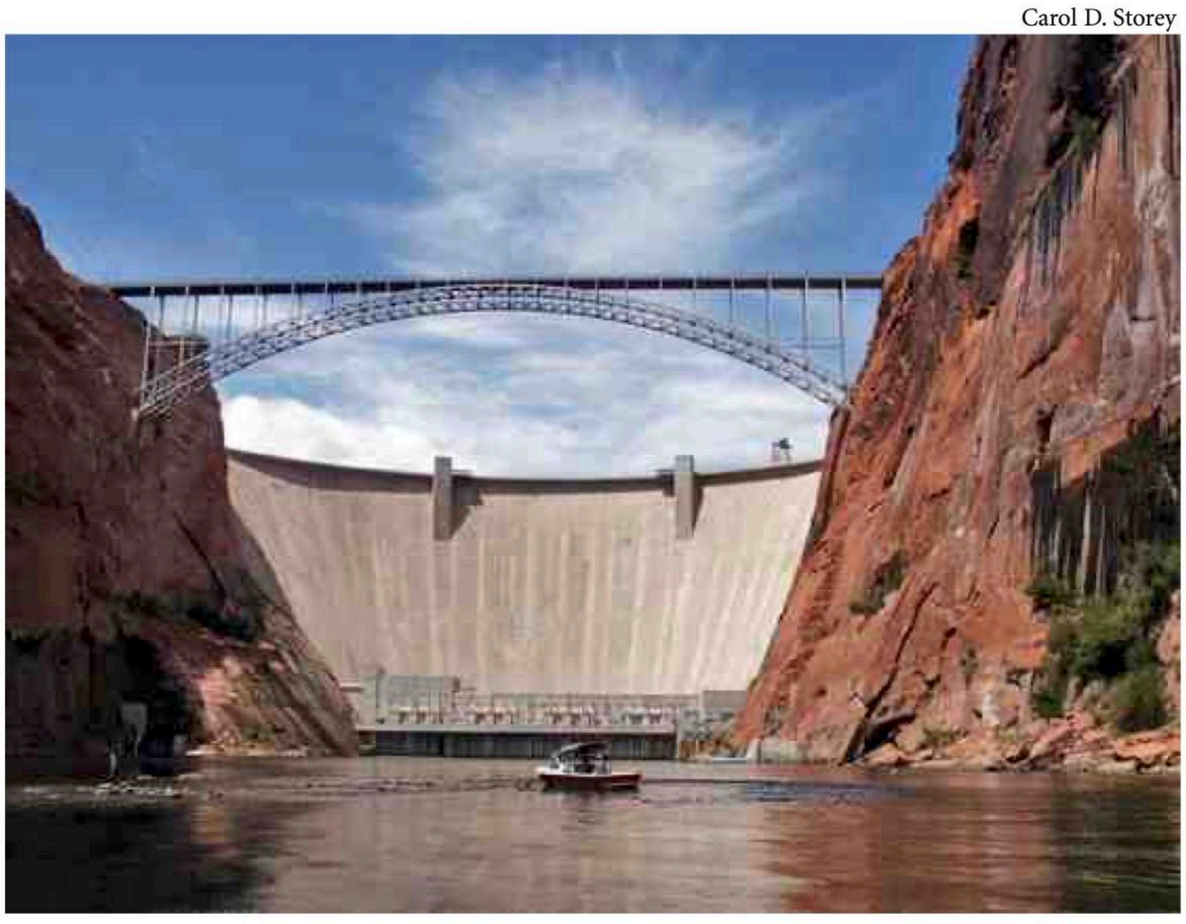
Blue-Ribbon Tailwaters: The Unplanned Role of the U.S. Bureau of Reclamation in Western Fly Fishing

by Ken Owens

Tailwaters, as all fly fishers know, are those stretches of rivers and creeks directly downstream from dams and their impoundments. Especially important in western America for trout and thus for fly fishers are the tailwaters below bottom-release high dams built for flood control and irrigation purposes, in particular the tailwaters downstream from many dams constructed by the U.S. Bureau of Reclamation (USBR) between the late 1930s and the early 1990s. Under the right circumstances, the bureau's high dams sustain blue-ribbon tailwater sites for trout growth. Before construction, however, no one—not civil engineers, not fisheries biologists, and certainly not fly fishers—had an inkling of what impact these dams would have on downstream fisheries. The only recreational concerns discussed by bureau planners for any of these projects were the boating and fishing opportunities being created in the huge impoundments behind the dams. The tailwater effect for downstream fisheries only came to be recognized gradually, as fly fishers began to investigate these radically changed streams and as aquatic entomologists first gave attention to the unique conditions of insect life in man-made tailwater microenvironments.

Carol D. Storey



Scenic fishing in the dramatic Glen Canyon tailwater on the Colorado River.

Table 1, "Inventory of Stream Sites" (page 4), identifies thirty-one USBR-constructed dams on twenty-four rivers and creeks in western states upstream from blue-ribbon tailwaters. State fisheries agencies now manage most of these sites for sustained recreational use by fly fishers, subject to special regulations that restrict the methods of angling and impose limited take or no-take rules on the tailwaters. The bureau has primary responsibility for managing nineteen of these thirty-one dams; local irrigation boards or similar entities control eleven, and one—the Pactola Dam on Rapid Creek in South Dakota—has a shared management arrangement in place.[1]

The construction dates of these thirty-one dams, displayed in Table 2 (page 6), show a trend familiar to all students of western water history. Before 1945, USBR engineers had completed only six high dams in the western states, none designed on a truly massive scale.[2] The 1945 completion of Shasta Dam on the Sacramento River in northern California signaled the bureau's entry into a new phase of dam building that emphasized large, high dams on big rivers, creating extensive tailwater environments.[3] By 1968, the bureau's leadership had planned, constructed, and put into operation eighteen more high dams, including such colossal projects as Canyon Ferry Dam on the Missouri River in Montana, Flaming Gorge Dam on the Green River in Utah, Glen Canyon Dam on the Colorado River in Colorado, and Yellowtail Dam on the Big Horn River, also in Montana. Since 1968, by comparison, the bureau has built only an additional six high dams that supply tailwater fisheries, none as great in size as the larger projects of the previous two decades.

Coincidentally, the major era of USBR large-dam construction in the West was the period during which fly fishing grew from a minor recreational interest to a widely popular enthusiasm in the western states.[4] And as more people learned to

U.S. Bureau of Reclamation

A tailwater pioneer. This lady angler displays her trophy steelhead taken below the Priest Rapids Dam on the Columbia River, circa 1960.

fly fish, the general level of on-stream sophistication rose markedly. Yet western tailwater fishing opportunities remained generally ignored until well into the 1970s. Most of the new high dams were situated on rivers that had previously provided at best only a marginal trout fishery. (Although naturalists may regret the dams' destruction of habitat for indigenous warm-water species, this concern has certainly not been a priority for trout fanciers.) Tailwaters were slow to develop their trout-growing potential because of the time it took for each stream to recover from the harsh impact of dam construction. In addition, this development of trout-growing potential waited on the efforts of state agencies to plant tailwaters with the trout that would naturalize and serve as a founding generation for new fisheries. In part also, fly fishers were slow to perceive that a special type of fishery was taking shape in advantageous tailwater situations. None of the standard published guides during the era of dam construction made mention of tailwater fishing as a distinct category, and none of the popular fly-fishing magazines carried early stories about the amazing new fisheries below the bureau's high dams.[5]

The situation at Lee's Ferry, downstream from the Glen Canyon Dam on the Colorado River, may represent a general case. According to Terry Gunn, a guide and fly-shop owner in nearby Vermillion Cliffs, the completion of Glen Canyon Dam "converted the Colorado River from a catfish fishery to a cold-water trout fishery, and nobody noticed." The Arizona Department of Game and Fish stocked trout in the tailwater in 1963, Gunn relates, "then basically forgot this fishery. Nobody was coming here then—no river runners to speak of, no anglers, not much of anything to impact the fishery that was growing up."[6] Until about 1975, these trout grew unmolested. Then anglers discovered the fish and started catching 15-pound rainbows, principally with bait and spinning gear. With a ten-fish limit and no special catch rules in place, the big fish disappeared within a few seasons. Trout stocking continued actively, but fishing pressure overwhelmed the state hatcheries' ability to deliver catchable trout to the site. Realizing the benefits of attracting fly fishers, in 1981 Arizona first put special regulations in place, ended stocking, and established a wild trout fishery now maintained by a catch-and-release policy for all trout more than 12 inches in length. "It is such a good fishery right now," one experienced guide declared in 2001, "you can easily fish it year-round."[7] It has become a boon to the local economy near the isolated Lee's Ferry site.

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As a few fly fishers began to explore productive tailwaters in various parts of the West by the late 1970s, aquatic entomologists and fisheries biologists also started to examine and analyze the tailwater effect. The creation of blue-ribbon tailwaters, they came to realize, turns on a few basic principles of stream ecology. High dams alter the downstream ecosystem by affecting water clarity, water flow, water temperature, and nutrient load. First, these dams trap the sediments in the river's natural runoff, sending clear, well-aerated water downstream that benefits the plants and insects sustaining trout populations. Second, the outflow from the high dams tends to be nutrient rich, giving the aquatic food chain an energy boost that fosters natural reproduction and promotes rapid growth rates in trout. Third, these dams moderate the pattern of highly variable seasonal flows that typify the high country in western America, holding back the snowpack runoff surges during the spring and keeping instream flows adequate for trout survival and growth during the low-water, late-summer seasons. Fourth, like natural lakes, large, deep impoundments turn over along a thermocline according to seasonal cycles. As air and water temperatures rise in the late spring and summer, the cooler water stratifies in the deepest parts of the reservoir. During the colder fall and winter months, warmer, denser water settles into the lower depths. Because high dams draw their outflow from the bottom of their impoundments, this seasonal stratification moderates the temperature extremes

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A drift boat lunch break on the lower Sacramento River tailwater, below Shasta Dam.

Table 1: Inventory of Stream Sites within U.S. Bureau of Reclamation Project Impact Areas Designated or Eligible for Special Trout Fly-Fishing Regulations

State	River/Stream	Upstream Dam	Construction Completion
Arizona Operator: U.S. Bureau of Reclamation Glen Canyon power plant online 1964 State fishery regulations: catch and release, barbless hooks, artificial lures	Colorado	Glen Canyon	1963
California Operator: U.S. Bureau of Reclamation Stampede power plant online 1988	Little Truckee	Stampede	1970
California Operator: Washoe County Water Conservation District	Little Truckee	Boca	1939
California Operator: U.S. Bureau of Reclamation	Putah Creek	Monticello	1957
California Operator: U.S. Bureau of Reclamation Shasta power plant online 1944 Water cooling device installed in 1997 to benefit threatened salmon runs	Sacramento	Shasta	1945
Colorado Blue Mesa power plant online 1967	Gunnison	Blue Mesa	1966
Colorado Morrow Point power plant online 1970	Gunnison	Morrow Point	1968
Colorado Crystal power plant online 1978 Operator: U.S. Bureau of Reclamation	Gunnison	Crystal	1976
Colorado Operator: Dolores Water Conservancy District McPhee power plant online 1993 Fishery wiped out by 1987 dewatering; now recovering	Dolores	McPhee	1984
Colorado Operator: U.S. Bureau of Reclamation	Uncompahgre	Ridgway	1983
Colorado Operator: U.S. Bureau of Reclamation Green Mountain power plant online 1943	Blue	Green Mountain	1943
Colorado Operator: U.S. Bureau of Reclamation	Fryingpan	Ruedi	1964
Colorado Operator: Uncompahgre Valley Water Users Association	Taylor	Taylor Park	1937
Idaho Operator: Boise Project Board of Control Anderson Ranch power plant online 1950	South Fork of the Boise	Anderson Ranch	1950
Idaho Operator: U.S. Bureau of Reclamation Palisades power plant online 1957	South Fork of the Snake	Palisades	1957
Montana Operator: U.S. Bureau of Reclamation Canyon Ferry power plant online 1953	Missouri	Canyon Ferry/Hauser	1954
Montana Operator: East Bench Irrigation District	Beaverhead	Clark Canyon	1964
Montana Operator: U.S. Bureau of Reclamation Yellowtail power plant online 1966	Bighorn	Yellowtail/Yellowtail Afterbay	1966
Montana Operator: U.S. Bureau of Reclamation	Marias	Tiber	1956
New Mexico Operator: U.S. Bureau of Reclamation	San Juan	Navajo	1963

Table 1 *(continued)*

State	River/Stream	Upstream Dam	Construction Completion
Oregon Operator: Northern Unit Irrigation District	Deschutes	Crane Prairie	1940
Oregon Operator: Northern Unit Irrigation District	Deschutes	Haystack	1957
Oregon Operator: Northern Unit Irrigation District	Deschutes	Wickiup	1949
Oregon Operator: Ochoco Irrigation District	Crooked	Arthur R. Bowman	1961
South Dakota Operator: U.S. Bureau of Reclamation/Rapid Valley Project	Rapid Creek	Pactola	1956
Utah Operator: U.S. Bureau of Reclamation Flaming Gorge power plant online 1963	Green	Flaming Gorge	1962
Utah Operator: Provo River Water Users Association	Provo	Deer Creek Jordanelle	1941 1993
Utah Operator: U.S. Bureau of Reclamation	Currant Creek	Currant Creek	1975
Wyoming Operator: U.S. Bureau of Reclamation Kortes power plant online 1950	North Platte	Kortes	1951
Wyoming Operator: U.S. Bureau of Reclamation	North Platte	Pathfinder	1909

common to western rivers, providing year-round temperatures within an optimal range for insect and trout populations.

The potential benefits of high dams for sustaining large, healthy tailwater trout populations are reduced or subverted in the case of dams built and run primarily for the production of hydroelectric power for urban customers. In this age of air-conditioning, fluctuating household and industrial power demands during the summer mandate drastic changes in stream flows from day to day and during different parts of the day. Seasonal flow patterns for hydroelectric dams can vary sharply, depending on weather conditions and other variables that affect power production and distribution throughout the western states. The uneven flows typical of these dams are more or less damaging to the tailwater food chain. In addition, rapid, unannounced drastic changes in flows are a hazard for wading fisherfolk. Every year a few overly bold, fatally uninformed, sadly unprepared, or just unlucky fly fishers are swept away by sudden dam releases.

To lesser degrees, these effects also appear downstream from USBR high-dam projects that include a power plant as part of their design, which is the case at fourteen of the thirty-one tailwater sites identified in Table 1. But the principal purpose of power generation at most of these sites is to run pumping plants and other USBR project–related operations with relatively stable electrical usage. Hence, downstream flows do not fluctuate so greatly as with projects operated mainly for hydroelectric power production. Consequently, the impact on downstream insect life and on the fisheries, although not negligible, is less severe.

More of the Favored

Under usual conditions, the overall ecological tendency in high-dam tailwater situations is to narrow significantly the natural range of diversity in insect species, but to produce extremely large populations of favored species. In other words, high-dam tailwaters support fewer different types of bugs, but produce huge numbers of these few types. On the Green River, for example, entomologists recorded twenty-three mayfly species before construction of the Flaming Gorge Dam. Now, only four species are well documented.[8] Every fly fisher familiar with western blue-ribbon tailwaters has stories to tell of amazing hatches of one insect or another, perhaps a green drake hatch on the Gunnison River or a Trico hatch on the Big Horn. Such hatches can bring enormous trout to the surface to slurp down the naturals with reckless abandon. These events, your piscatorial expert will probably tell you, are miracles of nature. Of course, they represent nature within a setting that man has reengineered along tailwater streams for other purposes.[9] The welfare of the trout and the satisfaction of avid trout anglers are serendipitous consequences, not part of the cost-benefits analysis that justified USBR high-dam construction.

Not all tailwaters are the same, of course, but a general pattern of insect life can be identified in tailwaters that is distinctly different from what is typically found in undammed western freestone rivers. First, tailwater insects tend to be small, especially in the flow directly below the dams. Midges are abundant. Mayfly species tend to be small close to dams, with a preponderance of blue-winged olives (*Baetis*), whereas larger mayflies like the pale morning duns (*Ephemerella infrequens*) are apt to appear only farther downstream. In most tailwaters, stoneflies are not found at all close to the dam, whereas the stoneflies that hatch downstream are the relatively smaller species rather than the large golden stoneflies and brown willow flies

Table 2: Dam Sites Arranged by Construction Dates

Completion Date	River/Stream	Dam
Before 1940 (3 dams)		
1909	North Platte	Pathfinder
1937	Taylor	Taylor Park
1939	Boca	Little Truckee
1940–1944 (3 dams)		
1940	Deschutes	Crane Prairie
1941	Provo	Deer Creek
1943	Blue	Dillon (Green Mountain)
1945–1949 (2 dams)		
1945	Sacramento	Shasta
1949	Deschutes	Wickiup
1950–1954 (3 dams)		
1950	Boise South Fork	Anderson Ranch
1951	North Platte	Kortes
1954	Missouri	Canyon Ferry
1955–1959 (5 dams)		
1956	Rapid Creek	Pactola
1956	Marias	Tiber
1957	Putah Creek	Monticello
1957	Snake South Fork	Palisades
1957	Deschutes	Haystack
1960–1964 (6 dams)		
1961	Crooked	Bowman
1962	Green	Flaming Gorge
1963	San Juan	Navajo
1963	Colorado	Glen Canyon
1964	Fryingpan	Reudi
1964	Beaverhead	Clark Canyon
1965–1969 (3 dams)		
1966	Big Horn	Yellowtail
1966	Gunnison	Blue Mesa
1968	Gunnison	Morrow Point
1970–1974 (1 dam)		
1970	Little Truckee	Stampede
1975–1979 (2 dams)		
1975	Currant Creek	Currant Creek
1976	Gunnison	Crystal
1980–1984 (2 dams)		
1983	Uncompahgre	Ridgway
1984	Dolores	McPhee
After 1985 (1 dam)		
1993	Provo	Jordanelle

(genus *Acroneuria*) common to western freestone rivers. Some tailwaters hold huge caddis populations; on others, the caddis species seem to be quite unimportant until the trout seeker moves miles downstream, where the tailwater effect gradually disappears. Fly fishers have learned to imitate two other forms of underwater life that are quite important in tailwaters but seldom if ever found in other western rivers: small freshwater crustaceans (genus *Gammarus*), commonly called scuds, and aquatic earthworms (family *Lumbricidae*), which go by the generic name San Juan worms, after the river where their easily tied imitations first became popular.[10] Another common feature of tailwater fishing is the general summertime prevalence of terrestrial bugs—ants, beetles, grasshoppers, and cicadas—that are high-protein trout food, easy to imitate, and productive with a surface presentation.

Peculiar to a few Colorado tailwaters are Mysis shrimp, native to lakes in the Canadian far north. During the 1960s, Colorado state biologists introduced these shrimp in Reudi Reservoir and Taylor Park Reservoir to provide a food source for planted kokanee salmon and lake trout. Unfortunately for the professional reputation of those who conceived this plan, the appearance and behavior of the Mysis—which are as clear as glass and which feed near the surface only at night, then descend to the depths during the daylight hours—left them virtually invisible and untouched by the sight-feeding kokanee. But the shrimp ate heartily of the zooplankton that the kokanee relished. Although lake trout flourished on a Mysis diet, ironically these impoundments experienced a sharp cutback in kokanee numbers. Downstream, something else happened. Mysis shrimp were swept from the lower layers of the reservoirs through the dams and into the tailwaters, where they became shrimp candy for the foraging trout. Fly fishers soon found it possible to catch fat, fat Mysis-gulping superfish. Below Reudi Dam on the Fryingpan River and below Taylor Park Dam on the Taylor River, the tailwaters became famous (and remain famous) for huge short trout—6, 8, even 10 pounds in weight—shaped like footballs with fins attached, taken deep on minimal small flies that can be tied with white thread, a few fibers of Antron, and a little scrap of clear plastic wrap or closed-cell packing foam.[11]

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With the rich mixture of trout food available in blue-ribbon tailwaters, a distinctive set of expectations and fly styles have come to characterize these fishing sites, influenced by local conditions and changing seasons. Easily the most effective way to fish most of the time is with small underwater artificials: nymph, scud, and worm imitations presented on light tippets, weighted to reach the fish near the streambed, and usually with either a bobbing surface strike indicator or an indicator fly tied in above. Dry-fly fishing will be limited to those happy few hours when a hatch is on. But especially in the late summer and early fall months, an abundance of grasshoppers and other terrestrials also means fishing success when their imitations are floated on top of the water. Midge fishing is the newest trendy fashion among fly fishers. These tiny two-winged flies challenge the hopeful angler to tie and fish imitations on hooks as small as size 22, 24, or even 26 and 28 (which are about an eighth of an inch long) and on extremely light tippets—a daunting challenge especially for senior devotees of the piscatorial art whose eyes are no longer what they might once have been. These miniature flies are fished deep or in the surface film, and it requires a delicate presentation and exquisitely honed skills for hooking and landing large trout on ultralight tippets. While midge fishing is

Mysis relicta.
Photograph courtesy of the U.S. Geological Survey.

also successful on spring creeks, east and west, this demanding technique has come to prominence mainly as a response to the challenge of stalking educated tailwaters trout.[12]

Reengineering: Biology and Politics

The mix of trout species commonly present in the West's blue-ribbon tailwaters is another element affected by the reengineering of nature. Cutthroat trout, with many localized subspecies, were the trout native to the interior West and many parts of the Pacific Slope. Rainbow trout were originally located within a much more restricted range, mainly at lower elevations in the waterways and lakes of the western Cascades and the Sierra Nevada. For many reasons mainly related to an impulse to improve recreational sport fishing, private individuals and then federal and state fisheries agencies in the late nineteenth century started to introduce exotic fish species here and there throughout the West. Brook trout from New England and brown trout from Europe each had their advocates, who made sure these species were planted in accommodating lakes and streams in the western states. Even more popular, however, were the rainbow trout: brilliantly colored, known for their proclivity to take to the air when hooked, and yet not particularly hard to attract with an artificial lure or fly. A hardy, fast-growing strain of rainbow trout from northern California became the brood stock for a massive dispersion of these fish throughout the West and into eastern states and overseas as well. Federal and state hatcheries began to rear millions of rainbows annually that were dumped either as fingerlings or—from the 1930s onward—as so-called catchable fish into any waters that could be reached by tank trucks or mule packlines, or later by small planes or helicopters. The result was to expand vastly the number and extent of fishable waters in the West. But the hatchery mania had unforeseen environmental consequences, not least the serious depletion or even eradication of native cutthroat, golden trout, Paiute trout, and other, less hardy strains of rainbow trout, all of which proved to be at a competitive disadvantage against the hatchery-bred invaders.[13]

Politics and biology intersect and often collide on issues related to large-scale fish stocking programs that rely on hatcheries. With their funding dependent on the sale of fishing licenses, state fisheries agencies are usually quite sensitive to the need to preserve stocking programs for so-called put-and-take fisheries, where untutored, unskilled fishers can readily catch a few recently planted hatchery fish with the simplest of methods and equipment. Meanwhile, fisheries biologists and an ever-growing constituency among fly fishers deplore the consequences of indiscriminate stocking over the past century. Throughout the West, local fly-fishing groups and scientists have allied in seeking to place premium waters off limits to fish planting and the put-and-take style of fish harvesting. Blue-ribbon tailwaters, with their rich suitability for raising trout by natural reproduction, are near the top of the list for those who advocate the creation of sustainable fisheries without the constant addition of hatchery-raised fish.

Because of the historical popularity of stocking programs, the trout populations in blue-ribbon tailwaters are by no means limited to native fish. Brook trout are seldom present, but brown trout and rainbow trout are commonly found, along with cutthroat. In many localities, a cutthroat-rainbow fertile hybrid, a *cutbow* as it is commonly called, is also part of the fishery. These different species coexist, each with distinctive traits, behaviors, and some degree of ecological niche specialization. What is important to fly fishers is that most of these fish, although they are not all natives, are completely naturalized; they have hatched and grown to maturity in the stream. They have never tasted little brown hatchery pellets; they have never competed with hundreds of thousands of their finny, voracious siblings in a narrow concrete tank. They are, according to another fly fishers' term, wild trout.

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Yet how wild are they? One sure way to spark a lively discussion among western fly fishers today is by characterizing blue-ribbon tailwaters as piscatorial Disneylands—Disneylands with trout.[14] The extremely large numbers of trout present in some tailwaters stagger the imagination of experienced fisherfolk. Fish census figures report an amazingly high 6,000 to 8,000 or more catchable-size trout per mile in the Big Horn River downstream from Yellowtail Dam or in the Green River downstream from Flaming Gorge Dam. Under optimum conditions with fast rates of growth, moreover, the average size of these tailwater trout can be astounding. Sixteen-inch or even 18-inch rainbows, regarded

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Drift fishing the lower Sacramento River's Shasta Dam tailwater.

as very good fish on other streams, may come to seem like little fellows after a few days' fishing on one of the prime blue-ribbon tailwaters. Four- and 5-pound trout are rare anywhere, but certainly less rare in the most productive western tailwaters. On those waters where Mysis abound, the fish might even be called Disneyland trout on steroids. Under favorable conditions, large tailwater trout can be taken in substantial numbers by any reasonably experienced fly fisher who can match the bugs *du jour* and present the imitations accurately with a natural drift and a delicate touch.

Still, despite their abundance, tailwater fish are not always easy to catch. Particularly in heavily fished waters with catch-and-release regulations, which now include most western blue-ribbon tailwaters, trout become discriminating with experience: once caught (and released), twice or thrice shy is the rule. These so-called wild trout are naturally reproducing trout with an education. Although their brains are no larger than a pea, on some days the better-educated fish will surely outsmart the big-brained people standing in the water and waving a very expensive graphite stick at them.[15] And just as in some heavily fished western spring creeks, the fish become accustomed to being hooked, with resulting modifications in their behavior that deserve the attention of fisheries scientists.

The abundance of fish and the conditions of fishing—perhaps with large numbers of fly fishers vying for a turn at the better runs—make tailwater fishing quite a different experience from the solitary pursuit of wild native trout in a small headwaters stream located long, leg-wearying miles from pavement. Ambitious, physically well-conditioned, high-energy purists among fly-fishing addicts will continue to prefer their secret places where no trails lead. But doesn't everyone like to go to Disneyland at least once in a while? Yet ecological historian Paul Schullery interposes a skeptical view of tailwaters, emphasizing the environmental cost of tailwater fisheries. They are ecological palimpsests, he has recently stated, "new river ideas written abruptly and violently over the top of old river ideas." Tailwaters, he reminds us, "are trout fisheries built upon the wreckage of whatever native aquatic ecosystems were there before the dam went in."[16]

A Recognized Subdiscipline

The discovery of tailwater fly-fishing opportunities came as no sudden revelation to trout chasers. Rather, one can see in the literature from the mid-1970s forward a gradually dawning awareness that some high dams in western states created special situations for great fishing. Stories in fly-fishing magazines were followed by expert books about specific tailwater fisheries. In 1991, the publication of Ed Engle's fine book, *Fly Fishing the Tailwaters,* first drew wide attention to the tailwater big picture. Colorado-based Engle and his fishing friends made Cheeseman Canyon, below the power-generating Cheeseman Dam on the South Platte River, their piscatorial kindergarten where they learned the basics of tailwater fishing. Travel to other tailwater fishing locations throughout the West increased their appreciation of the unique and wonderful opportunities common to these streams.

Chris Parsons

An urban tailwater: wading the lower Sacramento River at Redding, California, below Shasta Dam.

In the fifteen years since the publication of Engle's book, tailwater fly fishing has become, in effect, a recognized subdiscipline within the world of western trout hunters. Because fly fishing has continued to increase in popularity, the growing thousands upon thousands of devotees are crowding each other in the search for suitable fishing venues. In every western state, the issue arises of public access to good trout water. Private landowners find themselves in conflict with the fly-fishing community as represented by local groups and by Trout Unlimited. Tailwater fisheries have particular importance in efforts to strike a balance between the competing interests of recreational water users, including fly fishers, private landowners, and those municipalities or other public agencies with a prior-use claim to scarce western water resources. These fisheries can usually tolerate crowds of fish-infatuated visitors without destroying the resource, assuming that the fishery is regulated to sharply limit the catch or allow only catch-and-release fishing. Because they are bordered by publicly owned land, most USBR tailwater fisheries are easily accessible. On many larger rivers, access and use is further aided by convenient public launch sites for drift boats and other motorless craft, and frequently campgrounds are close at hand. Although data are not available, logic suggests that public availability of blue-ribbon tailwaters, some within easy driving distance of western urban centers and others in remote rural locations, relieves pressure on less accessible, less durable trout streams. And for fly fishers, tailwaters can provide a preferable alternative to competition with the crowds following the hatchery trucks.

We have partial figures—perhaps no more than guesstimates—on the dollar value of fly fishing and fly-fishing tourism for a few western localities. In *Fly Fishing the Tailwaters,* Ed Engle states (without specifying a time frame) that the Mysis-fattened trout of the Fryingpan River brought one million dollars' worth of new business to the local economy. More recently, a committee of the Colorado state legislature estimated that sports fishing in Colorado—a category in which fly fishers are prominent—had in 1996 more than one million participants, who spent in excess of $972 million. That figure likely does not count either the catalog purchases of fishing gear or the fly-fishing trips to Colorado sold by out-of-state fly shops and other non-Colorado businesses.[17] More trustworthy, perhaps, are the figures of the American Fly Fishing Trade Association, which estimates that there are nationwide seven million active fly anglers, who spend more than $600 million annually on fishing equipment and related gear.[18] Total expenditures for

fly-fishing travel and guide services on fish-rich streams are very likely two or three times that amount, judging from estimates by a small informal sample of fly-shop owners.

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Tailwater fisheries have become highly significant in many western localities, creating opportunities for wonderful fly fishing where, before USBR high-dam construction, there were no trout, or at best, the fishing was marginal. The development of tailwater trout fisheries, unplanned and at first virtually unregulated, now has come to attract widespread attention in the fly-fishing world. Feature articles in fly-fishing magazines and dozens of books highlight these sites, encouraging their use by well-informed, well-equipped, well-heeled, and perhaps well-skilled fishers. Because of their recreational benefits and their direct economic value to surrounding communities, sustaining these exceptional fisheries should become a key element in water resources management by the USBR and cooperating agencies. But to the present moment, bureau administrators still tend to ignore or downplay the importance of tailwaters and their fly-fishing constituency.

The steps necessary to optimize blue-ribbon tailwaters for fly fishers and to maintain these fisheries into the distant future are relatively few. First, for those tailwaters not yet under special regulations, bureau representatives should work with state fisheries agencies, Trout Unlimited, fishing-guide associations, and any local fly-fishing interest groups to institute a catch-and-release policy or, at a minimum, highly restrictive fish bag limits while allowing only artificial lures and barbless hooks. Second, with such regulations in place, bureau administrators should also encourage state fisheries officials to eliminate fish stocking or reduce stocking programs to a minimum in tailwater situations in order to establish a naturally reproducing trout population. Third, particularly for those dams operating under the supervision of local water users boards, the bureau should revise water management guidelines to assure appropriate minimum downstream flows even during drought cycles, preventing dewatering episodes that unduly stress or wipe out viable native trout populations. Fourth, bureau managers should reexamine, case by case, the daily and seasonal pattern of water releases, especially at those dams that combine power generation with storage for irrigation purposes. Relatively small modifications in flow regimes, according to a limited few studies, have the potential to enhance greatly some tailwater fisheries. These decisions also should involve consultation with representatives of the local fly-fishing community and especially tailwater fishing guides, who may spend two hundred days or more a year on their home waters and so are the most experienced monitors of the day-to-day condition of the fishery.[19]

Although not reliably quantifiable, the economic benefits from blue-ribbon tailwater fisheries are substantial in many communities served by the Bureau of Reclamation. Because of USBR projects, fly fishing has called into existence new local businesses and new vested interests whose needs should be considered alongside the concerns of the bureau's traditional rural constituencies. Finally, although this matter is largely untested in the courts, current environmental law suggests that tailwater trout themselves may have the potential to gain legal standing, with interests in an assured minimum stream flow that could perhaps require recognition under federal and state legislation. Responsible management of its high dams by the bureau will seek to minimize conflicts over water usage and maximize the benefits of its projects for all interested parties, including tailwater fly fishers and the abundant trout populations that they come seeking to catch—and then to release.

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Mike Gurnett, photographer, Montana Fish, Wildlife and Parks Department

View of the renowned Missouri River "boat hatch" on the Canyon Ferry tailwater during a full-scale fishers' frenzy.

ENDNOTES

1. This information comes from U.S. Department of Interior, Water and Power Resources Service, compiled, *Project Data 1981* (Denver: U.S. Government Printing Office, 1981), a weighty comprehensive guide to USBR projects. It is now supplemented by the bureau's excellent informational website: http://dataweb.usbr.gov.

2. High dams are built primarily to impound huge amounts of water for irrigation and flood control purposes; power generation is incidental. Dams built for hydroelectric generation are usually lower, with heavier volumes of water being released. My selection of the designated thirty-one "high dams" for this article reflects not only their design and use, but also the appearance of these thirty-one in the fly-fishing literature as good places to fish—the "blue-ribbon" effect.

3. Shasta Dam's development as a major tailwater fishery actually is more recent, resulting from the installation of an $80 million temperature-control device on the dam's face in 1997, intended to benefit the declining runs of Chinook salmon by providing cold water to their downstream spawning beds. The change in water temperatures unexpectedly created a new year-round fishery for large, wild rainbow trout that by 1999 made this section of the Sacramento, according to one fishing guide, "one of the hottest trout rivers in America right now" (Thom Gabrukiewicz, "Off season never really arrives for Sacramento trout," *Sacramento Bee*, 1 December 1999, E6).

4. Three complementary essays summarize recent fly-fishing history in the West, emphasizing the sport's role in modern western culture: Ken Owens, "Fishing the Hatch: New West Romanticism and Fly-Fishing the High Country," *Montana: The Magazine of Western History* (summer 2002, vol. 52, no. 2), 10–19; Adrian Bantjes, "Nature, Culture, and the Fly-Fishing History of Wyoming and the Rocky Mountain West," *Annals of Wyoming* (spring 2004, vol. 76, no. 2), 41–53; and Paul Schullery, "Fly Fishing in Western Culture," Chapter 2 in *Cowboy Trout: Western Fly Fishing As If It Matters* (Helena, Mont.: Montana Historical Society Press, 2006).

5. The most widely read and influential introduction to trout fishing during the World War II and postwar era was *Trout* by Ray Bergman, originally published in 1938, with a revised and enlarged second edition published in 1965 (New York: Alfred A. Knopf). This excellent book did not notice tailwaters. Another comprehensive and popular guidebook in its time was Arthur H.

Carhart's *Fishing in the West* (Denver: Sage Books, 1950), which reflected the general lack of awareness about tailwater fisheries, despite the existence of tailwater situations below hydroelectric power dams in many localities on the Pacific Slope since at least the 1920s. Such esteemed authors of the postwar era as Ted Trueblood, Joe Brooks, and Ernest Schwiebert also gave no specific recognition to tailwater fishing opportunities in the West.

6. Quoted in Richard Alden Bean, "Lee's Ferry," *California Fly Fisher* 9-3 (January/February 2001, vol. 9, no. 3), 32–33.

7. Dave Foster of Marble Canyon Guide Service, quoted in Bean, "Lee's Ferry," 33.

8. Dennis Breer, *Utah's Green River: A Fly Fisher's Guide to the Flaming Gorge Tailwater* (Portland, Ore.: Frank Amato Publications, 1998), 60.

9. This summary description of tailwater ecology depends heavily on material in Ed Engle, *Fly Fishing the Tailwaters* (Harrisburg, Pa.: Stackpole Books, 1991). Also important is Robert Behnke, "Tailwater Trout: Fish of Enormous Size," *Trout* (spring 1996), 43–44.

10. See Engle, *Fly Fishing the Tailwaters,* Chapter 2. Much of Engle's description rests on the observations of J. V. Ward, whose 1973 Ph.D. dissertation at the University of Colorado documented the postconstruction changes in insect life on the South Platte River below Cheeseman Dam.

11. Engle, *Fly Fishing the Tailwaters,* 141–42: "Mysis Shrimp Mysteries."

12. Exemplary of the recent enthusiasm for tailwater midge fishing is the following sample of articles taken from two leading fly-fishing publications during one year: Jim Schollmeyer, "Effective Midge Patterns for Streams," *Flyfishing & Tying Journal* (winter 2001), 90–93; Brian Chan, "Fly Fishing Biology: Midges," *Flyfishing & Tying Journal* (winter 2001), 82–85; Ed Engle, "Springtime Tailwater Fishing," *Flyfishing & Tying Journal* (spring 2001), 30–35; Ross Purnell, "Midge Tactics for Tailwater Trout," *Fly Fisherman* (September 2001), 34–37, 60–61; Dave Rothrock, "Tiny-Nymph Tactics," *Fly Fisherman* (September 2001), 46–49, 68; Trapper Badovinac, "Fishing Small Dry Flies," *Fly Fisherman* (September 2001), 54–57, 64. This last publication also features a how-to-do-it-style article on effective midge patterns: Rick Takahashi, "Fly Tier's Bench—Yong's Special," 62–64. The strength of this movement is demonstrated even more by the publication of *Midge Magic* by Don Holbrook and Ed Koch (Harrisburg, Pa.: Stackpole Books, 2001), which followed on the success of Neale Streeks and Rod Walinchus, *Small Fly Adventures in the West: A Guide to Angling for Larger Trout* (New York: Pruett Books, 1997) and Darrel Martin, *Micropatterns: Tying and Fishing the Small Fly* (New York: Lyons & Burford, 1994).

13. For detailed and appreciative accounts of the West's native trout, see Patrick C. Trotter, *Cutthroat: Native Trout of the West* (Boulder, Colo.: Colorado University Press, 1987) and Robert J. Behnke, *Native Trout of Western North America* (Bethesda, Md.: American Fisheries Society, 1992). No comprehensive account of the movement to introduce exotic trout and other fish species in western waters has yet appeared. Likewise, the related turn toward a reliance on hatchery programs as a mainstay in fisheries management—a policy meant to alleviate the damage to fish populations from environmental degradation, overfishing, and overdrafts on limited stream flows—also waits full telling. These topics, however, appear in bits and pieces throughout the literature of western fisheries and fishing.

14. The Disneyland analogy received wide circulation with the publication of Gary LaFontaine's column, "The Bighorn River: As You Like It," in the spring 1998 issue of *Trout,* pages 59–61. For a followup, see Gary LaFontaine, "Sparring over Fly Lines and Tailwaters," *Trout* (summer 1999), 57–59.

15. My thanks to John Gierach for this phrase, adapted from one of his fine books of trout-fishing stories, *Standing in the Water and Waving a Stick* (New York: Lyons & Burford, 1999), which includes essays about tailwater experiences. Gierach, who moved to Colorado in the late 1960s, records a first discovery of western tailwater fishing on a small, privately owned stretch of stream in the third chapter of *Where the Trout Are All as Long as Your Leg* (New York: Lyons & Burford, 1991).

16. Paul Schullery, "Blocking Rivers, Part II," *American Angler* (fall 2006, vol. 29, no. 5), 25.

17. House Joint Resolution 97-1035, Committee of Agriculture, Livestock and Natural Resources, First Regular Session, Sixty-first General Assembly, 7 May 1995, State of Colorado. The full text is available online: www.state.co.us/gov_dir/leg_dir/res/HJR1035.htm.

18. These figures are contained in news releases posted on the AFFTA's website: affta.com.

19. For an instructive example of cooperation between dam administrators and local fly-fishing interest groups, see Hugh Gardner, "Dateline: Wyoming," *The Angling Report* 13-5 (May 2000, vol. 13, no. 5), 1–3.

Chris Parsons

Fall fishing in the lower Sacramento River tailwater at Redding, California, below Shasta Dam.