

ECONOMIC VALUE OF GOLDEN TROUT FISHING IN THE GOLDEN TROUT WILDERNESS, CALIFORNIA

An Analysis By
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A Report for California Trout

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Cover illustration courtesy of Michael Flynn

FOREWORD
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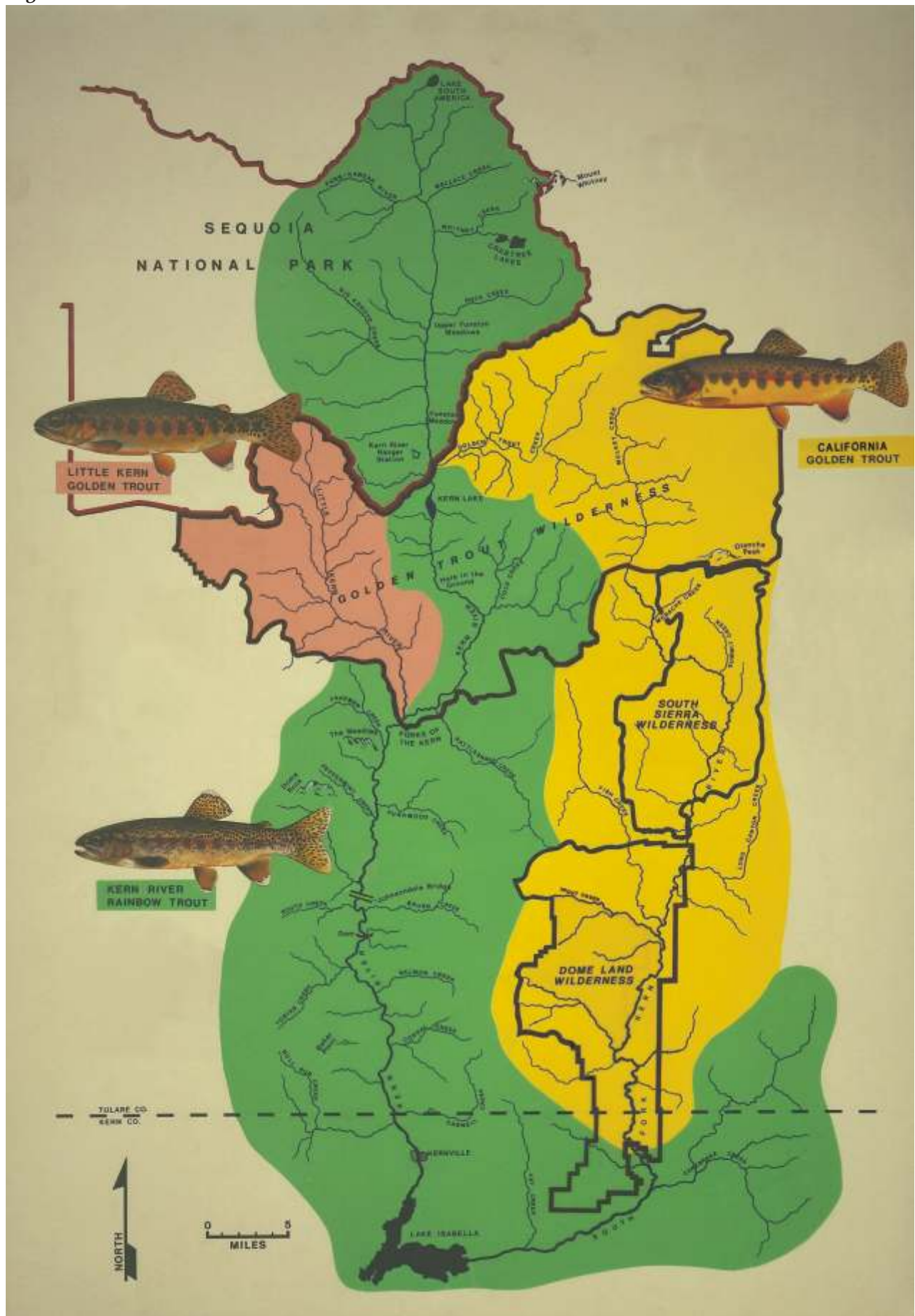
Cattle began grazing the Kern Plateau more than 130 years ago, long before the area and surrounding environs were established as the Inyo and Sequoia national forests. Various studies have documented that cattle grazing can seriously damage water and land resources. But attempts to reform grazing management policy on the Kern Plateau and to protect native species in this case, California's state fish, the golden trout, and its close relative have met with little success.

In part, the failure to reform grazing management stems from the long-held view that cattle ranching is the cornerstone of the local economy. Virtually ignored in management decisions are the economic benefits of recreational fishing, which depend to a large extent on the existence of native golden trout in viable habitat. Ignored, too, are well-documented studies that indicate protection of natural settings will attract visitors and their dollars to an area, as well as new business and new residents who seek a better quality of life.

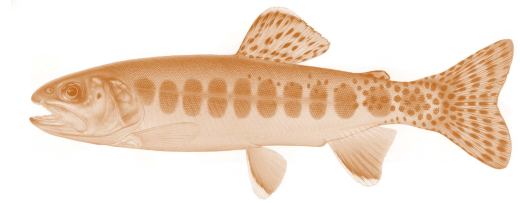
California Trout presents this analysis to inform the public debate over the fate of the Kern Plateau. Even its conservative results indicate that substantial economic benefits will accrue if steps are taken to preserve habitat for the golden trout.

We note, too, that the methodology used in the analysis can be readily adapted for use in other areas of California. Ultimately, we believe that the information in this document and data from similar studies will help protect areas that are well known and deservedly so for their beauty, wildlife, and valuable ecosystem functions, but that also offer potentially significant economic benefits.

Figure 1



Trout Drawings courtesy of Joseph R. Tomelleri



Report Summary

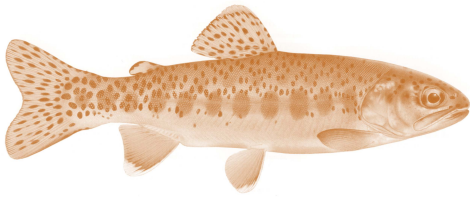
There is no mistaking the California golden trout. Its brilliant red and gold hues have long fascinated anglers in California's southern Sierra Nevada region. But populations of the golden trout California's state fish are declining, even in the Golden Trout Wilderness on the Inyo and Sequoia national forests. The primary causes are predation by brown trout, hybridization with non-native rainbow trout, and habitat degradation brought about by livestock grazing. Both the State of California and the Forest Service list the golden trout as a species of special concern, and the U.S. Fish and Wildlife Service is considering whether to list the subspecies under the federal Endangered Species Act.

This report describes the economic value of recreational fishing for golden trout and two related species in the Golden Trout Wilderness. The report also compares those values with livestock grazing, the other major economic activity in the wilderness area.

The Golden Trout Wilderness was chosen for this study because it provides most of the golden trout's remaining, relatively intact native habitat. The study area includes the Kern Plateau, containing Golden Trout Creek and the North and South forks of the Kern River in Tulare and Inyo counties (Figure 1). Of particular interest are 26 miles of native habitat along the South Fork Kern River, from the headwaters to Kennedy Meadow, in the Inyo and Sequoia national forests.

Maintenance of golden trout populations in Golden Trout Creek and South Fork Kern River will require active management, including elimination of competing non-native trout and elimination of grazing along the streams (Moyle et. al 1996). Documented impacts of livestock grazing in the wilderness area include fecal contamination, erosion of stream banks (which results in large amount of stream sedimentation that fill in many pools important to fish survival over the winter), channelization of shallow stream, trampling of spawning beds, and loss of vegetation and hiding cover.

In a recent study, Knapp and Matthews (1996) found that grazed portions of the Golden Trout Wilderness were in poorer condition than ungrazed portions of the wilderness area and that grazing-induced habitat degradation was harmful to the remaining populations of California golden trout. The study suggested "resting" of grazing allotments or reductions in livestock numbers to lessen the impacts of grazing on stream and riparian ecosystems in the Golden Trout Wilderness. This method of restoration is both easier to implement and more cost-effective than previous stream habitat rehabilitation efforts, which relied primarily on structural remedies such as bank stabilization and demonstrated only limited success. In 2001, the Forest Service decided to rest two grazing allotments in the Inyo National Forest for 10 years. Approximately 88,000 acres of those allotments are in the Golden Trout Wilderness (USDA Forest Service 2001).

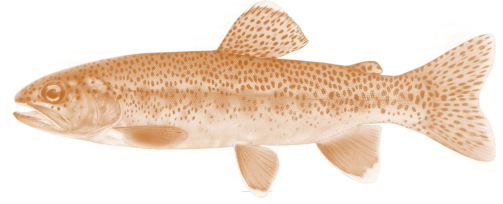


According to the Knapp and Matthews study, restoration of the stream and riparian ecosystems would increase meadow stability, improve habitat for native California golden trout, and enhance conditions for a wide range of other riparian-dependent species. In addition to ecological benefits, Knapp and Matthews conclude that preventing the extinction of California golden trout through measures such as habitat restoration will yield substantial economic benefits tied to recreational fishing.

This analysis for California Trout estimates the economic benefits of recreational fishing in the Golden Trout Wilderness at \$148,000 to \$713,000 a year. Economic benefits from grazing in the Golden Trout Wilderness, on the other hand, are estimated at \$35,000 a year.

The estimate for recreational fishing is a conservative estimate of the value of golden trout because it does not include non-fishing recreation values or passive-use values the option value that accrues from maintaining the ability to fish for the species in the future, the existence value to the general public from knowing that the California state fish continues to thrive in the wild, and the bequest value of providing viable populations of the golden trout for future generations. Studies suggest passive-use values are at least equal to and may be several times greater than recreation use values (Loomis and White 1996, Brown 1993).

In addition, this analysis found that annual Forest Service receipts from wilderness permits and pack station fees that are potentially related to fishing in the Golden Trout Wilderness are more than twice the amount generated from livestock grazing receipts. Some of the recreation revenues and benefits would undoubtedly be lost if California golden trout were to go extinct or if population levels were to fall below the threshold that allows recreational fishing.

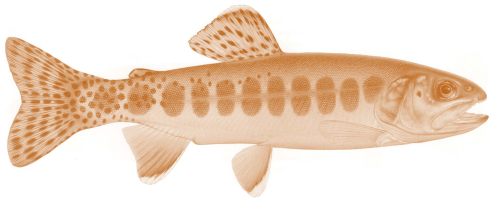


Recreational Fishing in California

Anglers come from across this country and around the world to fish California's coastal and inland waters. Of the 9.4 million people who participate in wildlife-related recreation each year in that state, 29 percent choose to fish mostly in freshwater streams, mostly (70 percent) for trout, and mostly for wild trout (U.S. Department of the Interior, Fish and Wildlife Service/U.S. Department of Commerce, Bureau of the Census 1998; Anderson 1990). In the Sierra region, anglers are showing increased interest in fly fishing for "natural" trout and in an expansion of catch-and-release programs (Duane 1996a).

Sales of sport fishing licenses and stamps generated more than \$48 million in revenue for the California Department of Fish and Game in 2000. Revenue from the sale of sport fishing licenses is deposited into the Fish and Game Preservation Fund and used, among other things, to raise and plant trout, steelhead, and salmon (California Department of Fish and Game 2002).

Trip and equipment expenditures associated with freshwater fishing in California totaled \$2.3 billion in 1996. Equipment represented the largest share (60 percent) of expenditures, followed by food and lodging (16 percent), transportation (12 percent), and other items (12 percent). Each angler in California spent an average of \$972 that year (U.S. Department of the Interior, Fish and Wildlife Service/U.S. Department of Commerce, Bureau of the Census 1998).



Recreational Fishing in the Golden Trout Wilderness

California golden trout, Little Kern golden trout, and Kern River rainbow trout (hereafter referred to collectively as golden trout) are the main target species for recreational anglers in the Golden Trout Wilderness. The vast majority of all golden trout and the only pure golden trout reside in the wilderness. A few are found north of the wilderness boundary, and these species have also been planted as far away as Wyoming and England.

California Fish and Game Commission sport fishing regulations (2002) specify that fishing is allowed in the Golden Trout Wilderness (within the Sierra Sport Fishing District) from the last Saturday in April through October 31, except:

- Cottonwood Creek and drainage lakes, Little Cottonwood Creek and tributaries in Inyo County July 1 through October 31
- Golden Trout Wilderness Area in Tulare County last Saturday in April through November 15

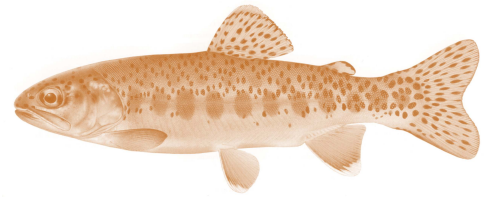
Golden Trout Creek and the upper Kern River have been designated as “heritage trout” waters and are managed to protect habitat for native trout. Special regulations apply as follows (California Department of Fish and Game 1999):

- Golden Trout Creek (entire drainage, including tributaries from the Kern River upstream to the headwaters in Tulare County) last Saturday in April through November 15. The heritage trout species is the California golden trout.
- Upper Kern River (from Forks of the Kern, upstream to Tyndall Creek in Sequoia National Park) last Saturday in April through November 15. The heritage trout species is the Kern River rainbow trout. Golden trout are among the other species that are occasionally present.



California Golden Trout

Economic Benefits of Recreational Fishing for Golden Trout



The economic benefits associated with recreational fishing in the Golden Trout Wilderness serve as a reasonable estimate of the economic value of recreational fishing for golden trout because golden trout are generally the only target species for recreational anglers in the wilderness. Such an estimate is also conservative because it does not take into account non-fishing recreation values or passive-use values described earlier, and because it does not include golden trout (hybrids) outside the Golden Trout Wilderness.

Estimating the economic benefits from recreational fishing for golden trout requires data on both the number of anglers and the economic benefits per angler. For this report, the number of anglers was based on the number of visitors to the Golden Trout Wilderness, as described below. The economic benefits per angler were obtained from published studies.

Estimating the Number of Potential Anglers

Forest Service staff provided data related to the number of people who entered the Golden Trout Wilderness at each trailhead and other points of access during 2001 (by month) and the number of nights they stayed.

Trailheads. Hikers must obtain a permit for overnight camping in the wilderness (permits are not required for day use). Between May 1 and November 1, entry quotas limit the number of people per day on the trails. The exception is Cottonwood Pass, where quotas are in effect from the last Friday in June through September 15.

During 2001, at least 5,228 people with permits visited the Golden Trout Wilderness (Table 1).¹ About two-thirds, or at least 3,387 people, entered on the western side of the wilderness in the Sequoia National Forest at the following trailheads: Blackrock, Osa Meadow, Lion Meadow, Rincon, Forks of the Kern, Jerkey, Lewis Camp, Clicks Creek, Summit, Jacobson, Griswold, and Long Canyon. The remaining visitors entered on the eastern side of the wilderness at trailheads in the Inyo National Forest: Cottonwood Pass, Olancho Pass, Trail Pass, Kennedy Meadows, Mulkey Pass, and Blackrock.² On the west side, a significant number of people entered the wilderness on pack animals or riding stock.

1. Wilderness permit data for the Sequoia National Forest are not available from October 2001 through December 2001 (Bauer 2002).

2. Both the Sequoia and Inyo national forests issue wilderness permits for the Blackrock Trailhead. In 2001, most permits for this trailhead were issued by the Sequoia National Forest (USDA Forest Service 2002a and 2002b).

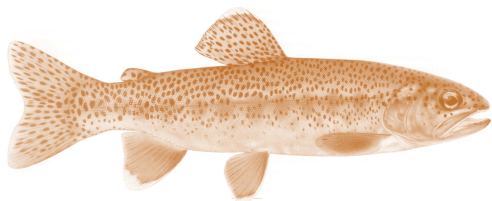


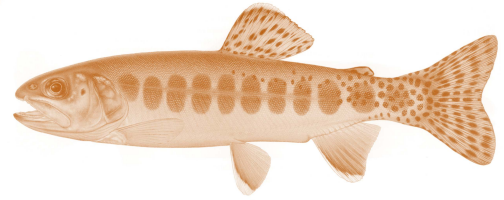
Table 1. Wilderness Permits for Golden Trout Wilderness, 2001

Month	Number of People			Number of Animals / Stock		
	West	East	Total	West	East	Total
January	8	0	8	0	0	0
February	0	1	1	0	0	0
March	1	0	1	0	0	0
April	10	0	10	0	0	0
May	525	48	573	72	4	76
June	603	254	857	124	0	124
July	832	478	1310	221	23	244
August	828	665	1493	247	44	291
September	580	354	934	164	19	183
October	*	36	> 36	*	0	> 0
November	*	5	> 5	*	0	> 0
December	*	0	> 0	*	0	> 0
Total	> 3,387	1,841	>5,228	> 828	90	> 918

Sources: USDA Forest Service. 2002a and 2002b. Sequoia National Forest, Cannell Meadow Ranger District; Inyo National Forest, Wilderness Permit Office.

* Not available > Greater than

Monache Jeep Road, Inyo National Forest. The Monache Jeep Road provides access to camping sites in Monache Meadow just outside the southwestern boundary of the wilderness area. People with four-wheel drive vehicles can drive in, camp, and walk into a wilderness portion of the South Fork Kern River without getting a wilderness permit. The road is generally open from late May or mid-June to early November. The South Fork of the Kern River flows south through Monache Meadow and is inhabited primarily by wild stocks of German brown trout and hybrid golden/rainbow trout (USDA Forest Service no date). California golden trout may also be found in this section of the river (Lentz 2002). During 2000, about 9,225 people visited the Monache Meadow area between the end of April and the end of November (Molzahn 2002).



Commercial Pack Stock Trips.

Several private companies have permits from the Forest Service to provide pack trips into the wilderness. Pack services include transport of camping equipment and supplies to a specified location and then back to the pack station on a pre-designated day (“spot trips”), multi-day trips with a packer and stock, and “all expense” trips in which the pack station provides meals as well as a packer and stock. The companies issue wilderness permits to their clients.



Photograph courtesy of Carla Cloer

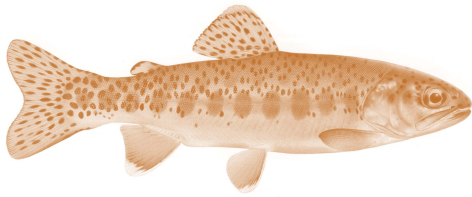
Five pack stations led trips to or through the Golden Trout Wilderness in 2001, two on the east side (Inyo National Forest) and three on the west side (Sequoia National Forest). Clients spent a total of 1,692 user days (equivalent to the number of people times the number of days) in the wilderness (Table 2). Most of these trips were one-way or spot trips (Molzahn 2002). Forest Service records do not indicate which entry and exit points were used.

Table 2. Visitors Using Commercial Packers in the Golden Trout Wilderness

Region and Pack Company	Number of People	Number of User Days
East: Inyo National Forest		
Cottonwood Pack Station	Not Available	80
Rock Creek Pack Station	40	240
Subtotal	> 40	320
West: Sequoia National Forest		
Balch Park Pack Station	83	212
Golden Trout Wilderness Packtrains	221	1,062
Mineral King Pack Station	32	98
Subtotal	336	1,372
Total	> 376	1,692

*Sources: USDA Forest Service. 2002a and 2002b. Sequoia National Forest, Tule River Ranger District and Inyo National Forest, White Mountain/Mt. Whitney Ranger Districts.
> Greater than.*

3. The Rock Creek Pack Station also conducts a Professional Packer School in the Golden Trout Wilderness (with the University of California, Davis). These participants are not included in Table 2 because fishing is not the intent of the trip. Most of Rock Creek Pack Stations trips are to the John Muir Wilderness (Rock Creek Pack Station 2002)



Flyfishing Guides. There is one flyfishing guide who has a permit to lead trips from the west side, but he reported no use within the Golden Trout Wilderness in 2001 (Bauer 2002).

Other Visitors. Groups often visit the Golden Trout Wilderness for work or educational trips. They include the Backcountry Horsemen of California, a service and education organization concerned with stock use in backcountry; Aguabonita Flyfishing Club; Sierra Club; the Boy Scouts of America; and area schools. Some people who own property in the wilderness may sponsor equestrian trips. In addition, whitewater rafting trips originate from the Forks of the Kern in the Golden Trout Wilderness, but most of the river traveled by the rafters is in the non-wilderness portion of the Sequoia National Forest (Bauer 2002).

Estimating the Number of Angler Days

Variations in fishing seasons within the Golden Trout Wilderness present a challenge in estimating the number of potential anglers. In addition, visitor data for wilderness permits is not available by destination (only by entry point), so the number of visitors to Golden Trout Creek, for example, is unknown. And while fishing is allowed as early as April, the high elevation habitat for golden trout is generally inaccessible until June because of snow (Matzke 2002). Therefore, this report used the most conservative estimate of the number of potential anglers during fishing season that is, the number of visitors who obtained permits between July 1 and October 31. There are only a few golden trout fishing areas that can be reached without an overnight stay. Thus, all permitted wilderness visitors from July through October were considered potential anglers.

During the four months, visitors with permits totaled at least 3,773 - 2,240 from the west side and 1,533 from the east side trailheads. Those visitors accounted for 21,014 user days (Table 3). All of the commercial pack trips occurred during fishing season, so all 1,692 user days from the pack trips were counted as potential angler days.

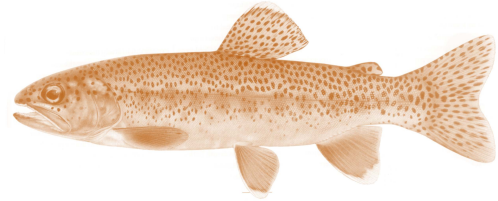


Table 3. Golden Trout Wilderness User Days during Fishing Season and Angler Days by access location

	Number of User Days ^a	Number of User Days	
		Upper Bound ^b	Lower Bound ^c
Wilderness Permits			
East - Inyo National Forest	7,874	4,567	945
West - Sequoia National Forest	> 11,448	> 6,640	> 1,374
Subtotal	> 19,322	> 11,207	> 2,319
Pack Station Clients:			
East - Inyo National Forest			
Cottonwood Creek Pack Station	80	46	10
Rock Creek Pack Station	240	139	29
West - Sequoia National Forest			
Balch Park Pack Station	212	123	25
Golden Trout Wilderness Packtrains	1,062	616	127
Mineral King Pack Station	98	57	12
Subtotal	1,692	981	203
Monache Jeep Road	9,225	5,351	1,107
Total	> 30,239	> 17,539	> 3,629

a. For wilderness permits, number of user nights. Number of permits issued during October for Sequoia National Forest trailheads is not available; user nights for July to September estimated based on average nights per person for Inyo National Forest trailheads.

b. Number of visitors multiplied by the larger estimate of the portion that fish (58 percent).

c. Number of visitors multiplied by the smaller estimate of the portion that fish (12 percent).

> Greater than.

The Forest Service does not routinely collect data on the types of activities people engage in once they are in the wilderness, although research shows that fishing, photography, and nature study follow hiking as the most common activities in wilderness (Roggenbuck and Watson 1989). Published studies of recreation users in the region provide some indication of just how popular fishing is. As examples, a survey of recreationists in the Inyo National Forest found that fishing was the main activity for 58 percent of the respondents (Lee and Brown 1991). The management plan for the Sequoia National Forest notes that fishing accounts for 40 percent of wildlife and fish user days in the forest (USDA Forest Service 1988a). In the Mt. Whitney region, 12 percent of hikers surveyed indicated that they fished during their trips (Duane and Knauer 1996).

This report applied the lower (12 percent)⁴ and upper (58 percent) bounds from the above studies to the number of user days during the fishing season to derive estimates of 3,629 to 17,539 angler days (Table 3).

4. Although golden trout are not found in the Mt. Whitney region, the percent of hikers that fish there is believed to be a reasonable lower bound for fishing participation in wilderness.



Estimating Fishing Benefits: Fishing Value Per Person

There appear to be no published empirical studies that address recreational fishing values for the southern Sierra Nevada region. However, a reasonable estimate of fishing use value can be obtained by using benefit transfer methodology, which refers to the adaptation and use of economic information from specific sites at other sites with similar resource and policy conditions (Rosenberger and Loomis 2001).

For this report, day values for fishing in the Pacific Coast Area (defined to include the states of Washington, Oregon, and California) were applied to fishing use data for the Golden Trout Wilderness. The most recent available studies suggest an average value per person per day of \$40.67 in current (2002) dollars⁵ (Rosenberger and Loomis 2001), which was estimated using contingent valuation a method that is accepted by federal agencies to estimate the value of recreation and other benefits for which no market exists.⁶

The Forest Service used a more conservative value of \$12 per fishing day in 1982 to estimate the value of fishing days in the Inyo and Sequoia national forests (USDA Forest Service 1988a, 1988b). Converting that amount to current (2002) dollars results in an estimate of \$19.92 per day.

Estimates of Fishing Benefits

The estimates of angler days from Table 3 were multiplied by the values per day \$40.67 to derive a minimum and maximum value for the entry points identified in Tables 1 and 2. This resulted in a total value of at least \$147,592 and as high as \$713,310 for recreational fishing in the Golden Trout Wilderness (Table 4). Using the lower Forest Service value of \$19.92 per angler day, the total value ranged from \$72,290 to \$349,377.

5. The value in 1996 dollars (\$36.97) was converted to 2002 dollars using the gross domestic product implicit price deflator (U.S. Department of Commerce 2002).

6. This measure of value, typically referred to as “willingness to pay,” is comparable to market price plus consumer surplus (the amount the consumer is willing to pay over and above costs). It measures economic value beyond cash flow to producers and has gained strong support as a concept that is relevant to many social decisions (USDA Forest Service 1990).

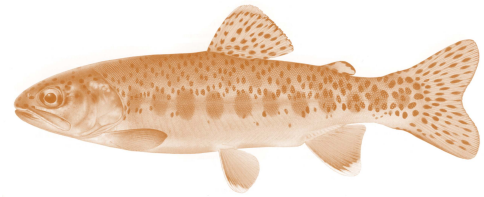


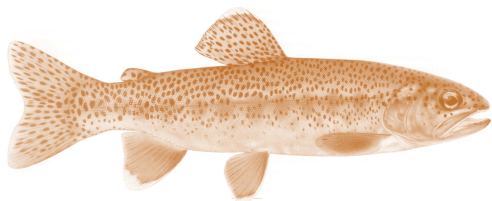
Table 4. Economic Benefit of Golden Trout per Fishing Day, By Access, at \$40.67 per Angler Day

	Fishing Value Upper Bound	Fishing Value Lower Bound
Wilderness Permits		
East - Inyo National Forest	\$185,740	\$38,433
West - Sequoia National Forest ^a	> \$270,049	> \$55,881
Subtotal	> \$455, 789	> \$94,314
Pack Stations:		
East - Inyo National Forest		
Cottonwood Creek Pack Station	\$1,870	\$407
Rock Creek Pack Station	\$5,653	\$1,179
West - Sequoia National Forest		
Balch Park Pack Station	\$5,002	\$1,017
Golden Trout Wilderness Packtrains	\$25,052	\$5,165
Mineral King Pack Station	\$2,318	\$488
Subtotal	\$39,896	\$8,256
Monache Jeep Road	\$217,625	\$45,022
Total *	> \$713,310	> \$147,592

a. October data for Sequoia National Forest permits was not available.
> Greater than.

Estimates of Non-Fishing Recreational Values

Independent of recreational fishing, golden trout and other species hold value for visitors to the wilderness who enjoy the simple pleasures of watching and photographing wildlife. The Forest Service assigns a value of \$48 (\$35.54 in 1989, adjusted to 2002 dollars) per activity day to such “non-consumptive” recreation uses on national forests in the region (USDA Forest Service 1990). No attempt was made to estimate non-consumptive recreation use values in this analysis.



Forest Service Receipts from Potential Golden Trout Anglers

Wilderness permits in the Inyo National Forest cost \$5 per person for the Golden Trout Wilderness, except that permits for Mt. Whitney trailheads cost \$15.⁷ The forest may keep 95 percent of the receipts 80 percent for projects on the forest and no more than 15 percent for administrative costs to run the program). The remaining five percent is sent to the agency's national office in Washington, DC, and is eventually deposited in the federal treasury. One thousand five hundred and thirty-three visitors with permits entered the Golden Trout Wilderness from Inyo National Forest trailheads from July through October, 2001, during the fishing seasons. This figure was multiplied by \$5 to estimate Forest Service receipts of \$7,665 that are potentially associated with golden trout fishing. There is no charge for wilderness permits issued by the Sequoia National Forest.

Pack stations and fishing guides operate under a special use permits from the Forest Service and pay either a flat fee or a percentage of receipts. Annual fees for the two pack stations that led trips from the eastern side of the Golden Trout Wilderness in 2001 totaled \$1,765 (Molzahn 2002). All receipts from pack stations are deposited in the federal treasury. Fees for the three pack stations operating from the western side of the wilderness totaled \$1,943 in 2001 (Kaiser 2002). Not all of these receipts are attributable to pack trips in the Golden Trout Wilderness because some visitors continue to other destinations such as Sequoia National Park.

Table 5. Forest Service Revenues from Potential Anglers, by Access, 2001

	Number	Fees Paid	Total Revenues	Revenues to NF	Revenues to Treasury
Permits:					
Inyo NF	1,533 visitors ^a	\$5 per person	\$7,665	\$7,282	\$383
Sequoia NF	> 2,240 visitors ^b	0	0	0	0
Pack Stations:					
Inyo NF	2 pack stations	\$1,765 / station	\$3,530	0	\$3,530
Sequoia NF	3 pack stations	\$1,942	\$1,943	\$136	\$1,807
Total			\$13,138	\$7,418	\$5,720

Sources: USDA Forest Service. 2002a and 2002b. Sequoia National Forest, Tule River Ranger District; Inyo National Forest, White Mountain/Mt. Whitney ranger districts.

a. National Forest

b. Number of people entering between July 1 to October 31 (Sequoia figure is missing October data).

> Greater than.

7. Mt. Whitney trailhead receipts are not included in this study because golden trout are not found in that area.



Table 5 displays Forest Service receipts from potential anglers in the Golden Trout Wilderness. It does not include revenues from other activities that may be related to golden trout but that are not directly attributable to fishing. For example, many of the people who stay at public campgrounds near trailheads in the Sequoia and Inyo national forests hike into the Golden Trout Wilderness to fish. These campgrounds can generate significant revenue. The three at Horseshoe Meadow on the Inyo National Forest, for example, account for about \$10,000 a year (Molzahn 2002), 80 percent of which has helped fund a seasonal staff member and rehabilitation of campground facilities. None of that revenue is included in this report.

Local Economic Contribution of Recreational Fishing for Golden Trout

Recreation surveys indicate that most of the visitors to the eastern Sierra come from other parts of California, primarily Inyo, Mono, Riverside, or Kern counties, or from metropolitan areas along the southern California coast (Duane 1996b). One way to view the economic contribution of fishing in the Golden Trout Wilderness to nearby localities is to calculate the money spent by anglers for transportation, food, lodging, tackle, and other items.⁸ The California Department of Fish and Game collects this information from various sites around the state, using voluntary angler survey forms during the fishing season. The only survey box located in the vicinity of the Golden Trout Wilderness is at the Forks of the Kern trailhead near the confluence of the North Fork Kern River and Little Kern Rivers. The North Fork Kern River is a two-mile hike from the Forks of the Kern trailhead on the southwestern side of the wilderness in the Sequoia National Forest. Kern River rainbow trout and brown trout are caught in the area. Surveys collected from the Forks of the Kern trailhead indicate that anglers spent an average of \$112 per trip in 2001, with gas and food as the largest expenditures (Table 6; California Department of Fish and Game 2002).

8. For employment, income, and output supported by visitors to wilderness and natural areas in Inyo and Mono counties, see Richardson 2002.

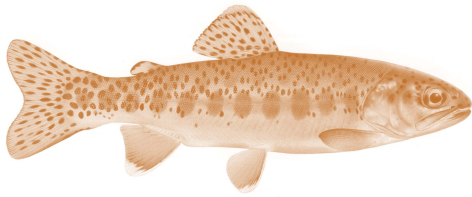


Table 6. Average Angler Expenditures for Forks of the Kern Trailhead, Sequoia National Forest

Year	Number of Surveys	Total	Gas	Food	Lodging	Tackle	Other
2001	26	\$112	\$43	\$35	\$66	\$19	\$3
2000	16	\$139	\$61	\$61	\$16	\$12	\$0
1999	13	\$78	\$33	\$30	\$19	\$10	\$0

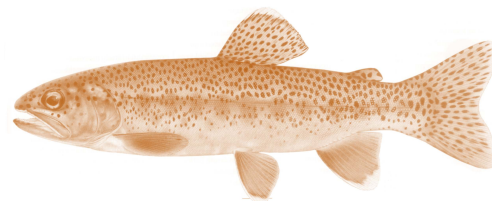
Source: California Department of Fish and Game

A 1993 study of the economic benefits of sport fishing on the Tule River Ranger District estimated that anglers at the Forks of the Kern trailhead spent \$1.5 million in 1990 (Lechner and Pustejovsky 1993). The estimate was based on expenditures reported by 39 anglers on survey forms provided at the trailhead by the California Department of Fish and Game. Nearly two-thirds of the average daily expense of \$71 was for goods and services that were probably purchased locally (food, lodging, tackle, etc.). The authors suggested that lodging costs were low because most forest users are either day-use visitors or campers.

A survey conducted by California Trout during the summer of 2002 indicated a similar level of spending.⁹ Trip expenditures for the 17 respondents totaled \$7,085 and averaged \$109 per day during an average four-day stay. The majority of trip-related expenditures (such as food and lodging) were local. Travel costs represented less than 20 percent of total expenditures. Most of the respondents reported catching golden trout.

Because of the small number of respondents in some surveys and because the surveys cover a very small portion of potential fishable water, these data cannot be interpreted as representative of all anglers in the region. The results do, however, provide a useful indication of the magnitude of fishing expenditures.

Livestock Grazing in the Golden Trout Wilderness



Cattle have grazed in the Golden Trout Wilderness and surrounding area for more than 130 years. Most present-day trails in the wilderness area were established before Congress designated the Golden Trout Wilderness, and cattle ranchers continue to drive stock over these historic trails and use pack stock to supply cow camps. Livestock operations are now controlled by a permit system based on guidelines established in the

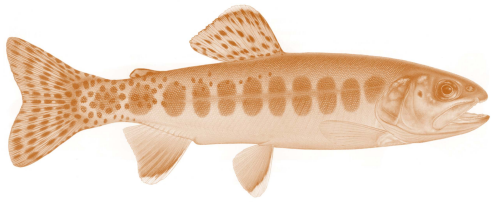


Photo courtesy of Christy McGuire

Forest Service's Grazing Allotment Management Plan and Forest Land and Resource Management Plan (USDA Forest Service 1988a, USDA Forest Service 1988b). Cattle are moved often and at any given time can be found in a relatively small part of the Golden Trout Wilderness.

There are seven active grazing allotments in the Golden Trout Wilderness four in the Inyo National Forest and three in the Sequoia National Forest that range in size from about 18,000 acres to 54,000 acres. However, only part of each allotment is in the Golden Trout Wilderness (see Appendix A), and the portions of the Ash Creek and Olancha allotments in the wilderness area are rarely used because of steep terrain and lack of vegetation (Hubbs 2002).

Permittees pay a fee for grazing based on the number of cattle and the number of months the area is used. The current fee, set by the U.S. Department of the Interior, is \$1.43 per animal month (AM), which equals one cow/calf pair grazing for one month. In 2001, the rate was \$1.35/AM. One-fourth of the grazing fees are deposited in the Forest Service's Range Betterment Fund to support activities that benefit grazing on the national forest from which the fees are collected (with no more than six percent to administration), one-fourth goes to the state in which the fees are collected (to compensate for the tax-exempt status of federally managed lands), and one-half is deposited to the federal treasury.



Economic Benefits of Grazing

The economic benefits associated with livestock grazing in the Golden Trout Wilderness can be estimated in the same manner as fishing benefits. Annual cattle use is multiplied by \$6.77, the Forest Service's value per animal unit month (AUM; USDA Forest Service 1990). This is the market price per AUM plus the consumer surplus in 2000 for California, converted to current (2002) dollars to adjust for inflation. Annual cattle use, measured as AMs, may be approximated as AUMs if the composition of the stock is known.¹⁰ Based on knowledge of local ranching operations, a reasonable assumption would be 90 percent cow/calf pairs, 5 percent immature heifers and 5 percent bulls (Shackelford 2003). This estimate of stock composition suggests that in the Golden Trout Wilderness 3,947 AMs are approximately equivalent to 5,143 AUMs. Multiplied by the value per AUM, this resulted in a total estimated value of \$34,818 for cattle grazing in the Golden Trout Wilderness. Annual expenditures for ranches using the Golden Trout Wilderness are not a matter of public record, so it was not possible to compare the total economic impacts of fishing and grazing in the wilderness area. This would be a useful topic for further research.

Table 7. Revenues from Golden Trout Wilderness Grazing Allotments, 2001

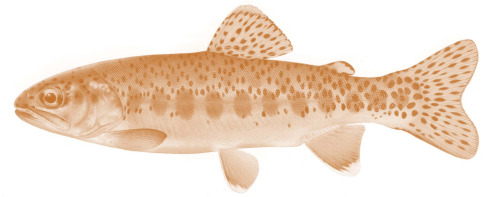
Allotment	Authorized Use (head months)	Total Revenues	Revenues RBF ^a	Revenues: California	Revenues: Treasury
Inyo National Forest:					
Ash Creek	\$192	\$259	\$65	\$65	\$130
Monache	\$1,174	\$1,585	\$396	\$396	\$792
Monache	\$907	\$1,224	\$306	\$306	\$612
Mulkey	\$719	\$971	\$243	\$243	\$485
Olancho	\$170	\$230	\$57	\$57	\$115
Sequoia National Forest:					
Beach ^b	0	0	0	0	0
Burnt Country ^b	0	0	0	0	0
Little Kern	\$785	\$1,060	\$265	\$265	\$530
Total	\$3,947	\$5,329	\$1,332	\$1,332	\$2,664

Source: USDA Forest Service. 2002c. Golden Trout Wilderness, Allotment and Permit Information Spreadsheet. Jim Shackelford, Region 5 Range Program Manager. There are two permit holders for the Monache allotment.

a. Range Betterment Fund.

b. Neither the Beach or Burnt Country allotments were used in 2001.

10. One AM for a stocker or heifer cow (immature) is equivalent to 0.8 AUM, one AM for a mature cow is equivalent to one AUM, one AM for a mature cow with a nursing calf is 1.32 AUMs, and one AM for a mature bull is 1.5 AUMs (Shackelford 2002).
To calculate AMs to AUMs: 5,143 AUMs = (3,947 x 0.9 x 1.32) + (3,947 x 0.05 x 0.8) + (3,947 x 0.05 x 1.5).



Overview of the Region's Economy

Information about employment and income in the areas surrounding the Golden Trout Wilderness provides an overview of the leading types of economic activities in the area. One of the smallest geographic units for which such data are readily available is the Census County Division (see maps below). In 2000, there were 7,658 people in the two County Census Divisions Lone Pine and Springville-Johnsondale that border the Inyo and Sequoia national forests. (U.S. Bureau of the Census 2002a). That figure represents a seven percent increase in population since the 1990 census.

Employment totaled 2,918 in 2000 (Table 8); education, health, and social services accounted for the most significant portion (28 percent) of the employed. Arts, entertainment, recreation, accommodations, and food service entities were the second largest employer (14 percent). All other sectors each represented eight percent or less of total employment.



Lone Pine Census County Division
Source: U.S. Bureau of the Census 2002b.



Springville-Johnsondale Census County Division
Source: U.S. Bureau of the Census 2002b.



Golden Trout Creek Golden Trout
Oncorhynchus mykiss aquabonita



Little Kern River Golden Trout
Oncorhynchus mykiss whitei



Kern River Rainbow Trout
Oncorhynchus mykiss gilberti

Trout drawings courtesy of Joseph R. Tomelleri

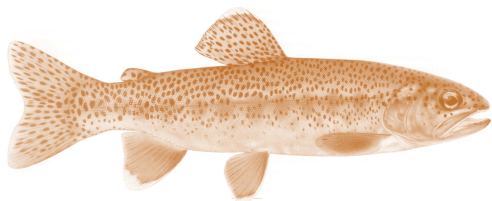


Table 8. Employment by Industry in Areas Bordering the Inyo and Sequoia National Forests, 2000

	Total Employed	Percent of Total
Educational, Health and Social Services	821	28%
Arts, Entertainment, Recreation	343	12%
Accommodation and Food Services		
Agriculture, Forestry, Fishing and Mining ^a	254	9%
Retail Trade	241	8%
Public Administration	221	8%
Construction	215	7%
Manufacturing	162	6%
Other Services	156	5%
Transportation, Warehousing and Utilities	149	5%
Professional, Scientific, Management, Administrative, and Waste Management Services	120	4%
Finance, Insurance, Real Estate, Rental and Leasing	102	3%
Wholesale Trade	91	3%
Information	43	1%
Total	2,918	100%

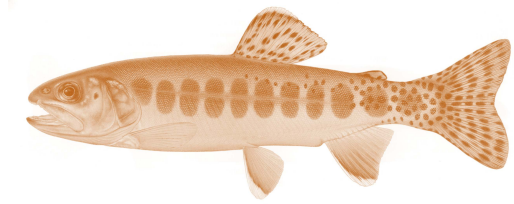
Source: U.S. Bureau of the Census 2002a.

a. Agriculture, Forestry and Fishing is comprised of establishments primarily engaged in (1) harvesting timber, (2) harvesting fish and other animals, (3) providing support activities for crop, animal, and forestry activities. It excludes agricultural production-based establishments such as farms, ranches, dairies, and greenhouses; these are covered by the USDA Census of Agriculture. This county-level survey is conducted every five years.

No industry category is devoted solely to recreation-related activities, but some portions of arts, entertainment, recreation, accommodations, and food services employment and retail employment categories are related to recreation such as fishing and whitewater rafting. Some portion of employment related to livestock grazing and other ranch activities is reflected in the agriculture, forestry, fishing, and mining total.

Total earnings in the region were \$97 million in 1999 (U.S. Department of Commerce 2002).¹¹ Virtually all other income was from social security payments (\$13 million) and retirement benefits such as pensions, annuities, and Individual Retirement Account income (\$12 million). Data for earnings by industry that were collected during the 2000 census are not yet available for County Census Divisions.

11. Wage or salary income plus net income from both farm and non-farm self-employment comprise earnings.



Conclusions

Golden trout have long been recognized as biologically and culturally important in the southern Sierra region. This analysis demonstrates that their survival also has significant economic repercussions and that the economic sectors related to recreation are important portions of the region's economy.

Economic benefits for recreational fishing in the Golden Trout Wilderness are estimated to be \$148,000 to \$713,000 annually, based on available visitation data from the Forest Service. These estimates of economic benefits are conservative because they do not include non-fishing recreation values or passive-use (option, existence, and bequest) values.

Annual economic benefits for grazing in the Golden Trout Wilderness are estimated to be \$35,000, based on the Forest Service's 2001 use data and values. As Table 9 illustrates, these estimated benefits are far less than the benefits that are likely to accrue from protection of habitat for the golden trout.

Table 9. Summary of Revenue and Economic Benefits

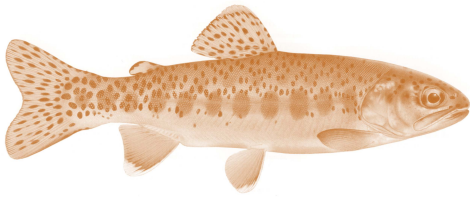
	Trout Preservation	Grazing
Revenue	\$13,138	\$5,329
User Benefits	\$148,600 - \$713,310	\$21,380 - \$40,082

As Table 9 also shows, annual Forest Service receipts from wilderness permit and pack station fees that may be tied to fishing in the Golden Trout Wilderness are substantially more than the receipts from livestock grazing.

The survival of the golden trout and associated recreation benefits depend on conservation and restoration of habitat. Hence, the economic benefits associated with golden trout fishing and other recreation pursuits in the Golden Trout Wilderness should be considered in future land management decisions that are likely to have impacts on golden trout habitat.

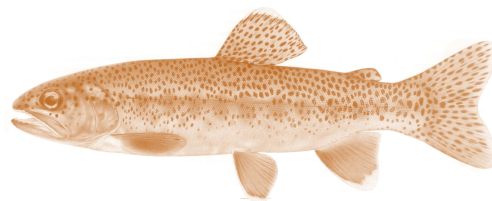
The methodology in this analysis is applicable to other areas.¹² It can be used to generate information that informs land management decisions, particularly in assessing the implications of allocating public land to recreation and other uses.

12. To apply the methodology to other areas, two types of data are needed. First is the number of visitors (ideally, the number of anglers) to the area in question. This information is generally available from the agency that is responsible for managing the area. Second is the economic value per activity day, which may be available from the management agency and/or published in empirical studies for the area. If not, Rosenberger and Loomis (2001) provides values by recreation activity including fishing for five regions in the United States (see Table 3) and list guidelines for applying benefit transfer methods.



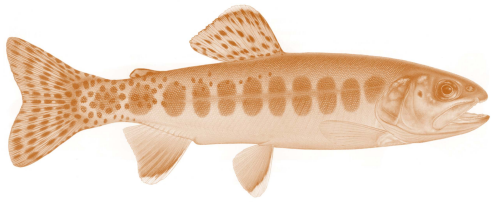
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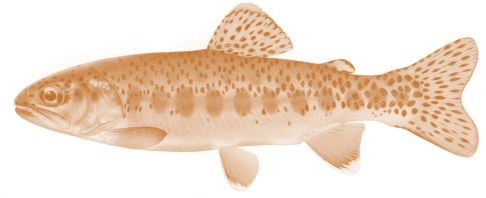
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Appendix A Golden Trout Wilderness Allotment/Permit Information

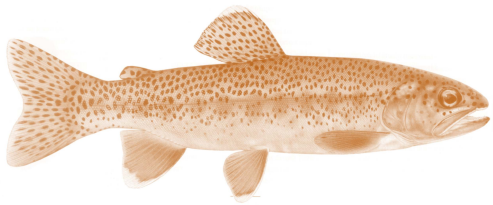


Allot ID	Allotment Name	Wilderness Name	Wilderness		% Allotment Within Golden Trout Waters	Total Capable Area Within Allotment	Percent Capable Area Within Allotment	Allotment Status	Permit ID	Permittee Name	Permitted Use (AUM's)	Authorized Use (AUM's) 2,001	Authorized Use (AUM's) 2,002	
			Outside	Inside										Grand Total
00402	ASH CREEK	Golden Trout Outside Wilderness	11,043	22,123	57%	2200	7%	Active	33402	Southtown Anchor Ranch	229	0	0	
			11,043	22,123										11,383
			00402 Total											11,043
00405	MCKNACHE	Golden Trout South Sierra Outside Wilderness	16,058	17,600	33%	5080	9%	Active	33406 47406	Southtown Anchor Ranch Kemp, Ronald	1467 1210	1174 907	605 464	
			16,058	20,062										16,068
			00405 Total											16,058
00407	MULNEY	Golden Trout Outside Wilderness	179	18,908	93%	3109	16%	Active	21407	Hunter, Roy	719	719	711	
			179	18,908										19,148
			00407 Total											179
00408	CLANCHIA	Golden Trout South Sierra Outside Wilderness	32,284	11,447	21%	5046	9%	Active	47408	Mantz, John C. Jr	242	170	162	
			32,284	8,859										32,284
			00408 Total											32,284
00409	TEMPLETON	Golden Trout South Sierra Outside Wilderness	501	43,040	98%	6046	14%	Vacant				1682	0	
			501	90										591
			00409 Total											501
00412	WHITNEY	Golden Trout Outside Wilderness	44,674	43,040	100%	3046	7%	Vacant				1013	0	
			44,674	180										44,854
			00412 Total											44,674
A0011	JORDAN Is now part of LITTLE KERN Allot	Golden Trout Outside Wilderness	17,200	479	3%			Active	4813A	Shannon, Jack	See Below			
			17,200	17,200										17,673
			A0011 Total											17,200
A0011	LITTLE KERN	Golden Trout Outside Wilderness	10,582	42,904	80%	3870	7%	Active	5213A	Stramon, Jack	735	785	785	
			10,582	53,545										53,545
			A0011 Total											10,582
A0052	BEACH	Golden Trout Outside Wilderness	31,430	3,634	11%	2210	7%	Active	5507A	Alexander, III & Victoria	605	0	0	
			31,430	3,634										35,124
			A0052 Total											31,430
A0056	BURNT COUNTRY	Doms Land Golden Trout Outside Wilderness	45,583	7,059	18%	4410	8%	Active	5510A	Wofford, John	785	0	No Data	
			45,583	756										46,339
			A0056 Total											45,583

** NOTE: Capable Area and Percent Capable Area are gross estimates of this amount of the entire allotment are estimated to use on a regular basis for grazing. These estimates are based on the best judgment of professional rangeland managers. They are based on the total grassed area of the allotment and not just the wilderness portion. Beach and Burnt Country Allotments may be underestimated for the "outside wilderness" annual grassland portion of the allotments.

** NOTE: The Whitney and Templeton Allotments are presently vacant, but were active prior to 2001. They will remain vacant until 2011 when they will be reevaluated for rangeland. Prior to 2002 they were grazed by John C. Mantz, Jr.

Source: USDA Forest Service 2002



Notes