

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

RECREATION USE SURVEY OF
INDIAN CREEK, PLUMAS COUNTY

2005

Technical Information Report ND-05-1

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This report was prepared to summarize information collected under SAP Internal Order 100493 to document recreation and fishery enhancement provided by a revised operation of Antelope Reservoir. This report has received only limited review; it is intended for internal use and should be considered preliminary and subject to revision.

November 2005

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SUMMARY

A survey of streamside recreation along upper Indian Creek, Plumas County, was made during the 2005 trout fishing season. This survey was made to estimate the amount and types of recreation occurring under revised lake operations and flow conditions. The random sample survey combined roving use counts with interviews of anglers to gather information on recreation use, activities, visitor origin, and angler success.

There were an estimated 31,500 hours of recreation use on 11 miles of Indian Creek between Antelope Dam and Flourney Bridge from April 30 to November 15, 2005. The most frequently observed activities were camping, relaxing, gold seeking, motorcycling/ORV riding, fishing, sightseeing, and bicycle riding, but several other miscellaneous activities combined to represent 6 percent of the observed use.

During 12 surveys at Indian Creek over 27 years, the total hours of recreation recorded in 2005 were exceeded only by an estimate of 35,600 hours in 1982. The amount of camping, relaxing, bicycling, motorcycling/ORV use, and gold seeking were all greater than in any previous survey. Fishing use was the lowest recorded in these surveys.

About 39 percent of the visitors and 36 percent of the anglers interviewed were from the northeast counties of California. The Sacramento Valley and San Francisco Bay Area were also well represented among visitors and anglers.

Anglers creeded about 100 rainbow trout, 800 brown trout, and perhaps 50 Eastern brook trout in 2,100 hours of fishing on this portion of creek.

DESCRIPTION OF STUDY AREA

Indian Creek is a major tributary of the East Branch North Fork Feather River in Plumas County. The creek flows from Antelope Dam about 38 miles to its confluence with Spanish Creek near the junction of Highways 70 and 89, about 11 miles northwest of Quincy (Figure 1).

The area has a rich history of gold mining, ranching, and lumber production. In recent decades, recreation has become a predominant use, with water-related recreation a major attraction. Employment in the area today is divided among services, government, and timber harvesting and processing. Indian and Genesee Valleys support large cattle ranches.

Below Antelope Dam, Indian Creek flows through a granitic canyon with stands of pine and fir, but short reaches are often meadow-like. It is closely followed by a paved road with wide pullouts for convenient stream access. A portion of the creek cuts through a deep and rugged canyon, accessible only by foot, before flowing into the upper part of Genesee Valley. All but the lower one mile of the upper 11-mile reach is within Plumas National Forest.

The study reach of the stream remains cold in summer and is slightly turbid due to deep-water outflow from the dam. Brown trout and rainbow trout dominate the fishery. Many large trout (mostly rainbows, a few brook trout) and warmwater species such as bass typically enter the creek from Antelope Reservoir during periods of spill (Rischbieter 1996). Spill can often be substantial, but in recent years spill timing and magnitude have been variable due to a wide range of hydrologic conditions.

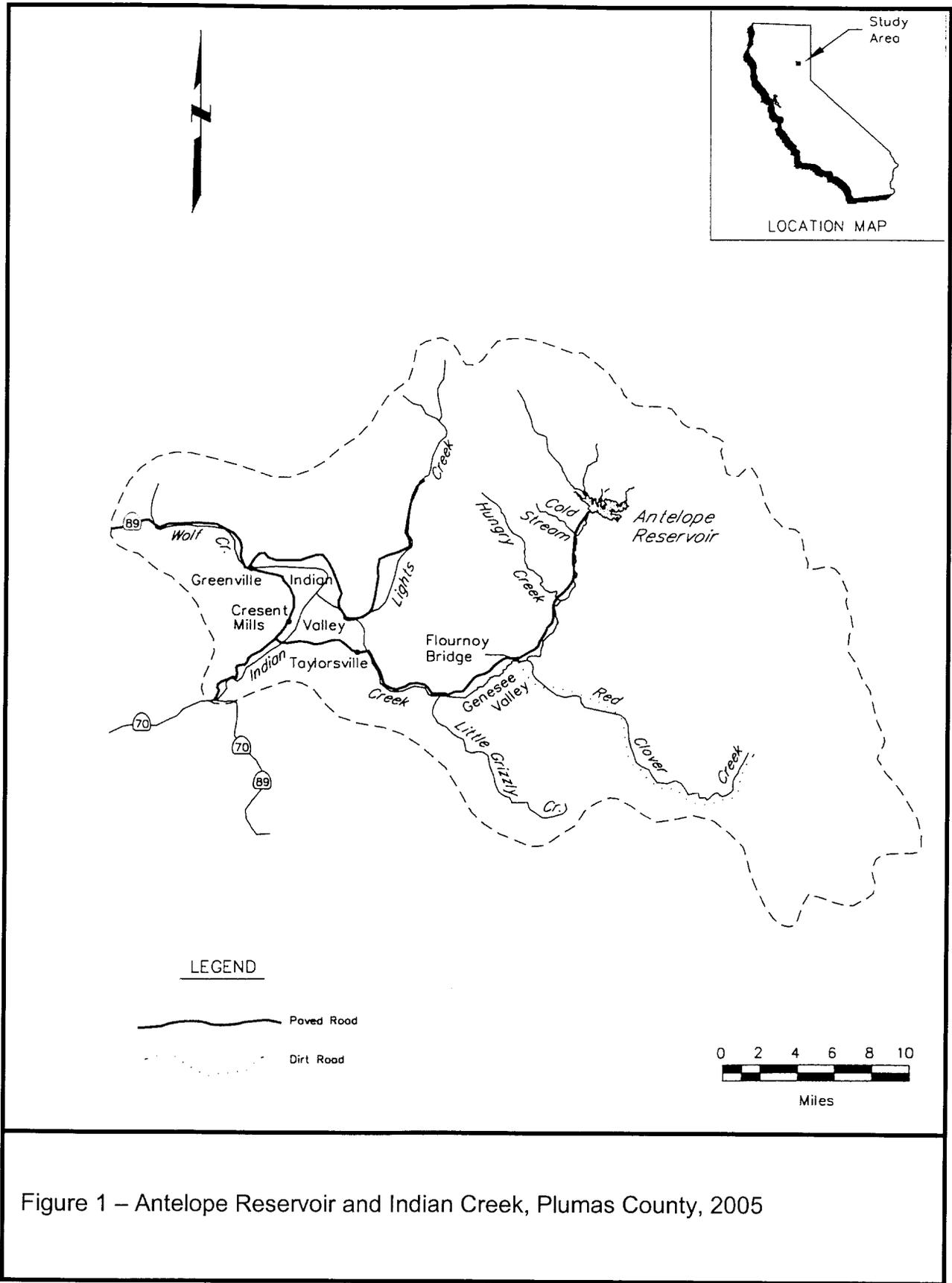


Figure 1 – Antelope Reservoir and Indian Creek, Plumas County, 2005

METHODS

Recreation Use Counts

Use counts were made on randomly selected dates within eight survey strata using the optimum allocation method described by Abramson and Tolladay (1959). Twenty-one days of the 200-day period from April 30 through November 15, 2002, were surveyed: both days of the opening weekend of trout season, 3 of 9 holiday weekend days, 8 of 139 weekdays, and 8 of 50 general weekend days. Five one-hour counts of recreation use were made in the study area each day at regular periods, scheduled according to the number of daylight hours (Appendices I and II).

The surveys were made from a vehicle or on foot, as necessary, to check access areas and recreation sites. Recreationists (and their vehicles) were counted and recorded by recreation activity. The five daily counts were totaled and multiplied by factors that accounted for recreation use during the daylight periods not counted. Similarly, the resulting daily figures were expanded to estimate total recreation hours for all days in each stratum. Adding the stratum totals provided an estimate of recreation hours for the 200-day study period.

Creel Census

Anglers along Indian Creek were contacted on the same twenty-one survey days to determine fishing success. The county of residence and length of time spent fishing so far that day was recorded for each angler contacted. Creeled fish were counted, measured (fork length to nearest 0.5 centimeter [cm]), and identified to species.

To determine total catch, the catch per hour was multiplied by estimated hours of fishing for each stratum.

RESULTS

Recreation Use

Total recreation use on Indian Creek, Antelope Dam to Flourney Bridge, was estimated at 31,500 recreation hours (\pm 6,100 hours) for the period April 30 to November 15, 2005. This represents about 9,200 recreation days, or 3,500 12-hour visitor-days.

Based on counts of recreationists, camping was the most common activity, followed by relaxing, gold seeking, motorcycling/ORV use, fishing, sightseeing, and bicycle riding (Table 1). Use counts reflect what recreationists were doing when seen and the number of hours spent on each major activity, but did not provide data on other activities that people pursued at other times during their stay.

Table 1

Recreation Hours by Activity along Indian Creek,
Antelope Dam to Flourney Bridge - 2005

<u>Activity</u>	<u>Recreation Hours</u>	<u>Percent</u>
Camping	14,400	46
Relaxing	5,900	19
Gold Seeking	3,100	10
Motorcycling/ORV Use	2,400	8
Fishing	2,100	6
Bicycle Riding*	1,700	5
Miscellaneous**	<u>1,900</u>	<u>6</u>
Total	31,500	100

* Bicycle riding includes 1,150 hours during Indian Valley Centuries Bicycle Ride on May 28 and 550 hours during the rest of the season.

**Includes sightseeing (800 hours), swimming and wading (440), walking for pleasure (250), kayaking (190), hunting (120), plus a variety of minor activities (100).

An unusually wet spring in 2005 included frequent poor weather that discouraged recreation use. The extended spring and late rains encouraged a spectacular wildflower bloom this year which lasted into late June or early July for some species.

Antelope Lake began to spill on April 25, just five days before the trout season opener on April 30, and reached a peak of 1.67 feet over the spillway elevation on May 19. The spill ended on June 28. The spill was large enough (>0.8 feet) from May 4 until about May 27 for fish to be attracted to the spillway and leave the reservoir (Rischbieter 1996). However, many anglers didn't seem to realize the spill was large enough for fish to emigrate from the lake and early season fishing use just below the dam was light.

This year, the Indian Valley Centuries Bicycle Ride was held on one of the scheduled survey dates, Saturday, May 28. The ride started at Greenville High School and offered 100 km and 100 mile routes. A total of 587 bicyclists participated in the ride, the largest turnout ever for the event according to local newspapers. The 100-mile ride began in Greenville and circled north edge of Indian Valley, then through Genesee Valley and climbed the grade to Antelope Lake, circled the lake and then returned to Greenville by the same route.

Bikers spent roughly two hours along the 11 miles of Upper Indian Creek, so the biking use along this reach of Indian Creek related to this event totaled about 1,175 hours. For corroboration, 341 bikers were counted during two use count periods on May 28 giving a survey estimate of 1,125 hours. The average of these two estimates was used to represent the amount of bicycling use along Indian Creek during the Centuries Ride. About 550 hours of bicycling was observed along Indian Creek road during the rest of the season.

In addition to the use counts, 159 interviews of recreationists were conducted during the 2005 season, representing 353 people. The interviews provided more detailed information on activity participation and additional information on visitor characteristics. About 43 percent of the recreationists interviewed said they fished during their visit to Indian Creek,

60 percent said they would be “relaxing,” about 15 percent gold seeking, and about 12 percent were motorcycling and ORV riding. Other activities included walking for pleasure (4 percent), picnicking (4 percent), swimming, wading and beach use (4 percent), and bicycle riding (3 percent). About 21 percent of the people interviewed mentioned miscellaneous other activities, including 3 percent who said they would be boating and fishing at Antelope Lake. These percentages total more than 100 percent because many recreationists engaged in more than one activity during their visit.

About 61 percent of the visitors camped along Indian Creek, 25 percent were day users and returned home at night, and 14 percent stayed overnight somewhere in the area, but not at Indian Creek. These were evenly divided between those who camped at Antelope Reservoir, and those stayed with friends or relatives in the area, nearby summer cabins, or motels.

Recreation visitors to Indian Creek in 2005 (Figure 2) came primarily from the Northeast counties (39 percent), Sacramento Valley Counties (21 percent), San Francisco Bay Area (17 percent), Mountain Counties (10 percent), and San Joaquin Valley (5 percent). The others came from other regions in California (2 percent), and Nevada (5 percent).

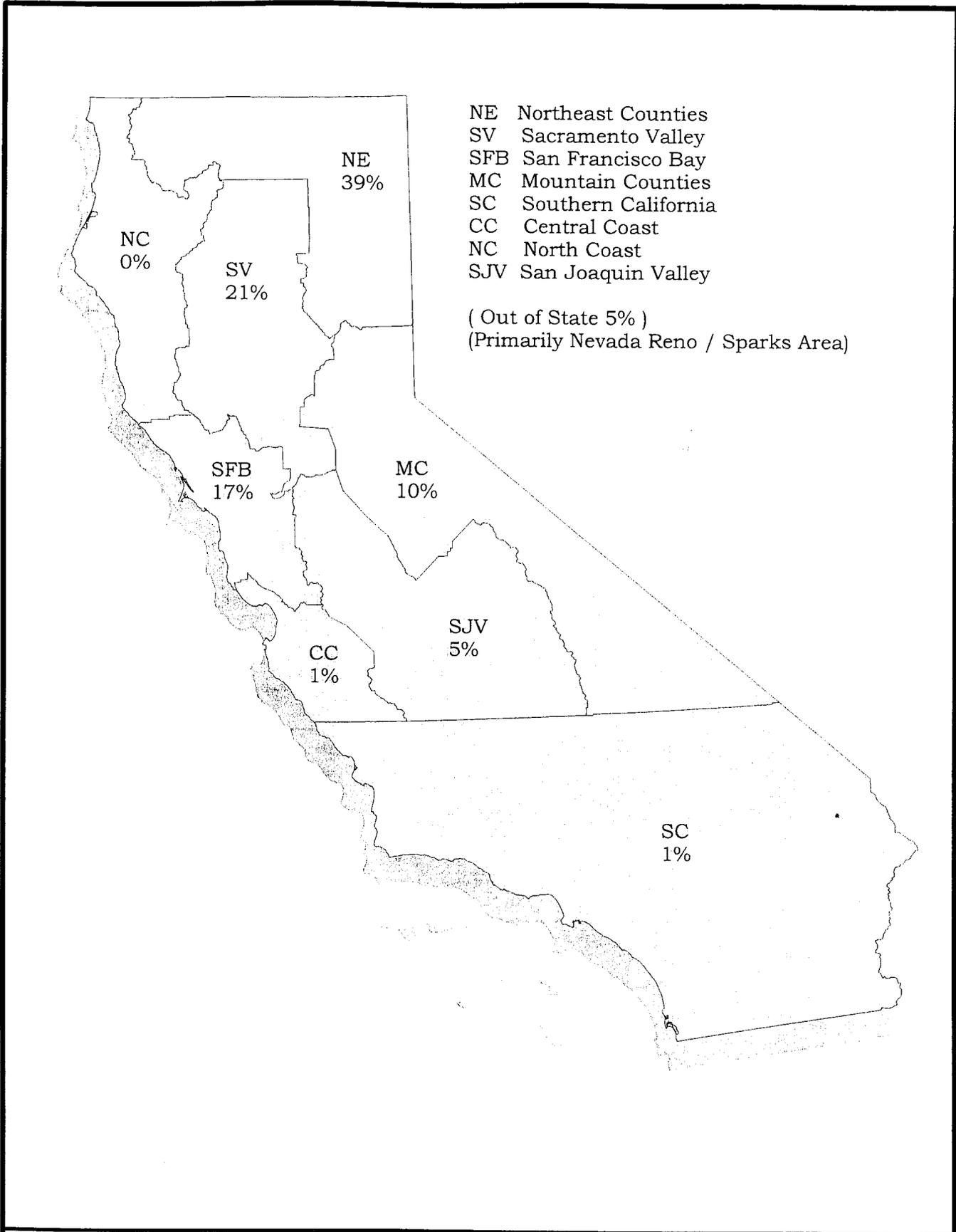


Figure 2 - Indian Creek Visitor Origin by County Groups 2005

Creel Census Data and Angler Success

During the 2005 trout season, 114 anglers were contacted between Antelope Dam and Flornoy Bridge. They had fished 216.25 hours, with a recorded catch of 65 brown trout (*Salmo trutta*) and 7 rainbow trout (*Oncorhynchus mykiss*). Three Eastern brook trout (*Salvelinus fontinalis*) were also observed in the catch. In addition, a total of 121 trout, two Sacramento pikeminnow (*Ptychocheilus grandis*) and one largemouth bass (*Micropterus salmoides*) were reported caught, or reported to have been caught and released.

Total angling use between Antelope Dam and Flornoy Bridge was estimated at 2,100 hours (±740 hours) or 1,250 angler days, with an estimated catch of 800 brown trout and 100 rainbow trout. Perhaps 50 brook trout also may have been caught. Based on reported catch and release, as many as 1,200 additional trout may have been caught and released.

The mean length of 62 brown trout measured during 2005 was 26.1 cm (10.3 inches [in]) with a range of 14.0 to 48.0 cm (5.5 to 18.9 in; Appendix III). The mean length of 6 rainbow trout was 27.1 cm (10.7 in) with a range of 23.5 to 37.0 cm (9.3 to 14.6 in; Appendix IV). The three brook trout measured 38.0 cm, 38.0 cm and 37.0 cm fork length.

Overall, about 47 percent of the anglers censused fished with bait, 18 percent with lures, 11 percent with flies, and about 24 percent fished with some combination of these methods.

Indian Creek angler origin (Figure 3) was similar to previous years in that most of the anglers came from the Northeast Counties (36 percent), Sacramento Valley Counties (28 percent), and San Francisco Bay area (22 percent). The other regions in California made up 9 percent of angler origin, with 5 percent from Nevada.

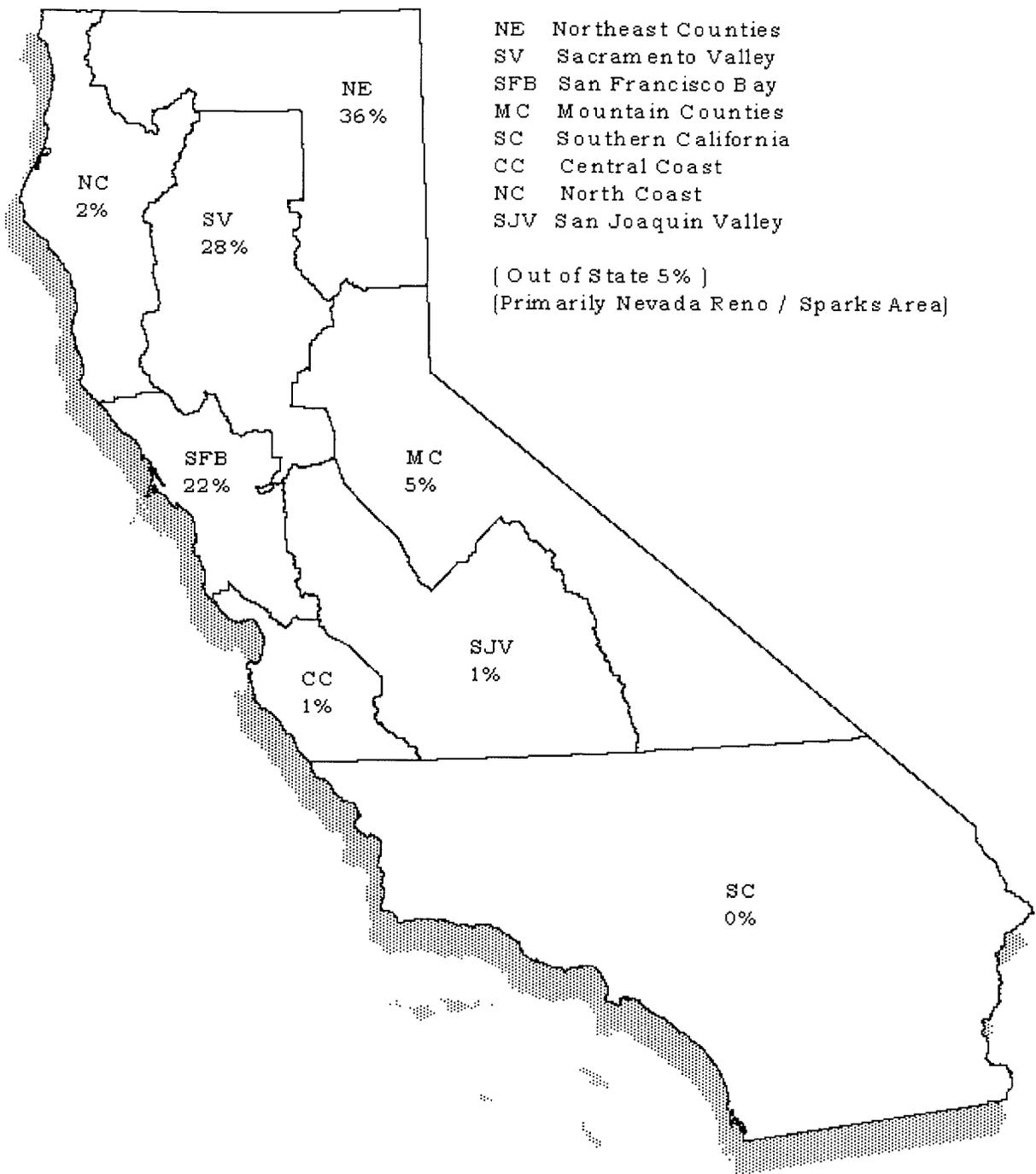


Figure 3 - Indian Creek Angler Origin by County Groups 2005

DISCUSSION

Understanding the limitations of the recreation use survey and creel census helps put the data obtained in perspective. This section describes such contextual information and compares data from previous years with 2005 data.

Limitations of Use Counts and Creel Census

Most recreationists at the creek were readily observed during the use counts. Vehicle access points were checked on each count, but people were not found for some vehicles. Vehicles of U. S. Forest Service workers, loggers, and other non-recreationists often park along the road in this reach of Indian Creek, making vehicle counts a poor index of recreation use. We observed loggers, truck drivers, and USFS employees and contractors working along Indian Creek during the summer. We did not include them in the estimates of use because they generally did not engage in recreation along the creek.

During most of June and July about a dozen employees from the Sacramento Office of the SWCA consulting firm camped at the Cold Stream site. They were working on an archeological survey contract with the U.S. Forest Service. During the week, they left the campsite early each morning and returned late in the evening. On weekends most or all left the area and returned late Sunday evenings. We did not include these campers in the recreation use estimates because they said they did not participate in recreational activities along the creek. There were also several botanists and bird researchers who camped occasionally near Babcock Crossing during the week. We didn't count these workers either, unless we observed them recreating along the creek.

During the past year, many Registered Mining Claim signs were nailed to trees along Indian Creek road from just below Antelope Dam downstream about 10 miles to the end of USFS property just above Genesee Valley. These signs can be intimidating to many recreationists who do not seem to understand just what they imply. At least one semi-permanent mining camp was created this summer and other miners have indicated they would discourage use of the campsites along the creek by the general public.

Recreational mining along Indian Creek during 2005 was the highest recorded in 12 surveys over a 27-year period. Much of the camping and relaxing recorded this year was by recreational miners present along the creek all summer.

On the 2005 Fourth of July weekend, members of the United Prospectors Incorporated recreational mining club gathered at Indian Creek (many at Babcock Crossing) and monopolized nearly all the camping sites along Indian Creek. Many miners believe the 14-day camping limit does not apply to them on a mining claim, only to the general public. Instances of obvious intimidation by miners were reported by a few recreationists, including statements such as, "This is a registered mining claim, you can't camp here" and "We were planning to camp here to work our claim, so you will need to leave."

Recreational mining organizations such as UPI have staked claims along the entire 11 mile reach of Indian Creek down to the lower limit of USFS property. They have bought out and consolidated a number of individual claims. This is obviously a major change in their previous practices. Sections of a proposed federal budget reconciliation bill, (HR 4241) passed by the House of Representatives November 18, 2005 would have allowed organizations to purchase federal property like this at relatively low cost. They could then sell the property or develop it for private use unrelated to mining. This would seem to be the ultimate goal of these organizations, and such an action could greatly limit or essentially preclude public use of the Indian Creek corridor in the future.

The 3,654-acre Stream Fire burned the upper two miles of Indian Creek in July 2001 and impacted many activities along two miles of creek from the dam downstream to Cold Stream. For safety reasons, the U.S. Forest Service closed the burned area to all public access for over a year, except for traffic on the Indian Creek road. By 2005, many dangerous snags had been removed and the upper two miles were again used by campers and anglers although the area is still unsightly and probably discourages some users. Campfires were not permitted outside designated campgrounds in the Plumas National Forest from August 1 to October 1, 2005. In addition, the lack of shade from large trees and runoff in the burned area may affect the water temperature and habitat for trout in this portion of the creek.

About 10 percent of the estimated fishing use was represented in the creel census. The estimates of total catch must be regarded cautiously, however, because angler success varied widely (from 0.0 to 0.8 fish/hr) among various strata. The estimated catch of brook trout (50 fish) is probably high. It is based solely on three brook trout caught just below Antelope Dam on May 27 and 28. The lake was spilling about 0.75 feet at that time and these fish likely passed over the spillway during the previous week or two. No other brook trout were observed in the catch during the remainder of the trout fishing season.

Comparison of 2005 Results with Previous Surveys

The first three surveys of Indian Creek (1978-80) covered 38 miles from Antelope Dam to the confluence with Spanish Creek. Since 1981 the survey has included only the 11 miles of the creek from Antelope Dam to Flournoy Bridge ("upper reach"). Three surveys also included "middle" Indian Creek (Flournoy Bridge to Shim Flat; 1990, 1993, 1995). A comparison of data from all 12 years (various authors, see References) illustrates patterns and changes that have occurred in general recreation, fishing, and angler success in the upper reach (Table 2).

The increase in camping and "relaxing" and the decrease in angling in 2005 both likely relate to the large number of recreational miners using Indian Creek in 2005. Interviews showed that most miners did not fish and they tended to relax at the campsite when not actively mining. We interviewed 47 recreational gold miners and only seven (15 percent) reported that they fished during their stay at Indian Creek. However, 35 (74 percent) said that they also "relaxed" at the campsite.

The increase in bicycle riding the past few years is due to increased interest and participation in this sport, and organized events such as the annual Indian Valley Centuries Bicycle Ride. The large increase in motorcycling and ORV use reflects similar trends in these activities, both in personal use and organized group events.

Table 2

Estimated Recreation Hours by Activity, Upper Indian Creek, 1978 to 2005*

<u>Year</u>	<u>Recreation Activities</u>							<u>Totals</u>
	<u>Camping</u>	<u>Relaxing</u>	<u>Fishing</u>	<u>Gold Seeking</u>	<u>Bicycle Riding</u>	<u>Motorcycling/ ORV Riding</u>	<u>Miscellaneous</u>	
1978	5,600	4,200	7,000	300	25	0	1,475	18,600
1979	7,700	5,200	3,400	200	0	0	1,500	18,000
1980	8,000	2,600	8,800	400	50	100	2,250	22,200
1981	4,500	2,000	3,600	1,600	25	175	1,600	13,500
1982	14,500	3,000	13,500	600	25	75	3,900	35,600
1986	9,700	5,300	7,600	1,900	25	25	2,450	27,000
1990	5,700	1,300	6,200	1,300	0	0	1,200	15,700
1993	11,500	4,000	6,200	2,500	250	50	4,000	28,500
1995	8,200	2,400	4,100	100	100	50	3,050	18,000
1999	8,000	2,000	4,500	400	500	50	3,550	19,000
2002	10,300	800	2,500	1,000	1,300	400	2,500	18,800
2005	14,400	5,900	2,100	3,100	1,700	2,400	1,900	31,500

* Sources: DWR Technical Information Report Nos. 79-1, 80-1, 81-1, 82-1, 83-1, 87-1, 90-1, 94-1, 96-2, 00-1, ND 03-1, and this report.

This table includes data for the upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge. Camping and Relaxing should be considered almost synonymous in this context and can be combined to reflect the total camping use.

Twelve years of surveys, a period that included a wide range of streamflow conditions, have revealed that angling success is often higher and more anglers are attracted to Indian Creek in years when Antelope Lake spills and summer flows are maintained at 20 cfs, than in years with lower flows (Table 3).

Table 3
Streamflow and Estimated Angler Use and Take,
Upper Indian Creek, 1978 to 2005 *

<u>Year</u>	<u>Streamflow Conditions</u>	<u>Angler Hours</u>	<u>Brown Trout</u>		<u>Rainbow Trout</u>	
			<u># BN Caught</u>	<u>Catch/ Hour</u>	<u># RT Caught</u>	<u>Catch/ Hour</u>
1978	Spill 46 days and 20 cfs	7,000	3,465	0.50	1,400	0.20
1979	Spill 20 days and 10 cfs	3,400	1,330	0.39	410	0.12
1980	Spill 177 days and 20 cfs	8,800	2,950	0.34	2,835	0.32
1981	No spill and 10 cfs	3,600	1,400	0.39	200	0.06
1982	Spill 237 days and 20 cfs	13,500	4,300	0.32	4,780	0.35
1986	Spill 123 days and 20 cfs	7,600	2,700	0.36	2,500	0.33
1990	No spill and 10 cfs	6,200	2,120	0.34	1,830	0.30
1993	Spill 102 days and 20 cfs	6,200	1,900	0.31	1,000	0.16
1995	Spill 154 days and 20 cfs	4,100	800	0.20	500	0.12
1999	Spill 69 days and 20 cfs	4,600	800	0.17	1,400	0.30
2002	Spill 58 days and 20 cfs	2,500	370	0.15	100	0.04
2005	Spill 64 days and 20 cfs	2,100	800	0.38	100	0.05

* Sources: DWR Technical Information Report Nos. 79-1, 80-1, 81-1, 82-1, 83-1, 87-1, 90-1, 94-1, 96-2, 00-1, ND 03-1, and this report. This table includes only data for the Upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge.

Anglers expect that large trout will leave the reservoir when it spills and fishing will be good downstream. The catch per hour and total catch of rainbow and brook trout can roughly reflect the number of trout entering the stream at the time of spill. Several years of lower rainbow catch in Indian Creek have reflected reduced reservoir planting between 1991 and 1995 and also in 1997.

Fishing success for brown trout has normally remained about the same irrespective of angling pressure, but in 1995, 1999, and 2002 it was unusually low. The readiest explanation for reduced catch of brown trout may be a reduced population (Brown 1996; Brown 2000) following successive record floods in 1995 and 1997. The brown trout catch rate returned to a "normal" level in 2005.

In previous years, most of the exceptionally large fish observed in the creel census were caught on opening weekend and early in the season. In 2005, the lake spilled a few days before the season opener but fishing success was unremarkable on opening weekend. A few large fish appeared in the creel census later in the year, as spill continued nearly through June. The opening weekend usually has the highest angling use of the year, but this year was an exception, accounting for only six percent of the annual use. Local anglers (Plumas and Lassen County residents), who are presumably more familiar with Indian Creek than other anglers, have been historically somewhat more successful in catching trout than residents of other counties.

After spilling ends, the higher maintained flows (20 cfs) make the stream appear better for fishing and increased angler use normally continues. However, angler use and total catch rate in 1995 and 2002 were noticeably lower than usual. This may have been due to relatively low numbers of rainbow and brook trout planted in Antelope Lake in those years. This plus a relatively short period of spill resulted in fewer trout emigrating downstream, especially in 2002 when the spill exceeded 0.8 feet for only two days. These circumstances, combined with relatively low numbers of brown trout in those years, were the likely cause of lower angler use early in the season, and a lower annual total angling use at Indian Creek, because of the relative importance of early-season use.

ACKNOWLEDGEMENTS

Fish and Wildlife Scientific Aide Jacob Nicholas began the survey, but was hired by the U.S. Bureau of Reclamation shortly after he graduated from California State University-Chico in late May. The author continued the surveys for the remainder of the 2005 season and drafted the report. Thanks go to Margie Graham (Environmental Scientist) for preparing the figures and to Lori Miles for formatting the text and tables. Margie and Doug Rischbieter reviewed early drafts of the report and provided insightful comments and suggestions.

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APPENDIX I

RECREATION SURVEY SCHEDULE FOR
 INDIAN CREEK, PLUMAS COUNTY
 APRIL 30, 2005, TO NOVEMBER 15, 2005

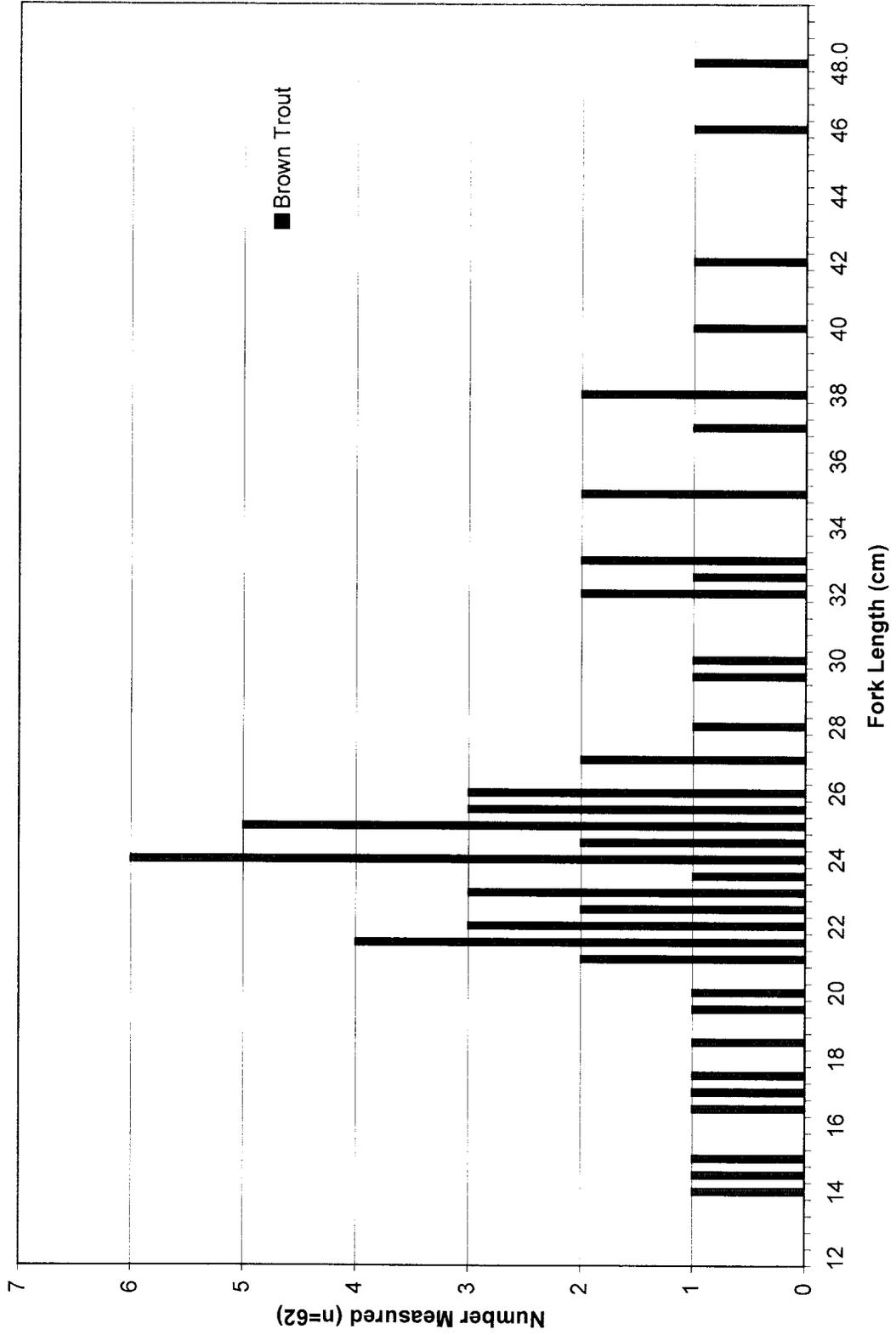
<u>Indian Creek Survey Dates</u>	Holiday = HD Weekend = WE <u>Weekday = WD</u>	<u>Survey Strata</u>
April 30	WE	I
May 1	WE	I
May 7	WE	III
May 26	WD	IV
May 28	HD	II
June 3	WD	IV
June 4	WE	III
June 8	WD	IV
June 19	WE	III
July 3	HD	II
July 8	WD	VI
July 9	WE	V
July 23	WE	V
July 28	WD	VI
August 6	WE	V
August 9	WD	VI
September 4	HD	II
September 10	WE	VII
September 20	WD	VIII
October 6	WD	VIII
October 16	WE	VII

APPENDIX II

2005 USE COUNT SCHEDULE FOR INDIAN CREEK

<u>Date</u>	<u>Daylight Hours</u>	<u>Use Count</u>		<u>Creel Census Time (approx.)</u>
		<u>Count</u>	<u>Time</u>	
April PDT	15-1/2	1st	0730-0830	0800-1200
		2nd	1000-1100	1500-1900
		3rd	1300-1400	
		4th	1530-1630	
		5th	1830-1930	
May-August PDT	16-1/2	1st	0700-0800	0800-1300
		2nd	1000-1100	1400-1900
		3rd	1300-1400	
		4th	1600-1700	
		5th	1900-2000	
September PDT	14	1st	0730-0830	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1730-1830	
October PDT	13	1st	0800-0900	0900-1300
		2nd	1000-1100	1400-1800
		3rd	1230-1330	
		4th	1500-1600	
		5th	1700-1800	
November PST	12	1st	0730-0830	0800-1200
		2nd	0930-1030	1300-1700
		3rd	1130-1230	
		4th	1330-1430	
		5th	1530-1630	

Appendix III
 Length-Frequency of Brown Trout Measured at
 Indian Creek, 2005



Appendix IV
Length-Frequency of Rainbow Trout Measured at
Indian Creek, 2005

