

*An angler—ecologist looks among the weeds and the watercress to probe the secrets of some of our most extraordinary trout streams*

## The Anatomy of a Spring Creek

ERNEST SCHWIEBERT

**D**URING THE LATE AFTERNOON, the smooth wind-polished hills below Sun Valley look soft and straw-colored in the waning light. The cottonwoods in the river bottoms are touched with the first hint of bright autumn color, echoing the first cold nights in August. The valley is steadily more arid below Hailey, with the patchwork fields of a few irrigated ranches on the high benches above the Big Wood channels.

Beyond the tree-lined streets of Bellvue, a solitary eagle circles lazily in the last thermals of the afternoon, watching the foothills for a careless jackrabbit. Cattle and sheep forage among the sagebrush slopes. The cottonwoods are already sparse along the Picabo road, and except for irrigation from the river and several spring creeks in this arid Idaho country, the valley enclosing Silver Creek is virtually a desert between its pale sheltering hills.

Although I had fished Silver Creek many years before, during a boyhood summer spent traveling in the Rockies, that early experience was both brief and myopic. It takes the perspective of time to savor and understand a spring creek, just as it takes time to see that the act of fishing is perhaps the least important part of angling.

My second baptism on the marshy reaches of Silver was with André Puyans and David Inks, two well-known fishermen from San Francisco. Their camper

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ERNEST SCHWIEBERT is well known as an angling author, but less noted for his equal proficiency as an ecologist, a skill which surfaces often in this discussion of spring creeks.

*A portion of the Nature Conservancy water on Silver Creek near Sun Valley, Idaho. Photo by John Merwin.*

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was filled with a cornucopia of tackle, wading gear, clothing, rod cases, sleeping bags, bottles in varied stages of emptiness, and fly-tying equipment from their richly stocked shop in Walnut Creek. Inks was driving while Puyans passed me incredible slices of cheese and cups of Cabernet Sauvignon, spicing the trip with anecdotes about the fly-hatches and free-rising rainbows on Silver Creek.

*Silver is pretty special, Puyans allowed.*

The valley widens steadily below Hailey, where the chalk-colored bluffs rise beyond the river and its yellow cottonwoods. There are potatoes and grain fields and hay meadows farther down the valley, watered with the intricately rigged irrigation sprinklers that move like delicate water spiders in their changing rainbows of misting spray.

Late summer is perhaps the best time to fish Silver Creek, except for its Indian summer hatches in October. After the summer dies, the stream has a brief season of cold nights and glittering stars, followed by shirtsleeve weather when the current is covered with tiny mayflies. The mornings are cool and still under cloudless skies, and the wind gathers lazily at midday, stirring the stubble fields and scattering its bright confetti of leaves from the willows and cottonwoods.

The smooth sagebrush hills are almost pewter-colored beyond their potato-field bottoms, where the county



## Spring Creeks . . .

road reaches out for miles across the valley. Gannett lies ahead in the trees. Except for the scattered ranches and their weathered outbuildings, lying against the pale foothills, the basin is completely arid outside the irrigation ditches that lie straight as surveyor's lines across the fields. When we left the Picabo road, the pasture dust billowed out behind the camper, thick and chokingly bitter with its alkalinity in our nostrils.

*Doesn't look like trout country,* I said.

*Not like most trout country,* Puyans agreed, *but it's trout country all right — wait until you see some of the fly-hatches!*

*Sounds good!* I said happily.

SILVER IS VIRTUALLY UNIQUE among our Western trout streams. Although there are many such spring creeks in the Rockies, and in the Sierras and Cascades farther west, none of these little rivers equals its size or its remarkable volume of flow or its curious isolation in a half-arid basin.

Unlike most trout streams, which are born in the snowmelt of alpine meadows or the seepages of their headwater tributaries, spring creeks rise almost full-blown from the earth. Such creeks are not always fertile. Some bubble from pale-bottom lagoons so empty of life-giving oxygen that they are virtually sterile except for their growths of stoneworts and fountain moss and elodea. Others abound with free acids or metallic toxins that make their icy spring-heads actually hostile to life. But still others are rich with oxygen and alkalinity, tumbling from the earth to shelter an aquatic world absolutely teeming with fish and fly-hatches.

Several factors are typically found in the birth of a spring creek. Some are simply the subterranean flowages of adjacent rivers, leaching through their own alkaline beds of gravel to emerge again downstream in a side channel incised during some primeval spate. The famous spring creeks above Livingston, in the valley of the Yellowstone, are typical of that type. Similar spring creeks are found in the sprawling alluvial bottoms of the Snake at Jackson Hole.

Some spring creeks are born in immense outcroppings of fractured lava, which absorb both rainfall and snowmelt in their sponge-like aquifers and eventually surrender their secret flowages miles away. Typical rivers of this type are found in the volcanic regions of Oregon and California. Spring-fed tributaries of the Deschutes, like the Crooked and Warm Springs and Metolius, are archetypes of the volcanic spring creeks. Others are found draining the volcanic barrens of Lassen National Park, or the immense lava plateau that reaches southward across Oregon from Crater Lake. Several excellent streams are triggered in the sudden rebirth of the Crater Lake aquifers, particularly those spring creeks at Fort Klamath and in the headwaters of the Williamson. The extensive lava aquifers formed over thousands of years above Mount Lassen have also spawned a network of unique fisheries in the remarkably fertile Hat Creek and Rising River drainages — and in the surprisingly large flowages and fertility of the Fall River in northern California.

Our counterparts of the famous chalkstreams of Europe are found in limestone country. The chalkstreams are spring creeks that tumble out from the unique cretaceous aquifers of chalk that border the English Channel. These chalk outcroppings produce not only the famous white cliffs of Dover, but also chalkstreams like the Risle and Andelle in Normandy, and the classic British dry-fly rivers like the Itchen and its sister Test.

The rivers in the United States that have their origins in immense limestone springs are not confined to trout fisheries. Ozark smallmouth streams like the Buffalo and Mammoth Springs and Current are well-known exceptions. Other limestone streams are perhaps more famous because they have played a role in the history of American trout fishing. Such waters include the famous Castalia Club in northern Ohio, and the Spring Creek at Caledonia in upstate New York, where the half-legendary Seth Green worked out the rudimentary philosophy of fish culture that led to a galaxy of trout and salmon hatcheries around the world. Huge limestone springs give birth to several Western rivers too, particularly the famous Spring Creek at Lewiston in the Montana foothill country, and the largest spring creek in the world — the incomparable Henrys Fork of the Snake in Idaho.

Still other spring creeks are spawned in strange hydrothermal basins such as the geyser country of the Yellowstone. Hot springs bubbling from deep in the molten fissures of the earth are in some cases toxic and in others richly fertile. Hot Creek in the eastern Sierra range of California is typical of a hydrothermal spring creek. But perhaps the best known of such streams are the serpentine Gibbon and its sister river, the remarkable little Firehole in Yellowstone Park. Both are born in the snowmelt of the high country, and both have icy little tributaries, but their ecology is radically modified in a series of unique geyser basins that mingle their rich alkalinity with the rivers themselves.

Silver is less dramatic than the Firehole, for example, with its smoking hot springs and spectacular geysers, but its character is intriguing. It is startling in less obvious terms, in the sense that its ecology parallels the storied chalkstreams in Hampshire and Wiltshire where fly-fishing had its genesis five centuries ago, and its springheads rise without prelude or warning from a table-flat valley floor. The principal springs that give birth to Silver are found on headwater tributaries like Stocker, Grove, and Loving. These three cross-bordered creeks are surprisingly large and swift, with exceptional volumes of flow at their sources. Each almost

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*The Gibbon River can be called a hydrothermal spring creek because of the inflow it gets from the geyser basins in the Yellowstone area of Montana. Letort Spring Run derives its unique spring-creek character from the limestone springs at its source.*



*The Gibbon River, Montana, in the above photo by Alexander Lowry.*

*Pennsylvania's Letort Spring Run, in the lower photo by Mark Sosin.*



explodes from the arid earth, spilling thousands of gallons per minute from their Stygian labyrinths underground.

Hydrologists believe that these giant springs are fed with water from the Big Wood, which drains the entire Sun Valley country from Galena Summit in the Sawtooths farther north. The valley floor is a remarkable aquifer that combines immense alluvial deposits of coarse stones and boulders and fine aggregates with a bedrock structure of permeable limestone and fissured lava. Whatever the origins of these tributary springheads and their remarkably stable volumes of flow, it is the chemistry of its soils and subsurface geology of the entire basin that structure Silver Creek and its unique ecosystem.

Soils in its headwaters are so alkaline that, in agricultural terms, they lie on the threshold of toxicity. Well-meaning anglers have continually tried to introduce trees along its grassy banks and to expand its sparse stands of aspen along Grove Creek and the Sullivan Slough. These men were always mystified when the soils chemistry killed their trees, while the ambient strains of willows and cottonwoods and aspens thrive. Freshly tilled acreages are typically permitted to lie fallow for one or two seasons, simply working the soil without planting, while precipitation and sunlight and exposure to the atmosphere leach out their excessive alkalinity.

The subsurface geology is equally fertile. The hydrology of the valley is filtered through sedimentary limestones and phosphates, mixed with porous beds of lava and immense deposits of river-polished aggregates. Concealed sources of alkalinity are also possible, like hydrothermal caverns and subterranean deposits of marl, hidden deep in the secrets of the earth, and hot springs do exist at several places in the drainage of the Big Wood. Each of these factors ultimately combines to affect the water chemistry of Silver Creek, leaching both water and fertility from twenty-odd miles of varied subterranean geology.

The character that results from such latent life-giving chemistry and stable volumes of year-round flow is remarkable. Its echoes are obvious in the rich growths of elodea, watercress, chara, ranunculus, tules, bullrushes, stoneworts, and water lilies that distinguish Silver Creek from the typical Western trout stream. Such alpine fisheries, tumbling steeply from their barren high-country origins, are usually a bit acid in their water chemistry. The fertility of Silver Creek is utterly different from its sister rivers throughout our Western mountains, and that fertility is also obvious in its remarkably heavy populations of fishlife, both its healthy free-rising rainbows and the abundance of its coarse coldwater species too.

Since the springheads are relatively constant in both temperature and volume, the stream is also a sanctuary for wading birds and waterfowl during both late-summer drought and winter freezes. Its fish enjoy relatively stable rates of growth, because its temperatures remain fairly close to their optimal metabolic requirements, and are sheltered from the sixty-percent factors



Armstrong's Spring Creek near Livingston, Montana, shown here in a photo by Larry Madison, is of a type produced by the leaching of adjacent waters through alkaline gravel into the spring-creek channel.

of winter kill that typically decimate an average mountain fishery.

Both birds and trout are sustained by the exceptionally abundant food chain in the watershed of Silver Creek. The fish-eating birds and rainbows alike thrive on a surprising population of frogs and baitfish, and virtually all of its aquatic species sustain themselves on its incredible numbers of terrestrials and tiny stream insects and crustaceans.

Fly-catchers and swifts and other birds gather along the stream, competing with predatory swarms of dragonflies and damselflies for the clouds of mayflies and sedges that hatch daily. These exceptionally heavy aquatic hatches are sustained and sheltered in the fertile growth of weeds that undulates in the current. Yet their fertility is only another symptom of its rich water chemistry, and the nutrients in the sediments that support their roots.

Some fishermen find it sluggish and strange, and its selective trout are a puzzle for a fisherman accustomed to the easier fish of our alpine streams. Anglers who complain about Silver and its difficult rainbows remind me of a class at Princeton, in which a sophomore blurted the opinion that he had disliked reading *War and Peace*.

The professor struggled to conceal his amusement. *That's an interesting opinion*, he remarked as he care-

fully filled his pipe, *but I think it tells us more about you than it tells about Tolstoy.*

Silver is particularly alive in the spring. There are red-winged blackbirds calling in the marshes, geese clamoring for nesting sites, cattle and sheep in the pastures, bees gathering pollen in the wildflower meadows — all mixed with the pleasant music of its rainbows working to its midday fly-hatches.

Since it remains open and relatively ice-free in winter, at least above the irrigation gates in its middle reaches, Silver Creek is a haven for extensive populations of ducks and geese and wading birds.

The Idaho summers provide optimal nesting conditions for ducks and geese, which love its marshy banks and sloughs. Plovers and sandhill cranes and curlews are common, mixed with the solitary birds of prey. There are redtailed hawks working the foothill thermals, and surprising numbers of golden eagles. Ospreys and kingfishers abound too, foraging with marsh hawks and kestrels and prairie falcons. Burrowing owls and goshawks are numerous. Sandpipers and yellowlegs and killdeers are migratory visitors, mixed with substantial numbers of snipe. Wilson's phalarope seeks the headwater marshes before its autumn odyssey carries it toward the Argentine pampas.

But perhaps the most remarkable example of its thriving birdlife lies in a stand of aspens which shelters

a thirty-nest heron rookery beside the Sullivan Slough. Although the herons eat some trout, their graceful flight is so beautiful against a twilight sky that even the hardcase trout fishermen must accept the fish they kill. Coarse fish and frogs are much easier to capture, and most biologists would probably agree that any trout they harvest are foolish specimens that deserved the fate of Darwinian selection.

Silver has received extensive plantings of hatchery rainbows over the past century. Our hatchery stocks are hybrid mixtures of our original landlocked and steelhead strains, which exhibit the disconcerting habit of migrating downstream like their anadromous ancestors. However, these hatchery trout are somewhat isolated in the cold headwaters of Silver Creek by the desert heat that lies downstream. The unfavorable water temperatures in the lower reaches of its watershed tend to inhibit the downstream migration typical of hatchery rainbows.

Yet the resident population of rainbows, particularly on the private ranches that are not stocked with hatchery fish, still bears strong traces of its origins in the McCloud River in northern California. The non-migratory strain of rainbows originally found in the McCloud was perhaps our most valuable American subspecies, although it was quickly lost through hybrid mixing with migratory steelhead stocks in our first

hatcheries in California. However, the first planting of rainbows in Silver Creek occurred late in the nineteenth century, before the complete hybridization of our hatchery stocks, and the echoes of these relatively pure strains of the beautiful McCloud fish still persist in Silver Creek today.

DURING THE PAST YEAR, I have been working with Jack Hemingway and the Nature Conservancy to raise sufficient money to purchase the Sun Valley Ranch, keeping its prime fishing mileage open to the public. Hemingway is the son of the late Ernest Hemingway, lives in Sun Valley, and serves on the Idaho Fish and Game Commission. When the Sun Valley Ranch was offered for sale, threatening public access to its remarkable fly-only water, Hemingway worked out a strategy with its present owners and the Conservancy to protect its fishery and keep it public. The Nature Conservancy performed a remarkable job in seeking out corporate grants and a series of challenge donations from both private donors and foundations, raising more than \$500,000 to acquire the property and establish an endowment for its management in the future. Extensive amounts were also raised in a public campaign for the preservation of the fly-water on Silver Creek, and although a few thousand dollars remain to be raised this year, our campaign has succeeded. The Nature Conservancy now holds the property, and the remarkable fly-only mileage in the headwaters of Silver Creek will remain in public hands in perpetuity.

Donations intended to cover the remaining funds needed should be sent to the Nature Conservancy, Western Regional Office, Silver Creek Project, 425 Bush Street, San Francisco, California 94108.

The Conservancy has already appointed a resident biologist, and a distinguished management committee has already held a number of planning sessions. Several graduate students at neighboring universities have started research programs in various aspects of Silver and its ecology. The committee includes experts in fisheries management, ecology, ichthyology, entomology, experimental agriculture, hydrology, botany and avifauna. Some preliminary studies on the soils chemistry, plant cover, fly-hatches, reptiles, and the heron population have already started.

The management committee intends to explore in depth the ecology of Silver Creek and its equilibrium with the agricultural and pastoral land-use in its watershed. Hopefully, Silver Creek will help us learn more about the intricate fabric of life found in our Western spring creeks, and the fragile relationship between its ranches and its ecology. Perhaps we can discover a world of fresh knowledge that may help both ranchers and fishermen protect spring creeks throughout our Western mountains in the future, with an optimal mixture of agricultural techniques and enlightened fisheries management.

STILL, IT HAS BEEN THE CHARACTER of Silver and its fishing that has brought me to Sun Valley over the years, and its selective rainbows are always a challenging

puzzle. Our afternoon on the Purdey water was typical of Silver Creek in late summer, and we fished a sparse hatch of sedges and prospected for grasshopper fish until evening.

*We should get a pretty good evening rise,* André Puyans said. *We've got lots of mayflies and sedges coming at twilight now.*

*Pretty heavy feeding then?* I asked excitedly.

*Heavy enough,* David Inks said.

Our afternoon was leisurely, fishing a partridge-hackled wet above the ranch and its outbuildings, and Puyans took several fish with a Grasshopper pattern below the irrigation gate. But we spent most of our time sitting in the warm grass with fresh bread and cheese and a fine bottle of Bordeaux.

But later we crossed the stream, anticipating a rise of fish in the still flat above the irrigation hatch. The smaller fish were already working, and we took several on tiny *Baetis* and *Pseudocloeon* imitations in the mirror surface. Finally there was a heavy spinner fall, and several good rainbows started sipping busily in the film. Puyans produced a few pale-bodied spinners dressed on #26 hooks that worked well, and we took trout steadily in the gathering twilight.

*Look at the trout!* Dave Inks sighed.

The still flat reflected the evening sky, and fish were dimpling in the weedy channels as far as we could see. Beyond a dense growth of elodea, a really large trout porpoised in a narrow channel, sending waves down along the weeds.

*That was some fish!* I gasped.

*The big fish know how to survive,* Inks laughed, *They're not dumb enough to come up over here!*

*I'm going to try him anyway,* I muttered.


It was too deep to wade close, and it meant making a long cast with the line lying across the weeds. Since the leader and line could not drift with the current, my dry-fly float would be painfully brief. The channel flowed still and smooth beyond the weeds, and for a moment I wavered. The big fish came up again, its dorsal and powerful back silhouetted in the dying light, and I started the cast.

The line worked swiftly, delivering the tiny fly beyond the weeds, and settling it above the fish. It floated spent in the film, impossible to see in the darkness, but I tightened when the fish rose.

There was an explosion. Spray showered across the weeds, and an immense rainbow jumped several times in a drum-fire rhythm, stitching my leader through the elodea. Finally it was hopelessly woven into the weeds and the fish was gone, still jumping to free itself from the annoying bite of the tiny hook. The leader was so tightly knitted through the weeds that I hand-lined it back, uprooting huge growths of fountain moss and elodea, and started to untangle it with shaking fingers.

*That was some fish,* Inks called.

*Bigger than I thought,* I answered in the gathering darkness. *I should have known better than to try him — that'll teach me!*

*Probably not!* Inks said wryly. 

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