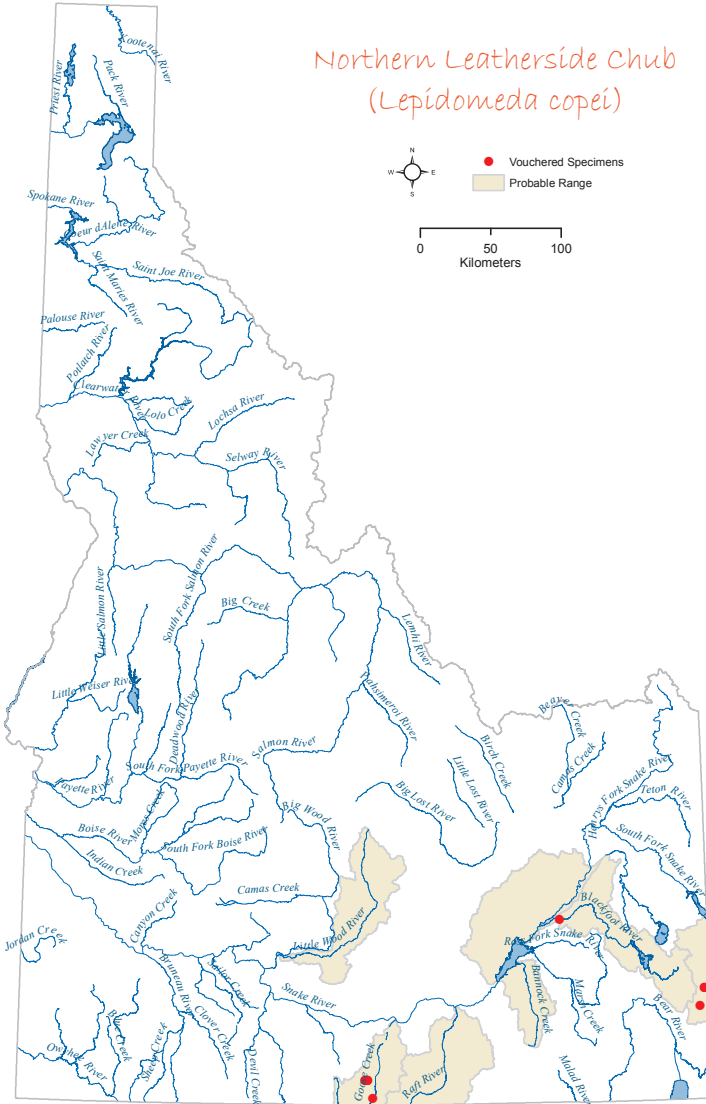
**Ecology:** Utah chub do well over a wide range of temperatures, from 15-30°C. They spawn in the spring when water temperatures reach or exceed 15°C. The eggs are broadcast over a variety of substrates. Female Utah chubs produce 5,000-60,000 eggs.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine conservation status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Zaroban et al. 1999.



### Northern Leatherside Chub (*Lepidomedea copei*)



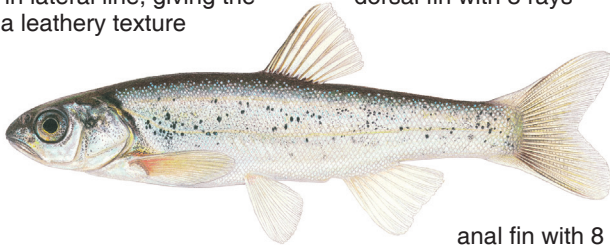


## Northern leatherside chub

*Lepidomeda copei*

scales very small, about 75 – 85 in lateral line, giving the skin a leathery texture

dorsal fin with 8 rays



anal fin with 8 rays

trim, gradually tapering body

**Attributes:** Northern leatherside chub are dark bluish or greenish-gray on the back and upper sides and silvery below. Males have an orange to reddish hue on lower sides, lower lobe of caudal fin, and base of the anal fin, silvery below. The dorsal fin originates behind the insertion of the pelvic fins. The dorsal and anal fins are rounded. The mouth is small and oblique. The leatherside chub typically lives less than five years and ranges between 76-165 mm total length.

**Distribution:** The native range of the northern leatherside chub is within the Bonneville basin of Utah, Idaho, and Wyoming, and in the upper Snake River of Wyoming and Idaho. In Idaho, this species is reported from the Bear River system, the Snake River system above Shoshone Falls, and the Wood River system. It has been introduced into a few localities outside its native range in Utah.

**Habitat:** Typically, the northern leatherside chub is found in cool to cold streams, in riffles and pools, although it tends to prefer pools. The young seek quiet pockets or brush areas near shore. They also may inhabit rivers. The water may be clear or moderately turbid and flow over an entirely gravel bottom, although there may be sand, rubble, boulders or silt. The current velocity is typically moderate, 15-23 cm per second. It generally occurs in waters 0.6-1.0 m deep or less.

**Diet:** Northern leatherside chub are invertivores. We know of no reports of the food habits of this species, but presumably it feeds on small drift organisms such as aquatic insects and crustaceans.

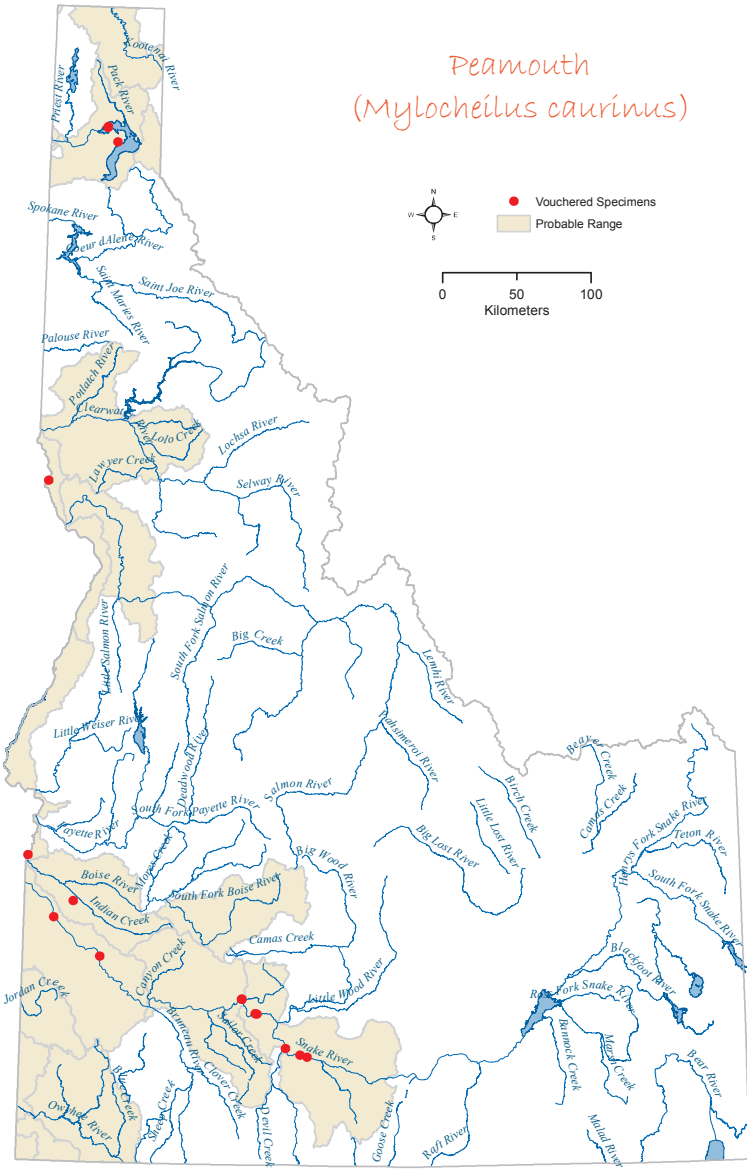
**Ecology:** They spawn over small cobble substrate in the summer when water temperature ranges between 15-20°C. Northern leatherside chub provide no care for their eggs or young.

**Idaho Conservation Status:** It is rare in Idaho and is considered a state species of special concern. The U.S. Fish and Wildlife Service announced the northern leatherside chub is not warranted for listing under the Endangered Species Act (Federal Register Volume 76, pages 63444-63478).

References: Billman et al. 2008; Johnson et al. 2004; Sigler and Sigler 1987, 1996; Simpson and Wallace 1982; Walser et al. 1999; Wilson and Belk 2001; USFWS 2009; Zaroban et al. 1999.



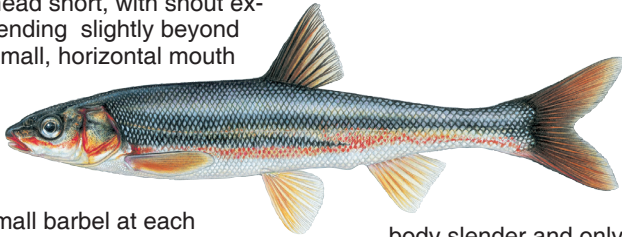
Peamouth  
(*Mylocheilus caurinus*)



Cyprinidae

**Peamouth*****Mylocheilus caurinus***

head short, with snout extending slightly beyond small, horizontal mouth



small barbel at each corner of mouth

body slender and only slightly compressed

**Attributes:** Peamouth are dusky brown or green on back, with males tending to be more greenish than females, and silvery white or slightly yellowish on sides and belly. There is reddish coloration at the angles of mouth. Younger fish have two distinct dark bands along sides. Both sexes are brightly colored at spawning time with a distinct red stripe along the sides and lower lip. There are typically 68-78 scales in the lateral line. The dorsal and anal fin rays are typically 8 and the origin of dorsal fin is slightly forward of origin of pelvic fins. Adult peamouth range between 150-300 mm total length.

**Distribution:** This minnow is found in the Columbia River system and coastal drainages of Oregon, Washington, British Columbia, and in Alberta. It also is found on Vancouver Island and other coastal islands off British Columbia. In Idaho, this species is native to the Snake River and tributaries below Shoshone Falls, and the Spokane, Pend Oreille, and Kootenai River systems. It has not been recorded in the Palouse system in Idaho.

**Habitat:** This species prefers lakes and slow-moving waters of rivers and streams and will school in shallow areas where aquatic vegetation is present. Juvenile peamouth remain in shallow water during their first summer of life.

**Diet:** Peamouth are invertivores. Young peamouth feed on zooplankton. Older fish are considered insectivorous and feed on a wide variety of aquatic insects and their larvae, but also take plankton, terrestrial insects, snails and molluscs. They occasionally take small fish such as sculpins.

## *Cyprinidae*

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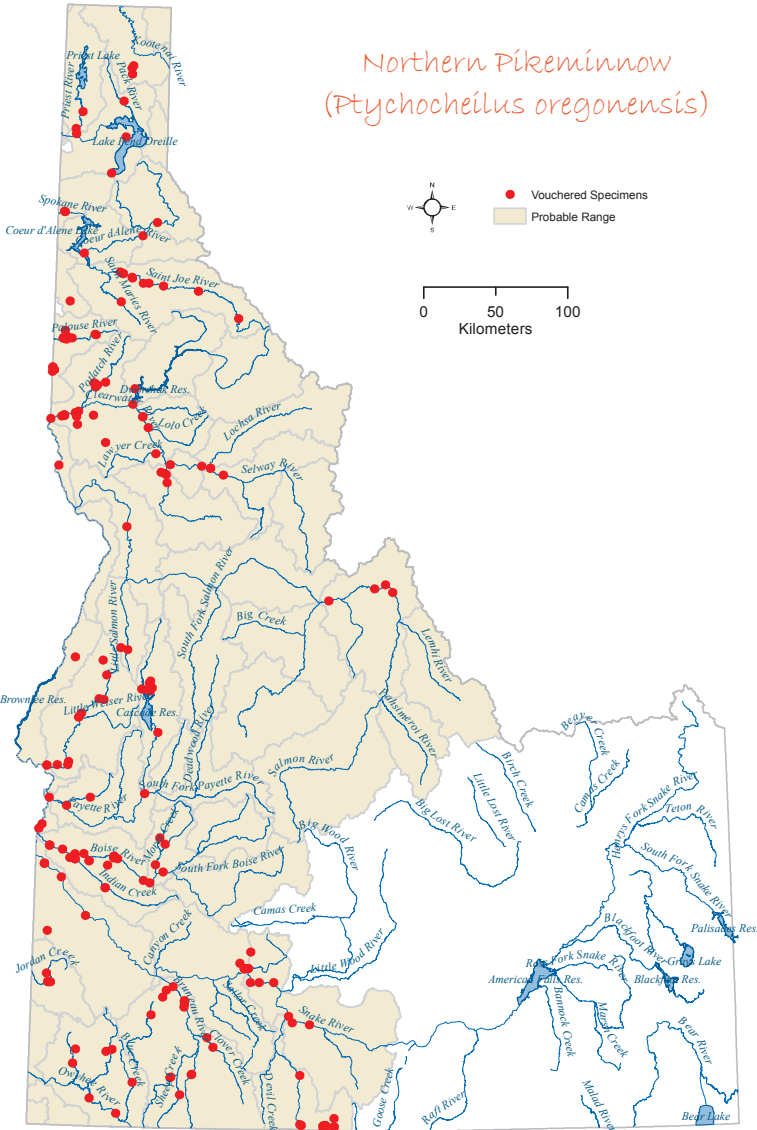
**Ecology:** Peamouth spawn in shallow waters over gravel and rubble in water temperatures of 12-16°C during the spring months. Larger females may release up to 35,000 eggs which are broadcast and settle into the substrate after fertilization.

**Idaho Conservation Status:** Unknown. There have been no defined studies in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.



Northern Pikeminnow  
(*Ptychocheilus oregonensis*)



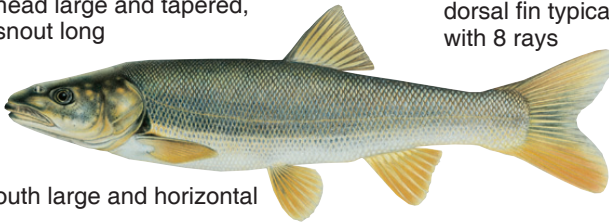


## Northern pikeminnow

## *Ptychocheilus oregonensis*

head large and tapered,  
snout long

dorsal fin typically  
with 8 rays



mouth large and horizontal

upper jaw extends to below  
anterior margin of eye

**Attributes:** Northern pikeminnow are dark green to olive green on the back, with grayish-silvery sides, and a yellowish-white belly. The young have a dark triangular blotch at the base of the caudal fin. Males develop a yellow orange to reddish color on lower fins at spawning time. The body is elongate and somewhat laterally compressed. There are 68-75 scales in the lateral line. The caudal fin is forked. Northern pikeminnow are a relatively slow-growing, long-lived species, attaining 13 years of age and 4 kg in weight in Hayden Lake, Kootenai County. Elsewhere, they have been recorded to 19 years of age and 13.2 kg. A maximum total length of 700 mm has been recorded.

**Distribution:** This fish is native to the Pacific slope of western North America from Oregon north to the Nass River of British Columbia. It also occurs east of the continental divide in the Peace River, Alberta system. In Idaho, it is found in the Snake River system below Shoshone Falls (including the Palouse drainage), and in the Spokane, Pend Oreille, and Kootenai River systems.

**Habitat:** Northern pikeminnow prefer lakes and reservoirs or the slow moving portions of larger streams, but has been taken in slower, relatively warm waters of small streams. They do well in temperatures of 20-25°C. The young inhabit inshore waters in the summer.

**Diet:** Northern pikeminnow are invertivores-piscivores. The young of this species, 25-100 mm total length, feed primarily on insects, both aquatic and terrestrial. As they become larger, fish make up more of

## *Cyprinidae*

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the diet. Adult northern pikeminnow feed almost exclusively on fish. In various studies in Idaho, the diet of adult northern pikeminnow also included crayfish and larger insects.

**Ecology:** Northern pikeminnow spawn during late spring or early summer within a temperature range of 14-18°C in gravelly shallows. The females broadcast up to 83,000 eggs which, when fertilized, drop to the rocky substrate.

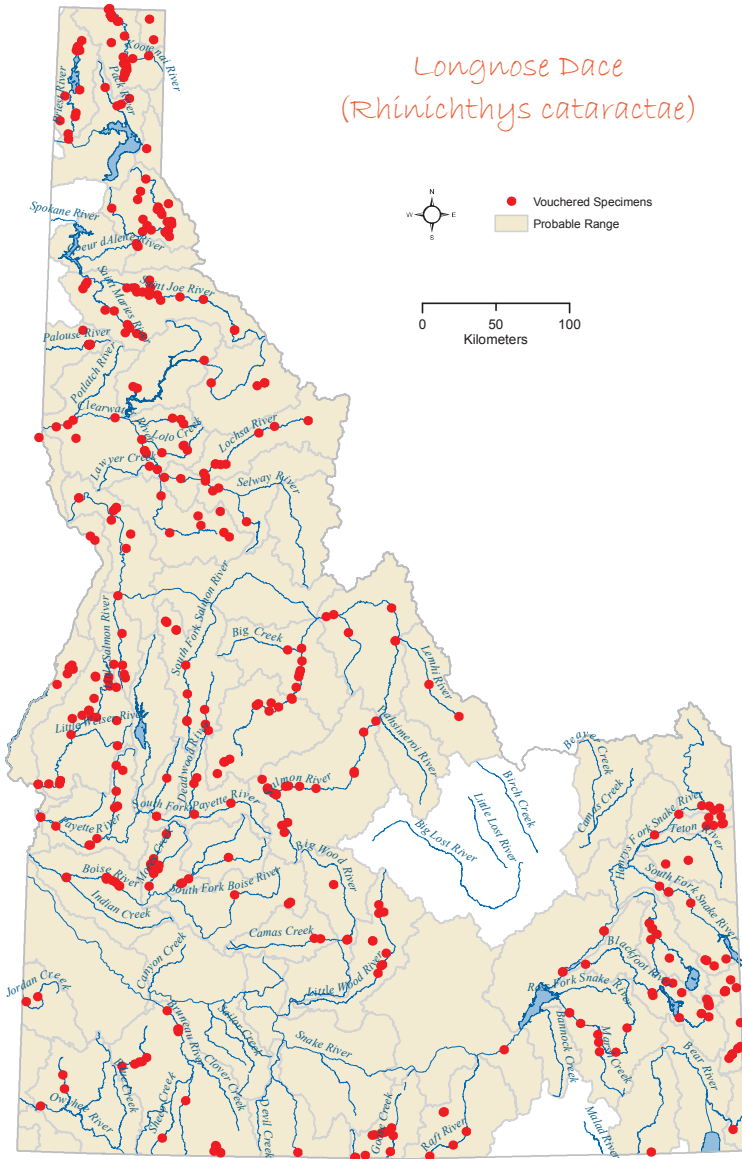
**Idaho Conservation Status:** This species is common in Idaho waters and has no apparent threats to its continued existence, however numbers appear to have declined in some waters where smallmouth bass have been introduced.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

Notes

A series of 20 horizontal blue lines for writing notes.

Longnose Dace  
(*Rhinichthys cataractae*)



**Longnose dace*****Rhinichthys  
cataractae***

upper jaw attached to snout  
by a bridge (frenum) of skin

body elongate, stout, nearly  
round in cross section



small, subterminal mouth  
with a small barbel in each corner

caudal peduncle  
relatively thick

**Attributes:** Longnose dace are light olive green to dark brown or black on back and upper sides, shading to creamy white or silvery on the belly. Faint mottling is often present on the sides. A dark stripe is present on the nose forward of the eye and a dark lateral stripe is found from the gill cover to the caudal fin. These are especially pronounced in young fish, but may occur only in the posterior portion of the body in adults. Breeding males may have various shades of orange-red coloration on the head, body, and fins. The head is broad and triangular in shape. The dorsal and anal fin rays are typically 8. There are 60-72 scales in the lateral line. This dace may be distinguished from other daces in Idaho by the presence of the frenum and a snout that extends well beyond its mouth. It typically lives 5-6 years and averages 100 mm total length, although specimens over 150 mm have been taken in Idaho and Montana.

**Distribution:** Longnose dace are widely distributed from the Pacific to the Atlantic in North America, as far north as Labrador and the Northwest and Yukon Territories in Canada. Their range extends southward in the Appalachians to Georgia and in the Rockies to northern Mexico. In Idaho, they are common in every river system in the state, with the exception of the independent drainages.

**Habitat:** Longnose dace live in the fast-flowing sections of streams. Their body shape is an adaptation to a benthic life on and among the

rocks of riffles. Their preferred summer temperatures range between 11-20°C. They may be found in streams with a firm, clay bottom, but only rarely on a mud bottom. They are also found in lakes where the shoreline is composed of small rubble.

**Diet:** Longnose dace are invertivores. They are a benthic feeder, as indicated by the subterminal mouth. The young feed on drift organisms, but adults feed mainly on immature aquatic insects found in and among gravel, rocks, and rubble of the stream substrate.

**Ecology:** Longnose dace spawn during late spring or early summer when water temperatures reach 11°C. No nest is built, however, males are territorial and protect spawning sites over gravelly riffle areas. Females can produce up to 1,200 eggs.

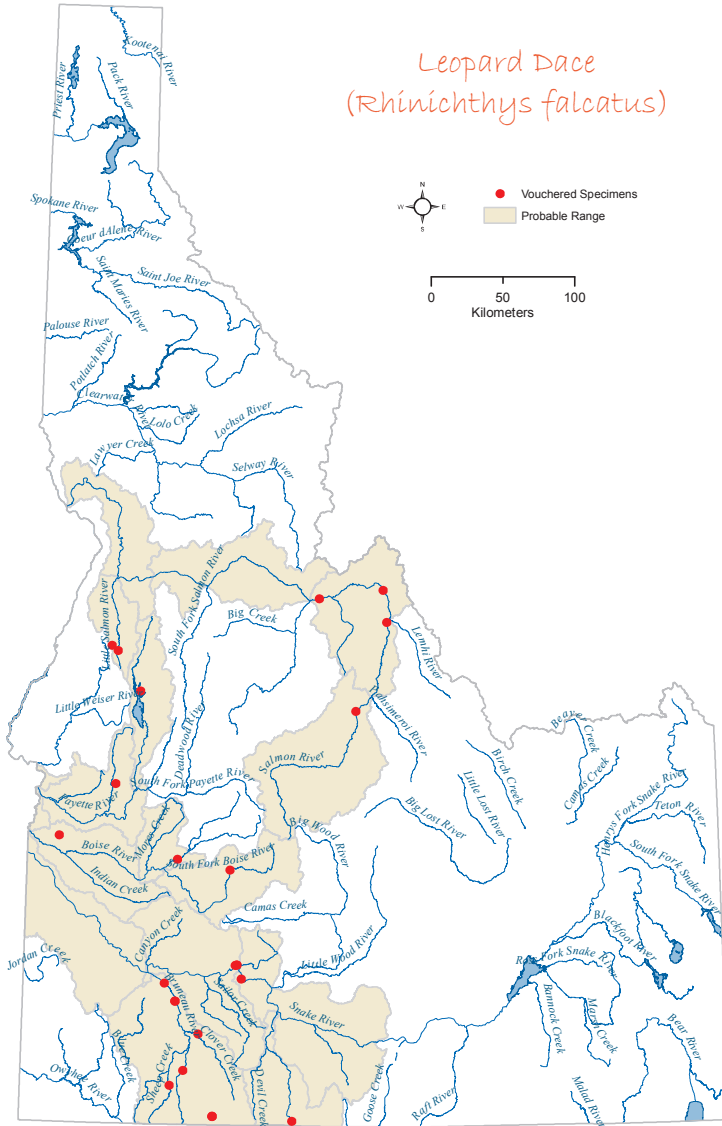
**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

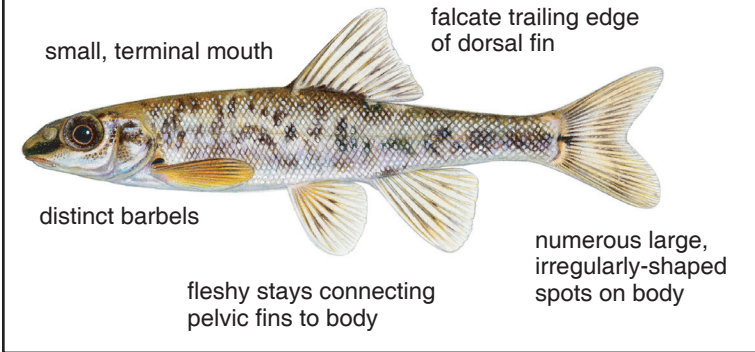
Notes

Lined writing area consisting of 22 horizontal lines.

Leopard Dace  
(*Rhinichthys falcatus*)





**Leopard dace*****Rhinichthys falcatus***

**Attributes:** Leopard dace are a light-colored with greenish gray or greenish brown on the back, creamy to gray on the sides, and silvery-white below. There are numerous large, irregularly shaped spots on the sides. There is a yellowish tinge on the fins. Adult males have an orange-red coloration to the lips and base of the pelvic fins. There are 52-57 scales in the lateral line. Dorsal fin rays number 9 while anal fin rays number 7-8. The caudal peduncle is relatively slender compared to longnose and speckled dace. Adults average 75-100 mm total length, and specimens with fork lengths to 119 mm have been reported.

**Distribution:** Leopard dace occur in the Columbia River system east of the Cascade Mountains and the Fraser River system in British Columbia. In Idaho, the species occurs in the southern part of the state and has been collected from the Snake River system below Shoshone Falls, including the Bruneau River, Boise River and Salmon River basins.

**Habitat:** Leopard dace typically inhabit slower-moving current and deeper water areas of streams than do longnose dace. The young are often found in water less than 0.3 m deep, whereas adults are often found in water greater than 1.0 m. This is a benthic species living just off the bottom. In British Columbia, leopard dace occur in rivers with August water temperatures between 15-18°C.

## *Cyprinidae*

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**Diet:** Leopard dace are invertivores. Their food habits have not been studied in Idaho, but in other areas the young feed primarily on aquatic insects. Adult fish take both aquatic and terrestrial insects.

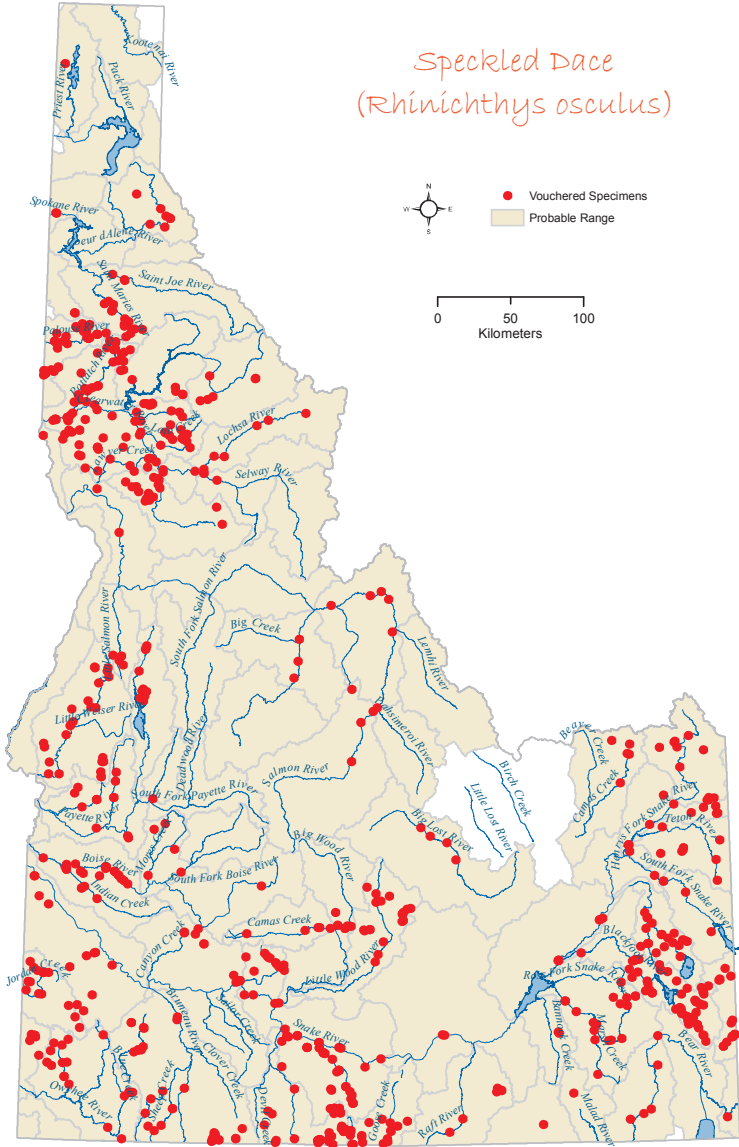
**Ecology:** This species spawns in early summer. Eggs are broadcast over gravel and pebble substrates. Females may produce up to 500 eggs.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Peden 1991; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999



Speckled Dace  
(*Rhinichthys osculus*)



Cyprinidae

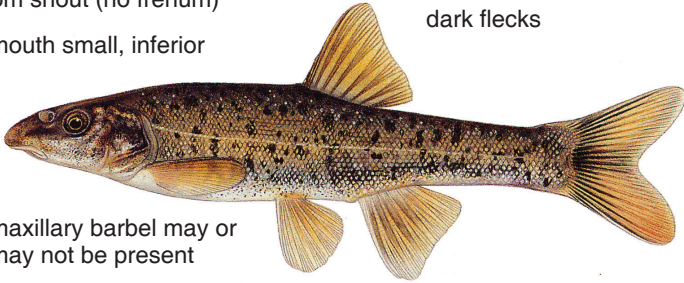
**Speckled dace*****Rhinichthys osculus***

a groove separates upper jaw from snout (no frenum)

mouth small, inferior

sides and back typically covered with small, dark flecks

maxillary barbel may or may not be present



**Attributes:** Speckled dace are grayish brown or dusky on back and upper sides with the lower sides and belly yellowish or creamy white. The sides and back are typically covered with dark flecks covering about 1 scale. The young have a prominent dark lateral stripe usually running from the tip of the snout to the caudal fin base. Spawning males typically have an orange to scarlet coloration around the mouth, upper part of the gill opening, the anal fin base, and lower caudal fin lobe. Lateral line scales number 55-67. There are 7-9 rays in the dorsal fin and 7 in the anal fin. The speckled dace is a small species reaching about 75 mm total length and has a short life span of not more than 3 years.

**Distribution:** This species is widely distributed in western North America from the Columbia River system south to the Colorado River system and in coastal and interior drainages. It is present in all the major tributaries of the Snake and Bear rivers in Idaho, in the Spokane River, and independent drainages.

**Habitat:** Throughout its range, this benthic species occurs in a variety of habitats, ranging from cold, swift riffles of mountain streams to the isolated waters of springs and lakes. In Idaho, it is most commonly found in shallow, cool, and relatively quite to moderately swift waters of streams. It is generally found in water less than 1.0 m deep. Speckled dace spend the day among rocks and become active on the surface of the bottom at night.

## *Cyprinidae*

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**Diet:** Speckled dace are primarily invertivores, feeding on plankton, insects, freshwater shrimp, and plant material. Most of the food items of adults are benthic organisms. Some populations may feed on eggs and larvae of suckers and other minnows.

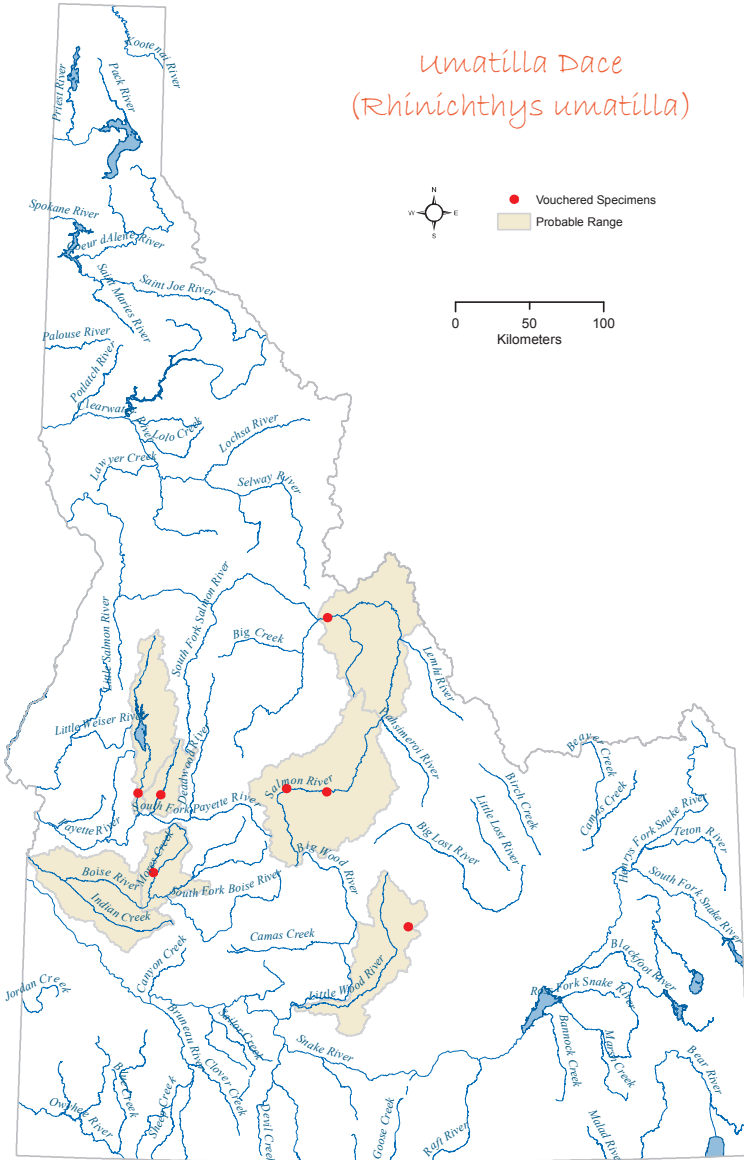
**Ecology:** Spawning occurs during early to mid-summer in stream riffles. Females produce up to 500 eggs. It probably is an important forage species for fish-eating fish, birds, and mammals.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.



Umatilla Dace  
(*Rhinichthys umatilla*)





**Umatilla dace*****Rhinichthys umatilla***

No Tomelleri image available.

**Attributes:** Umatilla dace are cream-colored on the sides with large dark blotches along the lateral line. They have a slightly sub-terminal mouth and maxillary barbels. Typical Umatilla dace have more than 60 scales on the lateral line. Depth of the caudal peduncle is intermediate between leopard dace (narrow caudal peduncle) and speckled dace (broad caudal peduncle). Fleshy stays between the pelvic fins and the body are reduced as compared to the leopard dace. Adult Umatilla dace are reported to reach greater than 100 mm fork length.

**Distribution:** Umatilla dace occur in the Columbia River and tributaries in British Columbia, Oregon and Washington. In Idaho, they are reported to occur in the Snake River below Shoshone Falls, Boise River, Little Wood River and Salmon River. Umatilla dace may occur more widely in Idaho. Further knowledge of their distribution awaits taxonomic clarification, genetic analysis, examination of museum specimens and additional field collections.

**Habitat:** Umatilla dace are found in low gradient and low elevation streams with substrates containing little or no silt. Juvenile Umatilla dace occur in shallow water with cobble and rubble substrates.

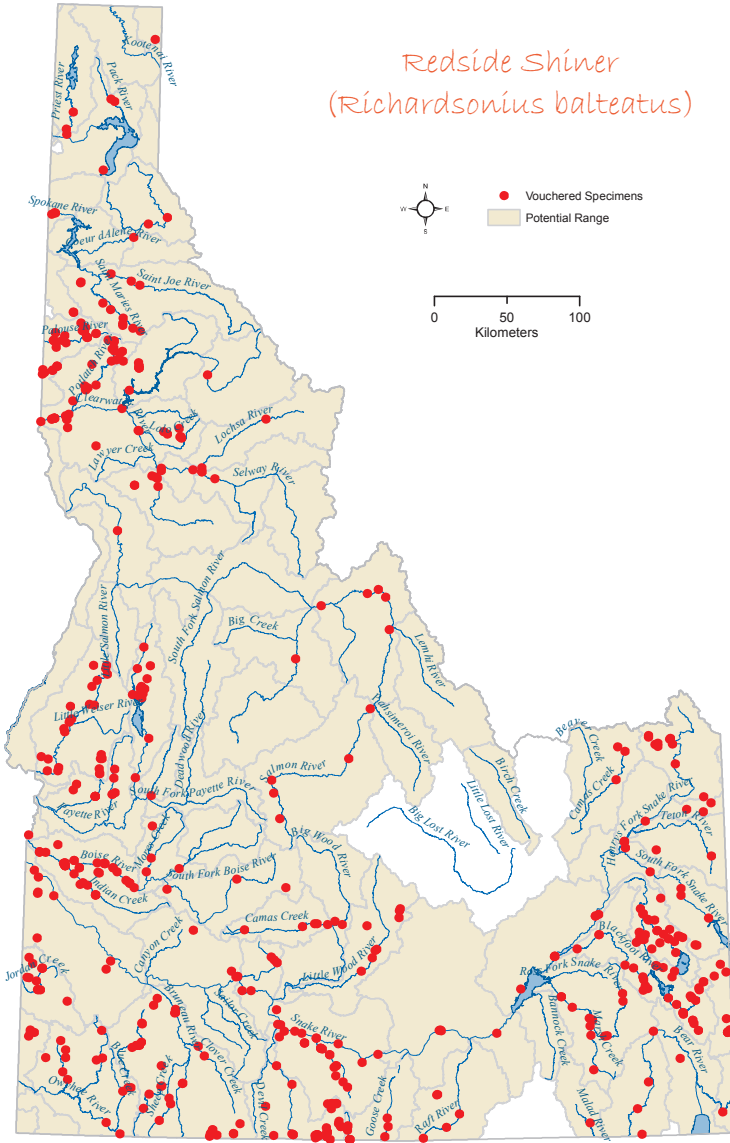
**Diet:** The food consumed by Umatilla dace is unreported, but likely is similar to other dace which feed on insect larvae.

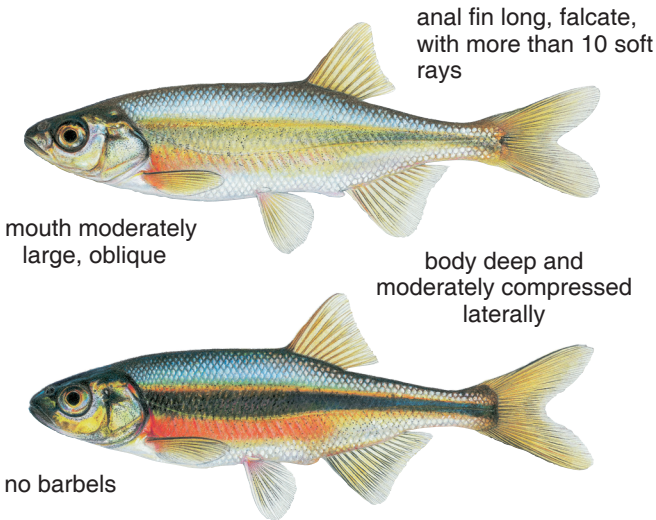
**Ecology:** Umatilla dace are reported to spawn in July in Washington and mid-July to early August in British Columbia.

**Idaho Conservation Status:** Unknown. The Umatilla dace was recognized as a separate species in 2004 by the American Fisheries Society. No defined studies have been conducted in Idaho to determine population status.

References: Bond 1994; Hughes and Peden 1989; Nelson et al. 2004; Peden and Hughes 1988; Wydoski and Whitney 2003.

Redside Shiner  
(*Richardsonius balteatus*)



**Redside shiner*****Richardsonius  
balteatus***

**Attributes:** The redbside shiner is steely-blue, dark olive, or dark brown on the back, silvery on the sides and belly. It also has a dark lateral stripe extending from the snout to the base of tail. Both sexes become more highly colored at spawning time, with lateral bands of yellow and orange to crimson, although coloration of females is subdued compared to that of males. There is a half-moon of gold color around the lower orbit of the eye. Scales in the lateral line number 52-65. The dorsal fin has 8-10 soft rays; the anal fin has 10-22 rays. The caudal fin is deeply forked and the eye relatively large. The average size of an adult redbside shiner is 100-125 mm total length. However, specimens 165 mm in length have been reported from several lakes in Idaho.

**Distribution:** The native distribution of the redbside shiner is mostly west of the Rocky Mountains in North America from the Nass River, British Columbia south through Washington, Oregon, and the Columbia River drainage. It also occurs in isolated drainages in eastern Oregon and the Bonneville basin in Idaho, Utah, Wyoming, and Nevada. In Idaho, this species is common in all of the major river systems.

**Habitat:** The redbside shiner is a schooling species, occurring in a variety of habitats including lakes, ponds, ditches, sloughs, springs, and slower moving sections of rivers and streams. Schools of shiners tend to remain in vegetation when in shallow areas. They occur in waters with summer temperatures of 12-20°C, but can be found in waters with temperatures as low as 5°C and as high as 25°C.

**Diet:** Adult redbside shiner are primarily invertivores. Juveniles feed on zooplankton and algae. Older fish feed primarily on terrestrial and aquatic insects, but also take molluscs, fish eggs, and smaller fishes (many of which may be of their own species). Adults feed on zooplankton when occurring in pelagic areas of lakes and ponds.

**Ecology:** Redside shiner spawn in late spring or early summer in shallow gravelly areas. These fish are broadcast spawners as no nest is built. Larger females can produce up to 3,600 eggs. This fish provides forage for piscivorous fish, fish-eating birds and a variety of mammals such as mink.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

Notes

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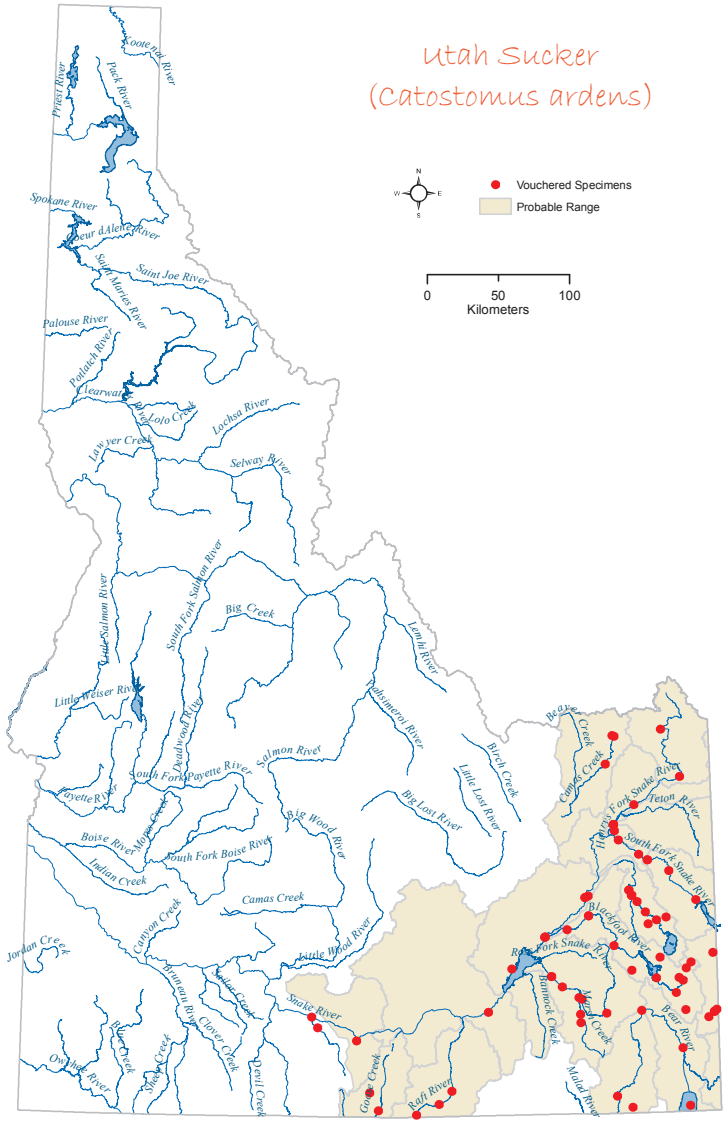
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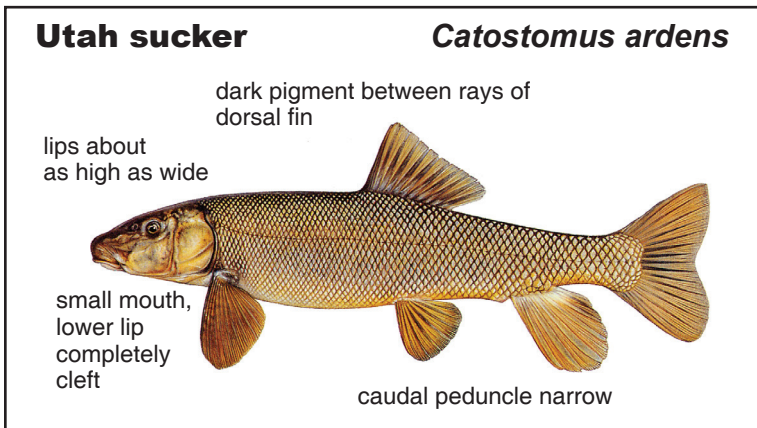
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Cyprinidae



**FAMILY CATOSTOMIDAE****suckers**

Suckers are characterized by cycloid scales, soft-rayed fins, and abdominal pelvic fins. All known Idaho suckers have a highly-protrusible mouth with fleshy lips located on the ventral side of the head. The insertion of the pelvic fin is distinctly posterior to the insertion of the dorsal fin. They lack teeth on the jaws and do not have an adipose fin. With the exception of lake suckers, these are bottom-dwelling freshwater fishes of North America, Siberia, and China. The family contains about 68 species, 60 of which occur in the United States and Canada. Six species are known in Idaho.



**Attributes:** The Utah sucker is bronze to dark gray above and whitish below with dark fins. Breeding males usually have a bright rosy lateral stripe. There are 60-70 relatively large scales on the lateral line. The lips are without lateral notches. Dorsal fin rays number 12-13. Adults attain lengths of 500-550 mm in Bear Lake and average 1.0-1.5 kg in weight. A 3.5 kg fish was caught in the Portneuf River in 1999.

**Distribution:** The native distribution of this sucker is the Bonneville basin in Idaho, Utah, Wyoming, and Nevada, and the upper Snake River drainage in Idaho and Wyoming. It is found in the Snake River drainage above Shoshone Falls, the Bear River drainage, and the independent drainages of Idaho.

**Habitat:** An adaptable species, this sucker is a bottom-dweller living in lakes, reservoirs, rivers or creeks in warm (up to 26°C) to very cold water. If living in a stream, they prefer slow-moving current but can

be found in swifter waters. The water may be turbid to clear with the bottom varying from mud to clay to sand and gravel.

**Diet:** The Utah sucker is an omnivore, feeding on bottom organisms, both plant and animal. In Wyoming, animal food, including insects and crustaceans, make up a major part of the diet. It is common, however, to see them feeding on algae on fixed objects.

**Ecology:** The Utah sucker becomes sexually mature at 2-3 years of age and spawns in small streams in spring when water temperatures reach 15°C. The species is important as a forage fish over much of its range.

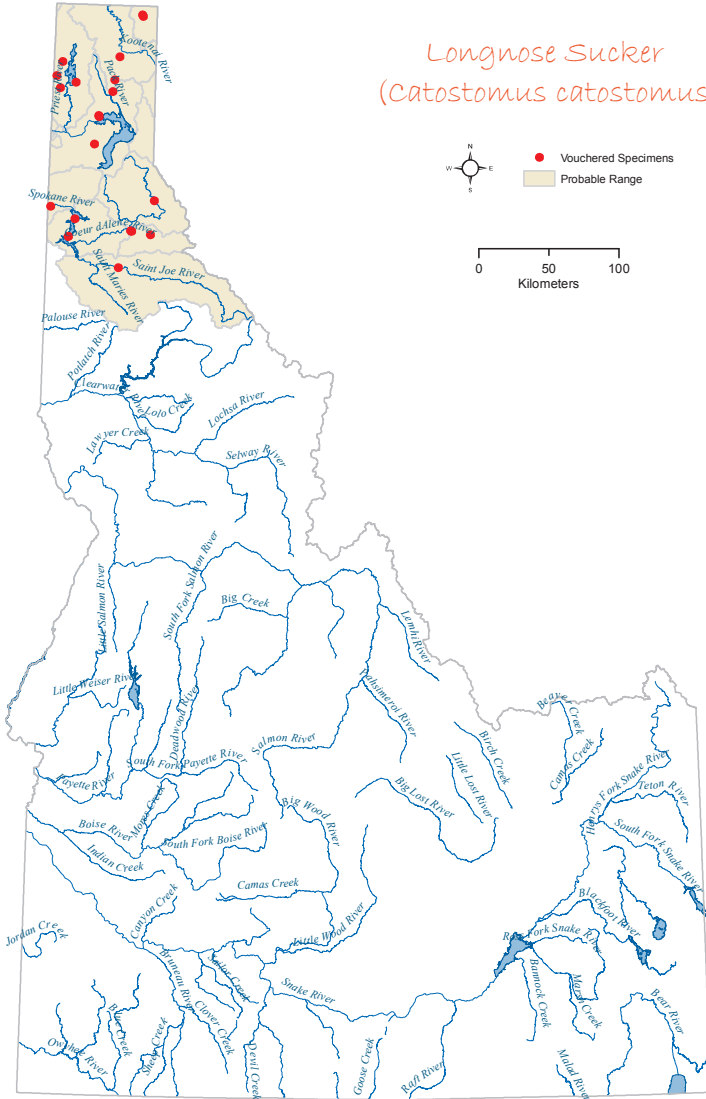
**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Sigler and Sigler 1987, 1996; Simpson and Wallace 1982; Zaroban et al. 1999.





Longnose Sucker  
(*Catostomus catostomus*)



**Longnose sucker*****Catostomus  
catostomus***

small scales, 95-115 in lateral line

dorsal fin short, 9-12 rays



**Attributes:** The longnose sucker is black, dusky, or dark olive above, with lighter sides, and a white belly. Large specimens often have a cream or pale yellow belly. Breeding males have a rosy stripe on the sides and reddish on the belly and lower fins. Juveniles have several dark blotches along the back. The lips have no notches at the sides, however, the lower lip is deeply incised. The lower lip is wider than high. The snout overhangs its mouth. Typically, adult longnose sucker reach 375-450 mm total length, but specimens 675 mm and 3 kg have been recorded. The largest reported in Idaho was 1.6 kg.

**Distribution:** This species has a broad natural range from Siberia and Alaska across North America to the Atlantic coast and as far south as the Great Lakes, Colorado and Idaho. In Idaho, it is found only in the northern most drainages, the Kootenai, Pend Oreille and Spokane River systems.

**Habitat:** This species generally is found in clear, cold lakes, and their tributary streams. The young may remain in shallow, weedy areas whereas larger fish are found in deeper water.

**Diet:** Adult longnose sucker are primarily invertivores. The food of young longnose sucker is mainly plant material. Larger fish feed on a variety of bottom organisms including amphipods, aquatic insect larvae (especially midge larvae), clams and snails, in addition to plants. They also feed on crustaceans and sometimes fish eggs.

**Ecology:** This fish may live up to 20 years. It spawns in late spring over gravelly substrate when the water reaches 5-9°C. The eggs are broadcast and sink to the bottom after fertilization. The larger females may produce up to 60,000 eggs. The young are forage for other fishes and fish-eating birds.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

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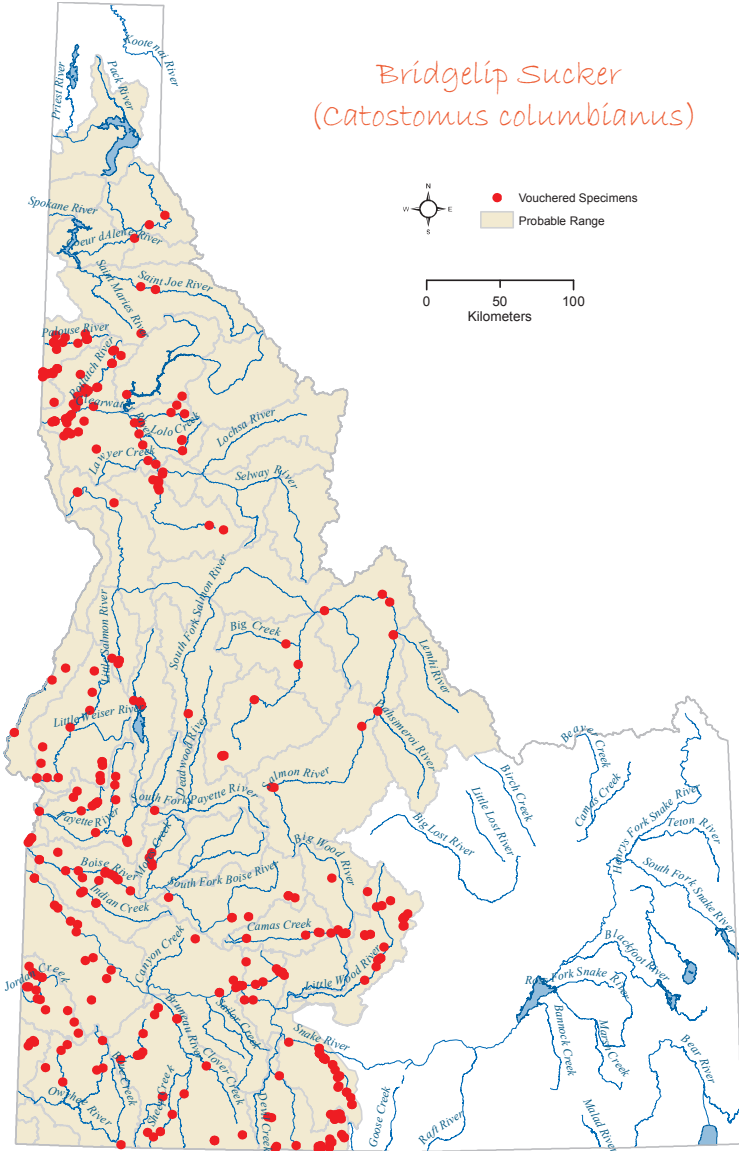
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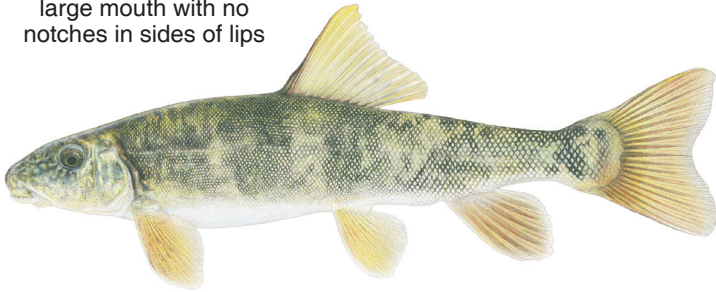
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### Bridgelip Sucker (*Catostomus columbianus*)



**Bridgelip sucker*****Catostomus  
columbianus***

large mouth with no  
notches in sides of lips



shallow incision between lower lips, typically  
with 3-4 rows of papillae crossing midline

**Attributes:** The bridgelip sucker is brown to olive on the back, the upper sides are somewhat mottled and a paler brown, and the belly is white to pale yellow. Breeding males have an orange lateral band. The young often have three dark lateral blotches. There are 97-111 scales on the lateral line. Dorsal fin rays number 9-12, but are typically 12. A relatively small sucker, this species attains 300-425 mm total length.

**Distribution:** The bridgelip sucker is restricted to the fresh waters of northwestern North America from the Fraser River system in British Columbia south to central Oregon. It occurs throughout the Columbia River system and in Idaho it is a common species in the Snake River and tributaries below Shoshone Falls (including the Palouse River), and in the Spokane River drainage.

**Habitat:** Bridgelip sucker typically inhabit the quiet areas in pocket waters, backwaters or the edges of the main current of rivers and streams with sand, silt, or mud bottoms. It also is found in the colder water of small, fast-flowing rivers with a gravel to rocky bottom. It is seldom found in lakes.

**Diet:** The bridgelip sucker is an herbivore. The shape of the mouth and the sharp-edged lower jaw suggest that it scrapes periphyton off rocks. Like most other suckers, aquatic invertebrates are consumed to some extent.

**Ecology:** This species spawns in late spring to early summer in water temperatures of 7-13°C. Larger females produce up to 21,000 eggs. They are ecologically valuable in linking algae to fish, birds, and mammals in the food chain.

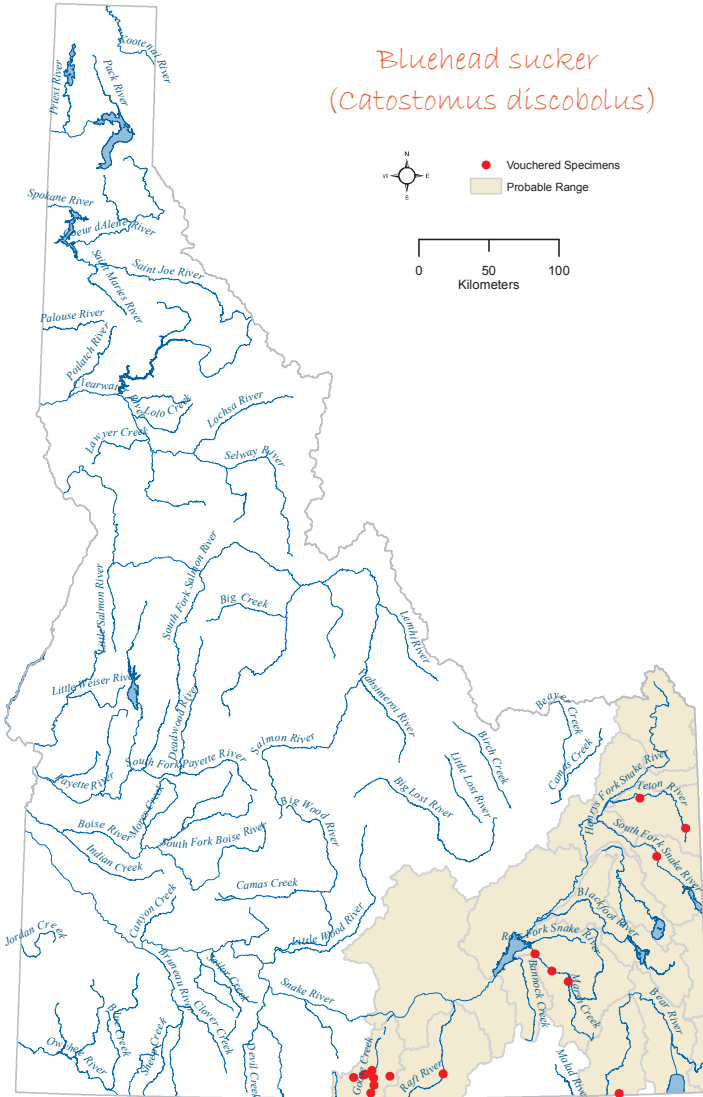
**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.





Bluehead sucker  
(*Catostomus discobolus*)



**Bluehead sucker*****Catostomus discobolus***lips deeply notched  
at each side of mouthcaudal fin membranes  
uniformly pigmentedlower lip with a shallow,  
median notch

no pelvic axillary process

**Attributes:** The bluehead sucker is olive above with a bluish cast to the top of head, shading to yellow or white on the lower sides and belly. The lower fins of breeding males are yellow or orange, and a red or rosy colored lateral band, often more or less interrupted, is present along the sides. Younger specimens are plain dusky above, silvery below. The scales in lateral line typically number 90-100. The dorsal rays typically number 11. Bluehead sucker may occasionally reach total lengths of 400 mm or more. In Idaho, most adults are 275-300 mm total length.

**Distribution:** The bluehead sucker occurs in the Colorado and Green River basins in Wyoming, Colorado, Utah, Arizona, and New Mexico; the Bonneville basin in Utah, Idaho, and Wyoming; and the upper Snake River drainage in Idaho and Wyoming. In Idaho, this species is found in the Bear River drainage and the Snake River drainage above Shoshone Falls.

**Habitat:** This species occurs in mountain streams and large rivers, but seldom in lakes. It typically is found in the main current, which may have swift or moderate velocity. The bottom typically includes rocks, gravel, or boulders along with sand and mud. This is a species of cool waters, although it can tolerate temperatures greater than 27°C.

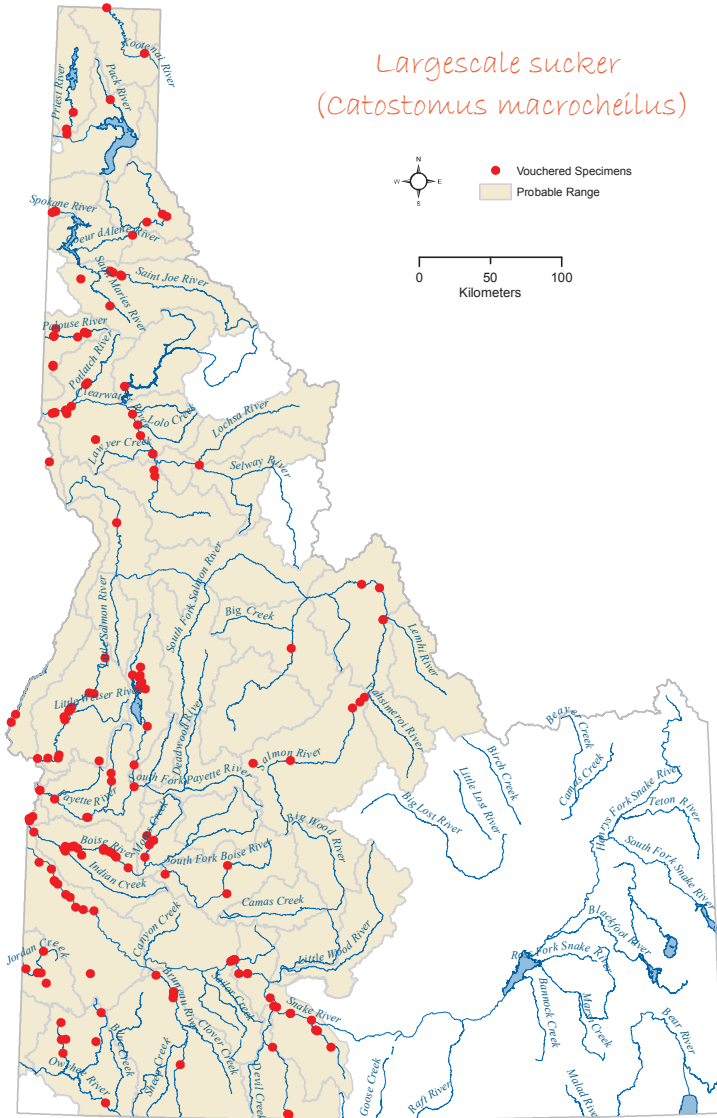
**Diet:** Bluehead sucker are herbivores and bottom feeders, scraping algae and other organisms, mainly aquatic insect larvae, from rocks and boulders. The hard cartilaginous edges of their jaws allow them to feed in this manner, even in riffle areas. Occasionally, they can be seen on their sides, or even upside down, feeding along the bases of rubble and boulders.

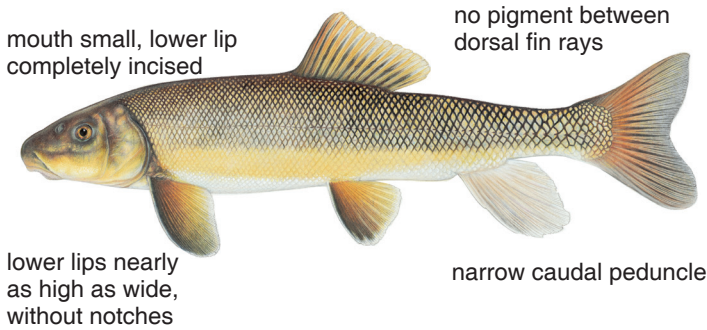
**Ecology:** Bluehead sucker typically spawn in spring to late summer when the water temperature reaches 15°C. It provides an important link in the food chain to predaceous fishes.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Baxter and Stone 1995; Sigler and Sigler 1996; Simpson and Wallace 1982; Zaroban et al. 1999.





**Largescale sucker*****Catostomus macrocheilus***

**Attributes:** The largescale sucker is blackish to dark olive gray on the back and sides with a dusky lateral stripe running below the lateral line to the base of the caudal fin. The lower sides, lower part of the head, and the belly are cream to white. Their fins have a dark leading edge, or a white edge with dark behind it. The young, up to 150 mm total length, have 3-4 diffuse dark blotches on the sides. There are 62-80 relatively large scales in the lateral line. The dorsal fin base is longer than the fin is high. Dorsal fin rays number 13-15, but typically 13. Adults of this species attain total lengths of about 300-400 mm, but fish 600 mm and 3.8 kg have been recorded.

**Distribution:** The native range of this species is northwestern North America, primarily west of the continental divide, from the Nass River, British Columbia south to the Sixes River in Oregon. It occurs throughout the Columbia River system and in Idaho is common in the Snake River below Shoshone Falls. It also occurs in the Spokane, Pend Oreille and Kootenai River systems.

**Habitat:** Largescale sucker live in lakes and the slower moving portions of large rivers and streams. The young are pelagic early in their life, but soon take up a benthic life in deeper water. They usually inhabit shallow water, but have been taken in lakes as deep as 25 m. It often is present in large numbers in weedy shore areas of lakes or in backwaters and stream mouths.

**Diet:** Largescale sucker are omnivores. The young eat small zooplankton when they are pelagic. Adults feed on aquatic insect larvae, other aquatic invertebrates, diatoms, and other plant material.

**Ecology:** This fish may live up to 27 years. They spawn during late spring in deeper sandy or gravelly areas in streams or lakes, typically when water temperatures reach 8°C. Females may produce up to 20,000 eggs which are broadcast for fertilization. The young are forage for other fish and fish-eating birds, and thus, is an important link in the food chain between plants and fish-eating predators. A study of osprey *Pandion haliaetus* in the Cascade Reservoir area showed the largescale sucker was a common prey item of this fish-eating bird.

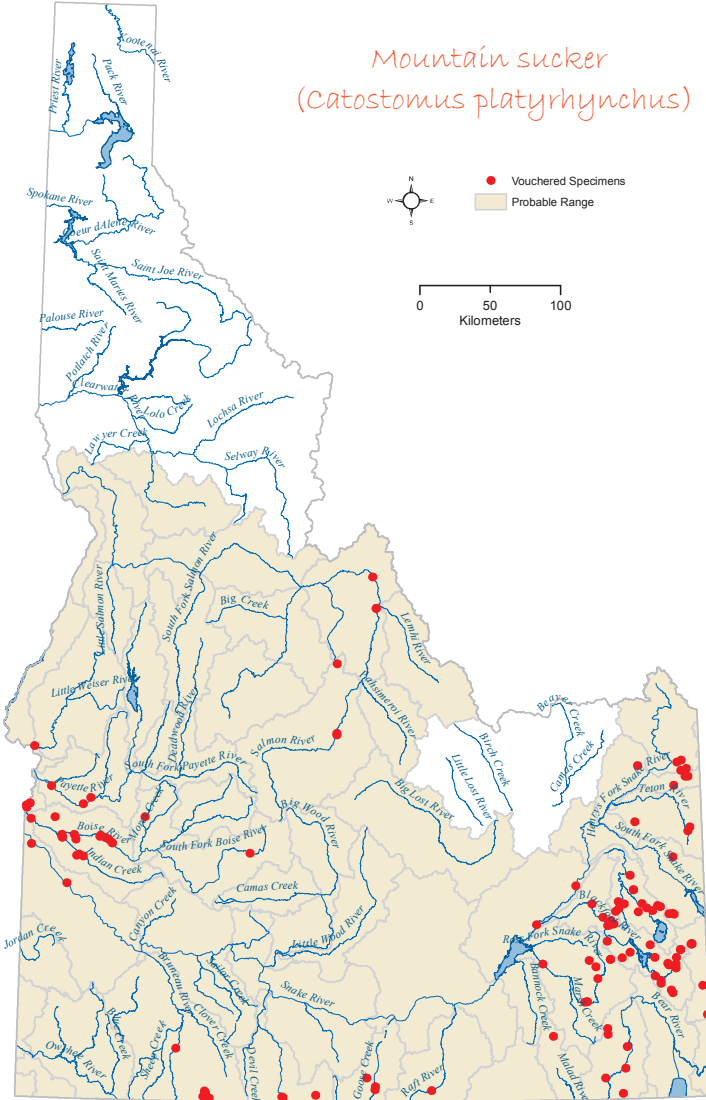
**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

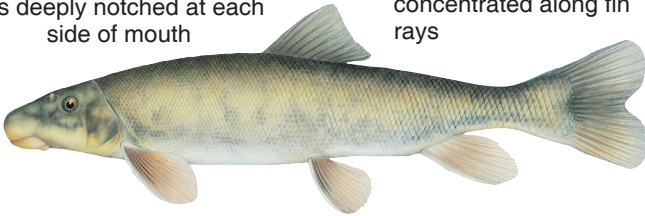
References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.





Mountain sucker  
(*Catostomus platyrhynchus*)



**Mountain sucker*****Catostomus  
platyrhynchus***lips deeply notched at each  
side of mouthcaudal fin pigment  
concentrated along fin  
rays

pelvic axillary process present

**Attributes:** The mountain sucker is dark greenish above with fine black speckling fading to light gray or white on the lower sides and pale yellow to white on the belly. A dark greenish stripe extends from the snout to the caudal fin. The lower fins are yellowish. There is a deep orange to reddish lateral stripe on each side, above the dark greenish stripe, that runs from the tip of the snout to just below the base of the caudal fin in breeding males. The young are mottled on the back and sides. The pelvic axillary process is well developed. There are 80-85 scales in the lateral line. The dorsal fin rays typically number 10. A relatively small species, the mountain sucker seldom reaches a length greater than 200 mm.

**Distribution:** This species is found in the fresh waters of the mountainous regions of western North America. Its range extends from the Lahontan and Bonneville basins in Utah through the Columbia and Missouri River systems in British Columbia, Wyoming, Idaho, Nevada, and Montana. In Idaho, it is widespread throughout the Snake and Bear River systems.

**Habitat:** This species typically inhabits riffles in clear, cold streams with clean rubble, gravel, or sand bottoms, although it may occur in turbid streams with mud, sand or clay bottoms. Only occasionally is it found in lakes. Juveniles and adults are found in swift waters, usually 0.3-1 m deep, but the young are found in the shallower, quieter backwaters and weedy side channels. Its preferred summer water temperatures range between 12-20°C.

**Diet:** Mountain sucker are herbivores. The diet of this sucker is mostly algae, which is scraped off the rocky substrate with the aid of the cartilaginous lower jaw. It also feeds on small aquatic insects, rotifers, and crustaceans, which were probably living in the algal community attached to rocks.

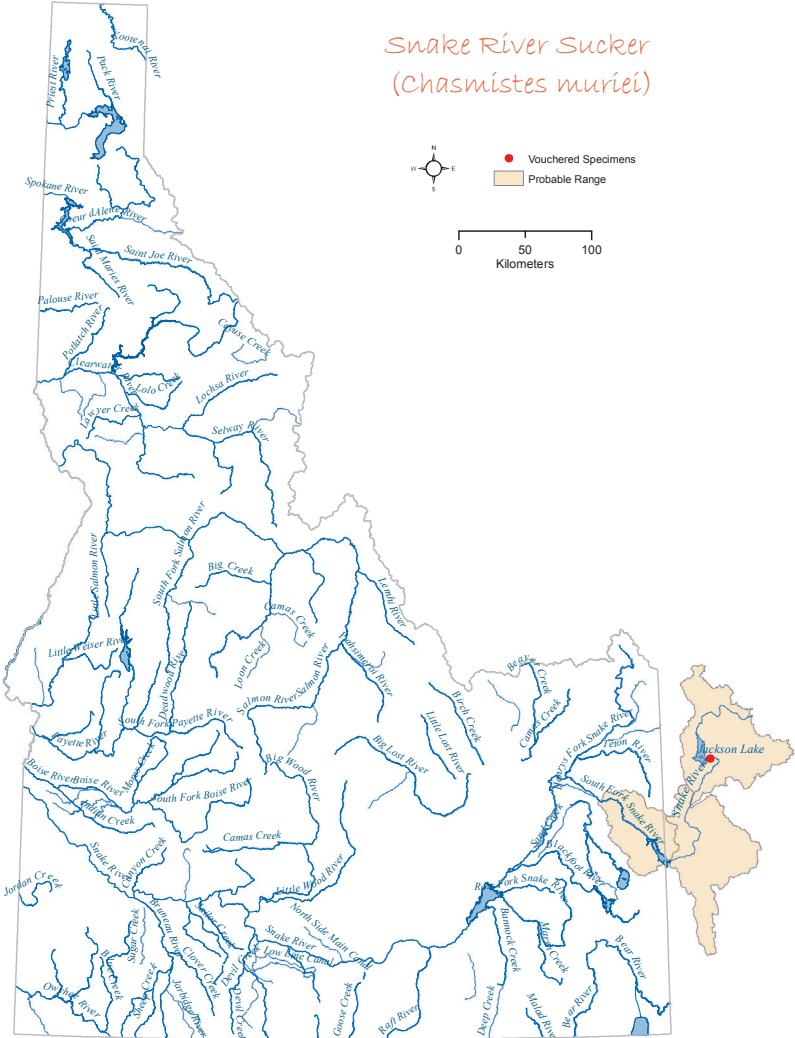
**Ecology:** This species spawns in late spring and early summer in water temperatures of 10-19°C in gravelly riffles. No nest is built as the eggs are broadcast for fertilization. Females may produce up to 4,000 eggs. Because of its small size and food habits, this sucker is believed to be an important part of the food chain from primary producers (algae) to carnivores, such as game fish, fish-eating birds, and aquatic mammals

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status.

References: Scott and Crossman 1998; Sigler and Sigler 1996; Simpson and Wallace 1982; Zaroban et al. 1999.



Snake River Sucker  
(*Chasmistes muriei*)



**Snake River sucker**      *Chasmistes muriei*

No Tomelleri image available.

**Attributes:**

The mouth of the Snake River sucker is sub-terminal and oblique as opposed to the ventral position in species of the genus *Catostomus*. The lower lip is separated into two lobes by a distinct gap and the gill rakers are branched.

**Distribution:**

The commonly reported distribution of recent species of the genus *Chasmistes* (lake suckers) is limited to the Klamath Lakes of south-eastern Oregon, Pyramid Lake of the Lahontan drainage in Nevada and Utah Lake of the Bonneville drainage in Utah and lakes in the Jackson Hole area of the upper Snake River basin in Wyoming. *Chasmistes* fossils have been collected from Miocene to Pleistocene deposits in California, Idaho, Nevada, Oregon, Utah and Wyoming. The Snake River sucker was described by Miller and Smith from a single, dead and potentially hybrid, specimen collected from the Snake River below Jackson Lake in 1927 by Olaus Murie. Presumed extinct, detections of fish with lake-sucker attributes have been recently reported by Utah State University researchers, providing evidence that the Snake River sucker or hybrids may persist. The Snake River sucker is included in this book given its potential to exist in Palisades Reservoir.

**Habitat:**

Little is known about the Snake River sucker. The following descriptions are for lake suckers in general. Lake suckers are pelagic or mid-water fish. They typically exhibit an adfluvial life history, residing in lakes except during spawning when they migrate upstream and spawn in tributaries. Adults immediately return to the lake.

**Diet:**

Lake suckers are omnivores typically feeding on zooplankton, aquatic insects and algae. They take food items from the water column, not from the bottom.

**Ecology:**

Lake suckers are slow-growing, long-lived fish with some reported living more than 18 years. Spawning habits are similar to other suckers. Typically, a female will spawn with several males and the fertilized adhesive eggs are broadcast over the substrate.

**Idaho Conservation Status:**

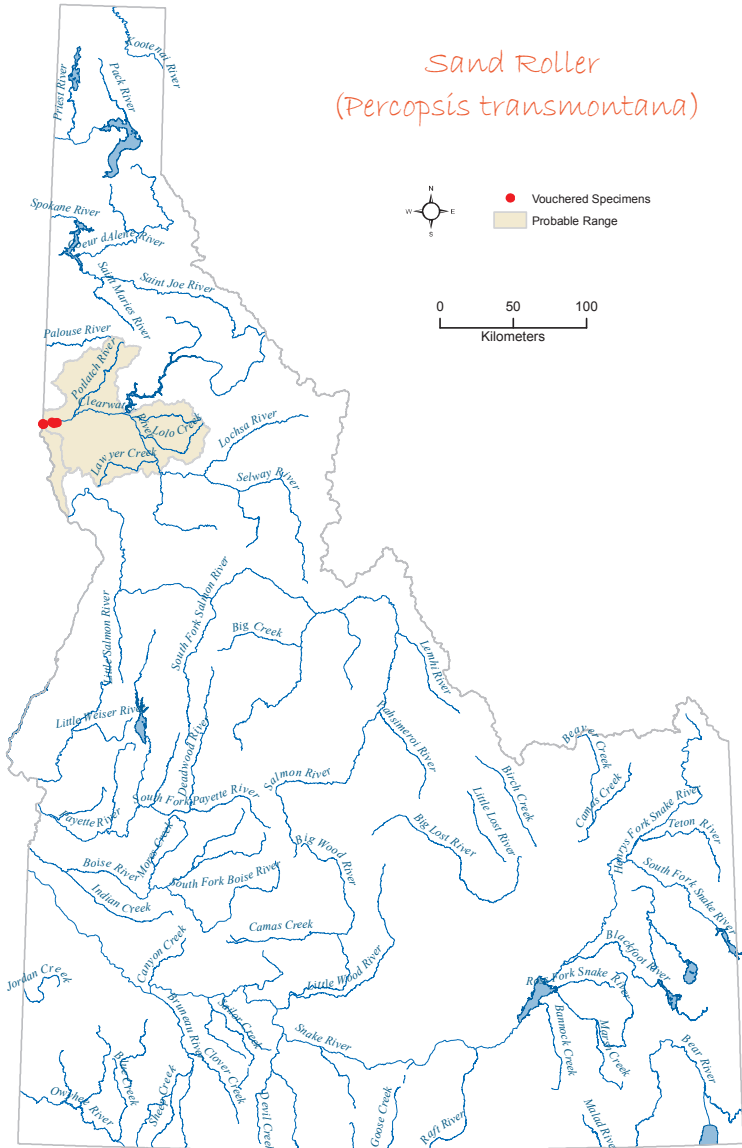
None. Presumed extinct.

References: Baxter and Stone 1995; Bond 1973; Cole et al. 2008, Cole et al. 2012; Kimmel 1975; La Rivers 1962; Lee et al. 1980; Miller and Smith 1981; Sigler and Sigler 1987, 1996; Smith 1975.



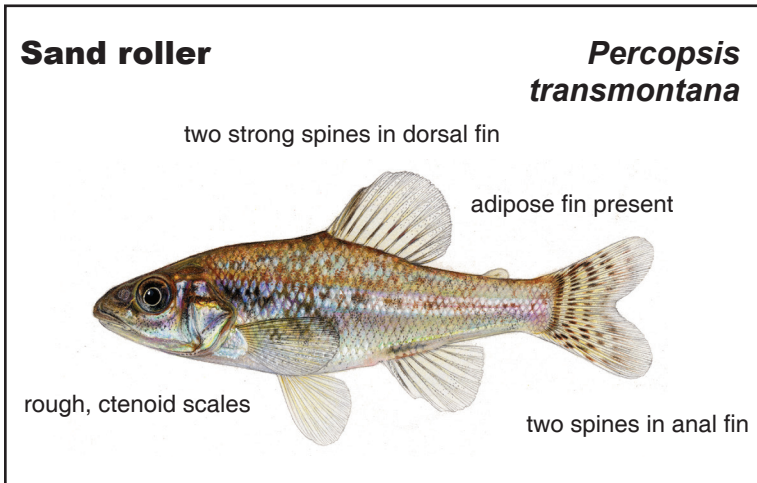


Sand Roller  
(*Percopsis transmontana*)



**FAMILY PERCOPSIDAE****trout perches**

The two species of this family can be distinguished by the small spotted body, relatively large head, the adipose fin, true spines in the fins, and the small, rough ctenoid scales. The eastern species is found in the central United States and much of Canada east of the continental divide. The western species is restricted to the Columbia River system and its tributaries. These are strictly freshwater fishes.



**Attributes:** The sand roller is light smutty green on the back and sides with a grayish white belly. There are several oblong dark blotches on the sides. The body is small, 75-100 mm total length. An adipose fish is present. The lateral line is incomplete and the mouth is slightly subterminal.

**Distribution:** The sand roller is found only in the Columbia River system of Oregon and Washington (Yakima and Cowlitz Rivers, and Salmon Creek). It also has been recorded from the mainstem Columbia River. In Idaho, this species has been documented only from the lower Clearwater and Snake rivers near Lewiston.

**Habitat:** This species inhabits quiet backwaters with cover, such as undercut banks, submerged tree roots, and debris. It is a secretive fish and difficult to capture. This species is generally found in deep water

during daylight hours and in shallower waters during night time hours when the fish are actively foraging. It hides in cover during daytime and only comes out at night to feed.

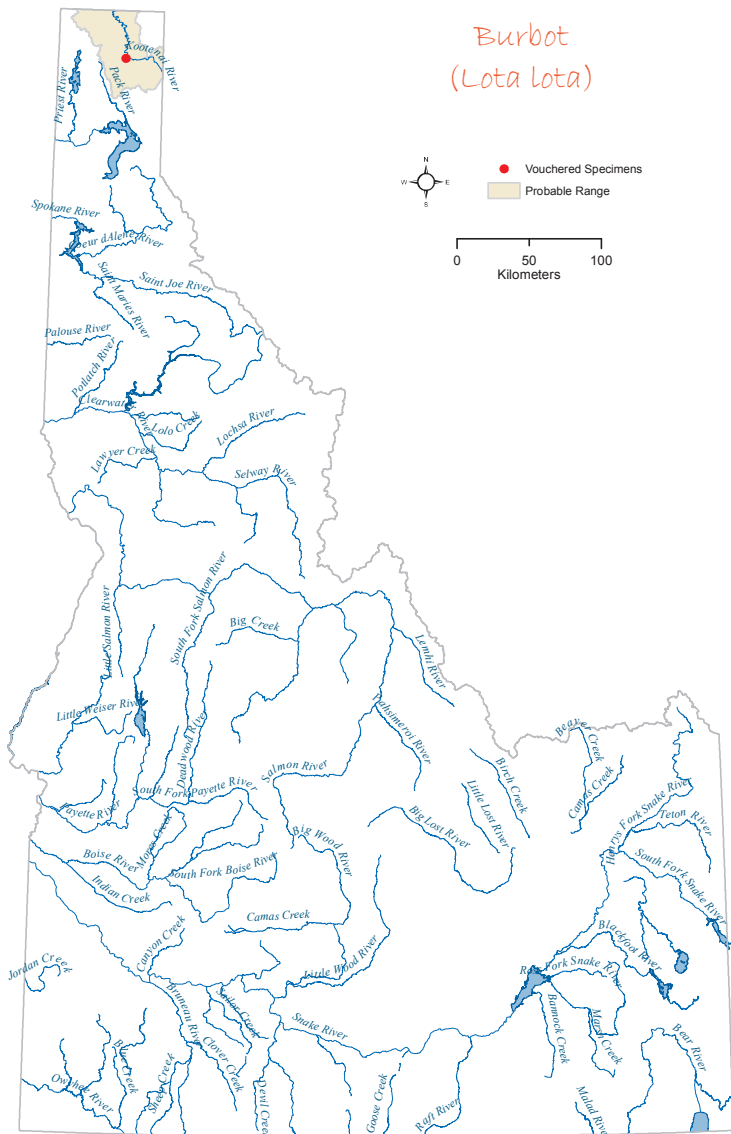
**Diet:** The sand roller is an invertivore. The diet of this species in Idaho has not been studied, but specimens from Washington had aquatic insect larvae and small crustaceans in their stomachs. Smaller sand roller had a greater proportion of small crustaceans in their stomachs and larger fish consumed relatively more aquatic insect larvae.

**Ecology:** They become sexually mature at 2-3 years of age and typically spawn during the spring months over sand and gravel substrate in quiet water. The females broadcast 1,000-3,000 eggs for fertilization by the males.

**Idaho Conservation Status:** This species is considered common to rare throughout much of its range. It is currently considered as a species of special concern by the State of Idaho. It was first reported from Idaho in 1952 based on specimens collected from the fish trap at the Lewiston Dam on the Clearwater River near Lewiston. Repeated attempts to collect sand rollers from the Clearwater River and lower tributaries have failed and none have been reported since the removal of the dam in 1973. However, recent collections in 2007, 2008 and 2010 have found this fish in the Snake River between Lewiston and Clarkston, Washington.

References: Pratt and Whitt 1952; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999

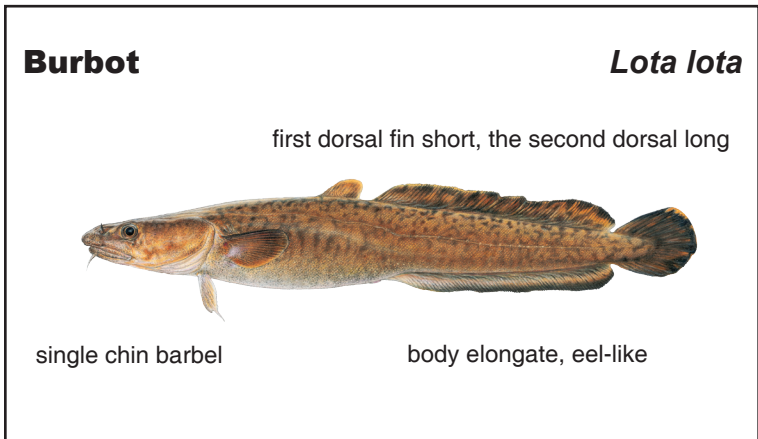




Gadidae

**FAMILY GADIDAE****cods**

The cod family is characterized by having soft rays in the fins and the dorsal and anal fins variously divided. The body is elongate and covered with small cycloid scales. The pelvic fins are far forward, thoracic or jugular in position. Typically, there is a small barbel at the tip of the lower jaw. The cod relatives, about 30 species, are mostly marine fishes of cold and temperature waters of the northern hemisphere. The only exception is the burbot, which is the only family member residing in freshwater.



**Attributes:** The burbot has a dark olive to brown back, marbled with contrasting brown or black. The sides are lighter and the belly is yellowish white. The fins are mottled. Fish from some northern lakes may be uniformly dark brown or black. The speckled pattern is conspicuous on young fish, 40-100 mm total length. They have small, cycloid scales and their caudal fin rounded. The pelvic fins are below and forward of the pectoral fins. The anal fin is long and the head short and wide. Mature fish range in size from 300-450 mm total length. The largest specimen reported from Idaho was 6.5 kg, but fish over 760 mm and 8.2 kg or more have been reported from Canadian waters.

**Distribution:** The burbot is found throughout most of Canada and the northern United States from coast to coast. It also occurs in northern Eurasia. In Idaho, it is found only in the Kootenai River system.

**Habitat:** The burbot is a cold water species and prefers lakes, reservoirs, or large rivers. In summer, it moves into deep pools of rivers and deep water areas of lakes and reservoirs. Young fish often are found beneath stones and sometimes are abundant in streams and in the shallows of lakes.

**Ecology:** The burbot is one of a few Idaho fishes to spawn during mid-winter, often under the ice at temperature ranges of 0-4°C. Male burbot become sexually mature at age three, females at age four. Large females have been reported to produce over 1,000,000 eggs.

**Diet:** Burbot feed typically at night and are more active in winter than summer. The diet of small burbot (75-250 mm total length) is composed of available aquatic organisms, such as insects, amphipods, snails, crayfish, and small fish. Adult fish are piscivores, feeding almost exclusively on fish that inhabit deep waters, such as ciscoes, sculpins, whitefish, sticklebacks, yellow perch, and possibly kokanee and small trout.

**Idaho Conservation Status:** Burbot provided important sport and commercial fisheries in the Kootenai basin in Idaho and British Columbia during the 1950's through the early 1970's. However, soon after completion of Libby dam on the Kootenai River, Montana in 1972 and the formation of Lake Koocanusa, burbot populations declined. By the early 1990's, burbot fisheries in the river and lake collapsed. Burbot fishing was closed to any harvest in Idaho in 1992. Research is continuing on the reasons for the decline and how to restore this population to its former abundance. Currently, this species is considered endangered by the State of Idaho.

References: Paragamian and Willis 2000; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.



**FAMILY COTTIDAE****sculpin**

This family of fishes is characterized by having soft rays and spines (not stiff and sharp) in the dorsal and pelvic fins, large fan-shaped pectoral fins, a large, variously flattened head with eyes located dorsally and a body that tapers to the caudal peduncle. Sculpins are partially scaled or naked, often with well developed prickles over parts of the body. Sculpins are not commonly seen due to their cryptic behavior, camouflage, and like most fish possess the ability to change color to match their background. They are commonly referred to as bullheads, muddlers, or blobs, but the American Fisheries Society common name for species of this group is sculpin.

This family contains about 195 species of marine and freshwater fishes found in the northern hemisphere and the Australian region. There are about 115 species in the salt and fresh waters of North America. The genus *Cottus* contains approximately 34 species found in fresh waters of the northern hemisphere (circumpolar), about 23 of which inhabit the fresh waters of North America. Currently eight species are described in Idaho. However, the descriptions of *Cottus* species are unresolved and will likely change as a result of current and future research. Investigations that combine classical taxonomy with molecular systematics are needed to more accurately describe sculpin species in Idaho, particularly in the Spokane and independent drainages, as well as the Snake River above Shoshone Falls.

Freshwater sculpins are difficult to identify to the species level. They are highly variable in structure and color patterns within and between species, and overlap in meristic characters is common. Most are widely distributed and more than one species may occur in the same river system, although typically not at the same site. Sympatric species can hybridize, complicating species identification; hybrids between slimy sculpin and shorthead sculpin have been observed outside of Idaho.

A hand lens is useful for identifying specimens in the field. To help determine the presence of body prickles, rub your finger gently forward along the lateral line to the opercle to feel the “roughness” of these small projections. Sculpins of the same species living in different environments may vary in physical characteristics such as the presence and prominence of body prickles and palatine teeth.

The known distribution of the various species is usually very helpful in identifying the species in question. However, because sculpins have been used as bait fish, their distribution in Idaho likely has been altered.

Most species of freshwater sculpin display similar reproductive behavior. Spawning occurs from spring through summer. In some species, the males perform swimming displays to attract the females into crevices to spawn. Eggs are typically laid in adhesive clumps on the bottom surfaces of rocks. Males guard and tend the nests after spawning until the eggs hatch, usually within a month. The number of eggs produced by the female is proportional to her body length.

The presence of sculpins has been used to indicate high quality waters which are also suitable for salmon and trout. Most species of sculpin live under rocks and stones of the bottom or in vegetation, typically in waters less than one meter deep for river-dwelling species, deeper for lake-dwelling species. Sculpins are susceptible to land use practices or other events that degrade water quality or quantity, substrate composition and temperature.

Sculpins serve as prey items for trout and other aquatic predators, and they are also cannibalistic. Sculpins are unique in that they do not possess a swim bladder, making them negatively bouyant. Therefore they spend most of their time on or near the bottom. Sculpin transform insects, which comprise a large part of their diet, into fish flesh, which in turn becomes available to other animals, including trout, snakes and birds such as great blue herons.

Because sculpins eat fish eggs, they were once blamed for reduction of salmon and trout numbers. Subsequent research has shown that sculpin mostly feed on eggs that do not get buried in the nest of the spawning fish. Sculpin are a part of Idaho's natural fish fauna and thus play an important role in the ecosystem.

References: Bailey and Bond 1963; Markle et al. 1996; McAllister and Lindsey 1961; McPhail 2007; Robins and Miller 1957.

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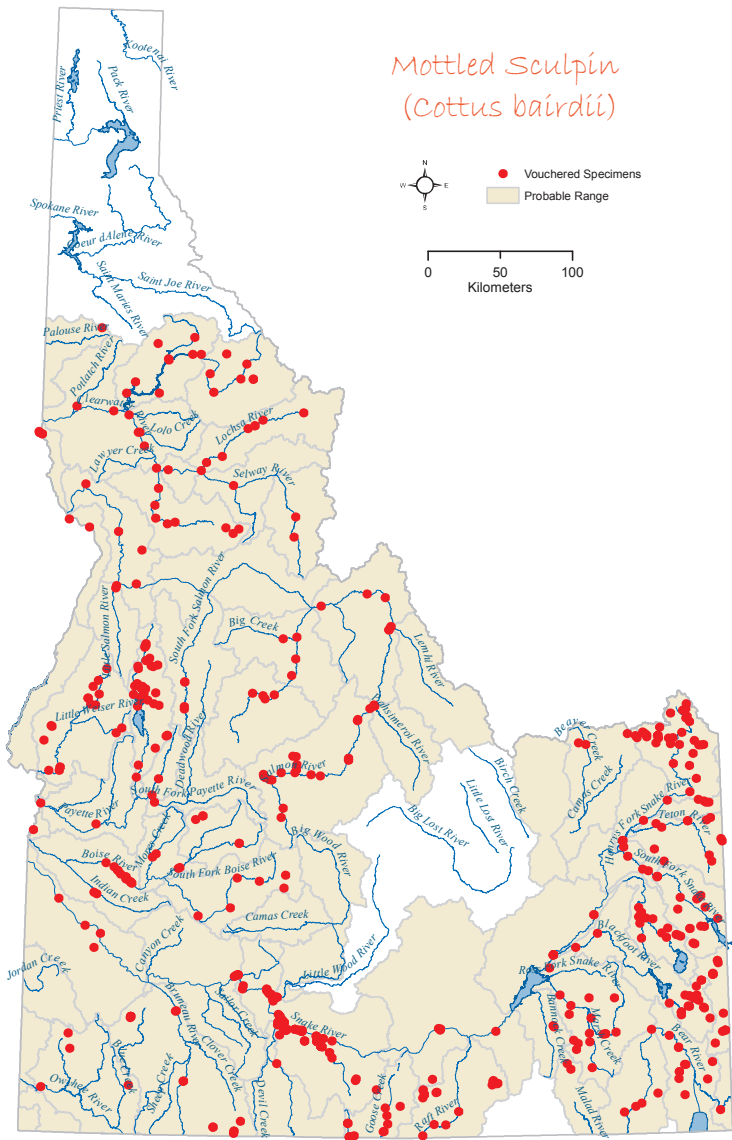
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**Cottidae**



**Mottled sculpin*****Cottus bairdii***

body robust, especially anteriorly

three vertical, dark bands,  
more-or-less distinct, under  
second dorsal fin

pelvic fins with 4 soft rays

lateral line typically incomplete

**Attributes:** The mottled sculpin is a slate to olive-brown color dorsally, with brown or black blotches, becoming paler along the sides. The belly is whitish. The margin of the first dorsal fin is reddish, brown, or cream colored in spawning males. Identifying characteristics include three preopercular spines, multiple rows of exposed palatine teeth, four pelvic fin rays, prickles present in axil of pectoral fins (under the fins), and large pectoral fins, typically 15-16 rays. The mottled sculpin occasionally reaches 150 mm total length, but in Idaho most are 75-100 mm.

**Distribution:** The mottled sculpin has a wide, disjunct distribution throughout North America, occurring east and west of the Continental Divide. In the west, it is found in the Columbia, upper Missouri, and upper Colorado River drainages. It also occurs in the Bonneville basin in Utah and the Harney basin of Oregon. In Idaho, they have been collected from the Snake River and tributaries below and above Shoshone Falls, and the Bear River system. The systematics of this wide-ranging sculpin are not well understood or described, and it is possible that more than one subspecies occurs in Idaho.

**Habitat:** This is a cavity-dwelling (speleophilic) species, preferring cool, clear mountain streams of moderate to rapid current. The bottom typically consists of coarse gravel, and loose rubble, but they may be found over sand, clay, or mud bottoms and around lake margins. Summer water temperatures typically range between 13-18°C where

this species is found, but they have been taken from water as warm as 21°C. In the Salt River drainage of Idaho, they were found in lower gradient spring streams with fine substrate, summer water temperatures greater than 10°C, and in elevations less than 2,150 m. They have not been observed in the higher gradient and higher elevation tributaries in Wyoming.

**Diet:** Mottled sculpin are invertivores. The diet of this species consists mostly of aquatic insects. Other aquatic invertebrates, such as freshwater shrimp and snails are occasionally eaten. Small fish, usually sculpin fry, are also taken when available.

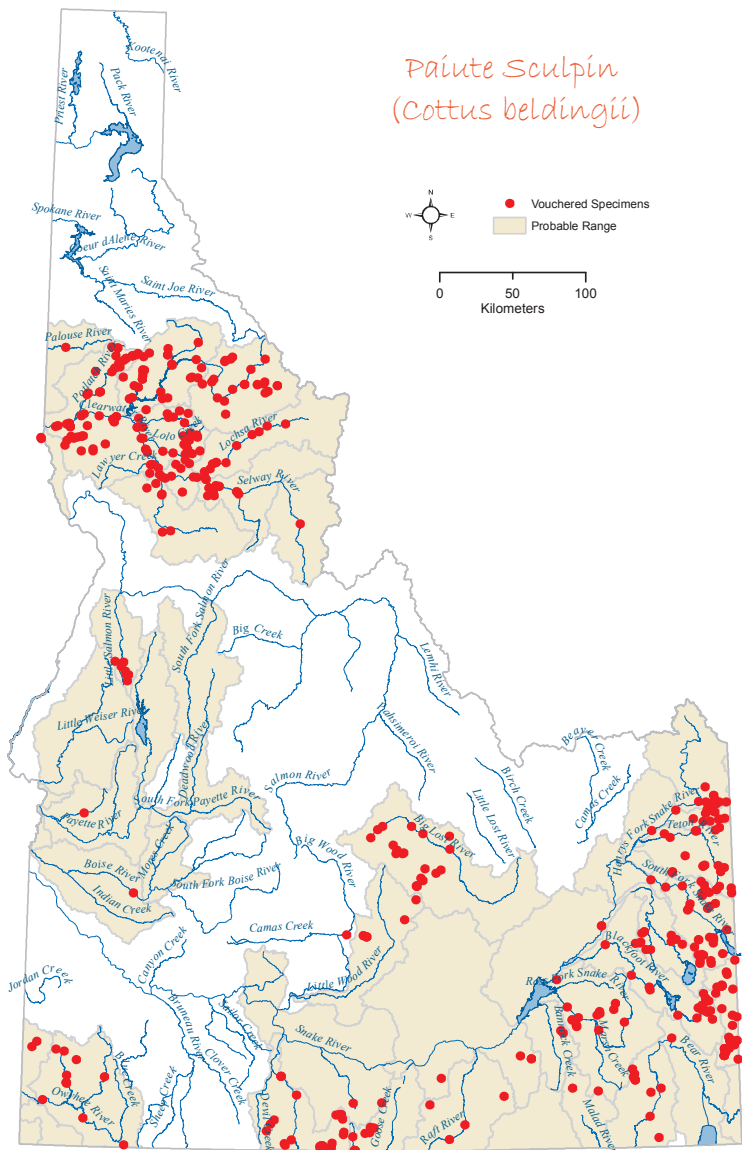
**Ecology:** Mottled sculpin mature at age two, and often live at least five years. Spawning occurs in the spring, from February through June, the timing varying by geographical location and water temperature. Water temperatures during spawning range between 5-16°C. The female produces approximately 50-300 eggs, depending on her size. Females deposit adhesive eggs in clusters of 20-150 on the underside of rocks, in aquatic vegetation or on submerged wood. Males prepare and attend the nests, which may be used by more than one female. Because of their small size and abundance in cool, clear streams, they are important as forage for trout and other predators.

**Idaho Conservation Status:** Unknown. This species is widely distributed in Idaho, although no studies have been conducted to determine population status. Mottled sculpin are considered a nongame species by Idaho.

References: Bailey 1952; Bond 1963; Maughan 1972; McCleave 1964; Quist et al. 2004a; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zarbock 1951; Zaroban et al. 1999.



Paite Sculpin  
(*Cottus beldingii*)





**Paiute sculpin*****Cottus beldingii***

dark blotches in anterior dorsal fin typical in specimens above Shoshone Falls

heavily mottled body, 5-7 crossbars on back



prickles absent

relatively thick caudal peduncle

**Attributes:** Color on the back and upper sides of the Paiute sculpin is brownish to brownish black, becoming paler below. The first dorsal fin typically has anterior and posterior dark pigmentation or blotches. There is a pale yellow spot on the thick caudal peduncle at the posterior base of the dorsal fin. Mature adults are often black. Paiute sculpin typically have a single preopercular spine, no palatine teeth or prickles, and four pelvic fins rays. Adults average 75-100 mm total length, but specimens 125 mm long have been recorded.

**Distribution:** The Paiute sculpin occurs in the Columbia River system, the Lahontan basin of California and Nevada, and the Bonneville basin of the western United States. It also occurs in the upper Colorado River drainage. In Idaho, this species occurs in the Snake River system, the Bear River system, and the Big Lost River drainage.

**Habitat:** The Paiute sculpin inhabits both streams and lakes. Habitat used is variable, but this species is typically found in streams greater than 2.5 m wide with slight to moderate gradient, occurring in fast-water riffle areas among rubble or large gravel, although it can be found over other substrates. It prefers clear, cool water, with summer temperatures warmer than 15°C, but has been found in water over 21°C. In the Salt River of Idaho/Wyoming, this species was found in high elevation streams with large substrate and little deep-pool habitat, but not found in areas with mean summer water temperatures lower than 6°C. They are uncommonly observed during the day, where they

hide within cavities between large cobble size rocks. Their occurrence in Idaho lakes is unknown.

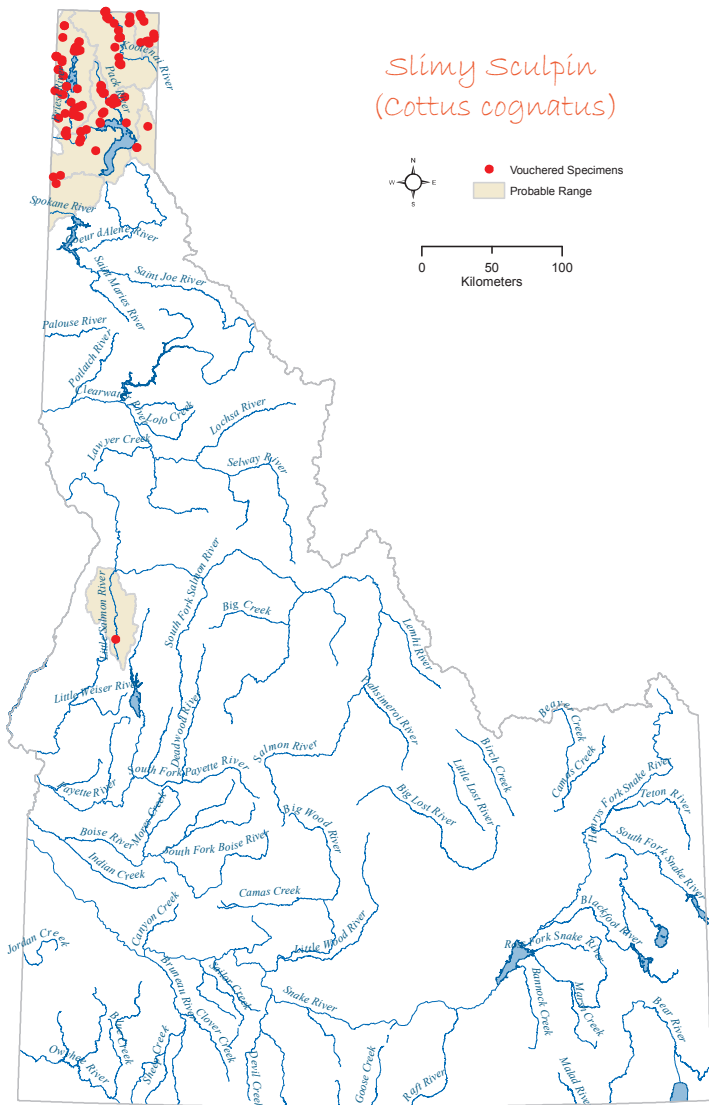
**Diet:** Paiute sculpin are invertivores. In streams, Paiute sculpin feed mainly on aquatic insect larvae, but also take snails, water beetles, and algae. In Lake Tahoe, they feed mainly on snails, aquatic insect larvae, amphipods, and cladocerans. They also take freshwater worms, especially when in deep water.

**Ecology:** Paiute sculpin are slow growing, and rarely live to 5 years. Becoming sexually mature at three years, they spawn in the spring, typically in May and June. Females produce from 20-500 eggs, laying them in clusters on the underside of rocks. Males attend the nest and defend it against other males. This sculpin is important in the food chain because of its varied diet, abundance, and as prey for some species of trout, char, and other predators.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status. Paiute sculpin are considered a nongame species by Idaho.

References: Bond 1963; Maughan 1972; Moyle 2002; Quist et al. 2004a, 2004b; Simpson and Wallace 1982; Zaroban et al. 1999.





**Slimy sculpin*****Cottus cognatus***

short lateral line, ending  
under middle of second dorsal fin

body slender, caudal  
peduncle long



small patch of prickles  
behind pectoral fins

typically three pelvic fin rays,  
occasionally a rudimentary fourth

**Attributes:** The back and sides of slimy sculpin are dark brown to black, with various dark mottling or dark cross bars. The belly is whitish. The first dorsal fin is darkly pigmented basally and almost clear marginally. The pectoral, caudal and second dorsal fins typically have cross bars. Spawning males have an orange band on the margin of the first dorsal fin. Identifying features include three preopercular spines and no palatine teeth. Pelvic fins typically have three rays, occasionally a rudimentary fourth. Adults typically are 50-75 mm total length, but individuals over 100 mm have been recorded. This species is very similar in appearance to mottled sculpin.

**Distribution:** The slimy sculpin has a wide distribution across northern North America from the east coast of the United States and Canada to Alaska and British Columbia. In the Pacific Northwest, it is restricted to the upper Columbia River system. This species exhibits a high degree of morphological variation across its range and occurs in both rivers and lakes. In Idaho, this species occurs in the Kootenai, Pend Oreille and the Little Salmon River drainages. This apparent disjunct distribution is not understood.

**Habitat:** The slimy sculpin is usually found in riffles among the rocks of cool, clear streams. Sometimes it occurs along gravel beaches of lakes, especially near inlet streams. In Alaska, this species has been taken from lakes to depths of 73 m.

**Diet:** Slimy sculpin are invertivores. This sculpin is an opportunistic feeder, eating the most abundant food items available. Adults eat aquatic insects, molluscs, crustaceans, and small fishes. In Alaskan lakes, this species feeds mostly on snails and salmon eggs.

**Ecology:** Slimy sculpin spawn in the spring, but the age of sexual maturity and number of eggs produced is not reported. One study in Canada found that a mature female 100 mm in length produced around 1,400 eggs. Spawning habits are similar to mottled sculpin. Most slimy sculpin are small and are prey of trouts, char, northern pike and burbot.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in Idaho to determine population status. Slimy sculpin are considered a nongame species by Idaho.

References: Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

Notes

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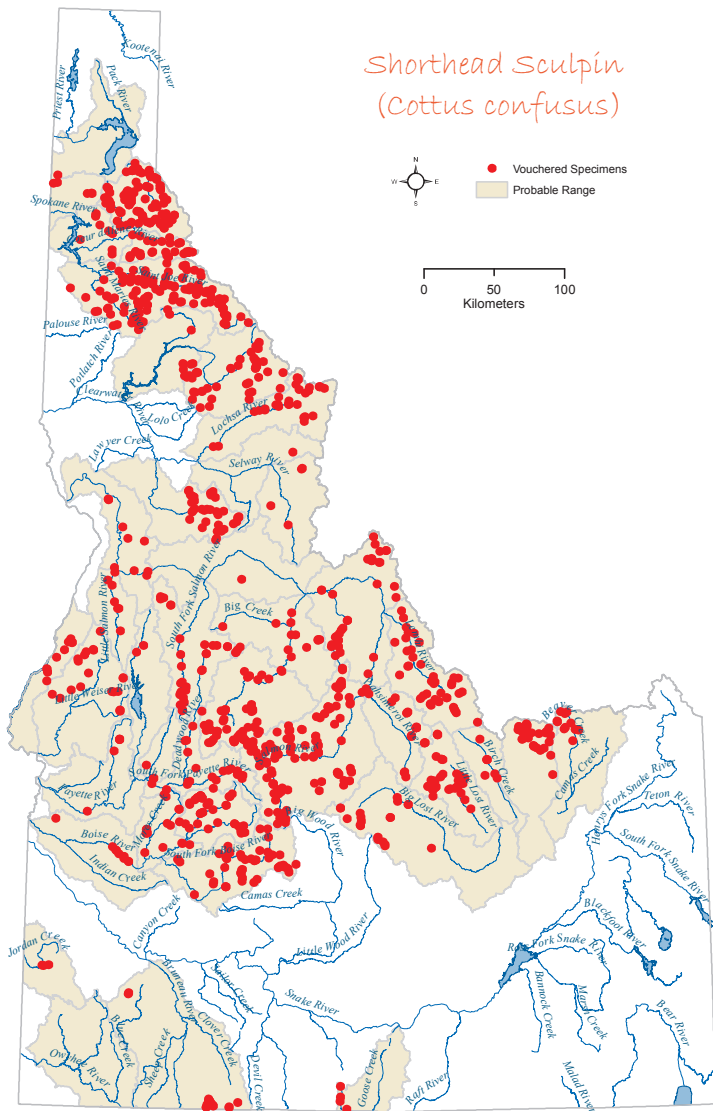


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Cottidae





**Shorthead sculpin*****Cottus confusus***

slender body; small head, typically less than 1/3 standard length

prickles typically present (but see below)



palatine teeth in a short, narrow row, difficult to see

four pelvic fin rays

**Attributes:** The back and upper sides of shorthead sculpin are brownish or yellowish gray, often mottled with cross bands that are poorly defined. The belly is light with fine speckles. The first dorsal fin is dark anteriorly and posteriorly. The lateral line is complete to the posterior part of the second dorsal fin, then interrupted or underdeveloped. The preopercular bone typically has two spines, the second often poorly developed. The pelvic fins have four rays. Adults average 60-100 mm total length, but individuals nearly 150 mm in length have been recorded. When isolated in headwater areas, each population can look somewhat different. Shorthead sculpin collected from the independent drainages of Idaho lack prickles on the body. The reasons for this variation are unknown.

**Distribution:** The shorthead sculpin is a northwestern species found in the Columbia River system of Oregon, Washington, Idaho, Montana, and British Columbia. It also occurs in several streams draining into Puget Sound. In Idaho, this species has been collected from most of the Snake River tributaries below Shoshone Falls, and the independent drainages of the upper Snake River basin. It also is widespread in the Spokane River system of Idaho.

**Habitat:** Typically, shorthead sculpin are found in riffle areas of high elevation, cold, clear streams with gravel or rubble bottoms. Older shorthead sculpin in the Big Lost drainage seemed to prefer pool areas with rubble substrate. Typically found farther upstream and at higher elevations than most other sculpins, shorthead sculpin are occasionally found in backwaters and along shorelines of large rivers. In the Clearwater River system, this species was common in the headwater areas of each major drainage above 975 m elevation, but undetected from the drainage downstream from these areas. The shorthead sculpin seems to prefer waters with average summer temperatures less than 15°C.

**Diet:** Shorthead sculpin are invertivores. They feed primarily in benthic aquatic invertebrates, although fish eggs and fish are occasionally taken. In the Big Lost River, diet was primarily caddis flies, true flies and mayflies.

**Ecology:** Shorthead sculpin mature at 2-3 years. Spawning occurs in the spring in the rock and cobble of riffle areas. In the Big Lost River, spawning occurred within a two week period in April. Females collected in the Big Lost River contained 184-511 eggs, which is higher than fecundity reported for populations in Washington. This species inhabits the same waters as trout and char and serves as food for these species (especially the bull trout). They live to a maximum of six years.

**Idaho Conservation Status:** Unknown. No defined studies have been conducted in most drainages in Idaho to determine population status. Shorthead sculpin are considered a nongame species by Idaho.

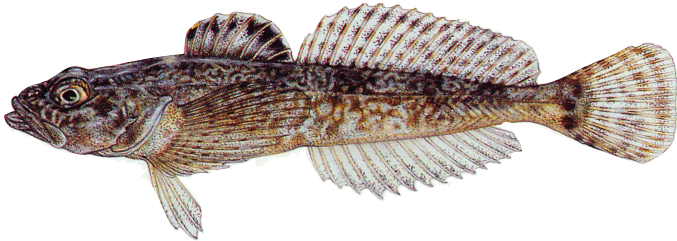
References: Bailey and Bond 1963; Gasser et al. 1981; Idaho Chapter American Fisheries Society 1995; Johnson et al. 1983; Maughan 1972, 1976; Scott and Crossman 1998; Wydoski and Whitney 2003; Zaroban et al. 1999.





**Bear Lake sculpin*****Cottus extensus***

palatine teeth present

prickles well developed on  
back and sides

3 spines on preopercule

pelvic fins with 4 soft rays

**Attributes:** This species is tan or brownish above, becoming lighter below with a few large blotches sometimes visible on the sides. The head is short, less than 1/3 standard length; pectoral fins with 15-16 soft rays (most often 16); lateral line incomplete, pores 21-26. The average size of specimens taken in gill nets is about 75 mm, although females of 137 mm and males of 173 mm have been observed.

**Distribution:** The Bear Lake sculpin native range is restricted to Bear Lake, Idaho/Utah. It is one of five fish species endemic to Bear Lake.

**Habitat:** The Bear Lake sculpin lives in waters from 15-53 m deep, except when it enters shallow water to spawn. No rocky substrate exists at these depths so this species may burrow in the soft marl for cover.

**Diet:** Bear Lake sculpin are invertivores. Their diet is composed mostly of the aquatic crustaceans, ostracods and copepods.

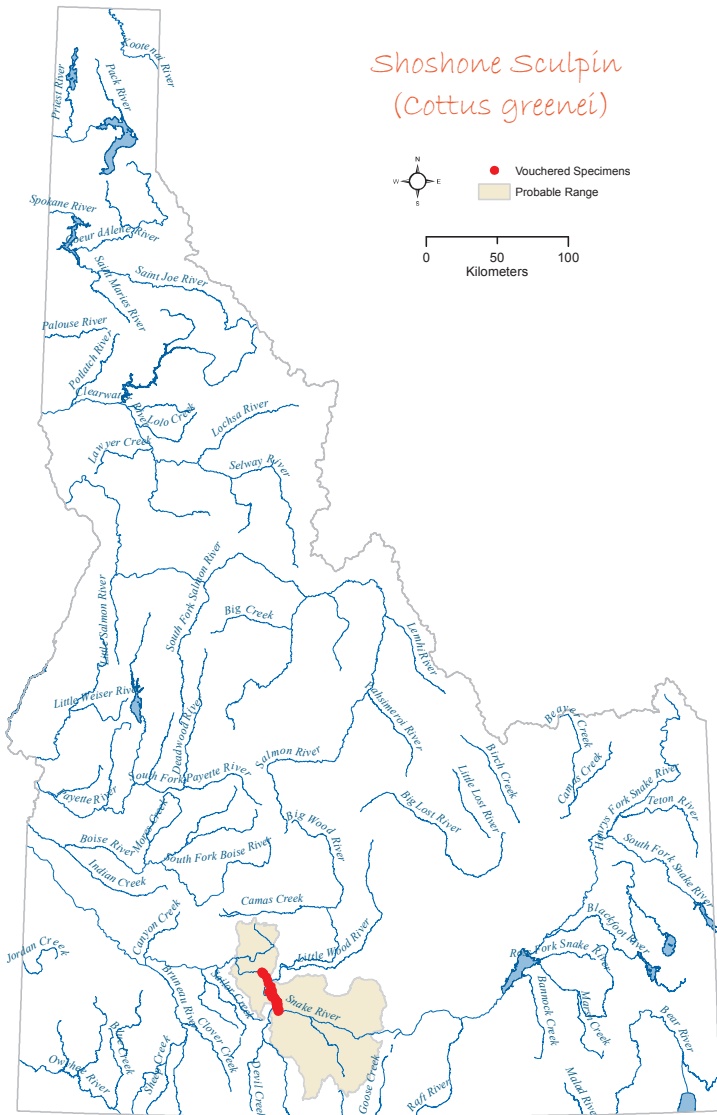
**Ecology:** Bear Lake sculpin are the second most abundant fish in Bear Lake after Bonneville cisco, and is an important prey for native Bear Lake cutthroat trout and Bonneville whitefish. Adults age 2 and older migrate from deep water to shallow areas in March and April to spawn from April into June when water temperature is 4°C or higher. Spawning is restricted to a central location on the eastern shore of the

lake where cobble and boulder substrate occurs. The male chooses the spawning site, selecting large cobble and boulders surrounded by pebbles and larger substrate. Egg masses are generally found near shore on the underside of rocks in water about 1 meter deep. Females have been observed to produce 300 eggs. Hatching occurs during May and June and appears to be synchronized with events of high surface turbulence, like a storm. For a week after hatching, the fry swim actively on the water surface. This behavior, observed in other lake-dwelling sculpin, serves to disperse them throughout the lake. After the yolk-sac is absorbed, the fry disperse to both the littoral and profundal benthic zones where they start feeding. A diel migration has been observed where feeding occurs in deep water during the day, with migration up into warm open water habitat at night. This behavior may aid digestion. During late summer and autumn, first year juveniles migrate offshore to spend their first winter in the profundal benthic habitat. Adult Bear Lake sculpin feed day and night.

**Idaho Conservation Status:** This species is an Idaho/Utah endemic, and because of its restricted range, is considered a protected nongame species by Idaho. Threats include the loss of spawning and rearing shoreline habitat when the lake is pumped down for irrigation, and a change in water quality with increased development around the lake.

References: Neverman and Wurtsbaugh 1992; Ruzycski et al. 1998; Sigler and Sigler 1987; Zaroban et al. 1999.





Cottidae



**Shoshone sculpin*****Cottus greenei***

spines in first dorsal 6 (occasionally 5)

thick caudal peduncle,  
1.5-2.0 eye diameterprickles present behind  
pectoral finspelvic fins with 3 visible  
soft rays

**Attributes:** Shoshone sculpin are typically brownish to brownish gray. The back and sides are covered with several blackish bars. Both dorsal fins and the anal fin are speckled with dark pigment. The caudal and pectoral fins have dark bands. The body is short and stubby with a very thick caudal peduncle. Shoshone sculpin typically have one preopercular spine, palatine teeth and three visible pelvic fin rays. Shoshone sculpin may live up to four years, but most populations studied have few individuals older than age two. The Shoshone sculpin is a short-lived, relatively fast growing species attaining total lengths of 50-75 mm. The largest specimen found in one study was 93 mm.

**Distribution:** The Shoshone sculpin is endemic to the springs and spring creeks within the Thousand Springs formation along the north bank of the Snake River in Gooding County between Kanaka Rapids and Bliss. One population occurs in a spring within the main Snake River. They have also been moved and established upriver at Crystal Springs in Jerome County.

**Habitat:** Shoshone sculpin occur in the headwaters of cool (13-14°C), clear, springs and spring-fed streams. The habitat is generally characterized as highly productive, with relatively constant temperatures and abundant food. Adults and juveniles are found in slow flowing sections of streams where water temperatures are less

than 15°C, water depth is 20 cm or greater, and visibility is at least one meter. Juveniles are found in areas with considerable aquatic vegetation, often with a sand/silt substrate. Larger sculpin inhabit areas with a greater proportion of the substrate composed of large rocks and rubble.

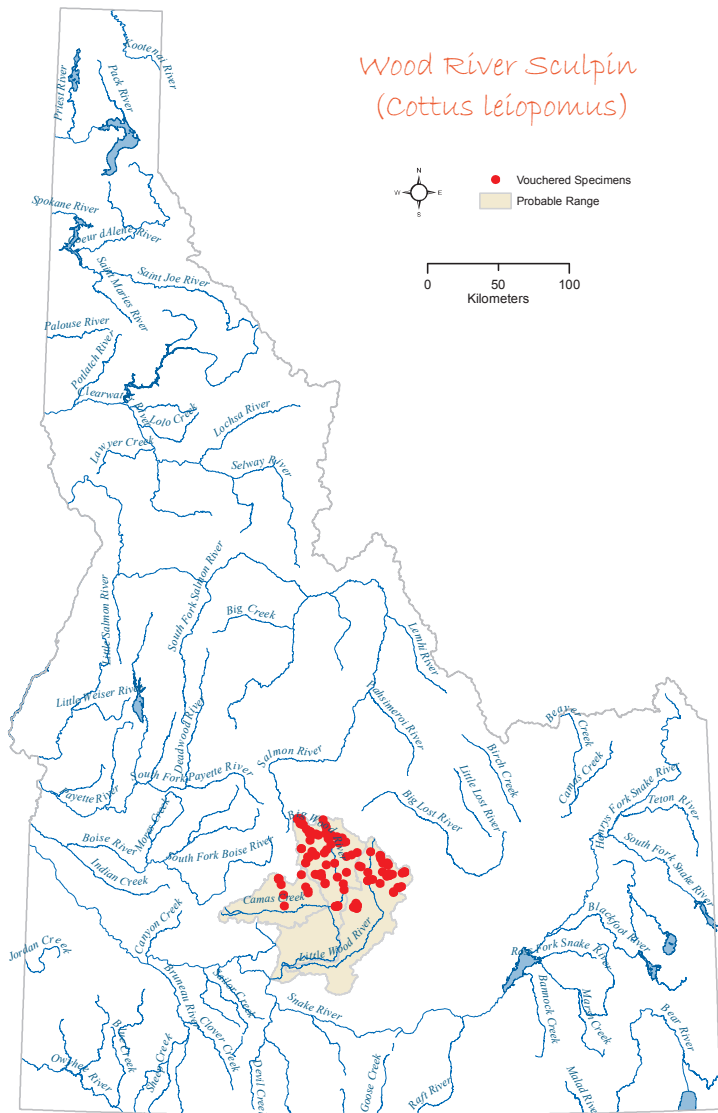
**Diet:** Shoshone sculpin are invertivores. They feed mostly on benthic aquatic insects and small crustaceans, such as amphipods and copepods. Other food items include ostracods, snails and small clams. Occasionally during winter, large males have been observed to take other Shoshone sculpin.

**Ecology:** Adults become reproductively mature at age one, with females maturing at a length of 40 mm and males at a length of 49 mm. Spawning occurs in the spring, but in at least one spring system with relatively constant water temperature the spawning season may last from late winter to mid-summer. In this population, females may spawn more than once in a season. Females produce between 20-120 eggs, and hatching occurs within the fourth week after being laid.

**Idaho Conservation Status:** This species is an Idaho endemic, and because of its restricted range, is considered a protected nongame species by Idaho. The Shoshone sculpin was first described from specimens collected in 1894 from Thousand Springs. Some populations of Shoshone sculpin found during surveys in 1979-1981 for a status review were not found in surveys conducted ten years later. The loss was attributed to increased diversion of water resulting in shallower habitat, poor quality of water returned to the springs after use which causes turbidity and higher water temperatures, and an increase in sediment which embedded spawning areas. The major threat to the survival of Shoshone sculpin probably is habitat destruction through land and water use practices such as irrigation, aquaculture, and hydroelectric projects.

References: Connolly 1983; Kuda 1995; Kuda and Griffith 1993; Simpson and Wallace 1982; Wallace et al. 1982; Zaroban et al. 1999.

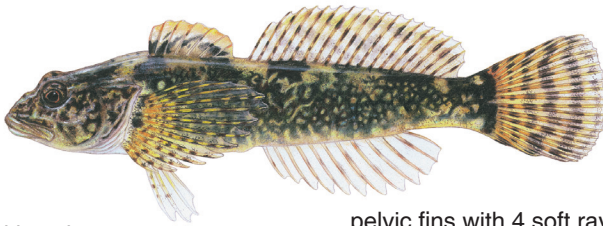




Cottidae

**Wood River sculpin***Cottus leiopomus*

no preopercular spines or poorly developed on one side only



prickles absent

pelvic fins with 4 soft rays

**Attributes:** The dorsal color of the Wood River sculpin is grayish olive with a mottling of dark brown or black. The belly ranges from white to blue. The ventral color is typically light cream colored with a slate-blue hue. The body is deep and compressed. Preopercular spines are typically absent, however, a few (less than 5%) individuals may have a blunt nub on the preopercle. Palatine teeth and prickles are absent. The lateral line is incomplete or interrupted under the posterior end of the second dorsal fin. Head is moderately large, broad and oval in shape. Adult Wood River sculpin are known to reach at least 141 mm total length.

**Distribution:** The Wood River sculpin is endemic to the Wood River basin of south central Idaho. In the Little Wood River drainage, they currently occur above the Little Wood Reservoir and in the Silver Creek watershed. In the Big Wood River drainage, they occur above Magic Reservoir. In the Camas Creek drainage, they are restricted to north side tributaries, primarily in Soldier Creek and Willow Creek.

**Habitat:** Typically, Wood River sculpin are found in greatest abundance in riffles and runs with cobble or rubble substrate. They may also be found in reduced numbers in pools, beneath undercut streambanks and in areas of submerged vegetation when cobbles and rubble are not present. They are typically found in cool and cold water, 15°C or less in moderate current. Wood River sculpin seasonally occupy ephemeral side channels and pools with suitable cobble and boulder substrate. They are rarely found in heavily

vegetated areas with fine substrate, low water velocity and water depth of less than 10 cm. They have been found in elevations above 2,374 m.

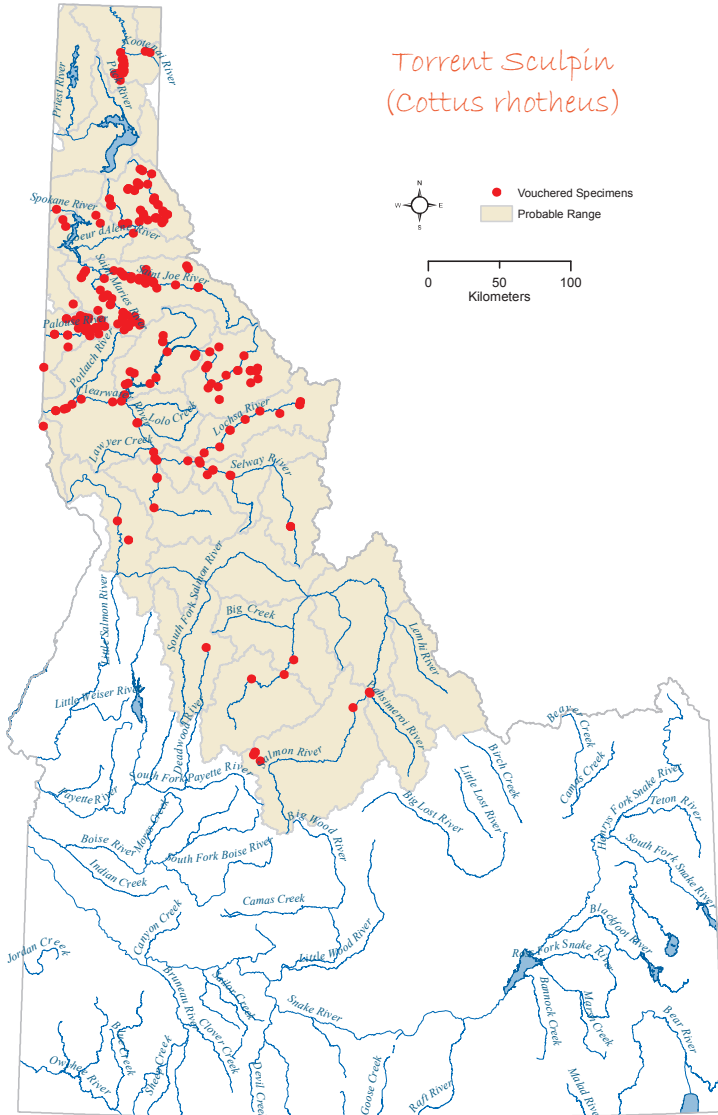
**Diet:** Wood River sculpin are invertivores. No studies of food habits have been conducted on this species, but observations of mouth contents in preserved specimens indicate they feed on benthic aquatic invertebrates.

**Ecology:** Wood River sculpins typically live 5 years and have been reported to reach 8 years of age. Reproductive maturity is typically reached at age 3 with a total length of 60 mm. Females have been observed to produce 38-314 eggs. Spawning occurs in the spring.

**Idaho Conservation Status:** The Wood River sculpin is not currently considered a species at risk, but due to its restricted range, is considered a sensitive species by the State of Idaho, the U.S. Forest Service and U.S. Bureau of Land Management. The Idaho Department of Fish and Game classifies this sculpin as a protected non-game species. They have not been collected from the Little Wood River below the mouth of Silver Creek in recent years. Potential threats to the Wood River sculpin include land development, stream channelization, water diversion, poor land management practices and introduced predators.

References: Gilbert and Evermann 1895; Griffith 1996; Merkley and Griffith 1993; Meyer et al. 2008a; Meyer et al. 2008b; Simpson and Wallace 1982; Zaroban et al. 1999; Zaroban 2010; Zaroban 2011.







**Torrent sculpin*****Cottus rhotheus***

head large

complete lateral line

narrow caudal peduncle

heavily prickled on head,  
back and sidestwo prominent, forward-slanting dark  
saddles below second dorsal fin

**Attributes:** Torrent sculpin are brown or grayish-brown on the back and sides with dark speckling. The lower sides are lighter and the belly is almost white. The chin is usually moderately to darkly mottled. The dorsal, caudal, and sometimes the anal and pectoral fins have darkly pigmented bars. The outer edge of the first dorsal fin becomes thickened and orange colored in spawning males. The preopercular armature is strong, with 3 spines, and the lateral line is complete, often extending onto the caudal fin. The palatine teeth are well developed, and adjacent to vomer. The pectoral fins have 15-16 soft rays. Geographic variation has been observed in body appearance. Torrent sculpin are one of the longer-lived cottid species, living up to seven years. This is a relatively large sculpin attaining a total length over 150 mm, but most adults are 75-115 mm.

**Distribution:** The native distribution of this sculpin is the Columbia River drainage and rivers tributary to the Pacific Ocean from the Nehalem River, Oregon north to the Fraser River, British Columbia. In Idaho, this species occurs in the Kootenai, Pend Oreille, Spokane, Palouse, and Clearwater river basins. It is also found in Warm Lake Creek (South Fork Salmon River), the main Salmon River and the Snake River below Shoshone Falls. There have been unverified reports of torrent sculpin occurring in the Bear River drainage.

**Habitat:** The torrent sculpin typically occurs in the middle reaches of larger rivers in swift, cool water with a stable substrate of gravel, rubble, or boulders. It also inhabits the beach areas and rocky shores of lakes. This species typically lives in fast water streams in western Washington, but in the Clearwater River it generally was found in slower waters or areas bordering fast water. Torrent sculpin were found in the main stem and larger tributaries of the Clearwater River, but have not been reported in the smaller streams. In the St. Joe and Coeur d'Alene river drainages, they were found in streams with an average width of 10.4 m, average gradient of 0.7%, and most often in low gradient riffles with small cobble substrate. They appear to tolerate warmer water temperatures than other species found in the same drainages, being sampled in temperatures ranging between 8-20°C.

**Diet:** Torrent sculpin are invertivores/piscivores. They feed on a variety of aquatic organisms, such as copepods, ostracods, aquatic insect larvae, molluscs, and small fish. Torrent sculpin have a relatively larger mouth than other Idaho sculpins and, thus at a comparable length can eat larger food items. They readily take small fish, such as shiners and northern pikeminnow, and the diet of torrent sculpin over 75 mm is almost entirely fish.

**Ecology:** Spawning occurs from May to July in fish two years and older. Females produce about 100-350 eggs, depending on their size. As the spawning season approaches, territorial males turn melanistic and the tip of the first dorsal fin becomes bright orange.

**Idaho Conservation Status:** Unknown. This species appears common throughout its range in Idaho, although few studies have been conducted to determine population status. Torrent sculpin are considered a nongame species by Idaho.

References: Maughan 1976; Quintela 2004; Scott and Crossman 1998; Simpson and Wallace 1982; Wydoski and Whitney 2003; Zaroban et al. 1999.

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## Glossary

**Adfluvial** a life history that includes regular migrations between a lake and stream or river

**Adipose fin** fleshy fin between the dorsal and caudal fins

**Ammocoete** larval lamprey; non-parasitic juveniles that live 5+ years in soft substrates

**Anadromous** a life history characterized by migration from the sea to rivers for breeding

**Benthic** pertaining to or occurring at or near the bottom of a body of water

**Cycloid** scale irregularly round smooth scales of trout and minnows

**Ctenoid scale** similar to cycloid scales except they have rough projections on the exposed edge

**Extant** currently exists

**Extirpated** no longer exists

**Falcate** concave-shaped trailing edge of a fin

**Fecundity** the number of eggs within the ovaries of a female fish

**Fluvial** a life history that includes regular migrations within a river system

**Frenum** flesh that interrupts the upper lip of longnose dace

**Herbivore** an animal that eats plant material

**Heterocercal tail** upper lobe is much larger than the lower lobe

**Invertivore** an animal that eats invertebrates

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**Kype** curved jaws developed by some sexually mature male salmonids

**Lacustrine** relating to, formed in, living in or growing in lakes

**Macrothalmia** juvenile lampreys that are transforming from an ammocoete to an adult

**Omnivore** an animal that eats plant and animal material

**Piscivore** an animal that eats fish

**Preoperculum** bony structure situated on top of the operculum

**Profundal** related to or occurring in the deep-water zone of a lake

**Resident** a life history with little or no migratory behavior

**Smolt** a juvenile trout or salmon that has initiated its migration from freshwater to the ocean; involves morphological and physiological changes that begin prior to entering salt water.

**Standard length** measured from the tip of the snout to the base of the tail fin

**Total length** measured from the tip of the snout to the tip of the extended tail

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## Appendix A

Non-native fish taxa reported to have been introduced into Idaho waters. Taxa are listed alphabetically by common name. OJSMNH is the Orma J. Smith Museum of Natural History, The College of Idaho.

Common Name	Taxa	Source	Status
American shad	<i>Alosa sapidissima</i>	Linder 1963; Simpson and Wallace 1982	extant
Arctic char	<i>Salvelinus alpinus</i>	Simpson and Wallace 1982	likely extirpated
Arctic grayling	<i>Thymallus arcticus</i>	Simpson and Wallace 1982	extant
Atlantic salmon	<i>Salmo salar</i>	Simpson and Wallace 1982	likely extirpated
banded killifish	<i>Fundulus diaphanus</i>	OJSMNH 100,837	extant
black bullhead	<i>Ameiurus melas</i>	Simpson and Wallace 1982	extant
black crappie	<i>Pomoxis nigromaculatus</i>	Simpson and Wallace 1982	extant
blue catfish	<i>Ictalurus furcatus</i>	Fuller et al. 1999	likely extirpated
blue tilapia	<i>Oreochromis aureus</i>	OJSMNH 70,546	extant
bluegill	<i>Lepomis macrochirus</i>	Simpson and Wallace 1982	extant
brook trout	<i>Salvelinus fontinalis</i>	MacCrimmon and Campbell 1969	extant
brown bullhead	<i>Ameiurus nebulosus</i>	Simpson and Wallace 1982	extant
brown trout	<i>Salmo trutta</i>	Simpson and Wallace 1982	extant
channel catfish	<i>Ictalurus punctatus</i>	Simpson and Wallace 1982	extant



chum salmon	<i>Oncorhynchus keta</i>	Simpson and Wallace 1982	likely extirpated
common carp	<i>Cyprinus carpio</i>	Simpson and Wallace 1982	extant
convict cichlid	<i>Cichlasoma nigrofasciatum</i>	OJSMNH 70,541; Fuller et al. 1999	extant
fathead minnow	<i>Pimephales promelas</i>	Simpson and Wallace 1982	extant
flathead catfish	<i>Pylodictus olivaris</i>	Simpson and Wallace 1982	extant
golden shiner	<i>Notemigonus crysoleucas</i>	OJSMNH 66,195	extant
golden trout	<i>Oncorhynchus mykiss aquabonita</i>	Simpson and Wallace 1982	extant
goldfish	<i>Carassius auratus</i>	Simpson and Wallace 1982	extant
grass carp	<i>Ctenopharyngodon idella</i>	Fuller et al. 1999	extant
green sunfish	<i>Lepomis cyanellus</i>	Simpson and Wallace 1982	extant
green swordtail	<i>Xiphophorus hellerii</i>	OJSMNH 82,112; Fuller et al. 1999	extant
guppy	<i>Poecilia reticulata</i>	Linder 1964	extant
Kamloops trout	<i>Oncorhynchus mykiss kamloops</i>	Linder 1963	extant
lake trout	<i>Salvelinus namaycush</i>	Simpson and Wallace 1982	extant
lake whitefish	<i>Coregonus clupeaformis</i>	Simpson and Wallace 1982	extant
largemouth bass	<i>Micropterus salmoides</i>	Simpson and Wallace 1982	extant
Mozambique tilapia	<i>Oreochromis mossambicus</i>	OJSMNH 70,540	extant
northern pike	<i>Esox lucius</i>	Simpson and Wallace 1982	extant

orangespotted sunfish	<i>Lepomis humilis</i>	Courtenay et al. 1987	likely extirpated
oriental weatherfish	<i>Misgurnus anguillicaudatus</i>	OJSMNH 82,127	extant
oscar	<i>Astronotus ocellatus</i>	Bart Gamett, personal communication	extant
piranhas	<i>Characiformes</i>	Fuller et al. 1999	likely extirpated
pumpkinseed	<i>Lepomis gibbosus</i>	Simpson and Wallace 1982	extant
rainbow smelt	<i>Osmerus mordax</i>	Simpson and Wallace 1982	extant
redbelly tilapia	<i>Tilapia zillii</i>	IDFG 1990; Fuller et al. 1999	extant
rock bass	<i>Ambloplites rupestris</i>	Linder 1963; Fuller et al. 1999	likely extirpated
sauger	<i>Sander canadensis</i>	Fuller et al. 1999	likely extirpated
shortfin molly	<i>Poecilia mexicana</i>	Fuller et al. 1999	extant
smallmouth bass	<i>Micropterus dolomieu</i>	Simpson and Wallace 1982	extant
splake	<i>Salvelinus fontinalis</i> X <i>S. namaycush</i>	Fuller et al. 1999	extant
spottail shiner	<i>Notropis hudsonius</i>	IDFG 1990; Fuller et al. 1999	extant
Sunapee trout	<i>Salvelinus aureolus</i>	Fuller et al. 1999	extant
tadpole madtom	<i>Noturus gyrinus</i>	Bond and Bisbee 1955	extant
tench	<i>Tinca tinca</i>	Simpson and Wallace 1982	extant
tiger muskellunge	<i>Esox lucius</i> X <i>E. masquinongy</i>	Fuller et al. 1999	extant
tui chub	<i>Gila bicolor</i>	Simpson and Wallace 1982	extant

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walleye	<i>Sander vitreus</i>	Simpson and Wallace 1982	extant
warmouth	<i>Chaenobryttus gulosus</i>	Simpson and Wallace 1982	extant
western mosquitofish	<i>Gambusia affinis</i>	Simpson and Wallace 1982	extant
white crappie	<i>Pomoxis annularis</i>	OJSMNH 69,654	extant
yellow bullhead	<i>Ameiurus natalis</i>	OJSMNH 70,794	extant
yellow perch	<i>Perca flavescens</i>	Simpson and Wallace 1982	extant

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