Field Guide to Common Fish of the Willamette Valley Floodplain

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Contents

* Indicates fish considered to be common in floodplain habitat

The Willamette River Basin

The Willamette River is the largest river in Oregon. It has the 13th largest flow of all rivers in the continental United States. The river drains a basin of 11,506 square miles, which is roughly the area of both Maryland and Delaware combined. The mainstem of the Willamette River starts in the south end of the valley at the confluence of the Coast Fork and Middle Fork Willamette, near the city of Eugene, and flows north 187 miles to join the Columbia River, near the city of Portland.

Rivers are in a constant state of change. Their channels and floodplains are continually altered by natural and human activities. Since the mid-1800s, people have altered the Willamette River and its floodplain to meet their needs for river navigation, agriculture, and urban development. By the end of the 1800s, people started introducing many nonnative fish species into the Willamette Basin. Most of these came from the eastern United States, though some came from as far away as Asia. Nonnative fish are harmful to the ecology of the Willamette River because they prey on native fish, compete with them for food and shelter, and can degrade water quality.

Local climate also has a strong influence on aquatic ecosystems. Western Oregon's rainy winters and dry summers bring about the Willamette River's characteristic winter high flows and summer low flows. During naturally occurring high-flow events, the floodplain is inundated by rising waters that fill sloughs, creeks, ditches, and depressions, and also flood riparian woodlands and farm fields. (In this book, we call these **seasonal watercourses**.) With the water come many fish and other aquatic life that move with the river's rising waters into these new, seasonal floodplain habitats to feed, reproduce, and

Willamette River floodplain, winter

seek shelter from the turbulent flows of the main river channel.

Currently, the Willamette River Basin is home to 36 native and 33 nonnative fish species. Researchers are just beginning to describe how fish use seasonal waters, but they have already confirmed 15 native and 16 nonnative species that use these important habitats. While the number of species (**species richness**) is about equal for native and nonnative fish, the relative abundance is drastically different. In both the main river channel and its seasonal watercourse, about 80 to 95 percent of the fish are native.

Identifying common fish species increases our understanding of how fish use seasonal watercourses in the floodplain. Improving our understanding helps us sustain these Willamette Valley habitats for the mutual benefit of human and aquatic life.

Northern pikeminnow

Sustaining seasonal aquatic habitat

There are several simple principles to consider if you want to benefit fish and other aquatic organisms in your seasonal waters. The first two are to make sure watercourses are unobstructed and to keep riparian areas healthy.

Unobstructed watercourses

All fish that use seasonal watercourses come from perennial water bodies (such as main river channels, lakes, or ponds). Fish can only reach the seasonal watercourses if they are well connected to the perennial bodies and are not obstructed by physical barriers.

Research shows that the closer a section of seasonal water is to permanent waters (main river channel or lake), the more fish species and numbers of individual fish that will occupy it. Barriers to fish passage (such as dams, weirs, waterfalls, and culverts that are perched, plugged, or poorly designed or installed) either eliminate or significantly reduce the number of fish that can use aquatic habitats upstream of those structures. So, for the most benefit to fish using these habitats, focus your activity on seasonal

watercourses that are closest to the main river channel, that fill frequently, stay filled the longest, and have (or can be given) unobstructed fish passage.

Because fish move both up and downstream within these watercourses, fish passage should be possible in all directions and at all times for the greatest benefit. Any obstructions that keep flooded fields and other seasonal watercourses from draining completely may trap and kill fish as the water warms up and becomes stagnant towards late spring and early summer.

Riparian health

Riparian vegetation contributes to overall habitat diversity and provides important sources of food and cover for both aquatic and terrestrial species (such as birds, mammals, amphibians and invertebrates, many of which are essential pollinators). Active management of riparian areas to maintain or restore the native cover of trees, shrubs, grasses, sedges, or flowering plants can improve the natural and beneficial function of these habitats.

Wooded riparian areas provide shade that helps keep perennial and seasonal waters from heating up as the season progresses. Proper management can also help filter surface runoff and protect against bank and surface erosion or unwanted sedimentation.

Northern pikeminnow and redside shiner

Different habitats provide different kinds of benefits, so having only one type of habitat may not be ideal. A complex channel bottom that is covered in grasses and has large pieces of wood provides cover for fish, their eggs, and newly hatched juveniles, and also increases the abundance of aquatic and terrestrial insects fish eat. Managing for a mixture of riparian plants and a complex habitat with interconnected patches of riparian forest may be a good strategy to benefit the highest number of species possible (both aquatic and terrestrial).

Using this field guide

This guide is a quick field resource to help identify native and nonnative fish species found in seasonal watercourses of the Willamette River floodplain. It should be useful throughout the Willamette Valley, although it applies mostly to the central and southern valley from Newberg south to Eugene.

The guide contains photographs of each fish species at different ages and sizes, with basic descriptions and background information on the ecology of each species. Each species description has a section called "Key characteristics." This section lists features that will help you correctly identify that species. There are arrows on some of the pictures that draw attention to certain characteristics. The arrow's number corresponds to the numbered key characteristic in the text.

A warning about collecting

While we encourage people to explore the seasonal watercourses of the Willamette River floodplain, the authors wish to remind readers to do so responsibly. Take precautions to avoid harming any organism or habitat, and please, do not move any species from one location to another.

Flooded riparian forest along the Marys River

In 2008, Oregon spent over $26 million on invasive species-related activities. It is estimated that nonnative plant and animal species cause over $140 billion dollars in lost revenue throughout the United States every year. **Be sure to thoroughly clean** all clothing, equipment, and materials that come into contact with aquatic environments. This is the only way to make sure you are not spreading dangerous organisms throughout the valley. Clean your waders, boots, and equipment with very hot water or freeze them to eliminate "aquatic hitchhikers."

Remember to follow state and federal laws pertaining to the collection and transport of organisms. Remember that the collection or other disturbance of rare, threatened, or endangered species is against the law!

How to report a sighting

If you have found a fish species you wish to report, contact your local Oregon Department of Fish and Wildlife (ODFW) office. Useful information to include in your report would be place, date, and time of sighting. To aid in the positive identification of a species, a picture of the fish, even if it is taken with your cell phone, can be very useful!

Find your local ODFW office at:
http://www.dfw.state.or.us/agency/directory/local_offices.asp

Find more information about invasive species at:

- Oregon Invasive Species Council: http://www.oregon.gov/OISC/Pages/index.aspx
- Oregon invasive species online hotline: http://oregoninvasiveshotline.org/

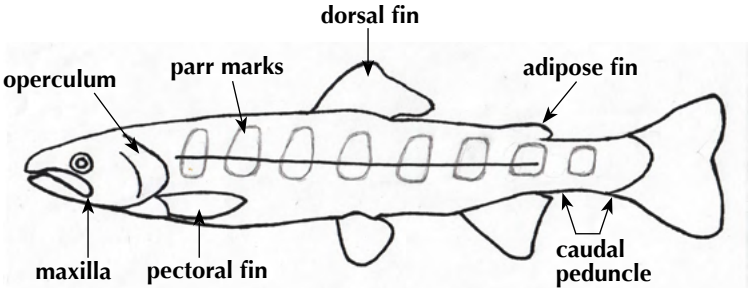
Seasonal watercourses in the Willamette Valley

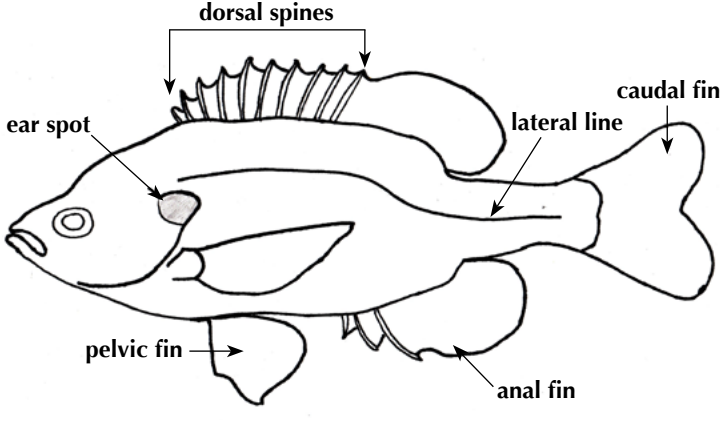
Important Anatomical Characteristics of Fish

A working knowledge of names and anatomical characteristics can help you identify different fish species and describe fish to others.

Here are examples using two generic fish:

- a salmonid (top)
- a sunfish (bottom)

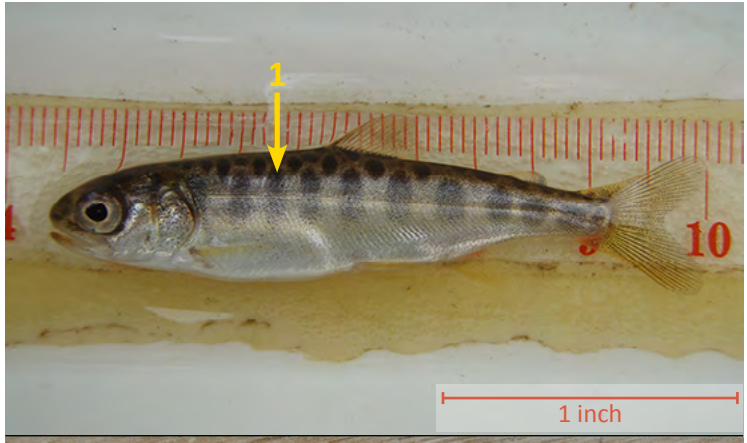




Native Fish

Chinook salmon *(Oncorhynchus tshawytscha)*

Origin	**Native** to Willamette Basin
Native distribution	West coast of North America from California to Alaska
Willamette Basin distribution	Juveniles are common in the main river channel and in sloughs, tributaries, and seasonal watercourses, but seldom far from permanent waters.
Key characteristics	Long, vertical, oval marks (parr marks) (1) equal to or wider than spaces between them. Parr marks bisected by lateral line. Adipose fin (2).
Common size	Juvenile < 6″ Adult < 60″
Similar species (distinguishing features)	Rainbow trout (more streamlined body, smaller anal fin, often more orange/blueish body spotting); cutthroat trout (slash mark on throat, body often more spotted and orange/blueish in color)
Color	Juvenile: silver/white bottom, darker top. Slight blues, blacks and yellows. Parr marks on side of body.
Diet	Aquatic and terrestrial insects; crustaceans and other invertebrates
Remarks	The Chinook or king salmon is the largest of the five Pacific salmon species. The world record is just over 97 pounds. Chinook are born in fresh water, where they spend between a few months (fall Chinook) and 1–2 years (spring Chinook) growing before migrating (some over 1,000 miles) to the ocean. In the ocean, they grow for 1–4 years before returning to fresh water to spawn and die. Chinook require cold, clean water rich in dissolved oxygen to survive.



Native Fish

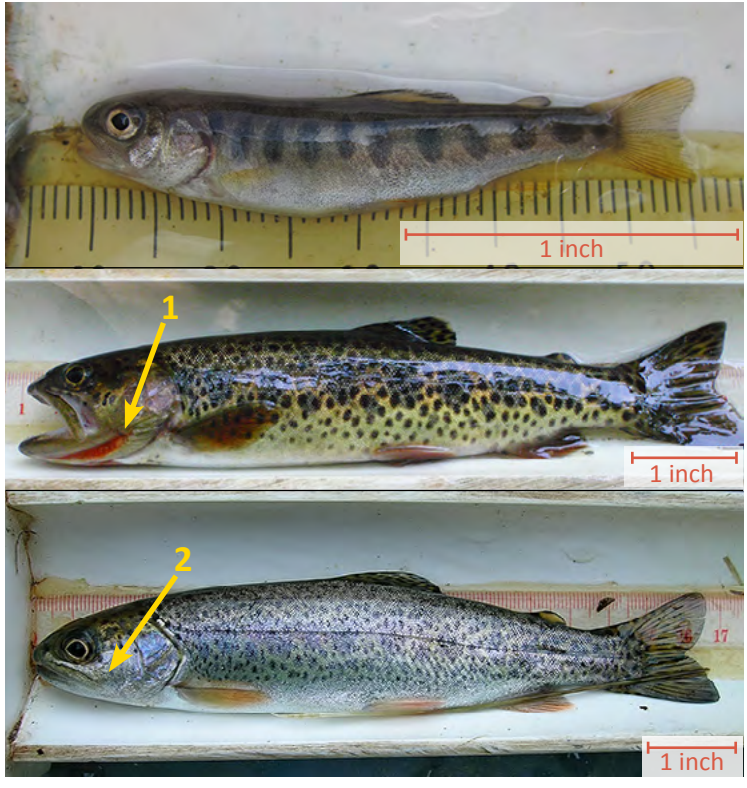
Steelhead / Rainbow trout *(Oncorhynchus mykiss)*

Origin	Native to Willamette Basin
Native distribution	Throughout western North America from northern California up into Alaska
Willamette Basin distribution	Common in the main river channel and in sloughs and tributaries. Mostly the juveniles of this species are present in seasonal watercourses.
Key characteristics	Mouth bone (maxilla) usually does not extend past eye (1). Adipose fin. Small spots on body. White edge to dorsal, pelvic, and anal fins. Few or no spots on tail.
Common size	Juvenile < 3″ Adult: rainbow trout < 25″ steelhead < 40″
Similar species (distinguishing features)	Cutthroat trout (red/orange slash mark on throat); Chinook salmon (robust body size and shape, not as colorful)
Color	Juvenile: no red/orange slash mark on throat, parr marks on sides. Can be blue/green on top with light red on sides, and white belly. Fins light yellow or orange with pale/white edges. Adult rainbow trout: blue and green to darker blue and reds. Lightly or heavily spotted. Can have broad, pale-red band down side.
Diet	Opportunistic feeders, eating other fish, insects, and other invertebrates
Remarks	Steelhead and rainbow trout are the same species. Rainbow trout remain in fresh water during their entire life cycle; steelhead migrate to the ocean for 1 to 3 years and return to fresh water to spawn. These trout live only in clean, cool, well-aerated waters. Steelhead/rainbow trout and cutthroat trout look extremely similar when young.

Native Fish

Coastal cutthroat trout *(Oncorhynchus clarki clarki)*

Origin	**Native** to Willamette Basin
Native distribution	Throughout western North America from northern California up into Alaska
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Red/orange slash mark on throat (1). Adipose fin. Small spots on body. Mouth bone (maxilla) extends past eye (2).
Common size	Juvenile < 3″ Adult < 20″
Similar species (distinguishing features)	Rainbow trout (no slash mark on throat); Chinook salmon (robust body size/shape, not as colorful)
Color	Juvenile: may not have obvious slash mark on throat and may have parr marks on sides. Color can be blue/green on top blending with light red on sides and white belly. Fins are often more yellow or orange. Adult: can be similar in color but usually are more silver, and may be lightly or heavily spotted
Diet	Opportunistic feeders, eating other fish, insects, and other invertebrates
Remarks	Cutthroat trout and rainbow/steelhead trout look extremely similar when young. Cutthroat trout have very complex life histories. Some stay in the same section of river, some migrate to different connected rivers, and some migrate to the ocean and back like salmon. Cutthroat trout require good water quality to survive.



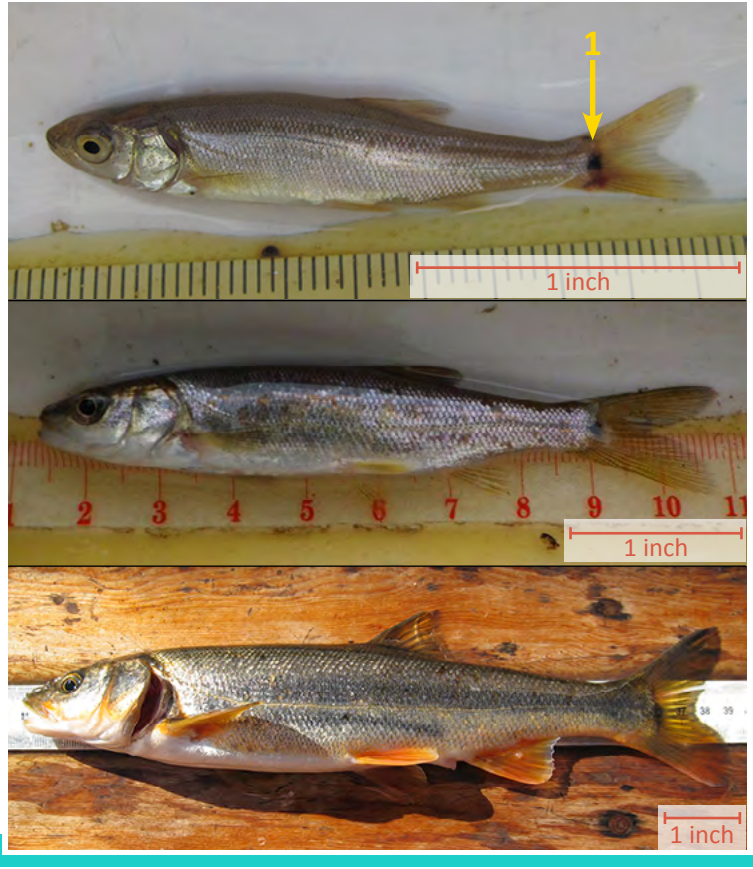
Chiselmouth *(Acrocheilus alutaceus)*

Origin	**Native** to Willamette Basin
Native distribution	Northern Oregon, northeast through Washington and into the Idaho panhandle and southern British Columbia
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Hard, cartilaginous ridge on the lower jaw (1) that becomes more apparent when the fish is a couple of inches long. They have a blunt nose, narrow tail base (caudal peduncle), and a deeply forked caudal fin (2).
Common size	Juvenile < 3″ Adult < 13″
Similar species (distinguishing features)	Redside shiner (more colorful, body shape); northern pikeminnow (caudal dot, body/mouth shape); peamouth (small mouth)
Color	Juvenile: silver and white, and may have light black spot at base of caudal fin. Adult: similar with more yellows and light browns, and fins tend to be orange.
Diet	Aquatic insects and algae that they scrap from rocks using the ridge on their lower lip
Remarks	Relatively common fish found in floodplain habitats. They may act as a major link in the food web, connecting primary producers such as algae and plants to consumers higher up the food chain.

Native Fish

Northern pikeminnow *(Ptychocheilus oregonensis)*

Origin	**Native** to Willamette Basin
Native distribution	Oregon and northern Nevada, north to western Montana and eastern British Columbia
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Relatively large mouth that extends past front of eye. Juveniles have a black dot (1) at base of a deeply forked tail (caudal fin).
Common size	Juvenile < 4″ Adult up to 20″
Similar species (distinguishing features)	Chiselmouth (mouth ridge); redside shiner (more colorful, body shape); peamouth (small mouth)
Color	Juvenile: silver belly and side, darker on top. They have relatively large scales and usually have a dark dot at base of caudal fin. Adult: dark dot lessens and color varies from greens to silver/white. Spawning fish develop brighter orange fins.
Diet	Omnivorous, but prey upon invertebrates when young and feed more on fish as they grow larger
Remarks	The name of this species was changed from northern squawfish in 1998. They can live to be around 20 years old. This is one of the most common native predatory fish in the Willamette River.



Peamouth *(Mylocheilus caurinus)*

Origin	**Native** to Willamette Basin
Native distribution	Northern Oregon, northeast to Idaho and Montana, and north through Washington to British Colombia and Alberta
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Small mouth (1), large eye, and deeply forked tail. Adults can have two dark horizontal stripes on sides.
Common size	Juvenile < 3″ Adult < 15″
Similar species (distinguishing features)	Redside shiner (more colorful, body shape); northern pikeminnow (caudal dot, body/mouth shape); chiselmouth (mouth ridge)
Color	Juvenile: silver/light blue with dark back. Adult: similar, but tends to be more light blue. When breeding, can have orange lips and fins and two dark stripes on body sides.
Diet	Small aquatic and terrestrial insects and sometimes small fishes
Remarks	This species of minnow has been known to spawn in floodplain habitats. Historically they were served at restaurants along the Columbia River.

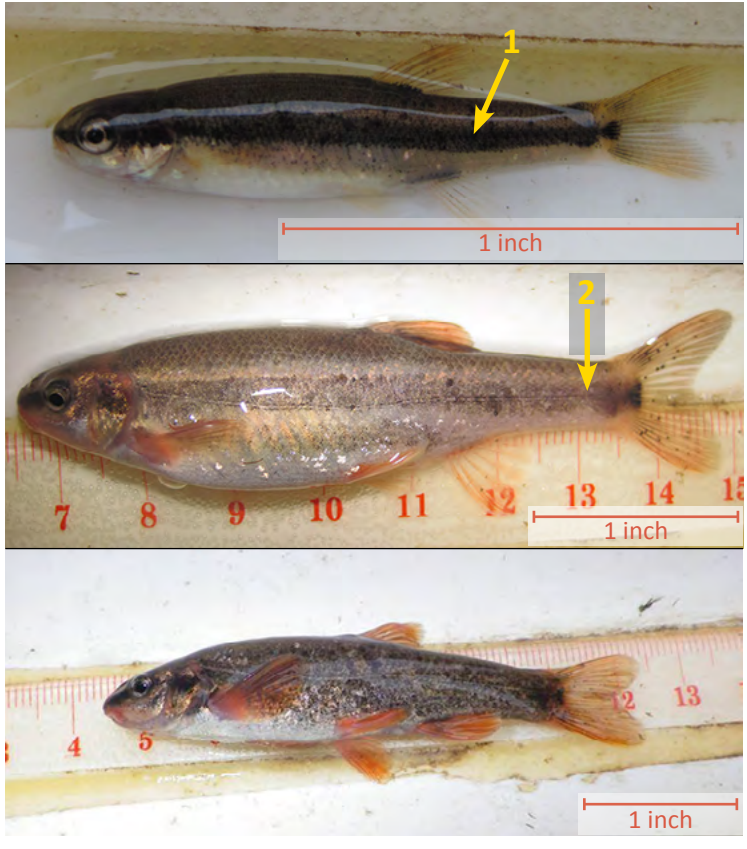
Native Fish

Redside shiner *(Richardsonius balteatus)*

Origin	**Native** to Willamette Basin
Native distribution	Mostly west of the Rocky Mountains, from British Columbia to Idaho and Wyoming, and south to Oregon and Nevada
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Small scales that rub off easily. Very long anal fin base. Body more robust than other minnows.
Common size	Juvenile < 3″ Adult < 5″
Similar species (distinguishing features)	Chiselmouth (mouth ridge, less colorful); northern pikeminnow (caudal dot, body/mouth shape); peamouth (small mouth); Oregon chub (large scales, body shape)
Color	Juvenile: silver with iridescent blues and reds. Adult: similar, with more prominent colors. Spawning colors are brilliant metallic yellow on head and sides with vivid red band.
Diet	Omnivorous, feeding on algae, aquatic and terrestrial insects, and other small organisms
Remarks	One of the most common fish found in floodplain habitats. They are a schooling species and can tolerate a wide range of temperatures (approx. 40 to upper 70s °F).

Speckled dace *(Rhinichthys osculus)*

Origin	**Native** to Willamette Basin
Native distribution	United States and Canada west of the Continental Divide
Willamette Basin distribution	Common in the main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Juveniles have dark line (1) down both sides of body from mouth to tail. Mouth is slightly turned down. Very thick caudal peduncle (2) and rounded fins.
Common size	Juvenile < 2″ Adult up to 3″
Similar species (distinguishing features)	Largescale sucker (body more elongated/body not as speckled)
Color	Juvenile: white on bottom, darker brown/grey on sides and top. Dark black line on sides of body. Adult: black line becomes faint and body becomes speckled brown, black, and yellow. Fins can be yellow to orange.
Diet	Aquatic and terrestrial insects along with some plant material
Remarks	This species of minnow is known to spawn in floodplain habitats. Speckled dace have been found in the diet of many other game fish.



Native Fish

Largescale sucker *(Catostomus macrocheilus)*

Origin	**Native** to Willamette Basin
Native distribution	Pacific Northwest from British Columbia south into Oregon, and east and north to Idaho and Montana
Willamette Basin distribution	Common in main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Rounded snout with downturned mouth on its underside (1) (as opposed to a mouth at end of head like most fish). Large scales and narrow tail base (caudal peduncle).
Common size	Juvenile < 4″ Adult < 24″
Similar species (distinguishing features)	Speckled dace (body more robust/body more speckled)
Color	Juvenile: mottled brown or olive green with dark spots and white to yellow belly. Adult: bronze to orange on top with lighter undersides.
Diet	Juveniles eat small invertebrates. Adults consume aquatic insect larvae, diatoms, worms, snails, and some plant material.
Remarks	Largescale suckers are the most widely distributed fish in the Willamette River system. They are a very important part of the food web and the diet of fish-eating animals (such as osprey, eagles, river otters, and other fish).

Threespine stickleback *(Gasterosteus aculeatus)*

Origin	**Native** to the Willamette Basin
Native distribution	North American populations are found on the East Coast in Canada south to Chesapeake Bay and on the West Coast from Alaska south to Baja California.
Willamette Basin distribution	Very common in sloughs, small tributaries, and seasonal watercourses
Key characteristics	Body and fin shapes are strong identifiers for this species. They have three dorsal spines (two prominent) (1) and a narrow caudal peduncle (2).
Common size	Juvenile approx. 1″ Adult < 3″
Similar species	None
Color	Juvenile: mottled olive green and brown with slight yellow and silver coloration on lower sides. Adult: similar to juvenile. The anadromous variety is much more silvery.
Diet	Small animals such as insects, molluscs, and worms along with plant material
Remarks	Possibly the most common fish species in floodplain habitats, where it is known to spawn in very high numbers. Historically, ground stickleback made into a paste was a common Native American food. In the lower river (downstream of Willamette Falls), ocean-migrating (anadromous) specimens may be found.

Reticulate sculpin *(Cottus perplexus)*

Origin	**Native** to Willamette Basin
Native distribution	Coastal river system from Northern California north to Washington
Willamette Basin distribution	Common in main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Smooth body (1). Conical body shape with head disproportionally large (frog looking) and narrowing body/tail. Eyes on top of head. Large fan-shaped pectoral fins (2).
Common size	Juvenile < 3″ Adult < 5″
Similar species (distinguishing features)	Prickly sculpin (body surface feels like sandpaper)
Color	Juvenile and adult: color can vary wildly, from mottled light browns and black to solid dark. Sometimes the fins have orange outlines or are more yellow/light brown.
Diet	Aquatic insects along with small fish and some plant material
Remarks	They spawn in both permanent streams and seasonal watercourses. Reticulate sculpin can dig up to 2 feet into the substrate of the river in search of food.

Prickly sculpin *(Cottus asper)*

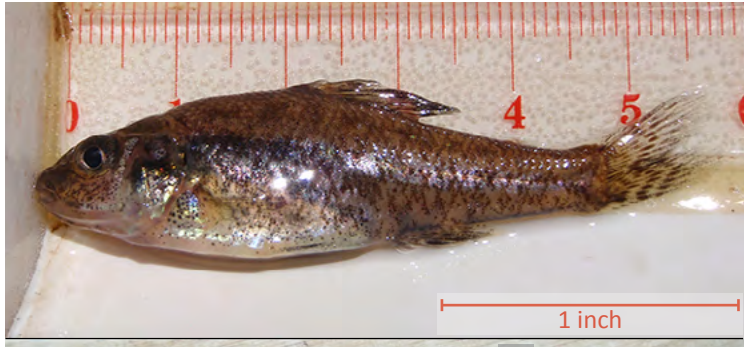
Origin	**Native** to Willamette Basin
Native distribution	Pacific coast from California to Alaska and throughout the Columbia River basin
Willamette Basin distribution	Common in main river channel and in sloughs, tributaries, and seasonal watercourses
Key characteristics	Small spines cover most of the body (1) except head and underside, giving it a sandpaper-like feel. Conical body shape with head disproportionally large (frog looking) and narrowing body/tail. Eyes on top of head. Large fan-shaped pectoral fins. May have dark spot at back of first dorsal fin
Common size	Juvenile < 3″ Adult < 9″
Similar species (distinguishing features)	Reticulate sculpin (smooth body)
Color	Juvenile and adult: generally a mottled light olive-brown and black with some yellow
Diet	Aquatic insects along with fish and some plant material
Remarks	Prickly sculpin spawn in both permanent streams and seasonal watercourses. They are the largest sculpin in the Willamette and can be aggressive towards other fish.

Oregon chub *(Oregonichthys crameri)*

Origin	**Native** to Willamette Basin
Native distribution	Confined to the Willamette River system and its tributaries
Willamette Basin distribution	Rare in sloughs and seasonal watercourses
Key characteristics	Very large scales (1). Relatively thick and robust body.
Common size	Juvenile < 1″ Adult < 5″
Similar species (distinguishing features)	Redside shiner (small scales, not as robust a body shape)
Color	Juvenile and adult: olive, silvery and mottled browns and blacks with lighter belly. Some may have a blue hue.
Diet	Mostly aquatic insects and small animals
Remarks	This species of minnow is found only in the Willamette River Basin. Oregon chub are very susceptible to being eaten by larger fish such as bass and sunfish. This species was listed as endangered under the federal Endangered Species Act (ESA) in 1993. However, as of 2014, and after great effort to conserve this species and its habitat, Oregon chub is the first fish species to be considered for removal from the Endangered Species list.

Sand roller *(Percopsis transmontana)*

Origin	**Native** to Willamette Basin
Native distribution	Confined to the Columbia River system and its tributaries
Willamette Basin distribution	Occasional or rare in the main river channel, sloughs, tributaries, and seasonal watercourses
Key characteristics	Adipose fin (1) and very rough scales. Very robust body.
Common size	Juvenile < 2″ Adult < 7″
Similar species (distinguishing features)	None
Color	Juvenile and adult: mottled browns and blacks, sometimes with a green hue
Diet	Small crustaceans, aquatic insects, other small animals, and plants
Remarks	These fish are rarely seen. They are most active during the night and prefer slow-moving water with dense cover, such as roots, wood, and undercut banks. They do not often occur in high numbers. This is one of the few species other than salmon or trout that has an adipose fin.



Brook lamprey and Pacific lamprey

(Lampetra spp. and *Entosphenus tridentatus)*

Origin	**Native** to Willamette Basin
Native distribution	Coastal rivers from California north to Alaska
Willamette Basin distribution	Common in main river channel, sloughs, and tributaries. Occasionally found in seasonal watercourses not far from permanent watercourses.
Key characteristics	Elongated body shape similar to an eel or snake. Juvenile forms resemble earthworms with seven gill openings towards head. No scales and no pectoral or pelvic fins.
Common size	Juvenile (all species): < 7″ Adult < 10″. Pacific lamprey are larger than brook lamprey.
Similar species	Oriental weatherfish (thick body, 10 barbels)
Color	Juvenile: dark greyish-blue to dark olive-green with paler underbody. Adult: more silver to blue-grey.
Diet	Young lamprey (ammocoetes) filter-feed on microscopic plants and animals from the water. Brook lamprey adults do not live long and do not eat. Adult Pacific lamprey parasitize other fish.
Remarks	Ammocoetes of all lamprey species look very similar. Young lack eyes but start to develop them when they transform into adults. They live 4–9 years (or longer) buried in fine sediments on the river bottom. Pacific lamprey migrate to the ocean, where they spend several years before returning to fresh water. Brook lamprey complete their life cycle in fresh water. Native American tribes prize lamprey for food as well as ceremonial and medicinal purposes.

Common Native Minnows

Juvenile

Redside shiner

Chiselmouth

Northern pikeminnow

Peamouth

Adult

Redside shiner

Chiselmouth

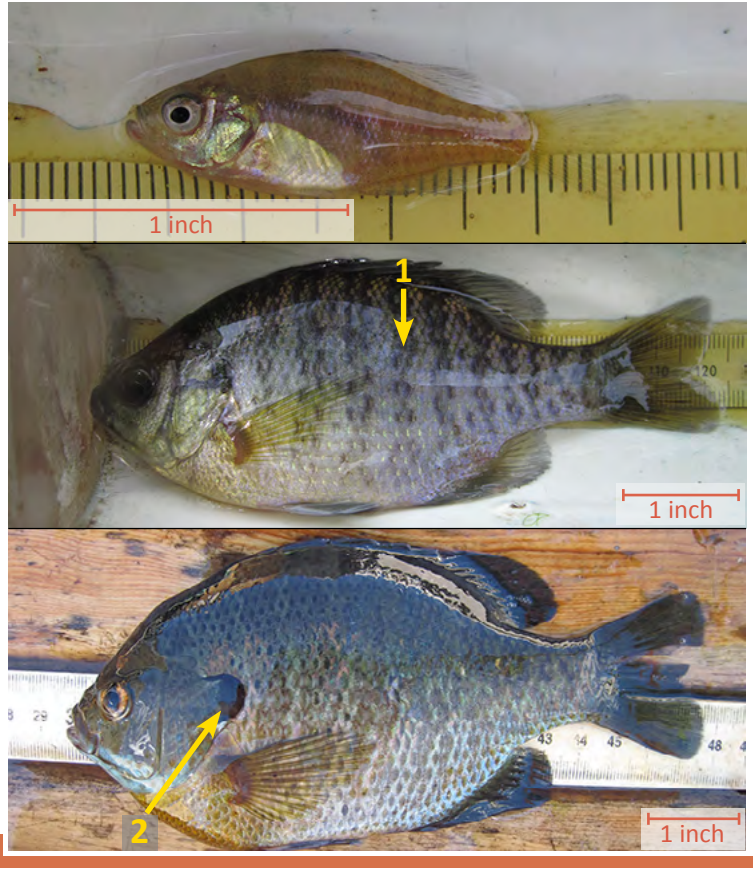
Northern pikeminnow

Peamouth

Nonnative Fish

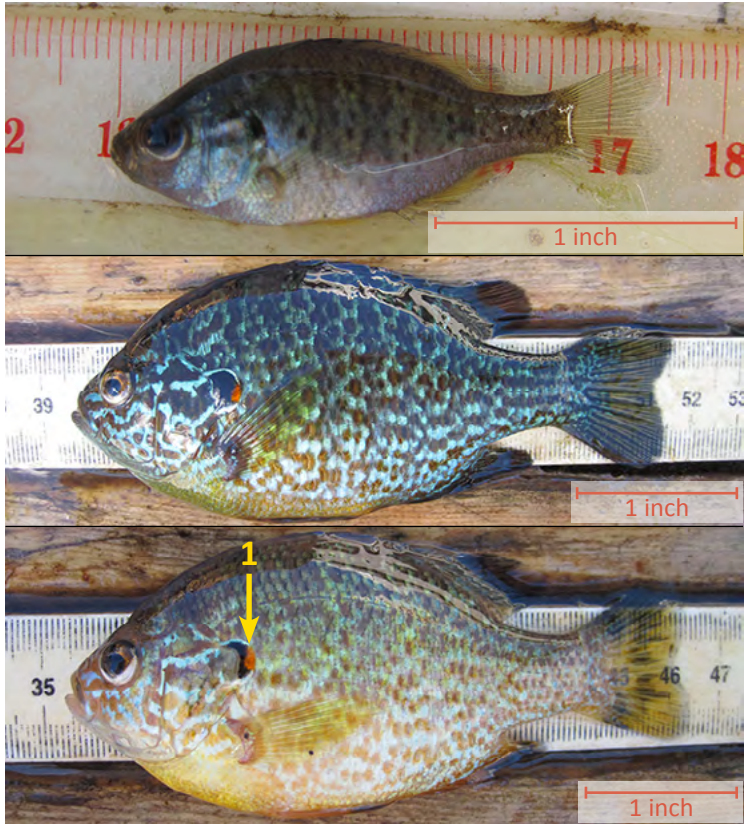
Bluegill *(Lepomis macrochirus)*

Origin	**Nonnative** to the Willamette Basin
Native distribution	Eastern United States rivers, from Minnesota east to the Atlantic states, and south to Texas and Florida
Willamette Basin distribution	Common in sloughs, tributaries, and seasonal watercourses
Key characteristics	Compressed "sunfish" body shape with dark vertical bands (1). Dark blue/black ear spot on rear edge of operculum (in larger fish) (2). Relatively small mouth.
Common size	Juvenile < 3″ Adult < 9″
Similar species (distinguishing features)	Warmouth (large mouth); pumpkinseed (red/orange mark on dark ear spot); green sunfish (large mouth, body shape, color)
Color	Juvenile: often light colored and can be iridescent. Adult: grey/blue with dark ear spot behind gills. All ages have vertical bands on sides of body.
Diet	Terrestrial and aquatic insects along with small fish, other small animals, and some plants
Remarks	Bluegill were introduced into the Willamette Basin in the late 1800s as game fish and are one of the most common sunfish found in floodplain areas. They are sought after by anglers and regarded as good-tasting. Bluegill, along with other nonnative fish, compete with native fish for habitat and food.



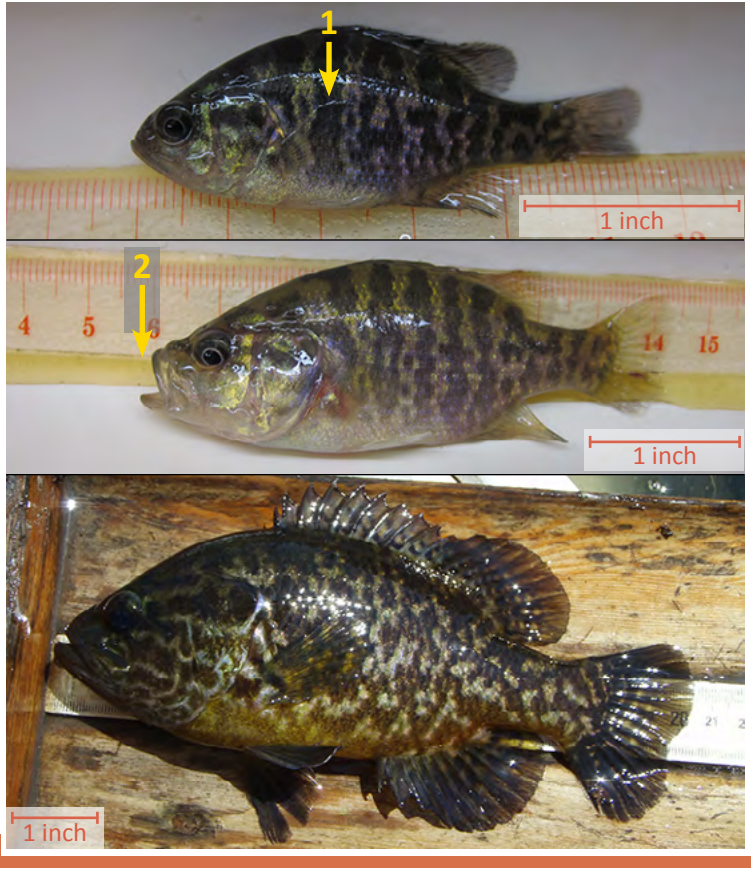
Pumpkinseed *(Lepomis gibbosus)*

Origin	**Nonnative** to the Willamette Basin
Native distribution	From the Dakotas, east to Maine and south to the Carolinas
Willamette Basin distribution	Common in sloughs, occasionally found in tributaries and small seasonal watercourses
Key characteristics	Compressed "sunfish" body shape. Orange/red mark on dark ear spot at rear edge of gill flap (operculum) (1). Becomes more obvious in larger fish. Very small mouth.
Common size	Juvenile < 2″ Adult < 6″
Similar species (distinguishing features)	Bluegill (no red marking on dark ear spot); warmouth (large mouth, not as colorful); green sunfish (large mouth, robust body shape, not as colorful)
Color	Juvenile: look similar to bluegill but may have orange/red mark on larger dark ear spot. Adult: very colorful, with speckling; more colorful than other sunfish with reds, blues, greens, and yellows
Diet	Terrestrial and aquatic insects, molluscs, and crustaceans
Remarks	Pumpkinseed were introduced to the Willamette Basin in the late 1800s or early 1900s as game fish. They generally don't reach a large body size in the Willamette River because it is cooler than their rivers of origin, and lower water temperatures slow down growth.



Warmouth *(Lepomis gulosus)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Minnesota south to Texas and New Mexico, east to Florida, and north to New Jersey
Willamette Basin distribution	Occasionally found in sloughs and tributaries, rarely in seasonal watercourses
Key characteristics	Compressed "sunfish" body shape. Juveniles have dark vertical bands (1). Large mouth (2) and heavy dark mottling throughout body. May have dark ear spot when mature.
Common size	Juvenile < 5" Adult < 10"
Similar species (distinguishing features)	Bluegill (small mouth, body not as robust); pumpkinseed (small mouth, body not as robust, more colorful); green sunfish (not as much mottling or bands)
Color	Juvenile: mostly green, light purples with dark vertical bands down sides. Adult: similar colors but more yellows underneath and dark bands or very heavy mottling.
Diet	Aquatic and terrestrial insects along with other small animals. When large, they tend to consume more fish than other sunfish of similar size.
Remarks	Introduced into the Willamette system in the 1890s as game fish. They tend to be very aggressive and can consume relatively large prey.



Green sunfish *(Lepomis cyanellus)*

Origin	**Nonnative** to the Willamette Basin
Native distribution	Western New York south to Louisiana, west to New Mexico, and northeast to Minnesota
Willamette Basin distribution	Occasional in main river channel, sloughs, and seasonal watercourses of the Willamette Valley
Key characteristics	Robust fish with a relatively large mouth. Typically has a dark spot at base of dorsal fin, and edges of fins are orange (1).
Common size	Juvenile < 3″ Adult < 10″
Similar species (distinguishing features)	Bluegill (body shape and color, small mouth); pumpkinseed (more colorful, red/orange dot on ear spot, small mouth); warmouth (stronger mottling, bands on body)
Color	Juvenile: dark green body with white undersides. Fins are orange; may have a colored earflap. Adult: dark green overall with iridescent blue mixed in. Fins are darker with orange/white outline.
Diet	Opportunistic when feeding. Eats small plants and animals when young, switches to larger organisms like fish and insects when older.
Remarks	Green sunfish are very aggressive. They were introduced as game fish, but they generally do not reach sizes that are desirable to most anglers. They can tolerate a wide range of water conditions and can populate new locations very quickly.

Black crappie *(Pomoxis nigromaculatus)*

Origin	**Nonnative** to Willamette Basin
Native distribution	North Dakota and Manitoba, east to Quebec and Vermont, south to North Carolina and Florida, and west to Texas
Willamette Basin distribution	Occasionally found in sloughs, tributaries, and seasonal watercourses
Key characteristics	Compressed "sunfish" body shape with more pointed snout. Large mouth and mottled black-and-white body and fins (1). Dorsal fin has 7 or 8 dorsal spines (2).
Common size	Juvenile < 5" Adult < 14"
Similar species (distinguishing features)	White crappie (5 or 6 dorsal spines); bluegill (rounder body, dark ear spot); pumpkinseed (colorful body)
Color	Juvenile: very light/iridescent blue and white. Adult: more mottled white and black with some yellow and green.
Diet	Juveniles eat small insects, plants, and animals. Adults tend to eat more fish.
Remarks	Probably introduced into the Willamette in the 1890s as game fish. Black crappie are relatively aggressive and eat most things that fit in their mouth. For this reason, they are sought after by anglers.

White crappie *(Pomoxis annularis)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Minnesota east to New York, south to Alabama, west to Texas, and north to South Dakota
Willamette Basin distribution	Rarely found in sloughs, tributaries, or seasonal watercourses
Key characteristics	Compressed "sunfish" body shape with more pointed snout. Large mouth, mottled black-and-white body and fins. Dorsal fin with 5 or 6 spines (1).
Common size	Juvenile < 5" Adult < 14"
Similar species (distinguishing features)	Black crappie (7 or 8 dorsal spines); bluegill (rounder body, dark ear spot); pumpkinseed (red/orange ear spot, round body)
Color	Juvenile: very light/iridescent blue and white. Adult: mottled white and black with some yellow and green
Diet	Juveniles eat small insects, plants, and animals. Adults eat fish.
Remarks	White crappie were probably introduced into the Willamette in the 1890s as game fish. They are relatively aggressive and eat most things that fit in their mouth. For this reason, they are sought after by anglers.

Common carp *(Cyprinus carpio)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Originally from Asia
Willamette Basin distribution	Common throughout the main river channel and in sloughs and tributaries. Occasionally found in seasonal watercourses.
Key characteristics	Small barbels on each side of upper lip (1). Long dorsal fin. Heavy spine at the front of both dorsal and anal fins. Large scales. Tube-like mouth pointed downward.
Common size	Juvenile < 5″ Adult < 35″
Similar species (distinguishing features)	Goldfish (lack barbels)
Color	Juvenile: various shades of golden brown or olive green. Adult: similar to juveniles, but tend to be brighter and more golden.
Diet	Usually feed on the bottom. Eat plants, insects, worms, and other small animals including fish. During summer, they also feed on berries and seeds that fall into the water.
Remarks	Probably introduced into the Willamette Basin in the late 1890s for people to eat. Carp have a strong negative impact on aquatic ecosystems. Their feeding behavior uproots plants, which disturbs habitat for invertebrates, fish, and waterfowl and increases water turbidity. A large adult can produce around two million eggs in a single season.

Goldfish *(Carassius auratus)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Originally from eastern Asia
Willamette Basin distribution	Occasionally found in sloughs, tributaries, and seasonal watercourses
Key characteristics	A leading spine on dorsal (1) and anal fins. No barbels on its lips.
Common size	Juvenile < 4″ Adult < 10″
Similar species (distinguishing features)	Common carp (two barbels; may be very small in juveniles)
Color	Juvenile: olive to golden brown. Adult: more golden brown
Diet	Juveniles feed on small plants and animals. Adults are opportunistic and can eat almost anything that fits in their mouth.
Remarks	Probably introduced into the Willamette Basin from aquarium releases or as baitfish. The wild variety lost the bright colors for which they are named in the pet industry. Goldfish and the common carp are close relatives.

Largemouth bass *(Micropterus salmoides)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Originally from Quebec south to Florida, west to Texas and northern Mexico, and north to Minnesota and southern Manitoba
Willamette Basin distribution	Occasionally found in the main river channel, but common in sloughs, tributaries, and seasonal watercourses
Key characteristics	Very large mouth, extending well past the eye in medium to large individuals (1). Deep, compressed body, with dorsal fin incompletely divided in two. Frontal portion of dorsal fin has sharp spines, anal fin has three spines. Often there is a dark lateral band along body.
Common size	Juvenile < 4″ Adult < 25″
Similar species (distinguishing features)	Smallmouth bass (smaller mouth size, greener body, sometimes a red or orange eye)
Color	Juvenile: white underside with green body and dark side band and spots. Adult: greener overall with darker band.
Diet	This opportunistic species eats anything that can fit in its mouth, including insects, fish, frogs, turtles, and birds.
Remarks	Introduced into the Willamette Basin in 1888 as game fish. They become a top predator in most waters they inhabit. Largemouth bass can also learn rapidly, and may avoid lures for a long time after being caught and released.

Smallmouth bass *(Micropterus dolomieu)*

Origin	**Nonnative** to the Willamette Basin
Native distribution	Originally from Minnesota, east to southern Quebec, southeast to Georgia, and west to Oklahoma
Willamette Basin distribution	Common in the main river channel and sloughs, occasional in seasonal watercourses of the lower Willamette Valley
Key characteristics	Deep, compressed body with a joined dorsal fin. Frontal portion of dorsal fin has sharp spines; anal fin has three spines. Medium-size mouth, not extending past the eye. Specimens are often green and sometimes have a red eye.
Common size	Juvenile < 5″ Adult < 22″
Similar species (distinguishing features)	Largemouth bass (larger mouth, bluer body)
Color	Juvenile: green and olive overall, often with orange/yellow fins. Adult: green and olive overall with lighter bottom. Eyes can be red or orange as adults.
Diet	Juveniles eat small plants and animals. Adults are more opportunistic and feed on anything that fits in their mouth, particularly fish.
Remarks	Introduced as a game fish, smallmouth bass are aggressive and a favorite among fishermen. Smallmouth bass tend to be found in rivers, while largemouth bass stay more in backwater sloughs, lakes, and ponds.

Western mosquitofish *(Gambusia affinis)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Kansas east to Illinois, south to Florida, and east to Texas
Willamette Basin distribution	Occasionally found in the main river channel. Very common in sloughs, small tributaries, and seasonal watercourses
Key characteristics	Small, even as adults. Mouth pointing upwards (1). Rounded caudal fin (2) and large scales.
Common size	Juvenile < 1″ Adult up to 3″
Similar species (distinguishing features)	Banded killifish (has bands on body)
Color	Juvenile and adult: grey with white undersides
Diet	Their mouth's shape and position allow mosquitofish to feed near the water's surface on small insects and animals along with some plant material.
Remarks	As their name suggests, they were introduced to control mosquito populations, something many native minnows also do. They are often seen skirting near the water's surface. Mosquitofish can mature about a month after birth. They do not lay eggs but give birth to live young, which is rare for fish.

Yellow bullhead *(Ameiurus natalis)*

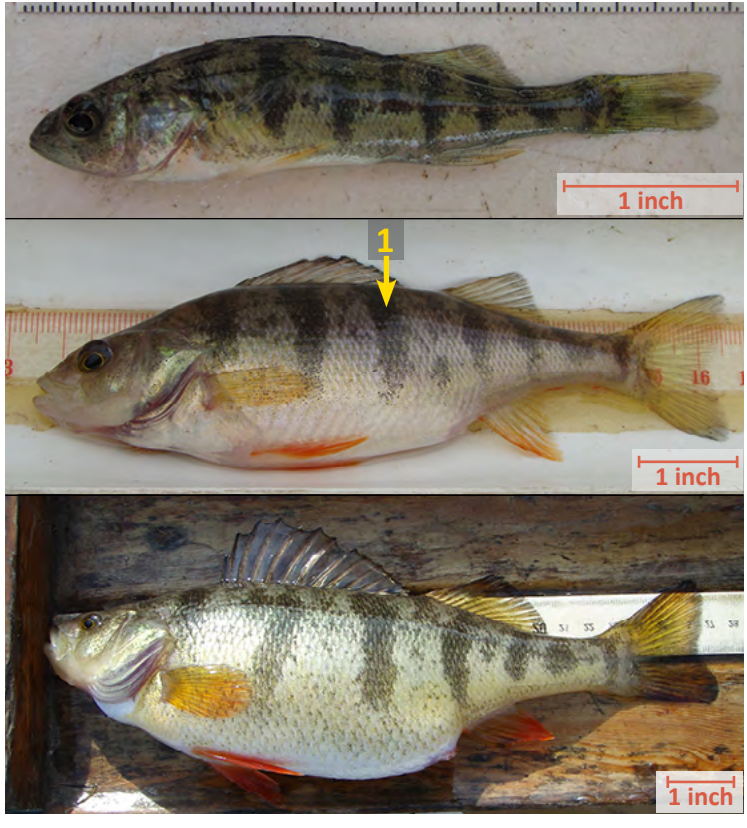
Origin	**Nonnative** to Willamette Basin
Native distribution	Vermont south to Florida, west to Texas, and north to South Dakota
Willamette Basin distribution	Occasionally in the main river channel; more common in sloughs, tributaries, and seasonal watercourses
Key characteristics	Eight barbels around mouth. Chin barbels are mostly yellow or white (1). Relatively flat body. No scales and smooth body. Adipose fin. Single large spine on each dorsal and pectoral fin.
Common size	Juvenile < 5″ Adult up to 14″
Similar species (distinguishing features)	Brown bullhead (chin barbels are two-toned, light with dark tips)
Color	Juvenile: white on belly and darker yellow on sides and back. Adult: similar in color. Barbels yellow or white with very little dark pigment.
Diet	A variety of food on or near the bottom, such as worms, insects, crustaceans, fish, and some plant material
Remarks	Introduced into the Willamette River in 1905 during the Lewis and Clark Exposition in Portland, Oregon, which showcased an exhibit of game fish from the East Coast. No commercial fisheries exist in Oregon for yellow bullhead, but these catfish are caught by sport anglers.

Brown bullhead *(Ameiurus nebulosus)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Nova Scotia south to Florida, west to Louisiana, and northwest to North Dakota and Saskatchewan
Willamette Basin distribution	Occasionally in the main river channel; more common in sloughs, tributaries, and seasonal watercourses
Key characteristics	Eight barbels around mouth. Chin barbels are yellow with dark tips (1). Relatively flat body, no scales and smooth body. Adipose fin. Single large spine on each dorsal and pectoral fin.
Common size	Juvenile < 5″ Adult up to 14″
Similar species (distinguishing features)	Yellow bullhead (chin barbels are all yellow)
Color	Juvenile and adult: whitish on bottom and dark yellow or brown on sides and back
Diet	A variety of food on or near the bottom, such as worms, insects, crustaceans, fish, and some plant material
Remarks	Probably introduced into the Willamette Basin in the late 1890s as a game fish and for commercial harvest from the 1890s through 1913. At the commercial brown bullhead fisheries' peak, 100,000 pounds of cleaned catfish were produced for local markets.

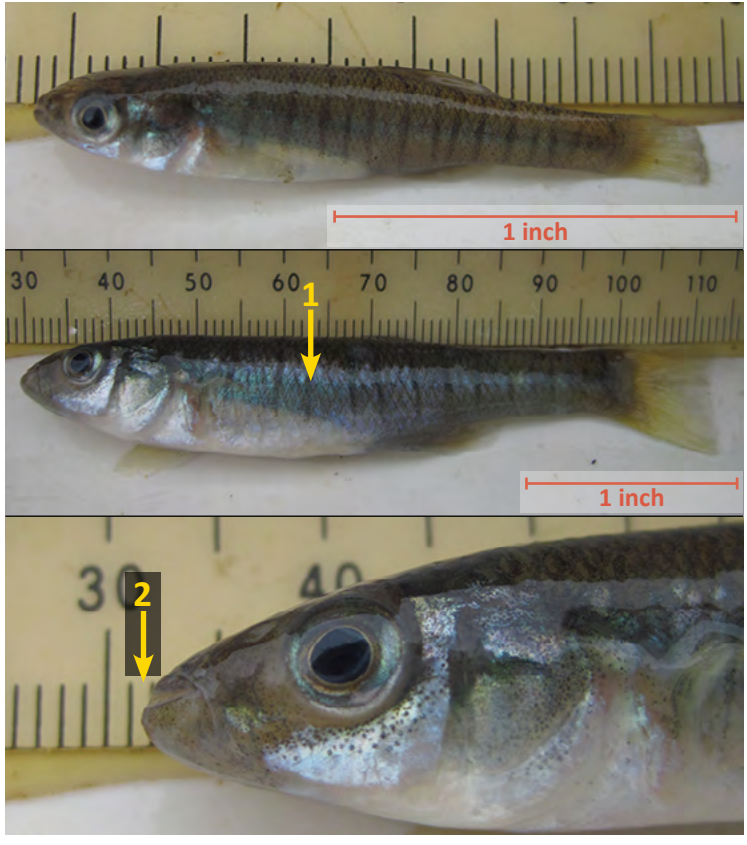
Yellow perch *(Perca flavescens)*

Origin	**Nonnative** to Willamette Basin
Native distribution	Saskatchewan east to Newfoundland, south to South Carolina, and northwest to North Dakota
Willamette Basin distribution	Common in the main river channel and in sloughs and tributaries; rarely in seasonal watercourses
Key characteristics	Six to eight large, dark vertical bands on body sides (1). Second dorsal fin shorter than front dorsal fin. Two anal spines.
Common size	Juvenile < 5″ Adult up to 12″
Similar species (distinguishing features)	None
Color	Juvenile: dark vertical bands down sides over light green/yellow body. Adult: similar; have orange fins when breeding
Diet	Juveniles eat small insects, plants, and animals. Adults switch to larger insects and fish.
Remarks	Introduced as a game fish, they are sought after by anglers and considered good-tasting. In the Willamette Basin, they rarely grow large. Yellow perch prefer highly vegetated habitat in slow-moving waters.



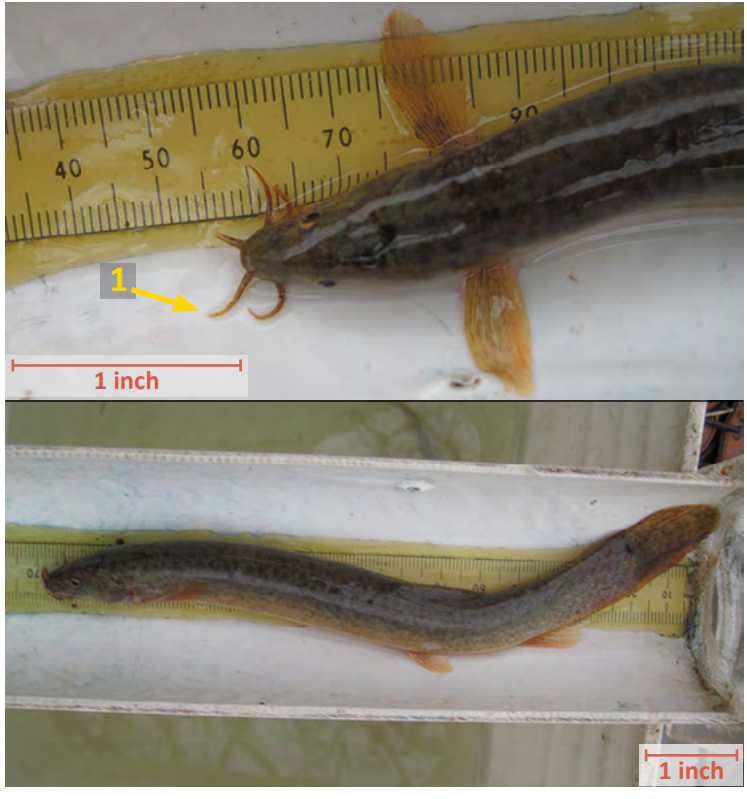
Banded killifish *(Fundulus diaphanus)*

Origin	**Nonnative** to the Willamette Basin
Native distribution	Eastern United States rivers, from South Carolina north to southern Quebec, west to eastern Montana, east through the Great Lake states, and southeast through Pennsylvania and West Virginia
Willamette Basin distribution	Common in main river channel, sloughs, and seasonal watercourses of the lower Willamette Valley. Occasionally found in habitats of the middle Willamette Valley.
Key characteristics	Dark vertical bands along body sides (1). Mouth pointing upwards (2).
Common size	Adult < 3.5"
Similar species (distinguishing features)	Western mosquitofish (body lacks bands)
Color	Juvenile and adult: often, white belly with bluish body and dark vertical bands on sides
Diet	Both juveniles and adults are opportunistic; consume small insects and animals.
Remarks	Banded killifish were introduced from aquarium releases or as baitfish. They are a very hardy fish and can survive in brackish waters or wet vegetation without water for several days.



Oriental weatherfish *(Misgurnus anguillicaudatus)*

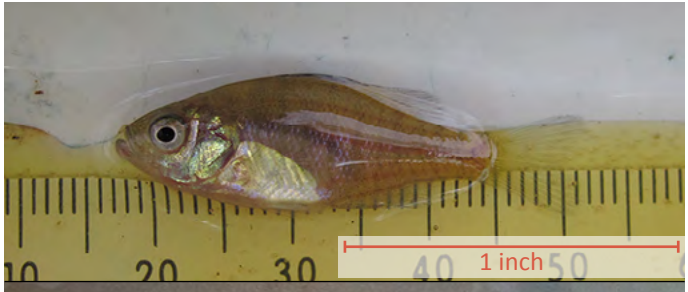
Origin	**Nonnative** to the Willamette Basin
Native distribution	Originally from northeast Asia
Willamette Basin distribution	Occasional in main river channel, sloughs, and seasonal watercourses of the lower Willamette Valley
Key characteristics	Eel-like body and 10 relatively small barbels (1)
Common size	Adult < 10″
Similar species (distinguishing features)	Lamprey (thin and has no barbels)
Color	Adult: Often greyish brown to olive in color. Fins are generally yellowish.
Diet	Opportunistic feeders, including worms, insects, small fish, and eggs
Remarks	It is thought that the oriental weatherfish was introduced from the aquarium trade, in which it is known as a dojo or weather loach. As its name suggests, it is thought that weatherfish become irritated and more active when the barometric pressure changes. Oriental weatherfish can tolerate a wide range of temperatures and survive low-oxygen aquatic environments by breathing air.



Common Sunfish

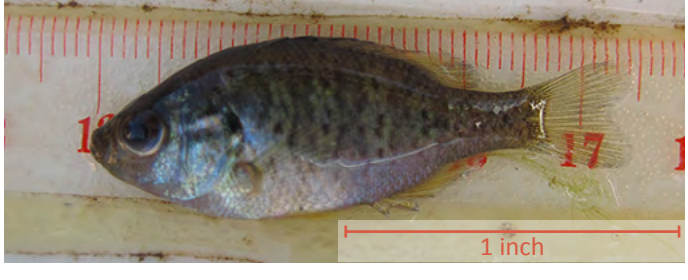
Juvenile

Bluegill



Black crappie

Pumpkinseed



Adult

Bluegill

Black crappie

Pumpkinseed

Glossary

anadromous – Fish that are born in fresh water, migrate to the ocean to feed and grow, and then return to fresh water to reproduce.

aquatic – Referring to water as opposed to land or air.

ecology – The science concerned with the interactions of organisms to one another and to their environment.

ecosystem – A system involving a community of organisms (plants and animals), their physical environment (which includes water, minerals in the soil and rocks, and air) and all interactions among them.

floodplain – An area of land adjacent to a water body that is frequently flooded during periods of high flow.

game fish – A fish caught by anglers for sport.

native – An organism that naturally occurs in the place where it is found.

nonnative – An organism that has been introduced to a location outside its native range.

perennial waters – Bodies of water that have water year-round.

resident – Fish that remain in fresh water for their entire life.

riparian zone –The land along the bank of a river or stream, or adjacent to the shoreline of a lake or wetland.

river channel – The area of a river that is filled with water and confined by its banks.

seasonal watercourse – A water body (i.e., stream, drainage ditch, pond, wetland) that has water during the rainy season (i.e., late fall to spring in western Oregon) but dries up as rains decrease and flood waters recede.

species richness – The number of species present in a particular habitat or area.

terrestrial – Referring to the land as opposed to water.

tributaries – Rivers, streams, and other watercourses that flow (drain) into another larger stream, river, or lake.

Willamette River Basin – The area of land that drains and collects all water feeding into the Willamette River.

Useful resources

A Guide to Riparian Tree and Shrub Planting in the Willamette Valley: Steps to Success (EM 9040). 2011. Oregon State University Extension Service.

Inland Fishes of Washington. 2nd edition. American Fisheries Society and University of Washington Press, Bethesda and Seattle, WA.

The Coming of the Pond Fishes: An Account of the Introduction of Certain Spiny-rayed Fishes and Other Exotic Species into the Waters of the Lower Columbia River Region and the Pacific Coast States. 1946. Binfords and Mort, Portland, Oregon.

References

Colvin, R., R.G. Giannico, J. Li, K. Boyer, and B. Gerth. 2009. "Fish Use of Intermittent Watercourses Draining Agricultural Lands in the Upper Willamette River Valley, Oregon." *Transactions of the American Fisheries Society*. 138:1302-1313.

Williams, J.E., and S.V. Gregory. Fish occurrence in a seasonally inundated floodplain of the Willamette River, Benton County, Oregon. (in press).

Internet resources

Conservation and Restoration of Willamette Valley Native Woodlands. http://extension.oregonstate.edu/benton/forestry/restoration

For more information on fish in flooded fields, see: http://fw.oregonstate.edu/content/extension-fisheries

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Flooded road, Willamette Valley