

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

RECREATION USE SURVEY OF
INDIAN CREEK, PLUMAS COUNTY

2002

Technical Information Report ND-03-1

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Under the Direction of

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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 2003

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SUMMARY

A survey of streamside recreation along upper Indian Creek, Plumas County, was made in 2002. This survey was made to estimate the amount and types of recreation occurring under revised 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 18,800 hours of recreation use on 11 miles of Indian Creek between Antelope Dam and Flourney Bridge from April 27 to November 15, 2002. The most frequently observed activities were camping, fishing, bicycle riding, sightseeing, and gold seeking, but several other miscellaneous activities combined to represent 14 percent of the observed use. Similar to past surveys, about 42 percent of the visitors and 49 percent of the anglers interviewed were from the northeast counties of California. The Sacramento Valley was also well represented among visitors and anglers. Anglers creeled about 100 rainbow trout, 370 brown trout, and about a dozen Eastern brook trout in 2,500 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 use 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, some brook trout) and warm water 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 (including 1999) spill has been delayed and minimized by revised winter operations.

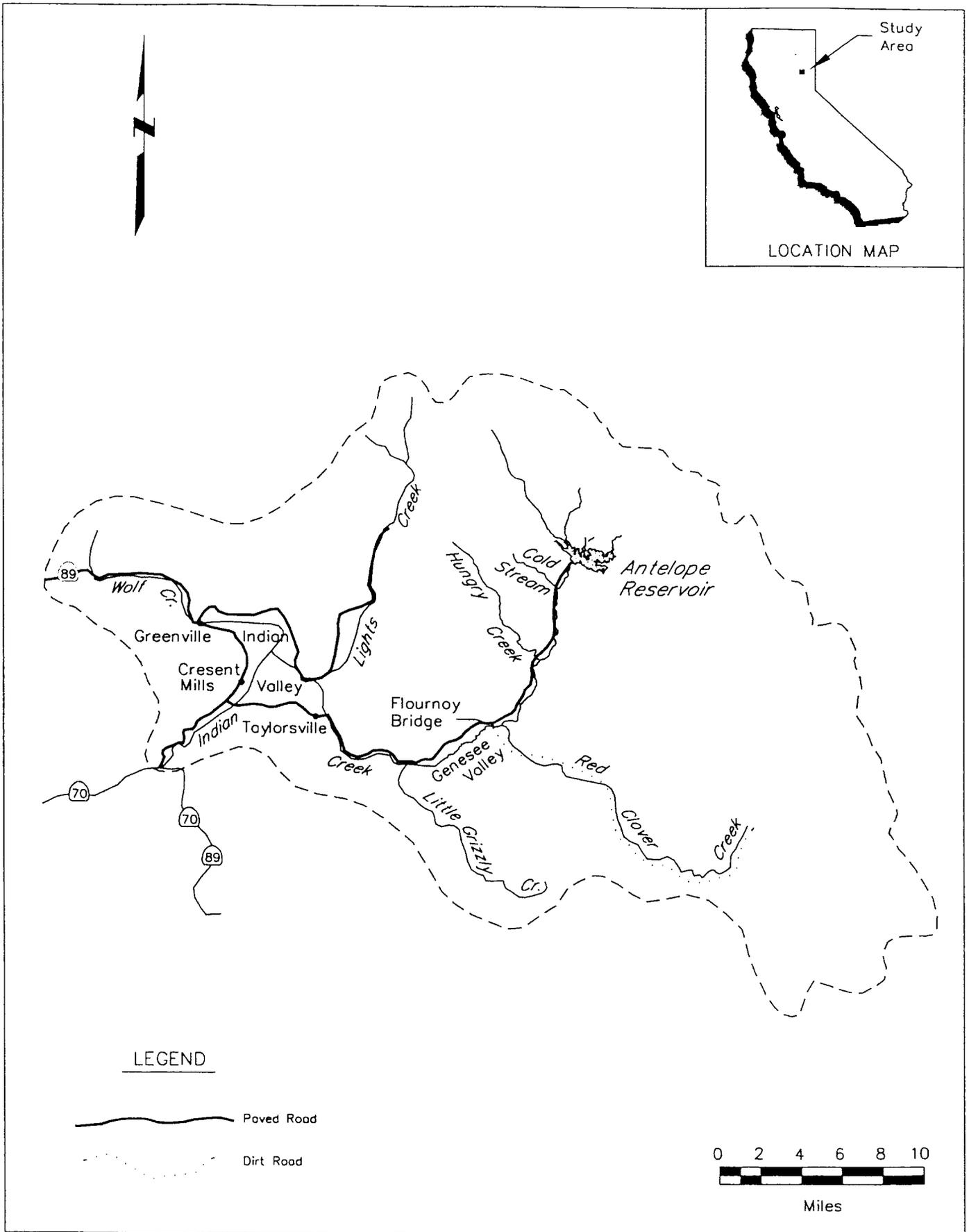


Figure 1 – Antelope Reservoir and Indian Creek, Plumas County, 2002

METHODS

Recreation Use Counts

Use counts were made on randomly selected dates within ten survey strata using the optimum allocation method described by Abramson and Tolladay (1959). Twenty-six days of the 203-day period from April 27 through November 15, 2002, were surveyed: both days of the opening weekend of trout season, 6 of 10 holiday weekend days, 9 of 141 weekdays, and 9 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 study period.

Creel Census

Anglers along Indian Creek were contacted on the same twenty-six 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. Total weight of trout caught was calculated from estimated total catch and length-weight data from Indian Creek trout (Brown 2003).

RESULTS

Recreation Use

Total recreation use on Indian Creek, Antelope Dam to Fournoy Bridge, was estimated at 18,800 recreation hours for the period April 27 to November 15, 2002. Based on counts of recreationists, camping was the most common activity, followed by fishing, bicycle riding, sightseeing, and gold seeking (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 Fournoy Bridge - 2002

<u>Activity</u>	<u>Recreation Hours</u>	<u>Percent</u>
Camping	10,300	55
Miscellaneous*	2,600	14
Fishing	2,500	13
Bicycling Riding	1,300	7
Sightseeing	1,100	6
Gold Seeking	<u>1,000</u>	<u>5</u>
Total	18,800	100

*Includes just relaxing (800 hours), walking for pleasure (700), motorcycling/ORV (400), and picnicking (100), plus a variety of undefined miscellaneous activities (600).

In addition to the use counts, 184 interviews of recreationists were conducted during the 2002 season, representing 426 people. The interviews provided more detailed information on activity participation and additional information on visitor characteristics. About 56 percent of the recreationists interviewed said they fished during their visit to Indian Creek, 45 percent said they would be "just relaxing", and about 12 percent said

they would be sightseeing. Other activities included walking for pleasure (9 percent), horseback riding (9 percent), picnicking (7 percent), swimming\wading\beach use (6 percent), and bicycle riding (5 percent). About 17 percent of the people interviewed mentioned miscellaneous other activities. These percentages total over 100 percent because many recreationists engaged in more than one activity during their visit.

About 47 percent of the visitors camped along Indian Creek, 45 percent were day users and returned home at night, and 8 percent stayed overnight somewhere in the area, but not at Indian Creek. These were evenly divided between those who camped at Antelope Reservoir, stayed with friends or relatives in the area, or summer cabins.

Recreation visitors to Indian Creek in 2002 (Figure 2) came primarily from the Northeast counties (42 percent), Sacramento Valley Counties (22 percent), San Francisco Bay Area (8 percent), and San Joaquin Valley (7 percent). The remaining 21 percent came from other regions in California (9 percent), and Nevada (12 percent).

Creel Census Data and Angler Success

During the 2002 trout season, 218 anglers were contacted between Antelope Dam and Fournoy Bridge. They had fished 443 hours, with a recorded catch of 81 brown trout (Salmo trutta) and 20 rainbow trout (Oncorhynchus mykiss). Two Eastern brook trout (Salvelinus fontinalis) (23.5 cm and 35.0 cm in length) and one largemouth bass (Micropterus salmoides) (35 cm fork length) were also observed in the creel. In addition, a total of 228 trout and 1 largemouth bass were reported caught, or reported to have been caught and released.

Total angling use between Antelope Dam and Fournoy Bridge was estimated at 2,500 hours (± 750 hours) or 925 angler days, with an estimated catch of 370 brown trout and 100 rainbow trout. About a dozen brook trout and a few bass were also probably taken. Based on reported catch and release, as many as 1,800 additional trout may have been caught and released.

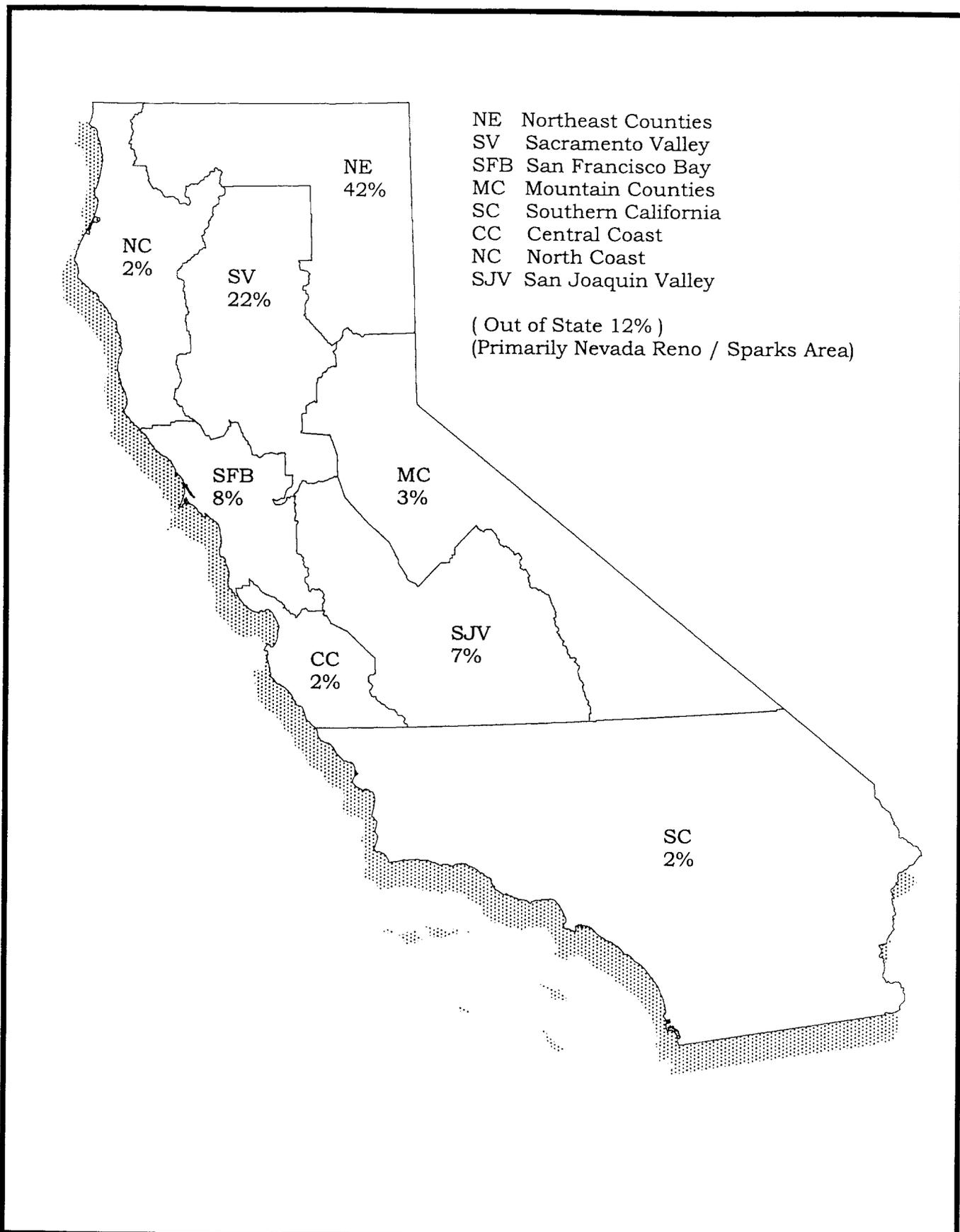


Figure 2 - Indian Creek Visitor Origin by County Groups 2002

The mean length of brown trout caught during 2002 was 24.6 cm (9.7 inches [in]) with a range of 16.5 to 40.0 cm (6.5 to 15.7 in; Appendix III). The mean length of rainbow trout was 27.7 cm (10.9 in) with a range of 12.5 to 43.5 cm (4.9 to 17.1 in; Appendix IV). An estimated 240 lb of trout were caught.

Indian Creek angler origin (Figure 3) was similar to previous years: most of the anglers came from the Northeast Counties (49 percent), Sacramento Valley Counties (24 percent), and San Francisco Bay area (8 percent). The other regions in California made up 15 percent of angler origin, with 4 percent from Nevada.

Overall, about 49 percent of the anglers censused fished with bait, 17 percent with lures, 15 percent with flies, and about 19 percent fished with some combination of these methods.

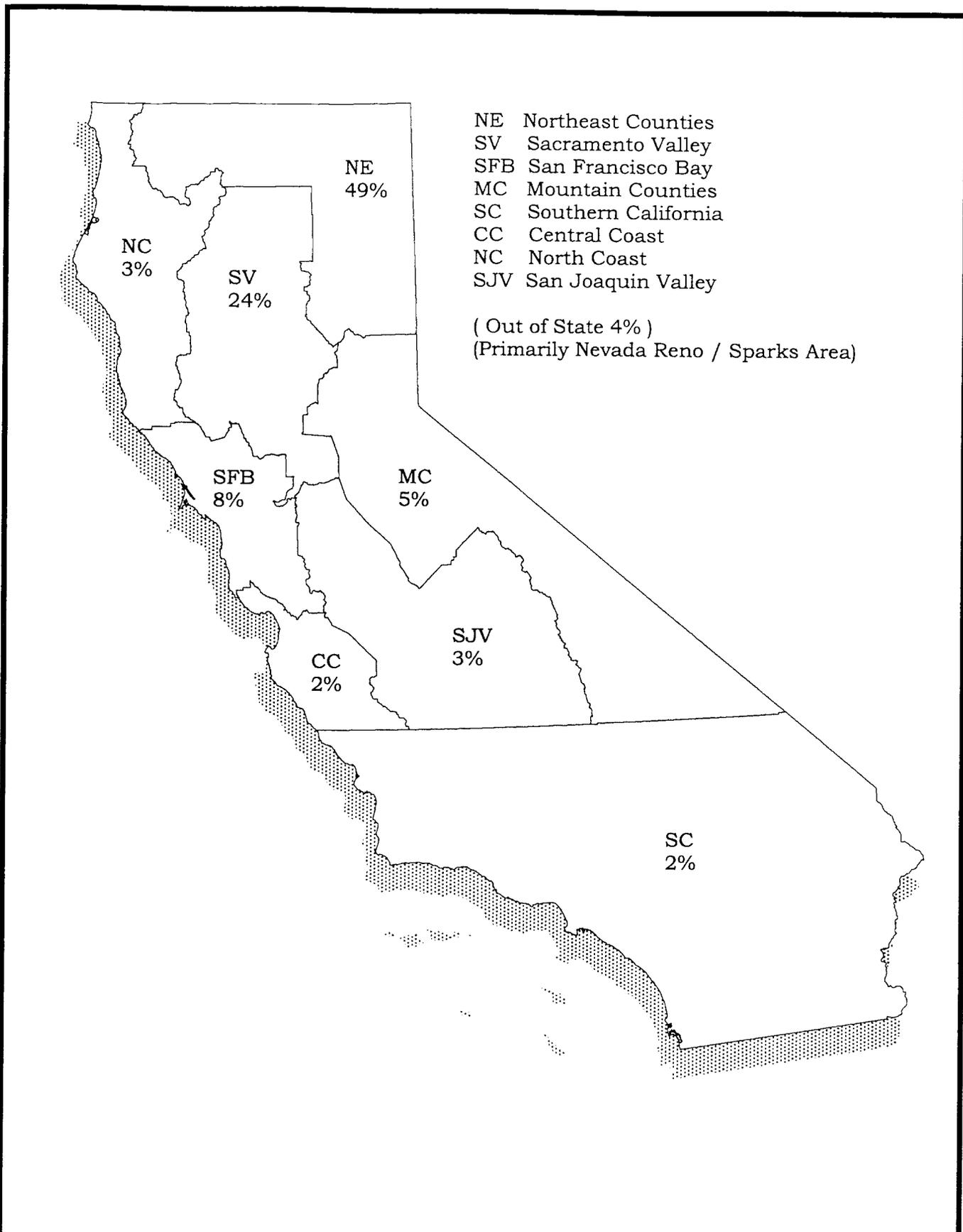


Figure 3 - Indian Creek Angler Origin by County Groups 2002

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 2002 data.

Limitations of Use Counts and Creel Census

Most recreationists on 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 wood cutters, truck drivers, and U. S. Forest Service employees 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.

It was unusually difficult to contact a statistically-sufficient number of anglers during some survey strata in 2002. The 3,654-acre Stream Fire in July 2001, burned the upper two miles of Indian creek and impacted many activities including fishing. The USDA Forest Service closed the burned area to all public access, except traffic on the Indian Creek road. The closure was in effect throughout the whole recreation survey season, due to potential hazards like falling trees. Upper Indian Creek was closed to access from the dam downstream 1.7 miles to the Cold Stream area. A few anglers still were observed fishing in the closed areas, but the majority respected the closures and fished at the lake or elsewhere. Nearly 18 percent of the estimated fishing use was represented in the creel census. However, the estimates of total catch must be regarded cautiously, because angler success varied tremendously (from 0.0 to 0.7 fish/hr) among various strata.

Comparison of 2002 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 below Antelope Dam. Three recent surveys also included "middle" Indian Creek (Flournoy Bridge to Shim Flat; 1990, 1993, 1995). A comparison of data from all eleven years (various authors, see References) illustrates patterns and changes that have occurred in general recreation, fishing, and angler success in the upper reach (Antelope Dam to Flournoy Bridge). Only data from the upper reach is shown in Table 2 for direct comparison.

Table 2.

Estimated Recreation Hours by Activity, Upper Indian Creek,
1978 to 2002^{1/}

Activity	Year										
	1978	1979	1980	1981	1982	1986	1990	1993	1995	1999	2002
Fishing	7,000	3,400	8,800	3,600	13,500	7,600	6,200	6,200	4,100	4,500	2,500
Camping	5,600	7,700	8,000	4,500	14,500	9,700	5,700	11,500	8,200	8,000	10,300
Relaxing	4,200	5,200	2,600	2,000	3,000	5,300	1,300	4,000	2,400	2,000	800
Picnicking	300	500	700	800	1,400	200	100	100	1,000	500	100
Gold Seeking	300	200	400	1,600	600	1,900	1,300	2,500	100	400	1,000
Miscellaneous	<u>1,200</u>	<u>1,000</u>	<u>1,700</u>	<u>1,000</u>	<u>2,600</u>	<u>2,300</u>	<u>1,100</u>	<u>4,200</u>	<u>2,200</u>	<u>3,600</u>	<u>4,100</u>
Total	18,600	18,000	22,200	13,500	35,600	27,000	15,700	28,500	18,000	19,000	18,800

^{1/} Source: 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, and this report. This table includes only data for the upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge.

Total use and the distribution of individual activities observed in 2002 were somewhat different than observations made in many previous years. The combination of fishing, picnicking, and relaxing appeared to be largely responsible for the relatively low use along Indian Creek in 2002. In the miscellaneous category there appear to be large percentage differences for the individual activities, but observed use of each activity is too low for such comparisons to be statistically meaningful. In addition to the access closure in the upper 1.7 miles, campfire restrictions after July 1 also limited camping use along the creek.

Eleven 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 Reservoir spills and summer flows are maintained at 20 cfs, than in years with low flows (Table 3). 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 trout can roughly reflect the number of trout entering the stream at the time of spill, and several years of lower rainbow catch reflected reduced reservoir planting between 1992 and 1996. However, increased planting has occurred since 1998. Fishing success for brown trout had normally remained about the same irrespective of angling pressure, but in 1995, 1999, and 2002 it was unusually low. The readiest explanation of low brown trout catch may be a reduced population (Brown 1996; Brown 2000) following successive record floods in 1995 and 1997.

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 2002, there was a spill but fishing success was unremarkable on opening weekend. Larger fish appeared in the creel census later in the year, as spill continued through June. The opening weekend usually has the highest angling use of the year, and this year was no exception, accounting for 13 percent of the annual use. Local anglers (Plumas and Lassen County residents), who presumably know Indian Creek better than other anglers, have historically been somewhat more successful in catching trout than residents of other counties.

Table 3.

Streamflow and Estimated Angler Use and Take
Upper Indian Creek, 1978 to 2002^{1/}

<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

^{1/} Source: 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 and this report. This table includes only data for the upper 11 miles of Indian Creek, Antelope Dam to Flournoy Bridge.

After the spilling ends, the higher maintained flows make the stream appear better for fishing and increased angler use normally continues. However, the use and catch rate in 1995, 1999 and 2002 were lower than usual. This may be because since 1996, the outflow of water from Antelope Reservoir has often been maintained at 60 cfs during winter, whereas in earlier it had been 20 cfs. The recent higher winter releases have delayed the onset of spill, and not allowed passage of fish from the lake until after the opening of fishing season. This, combined with relatively low numbers of brown trout, was the likely cause of lower angler use early in the season, and consequently a lower seasonal total because of the relative importance of early-season use. Also, the restricted access to the upper 1.7 miles of stream immediately below Antelope Dam reduced fishing use.

ACKNOWLEDGEMENTS

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APPENDIX I

RECREATION SURVEY SCHEDULE FOR
 INDIAN CREEK, PLUMAS COUNTY
 APRIL 27, 2002, TO NOVEMBER 15, 2002

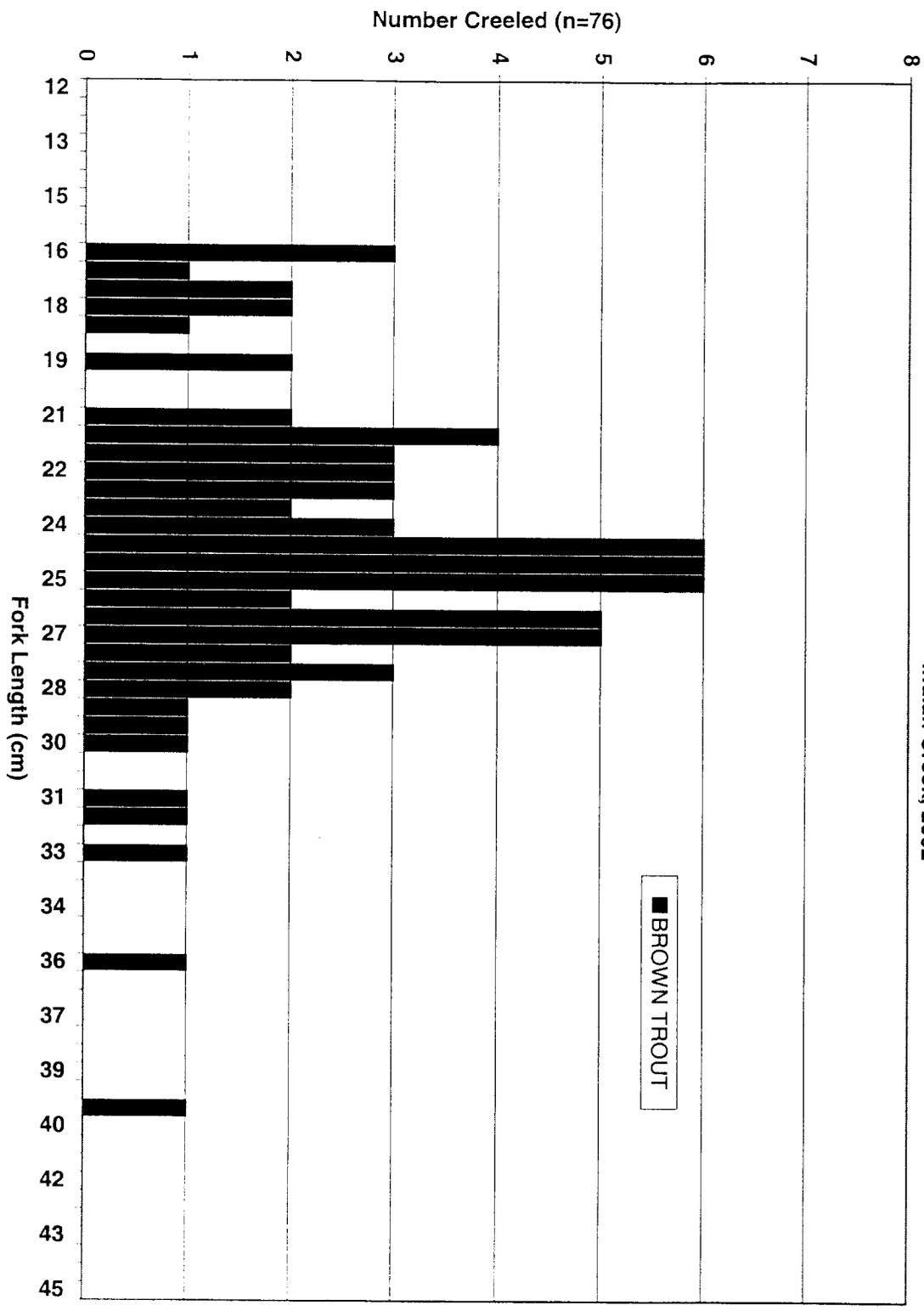
<u>Indian Creek Survey Dates</u>	Holiday = HD Weekend = WE <u>Weekday = WD</u>	<u>Survey Strata</u>
April 27	WE	I
April 28	WE	I
May 4	WE	III
May 14	WD	IV
May 17	WD	IV
May 25	HD	II
May 26	HD	II
June 01	WE	III
June 08	WE	III
June 10	WD	IV
June 11	WD	IV
June 19	WD	IV
June 29	WE	III
July 05	HD	IX
July 07	HD	IX
July 13	WE	V
July 23	WD	VI
August 03	WE	V
August 08	WD	VI
August 17	WE	V
August 31	HD	X
September 1	HD	X
September 15	WE	VII
September 19	WD	VIII
October 05	WE	VII
October 06	WE	VII
October 29	WD	VIII

APPENDIX II

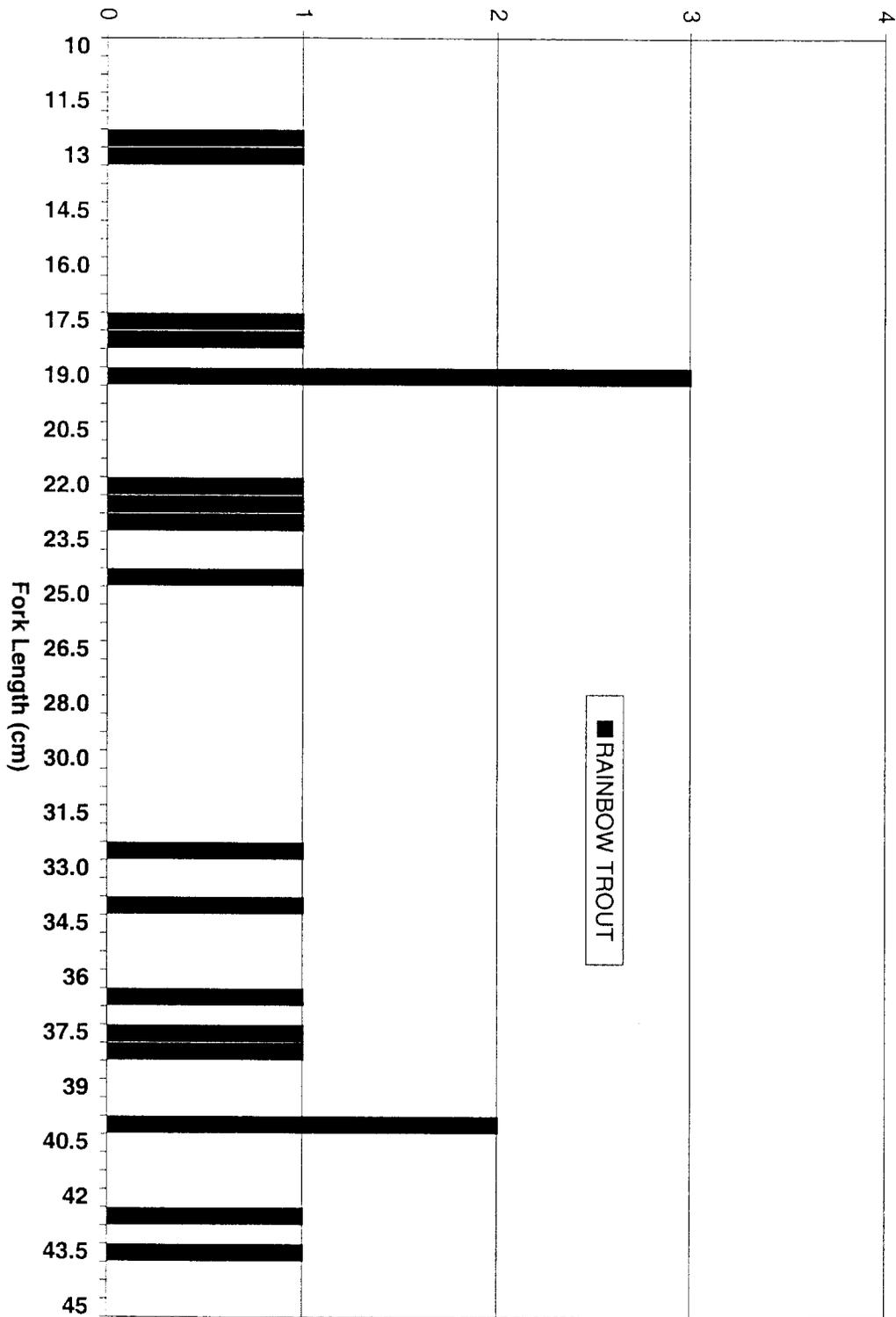
2002 USE COUNT SCHEDULE FOR INDIAN CREEK

<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 Censused Brown Trout
 Indian Creek, 2002



Number Creeled (n=20)



APPENDIX IV
Length-Frequency of Censused Rainbow Trout
Indian Creek, 2002