

Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*)



Description:

- The Lahontan cutthroat trout (LCT) is a member of the Salmonidae (trout and salmon) family, and is thought to be among the most endangered western salmonids.
- The Lahontan cutthroat was listed as endangered in 1970 and reclassified as threatened in 1975.
- Dark olive backs and reddish to yellow sides frequently characterize the LCT found in streams. Stream dwellers reach 10 inches in length and only weigh about 1 lb. Their life span is less than 5 years. In streams they are opportunistic feeders, with diets consisting of drift organisms, typically terrestrial and aquatic insects.
- The sides of lake-dwelling LCT are often silvery. A broad, pinkish stripe may be present. Historically lake dwellers reached up to 50 inches in length and weigh up to 40 pounds. Their life span is 5-14 years. In lakes, small Lahontans feed on insects and zooplankton while larger Lahontans feed on other fish.
- Body spots are the diagnostic character that distinguishes the Lahontan subspecies from the Paiute cutthroat. LCT typically have 50 to 100 or more large, roundish-black spots that cover their entire bodies and their bodies are typically elongated.
- Like other cutthroat trout, they have basibranchial teeth (on the base of tongue), and red slashes under their jaw (hence the name "cutthroat").
- Female sexual maturity is reached between ages of 3 and 4, while males mature at 2 or 3 years of age.
- Generally, they occur in cool flowing water with available cover of well-vegetated and stable stream banks, in areas where there are stream velocity breaks, and in relatively silt free, rocky riffle-run areas.
- LCT are stream spawners, spawning between February and July. Spawning depends upon stream flow, elevation, and water temperature (41 to 61°F).
- LCT generally spawn in riffle areas over gravel substrate. They lay their eggs in redds (nests) dug by females and chase intruders away from nest. Eggs generally hatch in 4 to 6 weeks and fry emerge 13 to 23 days later, depending on water temperature.

History:

- The LCT is endemic or native to the Lahontan basin of northern Nevada, southern Oregon, and the eastern slope of the Sierra Nevada Range in California. This includes the Lake

Tahoe Basin, Truckee River, and Pyramid Lake as a biologically connected aquatic ecosystem. The hydrologic connectivity of this system allowed the species to thrive in a wide range of environments, supported by an extensive area of natural reproduction and a vast pool of genetic diversity.

- LCT, like other trout species, are found in a wide variety of cold water habitats including large terminal alkaline lakes, oligotrophic alpine lakes, slow meandering rivers, mountain rivers, and small headwater tributary streams.
- In 1844, there were 11 lake dwelling populations of Lahontans and 400 to 600 stream dwelling populations in over 3,600 miles of streams within the major basins of Lake Lahontan.
- Today, LCT currently occupy between 123 to 129 streams within the Lahontan basin, and 32 to 34 streams outside the basin, totaling about 482 miles of habitat. They are also found in five lakes, including two small populations in Summit and Independence Lakes.
- Self-sustaining populations occur in only 10.7% of the historic stream habitats and 0.4% of the historic lake habitats.
- LCT from Pyramid Lake, Walker Lake, Summit Lake and Lake Tahoe were a major food source for Northern Paiute, Shoshone and Washoe Native Americans. Caught and dried, the trout were stored and eaten during the cold winter months.

Threats:

Human impacts from the mid 1800's silver rush and the rapid increase in development within the Truckee River watershed, eventually led to the extirpation of LCT by the 1930's. Several factors contributed to their extirpation:

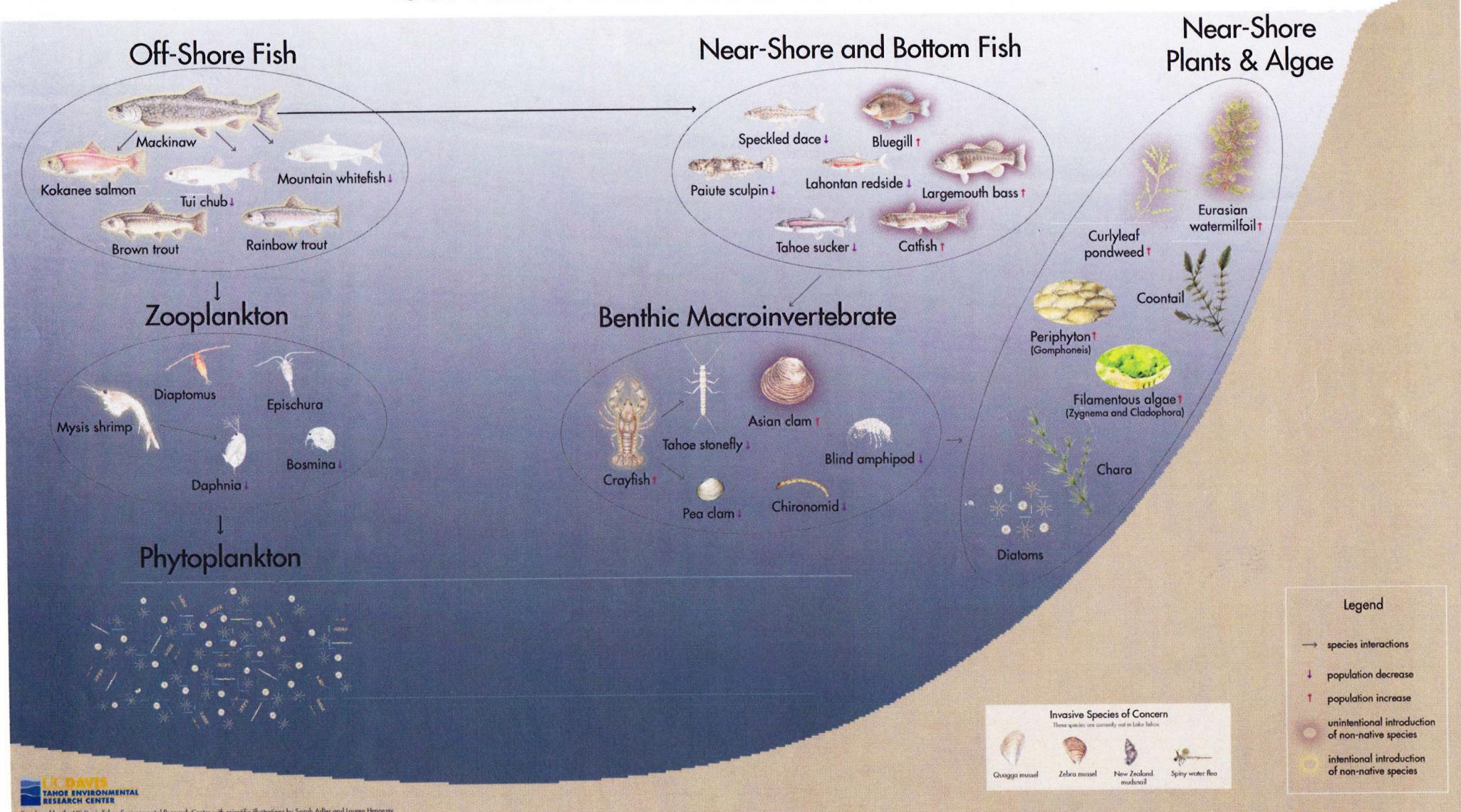
- Dam construction along Truckee River and the outlet of Lake Tahoe forced isolated populations to become self sustaining.
- Between 1872 and 1922 commercial fishing operations harvested 100,000 to 200,000 pounds of Lahontan trout each year from Pyramid, Walker, and Tahoe. They supplied many of the kitchens feeding the Comstock mining boom.
- Degradation of spawning streams as a result of clear cut logging practices and pollution from agriculture, limited juvenile recruitment to the population.
- Improper grazing practices altered much of the riparian habitat along stream banks, reducing habitat and spawning opportunities.
- Genetic hybridization with non-native trout. Rainbow trout are known to hybridize with LCT leading to genetic dilution.
- Introduction of predatory, non-native species (most notably lake trout and brown trout) to Lake Tahoe.

Restoration and Research:

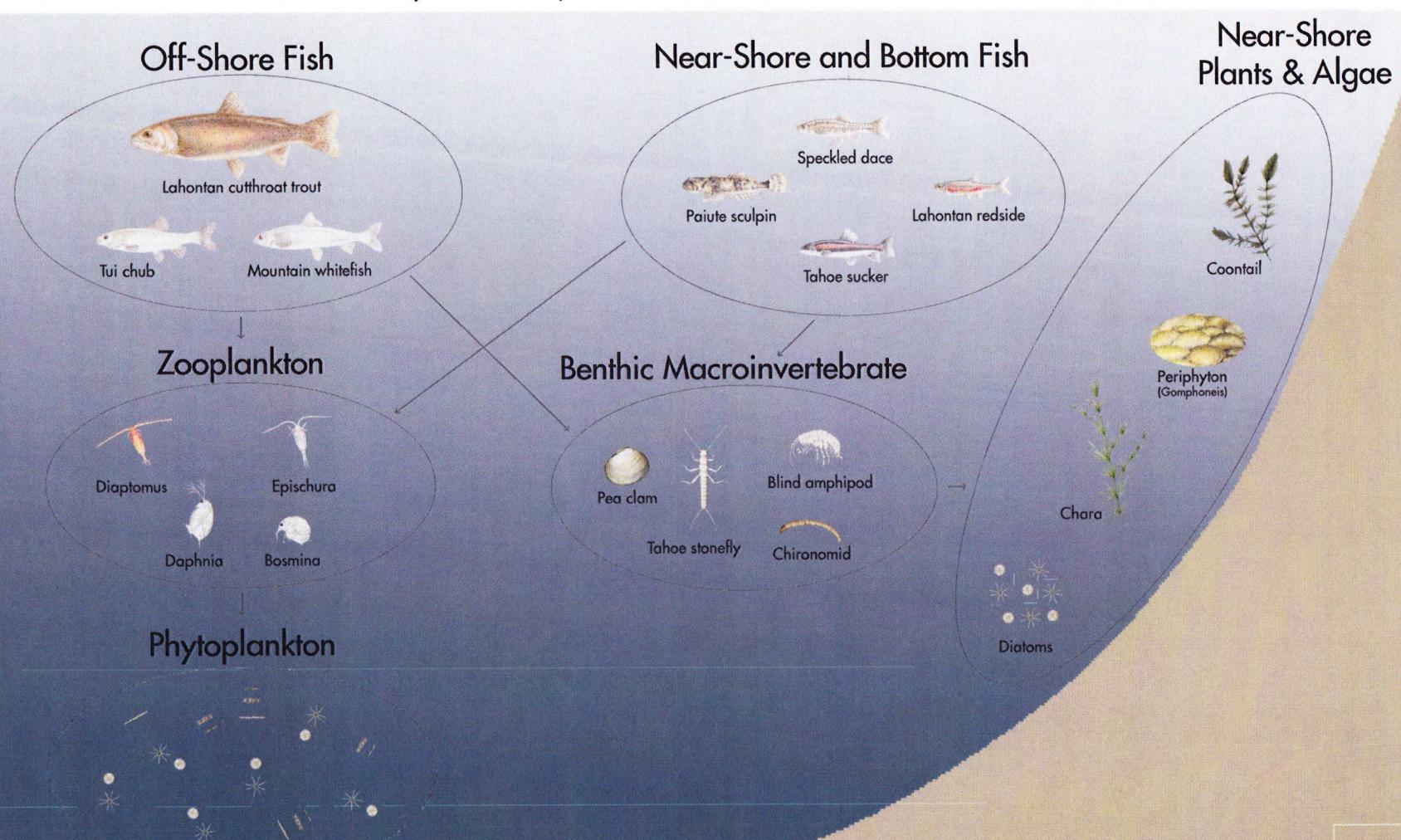
- Attempts to recover LCT began in Pyramid Lake in the 1950's. There has been success in re-establishing a lake population; however it is dependent upon hatchery support.

- In the Lake Tahoe Basin, there have been attempts to reestablish both stream and lake populations. The California DFG has successfully reestablished a stable population of LCT at the headwaters of the Upper Truckee River. While this population exist without supplemental stocking, currently annual maintenance is required for its survival.
- An effort to reintroduce a lake form of LCT in Lake Tahoe was attempted by both the Nevada DOW and California DFG in the late 1960s. Within a few years, it was determined that the LCT had been once again eliminated from the lake due to predation by lake trout.
- Outside the Tahoe Basin, but within the Truckee River watershed, additional efforts have been made to restore LCT populations. During the 1970's, a barrier was constructed on Pole Creek, a tributary to the Truckee River. Following an upstream chemical treatment to remove competitive non-native species, LCT were reintroduced. This population remains successful.
- The USFWS prepared a recovery plan for the LCT in 1995. The plan outlines the management actions necessary to lead to the eventual delisting of the LCT as the threatened species.
 - The USFWS coordinates recovery plan implementation activities among federal and state agencies, tribal governments, and private land owners to improve, manage, and secure habitats for existing and proposed LCT populations; develop and implement reintroduction plans; regulate fish harvest; manage self-sustaining populations outside historic range; conduct population viability studies and other research; and revise the plan in future when necessary.
- During the summer of 2002, LCT were stocked in Fallen Leaf Lake for the first time in 80 years. The fish plants were a collaboration between USFWS, California DFG, USDA Forest Service, and UC Davis Tahoe Research Center. In this study, USFWS funded UC Davis to find out how LCT can feed, grow, and spawn in a lake similar to Lake Tahoe but without so many large lake trout.
 - About 36,000 LCT were released in to Fallen Leaf Lake, with an average length of approximately 7 inches. The non-native trout consumed most of these.
 - About 6,000 more LCT, averaging over 11 inches in length, were released in 2003. It appears a large proportion of these trout survived the winter.
 - The goal of the research is to learn how the LCT interact in the ecosystem and to recommend management strategies that could enable them to become a self-sustaining population. The long term goal is to create both a sustainable population and a recreational fishery of the native fish in Fallen Leaf Lake.

Current Food Web of Lake Tahoe



Historic (1880) Food Web of Lake Tahoe



Fishes of the Lake Tahoe Basin

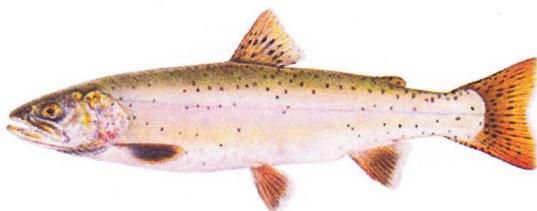
The Lake Tahoe Basin is known for its scenic beauty and angling opportunities. Yet many people are surprised to learn that popular game fish such as mackinaw, rainbow, kokanee salmon and browns are not native to the region and that the basin's native fishes are rarely seen and now occupy only a small portion of their historical ranges. Current distribution of native fish bears little resemblance to their distribution before settlement. People dredged creek bottoms, diverted streams and encouraged the introduction of non-native fish – altogether drastically altering aquatic habitats. Most fish communities today are dominated by introduced species.

Lake Tahoe is located within the Pleistocene Lahontan Basin. This basin was drained by the Walker, Carson, Truckee, and Susan rivers. Although the drainages are now isolated from each other, during the Pleistocene they were all tributaries to ancient Lake Lahontan – a gigantic lake that covered 8665 square miles.

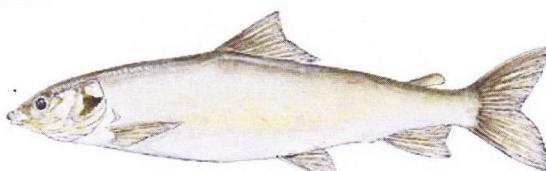
Native

Salmon and Trout Family (Family Salmonidae)

Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) – Historically these fish were the top predators in Pleistocene Lake Lahontan, dating back 70,000 years, and grew up to 50 inches and 40 pounds. LCT tolerate lower dissolved oxygen and high water temperatures than almost any other trout in western North America. They also persist in highly alkaline waters of Pyramid and Walker lakes. This fish was once abundant in Lake Tahoe. In the early days it was caught commercially to supply mining camps. Overfishing, competition from non-native species, and exotic disease reduced their populations drastically. Measures are being taken to reintroduce populations throughout the basin.



Mountain Whitefish (*Prosopium williamsoni*) – Mountain whitefish bears little resemblance to its relative, the trout. It is an opportunistic bottom feeder and appears to eat whatever is in abundance, including fish eggs. It is found along the bottom of colder streams and lakes throughout the basin. They tend not to enter smaller streams or small headwaters of big streams.



Minnow Family (Family Cyprinidae)

Lahontan Speckled Dace (*Rhinichthys osculus robustus*) – This species is the widest-range native fish in western North America. Body coloration varies between populations. This particular subspecies occupies the Lahontan basin portion of the Eastern Sierra, which includes Lake Tahoe. It occupies a wide variety of habitats, including thermal springs, cool and warm water rivers and streams, swift riffles flowing over cobble-size substrate, quiet backwaters, or shallow, muddy-bottom streams. The success of this species lies partly in its semi-nocturnal, bottom feeding habit. They can be found down to depths of 50 ft.



Lahontan Redside (*Rhinichthys egregius*) – This species is thought to be the most beautiful of the California minnows. The red streak is present in breeding males and rosy in females. In Lake Tahoe, they remain in large schools throughout most of the year. They are abundant near shore and will consume terrestrial and aquatic insects, plankton, and fish eggs. In streams, the Lahontan redside hold at mid-water to capture insects drifting downstream, and prefer pools with protective cover.



Lahontan Lake Tui Chub (*Gila bicolor pectinifer*) – Tui Chub are widespread throughout the western United States, but this subspecies is endemic to the Lahontan basin and widespread throughout its larger waters. The Lahontan Lake subspecies inhabits mid-water areas of the lake and rarely occupies streams. In deep lakes it can be found down to depths of 100 feet. In large, open habitats, like Lake Tahoe, they move in schools, but do so less in shallow habitats with more cover. It feeds mainly on plankton.



Sucker Family (Family Catostomidae)

Tahoe Sucker (*Catostomus tahoensis*) – This fish is endemic to the Lahontan Basin and is found in lakes in streams throughout the Tahoe Basin. Lake-dwellers are larger than those in streams. It feeds most actively at night – on aquatic plants, detritus, and invertebrates from substrate. They have a high reproductive capacity and are relatively long-lived.



Lahontan Mountain Sucker (*Catostomus platyrhynchus lahontan*) – This subspecies is endemic to the Lahontan Basin. It is distinguished from the Tahoe Sucker by its smaller size and rounded snout. It does not inhabit lakes and seems to prefer swifter waters and cooler streams. Today, this subspecies is rare. Perhaps the dams and reservoirs constructed during the last 30 years have eliminated their stream habitats. Lahontan Mountain Suckers are herbivorous.



Sculpin Family (Family Cottidae)

Piute Sculpin (*Cottus beldingi*) – It is the most abundant bottom-dwelling fish in the Eastern Sierras. This species is small and drably colored, allowing it to hide between rocks and sticks on the bottom. It is most active at night when it preys upon aquatic insects, snails, and smaller fish hiding between and underneath rocks. This fish usually only gets up to 4 inches long, but in Lake Tahoe it can reach up to 5 inches, where it is usually found over rocky substrate.



Non-Native

Salmon and Trout Family (Family Salmonidae)

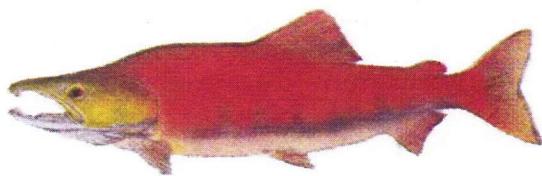
Lake Trout aka-Mackinaw (*Salvelinus namaycush*) – Mackinaw can reach well over a meter in length. It was introduced to Lake Tahoe from the Great Lakes in the late 1880s. It prefers lakes that are large, deep, cold, oligotrophic, low in nutrients, and well oxygenated at all depths. Therefore, Lake Tahoe is an ideal mackinaw habitat. As its name implies, it is strictly a lake species and does not even utilize feeder streams for spawning. As an adult it is exclusively piscivorous, meaning it only feeds on other fish. This feeding habit may well have been responsible for the disappearance of the native Lahontan Cutthroat in Lake Tahoe. The Lake Trout now preys upon other native fish, such as the Mountain Whitefish, Tahoe Sucker, and Tui Chub, as well as introduced Kokanee salmon.



Rainbow Trout (*Oncorhynchus mykiss gairdneri*) – Rainbow trout are very ample throughout the basin and the country, but are also one of the most difficult to understand in term of fish classification. Scientists are trying to fully understand the relationship between the steelhead trout, the anadromous (fish that live most of their adult life in saltwater but spawn in freshwater) form of the rainbow and the resident freshwater form. The species is native to the waters along the Pacific coast but has been introduced for food or sport to at least 45 countries, and every continent except Antarctica. Rainbow trout prefer cool, clear streams and lakes, but can survive in lakes or ponds on the prairie, as long as there is cool, oxygenated water in the depths. It prefers water from 55 to 60 °F, and will tolerate temperatures up to 75 °F. The diet consists mainly of insects, plankton, crustaceans, fish eggs, and small fishes.



Kokanee salmon (*Oncorhynchus nerka*) - Kokanee are the landlocked variety of the Sockeye Salmon. It was introduced to the basin in the mid 1900s. It has adapted to spawn in both feeder streams and gravel shallows of lakes, which allows them to mature in lakes rather than in the ocean, although they never reach the full size of sea-going fish. This fish exhibits a strong preference for low water temperature, therefore in summer months it remains in the lower thermocline. In fall they congregate at the mouths of spawning creeks, at which time males undergo a striking color change, acquiring a deep red body hue and black head. All the adults die after spawning, making for a tremendous food source for bald eagles, grizzly bears, and other animals. The Kokanee are zooplankton feeders throughout life.



Brown Trout (*Salmo trutta*) – This trout is not only introduced to the basin but is not native to the Western Hemisphere. It is the trout of Europe and has acquired adaptations to a wide range of habitat conditions. They have adapted to live in streams with higher temperatures than normally preferred by other trout species. It has been known to grow up to one meter and live up to eighteen years. Brown trout are the most territorial of all trout, but usually appear very sedentary. Brown trout are often described as being the wariest and hardest to catch of all trout. They are drift and bottom larvae feeders and do sometimes feed on other fish.

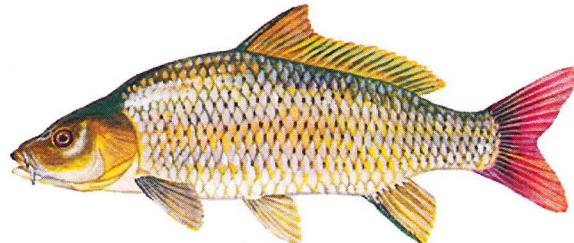


Brook Trout (*Salvelinus fontinalis*) – Brook trout do not exist in Lake Tahoe, but are one of the most abundant fish in the many streams and tributaries throughout the basin. It does however have the ability to spawn in lakes that lack feeder streams. Brook trout favor small, shallow, cold, headwaters streams, small lakes and ponds, particularly those that are spring-fed. Brook trout will eat nearly any living organism, and larger fish can be voracious predators on other fish and even their own young. Due to overpopulation stunting is often a problem in high mountain lakes and rapid cold mountain streams. They may cross with brown trout to produce infertile tiger trout.



Minnow Family (Family Cyprinidae)

Carp (*Cyprinus carpio*) – The carp is native to Asia and was probably the first fish ever to be cultured or farmed by man. It can grow up to approximately 30 inches and can weigh up to 88 lbs. Carp have been introduced, often illegally, into many countries. Due to their habit of grubbing through bottom sediments for food, they destroy, uproot and disturb submerged vegetation causing damage to native fish populations. Thus, in North America, the carp is a very controversial fish.

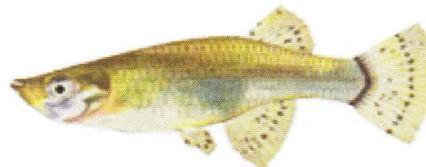


Golden Shiner (*Notemigonus crysoleucas*) – The Golden Shiner is a small, widespread minnow of the Eastern United States. It is a schooling minnow that seldom exceeds 10 inches in length. It primary feeds on plankton but does consume a variety of small surface invertebrates and filamentous algae. The introduction of the species to most waterways is courtesy of the angler's bait bucket. They are common in medium to large bodies of slow moving or standing water. This species requires good water quality and aquatic vegetation to thrive. Golden shiners prefer quiet, clear water, sand, gravel or organic debris covered bottoms.



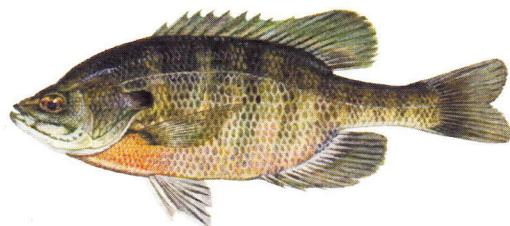
Livebearer Family (Family Poeciliidae)

Mosquitofish (*Gambusia affinis*) – The Mosquitofish is native to the southern Midwest and has been distributed around the country for mosquito control purposes. They are quite small, rarely exceeding 5 cm in length. Regardless of their name, they do not feed solely on mosquito larvae; they are actually wide spectrum omnivores. The Mosquitofish does add to the problem of introduced exotic species, in that they compete with other native fish species.

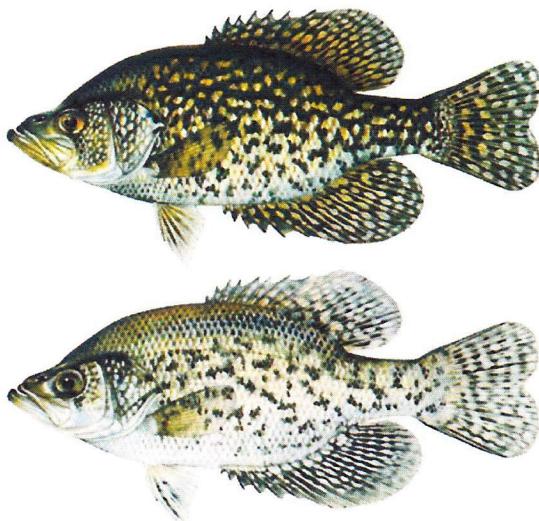


Sunfish Family (Family Centrarchidae)

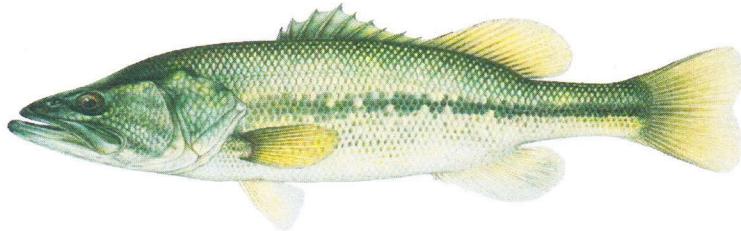
Bluegill (*Lepomis macrochirus*) – The Bluegill is the most abundant sunfish in the area and as such has been one of the native fishes main competitors. They are extremely prolific, resulting in rapidly expanding populations in most habitats where it is introduced. This great success has led in some cases to the development of stunted populations: whereas most mammal species experience large die-offs when populations greatly exceed food supply, most fish species adjust simply by growing less.



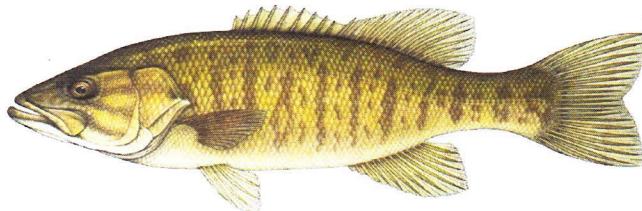
Black Crappie (*Pomoxis nigromaculatus*) and **White Crappie** (*Pomoxis annularis*) - Both species of crappie, as adults, feed predominantly on smaller fishes, including the young of their own predators. They have diverse diets, however, including zooplankton, insects, and crustaceans. By day, crappie tend to be less active and concentrate around weed beds or submerged objects, such as logs and boulders; they feed especially at dawn and dusk, moving then into open water or approaching the shore. The White Crappie prefers slower-moving water, often turbid, whether a backwater of a small creek or a large lake; while the black crappie tends to prefer clearer water.



Largemouth Bass (*Micropterus salmoides*) – The Largemouth is no doubt the most popular warm-water game fish in North America. It occupies the role of top predator in the vast majority of habitats that it occupies. It can reach up to 37 inches in length and 23 lbs. The largemouth bass has a wide variety of prey. Its diet consists of other fish, worms, grubs, frogs, snakes, crayfish, and insects. It will wait in structure including grass, brush, laydowns, drop-offs, and roots to ambush its prey. Then, it will swallow it whole and digest it. It has recently been found in Lake Tahoe and is a major growing concern for biologist in the Basin.



Smallmouth Bass (*Micropterus dolomieu*) – The Smallmouth Bass prefers cooler and clearer water than the largemouth, but can still be found in warmer slow moving waters. Because it is relatively intolerant of pollution, the smallmouth bass is a good natural indicator of a healthy environment, though it can better adjust to changes in water condition than most trout species. Carnivorous, its diet comprises crayfish, insects, and smaller fish, with the young also feeding on zooplankton.



Catfish Family (Family Ictaluridae)

Brown Bullhead Catfish (*Ictalurus nebulosus*) – The Catfish family possesses some unusual characteristics not found in other groups; the most apparent is the lack of scales. They also have barbels, which contain numerous taste buds on their surface. The brown bullhead catfish appears to exhibit the same broad spectrum adaptations to a variety of habitat conditions. It is particularly well adapted to large, eutrophic lakes, but it has been found in Lake Tahoe. Like all members of its family, it is basically a bottom feeder. The detection of a food item by the barbel triggers an immediate grabbing action by the mouth, allowing it to pick up even the smallest amount of food.

