

# Bumping the cutts: Spawning

*A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.*—Aldo Leopold

By Sandy Bryson

Early morning at Heenan Creek, a cinnamon-colored black bear sow shovels her massive snout into the cold, squirming water. The rocks are alive with fish. A spring feast. Though a natural angler, she is clumsy, but she finally smashes a brightly-colored trout into a crevice then works it back out with her paw. Downstream under the willows her black cub rolls and flops in the water, whacking at the dense surge of fish.

Across the lake, a mile away, a truck

turns off Highway 89 at the Heenan Lake Wildlife Area entrance. Getting out to unlock the gate, the driver sees a bald eagle 500 feet up trim its wings and rocket toward the water, emitting its harsh call. Instantly, the lake is alive. Every living thing conspires to announce the California Department of Fish and Game (DFG) employee's presence to the bear, who lifts her head into the west wind and pads off uphill through the sage, cub in tow.

At the creek mouth, the trout are oblivious, noisily thrashing upstream toward the concrete fish ladder, driven by the instinct to spawn. Parking the truck, Bob Burks, a DFG technician who runs the spawning station, opens the metal building sheltering the fish trap and pens. As other personnel arrive from DFG and the Nevada Division of Wildlife (NDW),

he moves expertly throughout the shed, preparing the tables, the buckets and solutions, hoses and other equipment needed for this operation.

Fish spawning at Heenan Lake, located in Alpine County at an elevation of 7,084 feet, usually takes place during May, though the exact dates depend on weather and water level. Each spring, DFG biologists spawn Lahontan cutthroat trout at the egg-taking station. Eggs are cultured at DFG's Hot Creek Hatchery and in Nevada. The trout are stocked back into Heenan Lake, 30 other eastern Sierra lakes, and Nevada waters.

The Heenan Lake site originally was a spring fed creek and snow melt marsh where the Washoe Indians camped, hunted ducks and deer, according to Jim Lyons, former Alpine County judge. The surrounding hills became summer range



Photo © Sandy Bryson

**Above, early morning at Heenan Lake, elevation 7,084 feet.**



**Left, starting the Heenan Lake Dam - Julian Masterino around 1920. The dam was built 1924 - 1925.**

Photo courtesy Alpine County Museum



# Cutthroat trout at Heenan Lake

for cattle and sheep. In 1924 to 1925, the Dangberg family constructed the reservoir to irrigate ranches and farms in California and Nevada. The waters were rich with food. Fish grew.

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) are named after ancient Lake Lahontan, which existed during the Ice Age over 75,000 years ago. At its peak, Lahontan had a depth of 875 feet and surface area of 8,500 square miles, draining over 45,000 square miles east of the Sierra Nevada. The original scientific name, *Salmo henshawi*, was given to these fish in 1878 by David Starr Jordan based on a specimen sent from Lake Tahoe by the naturalist H. W. Henshaw.

Besides the Humboldt River drainage in Nevada, the native range of Lahontan cutthroat consists of the Truckee, Carson, and Walker river systems in California and

Nevada; Summit Lake, Nevada; and 114 miles of the Northwestern Lahontan Basin consisting of the Black Rock Desert Subbasin, the Coyote Lake Subbasin, and the Quinn River Subbasin. Lake Tahoe is the source of the Truckee River, which empties into Pyramid Lake. Today, after the desiccation (complete drying) of Lake Lahontan and heavy commercial fishing in the early 1900s, self-sustaining native populations of cutthroat exist in only about 28 miles of headwater streams in the Truckee, Carson and Walker river drainages in California, and in only two lakes: Summit Lake, Nevada, and Independence Lake, California.

Patrick C. Trolter reported the life span of lake-dwelling Lahontan cutthroats appears to be seven or eight years. Juvenile trout in the spawning streams feed almost entirely on aquatic insects. Back in the

lakes, they continue this behavior until they reach a length of about 12 inches. Then, if forage fish are available, they become piscivorous (fish-eating).

The Heenan Lake brood stock of Lahontan cutthroat trout originated from an old transplant, in 1864, of Carson River fish into Blue Lakes. These were transferred to Heenan during the mid-1940s. The DFG started spawning the so-called Heenan Lake strain in the early 1950s through to the 1960s, when biologists discovered the fish were not pure Lahontan cutthroat as once thought. Since the Heenan Lake strain was first isolated from the Carson River, it was adapted to rivers (fluvial) rather than lakes (lacustrine). In Blue Lakes, the population had become hybridized with rainbow trout.

Searching for a replacement strain, DFG found that, despite a long history of



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**Left, fish barrier in Heenan Creek at the base of the spawning ladder.**

**Above, evening at Heenan Lake dam.**

**Right, flume/fish ladder used during low lake levels around 1955. Lahontan cutthroat have been maintained since the early 1940s.**





Photos © Sandy Bryson

**Retrieving cutthroat for spawning. Fish are sorted by sex and readiness to spawn. Males go into separate areas of the facility from the females, separated by underwater screens. Females are sorted again as *ripe* or *green*. *Ripe* females have soft abdomens that expel a few eggs when touched. *Green* female abdomens feel hard, and no eggs emerge.**

nonnative salmonid introductions, pure strains of Lahontan cutthroat existed in Independence Lake, between Truckee and Sierraville. Trapping started in 1970, and a new brood stock of Independence strain is now established in Heenan Lake. All these fish are marked with an adipose fin clip at the Hot Creek Hatchery, so the crews at Heenan only spawn fish that are missing an adipose fin. Any fish that come into the station with adipose fin intact are not spawned but planted back in outside waters to provide recreation for anglers.

Three characteristics distinguish Lahontan cutthroat trout from all other subspecies of cutthroat trout:

- The spotting pattern of medium-size to large, rounded spots are distributed evenly over the sides of the body, on top of the head, and often on the abdomen. The body is usually a dark, yellowish-olive color from back to belly, with a broad pinkish stripe on its side and large spots throughout. The sides of the head are often scarlet. Two distinct red stripes on the membrane beneath the jaw give the cutthroat trout its name.
- The most gill rakers of any cutthroat or rainbow trout, 21-28, averaging 23-26, facilitate planktonic feeding in lakes and streams, the habitats in which Lahontan cutthroat trout evolved.
- The abundance of pyloric caeca (which stores fat), 40-75 or more, typically averaging more than 50.

At the Heenan Lake spawning station, a diversion valve channels a portion of the creek through the building and down the fish ladder. The crew places boards into the concrete-sided ladder to help the fish ascend (Lahontan cutthroat are not Olympic jumpers) once the ladder is flooded. A barrier adjacent to the bottom of the ladder prevents the fish from bypassing the station and spawning in the creek.

At the top of the ladder, the fish enter the spawning shed by pushing a one-way gate into the initial holding pen. Pen space is limited, so

the technician on site must count and sort fish every day. Fish are sorted by sex and readiness to spawn. Males go into separate areas of the facility from the females, separated by underwater screens. Females are sorted again as *ripe* or *green*. *Ripe* females have soft abdomens that expel a few eggs when touched. *Green* female abdomens feel hard, and no eggs emerge.

Because Heenan Creek is small and shallow, the water temperatures fluctuate widely—typically from 35° F in the morning to 60° F in the afternoon. During the spawning season, temperatures usually run 44° to 60° F. Crews try to sort fish first thing in the morning, when the fish are less active than later in the day. *Green* female cutthroat are re-sorted at least once a week. Crews minimize handling the fish to avoid removing the coating that protects them against fungi and bacterial invasion.

When enough fish are penned, the crew conducts the spawning using the air injection method. A needle is inserted into the body cavity of the female under a low 1.5 to two pounds of pressure. This gently expels the eggs. Injecting air is gentler on the fish and breaks fewer eggs than hand spawning. Afterwards the technician manually expels the air from the body cavity — fondly called “burping” the fish — producing the same small sound and presumably relief similar to burping a baby. The fish is then placed in a submerged pen to recover. Next, male milt is manually ejected into the spawning pan on top of the eggs so that fertilization occurs almost instantaneously and the male is released.

The eggs are rinsed and placed in clear water to undergo *water hardening*. When an egg is first spawned, it is soft and flaccid. The outer membrane is semi-permeable and immediately starts absorbing fluid until the inside reaches equilibrium. At that point the egg is called *water hardened*. The eggs must be fertilized quickly because the opening through which the sperm enters, called the micropyle, starts to close off as the egg absorbs water. Successful fertilization has about a two minute window.

Once the eggs have saturated, the eggs are measured. Assisted by a counting board, they count the eggs in a 2-ounce dipper to determine the average number of eggs per ounce — typically 250 eggs. After measuring the total volume of eggs, simple math gives the total egg take for the day. This year, 1,745 fish entered the trap, and 522 females produced 904,840 eggs, averaging 1,733 eggs per female.



Next, the crew rinses the eggs of excess sperm, ovarian fluid, and biological waste. At this point the eggs are placed in a diluted solution of iodine for about 10 minutes to disinfect them. Since these eggs go back to the hatchery, this procedure acts as a precaution against introducing harmful bacteria into the hatchery.

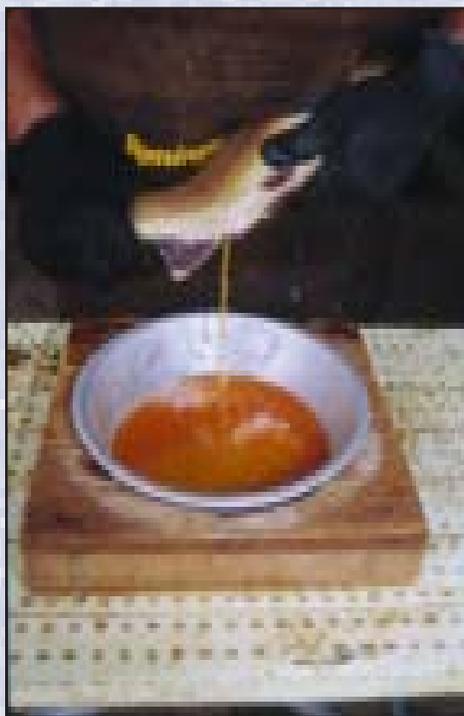
During the spawning, biologists obtain as much information as possible from the fish. Length frequency data are recorded. Some fish get coded tracking tag implants or are scanned for pit tags. To monitor fish health, ovarian fluid and tissue samples are taken periodically.

This year, the Heenan Lake Spawning Station opened May 3, allowing fish to begin entering the facility. The lake level was too low to necessitate installation of a fish barrier at the spillway. This diminished level resulted in a partial exposure of Heenan Creek below the ladder. A solar powered electric fence was erected along and slightly below the ladder to protect these areas of fish concentration from bear predation. DFG conducted three spawnings of Lahontan cutthroat trout – the first on May 11, and the second on May 18, produced 560,760 eggs from 322 females. These eggs were taken to DFG's Hot Creek Hatchery. The third spawning on May 23, produced 344,080 eggs from 200 females. These eggs were taken to NDW's Mason Valley Hatchery.

The Heenan Lake recreational Lahontan cutthroat trout fishery is supported by the hatchery program. It is a famous catch and release Heritage Trout Water with many fish greater than 18 inches in length. Surplus fish are planted in other waters for recreational fisheries. The marked Heenan Lake Lahontan cutthroat trout also serves as a backup source for the Independence Lake strain of Lahontan cutthroat trout, and may be used in the future for species recovery programs.

After the egg allotments are met, DFG personnel close the station. Heenan Creek and the surrounding land return to their normal state. The bear and the eagle know nothing of the spawn. They know only the meal-to-meal struggle for survival. Under the cover of night and the waning wind, they return to the stream and the cutthroat.

*Sandy Bryson is an author and director of Bryson and Associates.*



**Using the air injection method, a needle is inserted into the body cavity of the female under a low 1.5 to two pounds of pressure which gently expels the eggs.**



**Male milt is manually ejected into the spawning pan on top of the eggs so that fertilization occurs almost instantaneously and the male is released.**



*Photos © Sandy Bryson*

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