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South Fork of the Boise River
Creel Census and Fish Population Studies

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Period Covered: 1 January to 31 December 1977

by

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ABSTRACT

During the census period, 1 December 1976 to 30 November 1977, which includes a 4-month winter whitefish season and a 6-month trout season, anglers fished an estimated 16,366 hours and caught an estimated 25,203 fish in the South Fork of the Boise River between Anderson Ranch Dam and Danskin Bridge. The catch consisted primarily of harvested whitefish (11,046) taken in the winter season and caught and released rainbow (11,428) taken in the trout season. Harvested whitefish accounted for 93% of the estimated winter season catch while caught and released rainbow accounted for 77% of the estimated trout season catch.

The rainbow trout harvest during the trout season was estimated at 1,103 fish averaging 370 mm (14.6 in) total length, an increase of 27 mm (1.1 in) in mean length over 1976 samples. The proportion of rainbow over 406 mm (16 in) in the harvest increased from 5% in 1976 to 18% in 1977. The trout season catch rate for rainbow was 0.97 fish per hour, being relatively constant in the three census sections. Whitefish comprised 15% of the trout season estimated catch.

The winter whitefish season accounted for an estimated whitefish harvest of 10,565 fish averaging 345 mm (13.6 in) total length, the same mean length recorded during the 1973-74 winter season. Whitefish catch rates averaged 2.5 fish per hour during the winter season. We estimated anglers caught and released 713 rainbow trout or 6% of the total winter season catch.

Most South Fork anglers are local residents, primarily from Boise or Mountain Home, the closest population centers. Nonresidents comprised 7% of trout season anglers and 0% of winter season anglers.

Winter season anglers preferred bait fishing with spinning gear while trout season anglers favored fly fishing with artificial flies.

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INTRODUCTION

The lower South Fork *of* the Boise River (Fig. 1), historically an anadromous fish stream, was bracketed by Arrowrock Reservoir in the west and and Anderson Ranch Dam in the east by 1943. Operation of Anderson Ranch Dam produced widely fluctuating winter peaking flows and high but constant summer irrigation release flows. Water temperatures in the river are relatively constant year-round because the outlet works of Anderson Ranch Dam draws water from low in the reservoir pool.

By 1975, when the first detailed fishery study conducted by the Idaho Department of Fish and Game (Beach 1975) was completed, the South Fork had long been recognized as an excellent fishery for resident rainbow trout and mountain whitefish. Two angling seasons were available, one a 6-month trout season and the other a 4-month winter whitefish season.

The trout season was covered by statewide general trout regulations allowing harvest of both trout and whitefish. Beach (1975) estimated 26,443 angling hours producing 22,056 fish caught during the 1974 trout season. The catch consisted primarily of harvested hatchery rainbow trout (11,832) and harvested wild rainbow trout (5,710). The hatchery rainbow fishery was supported by stocking of about 15,000 catchable-size rainbow each year.

The winter whitefish season of 1973-74 produced an estimated harvest of 3,063 whitefish in 2,471 angling hours. Harvest was restricted to whitefish only by regulation.

The South Fork was designated a quality wild rainbow trout fishery in 1976 with trout season regulations modified and hatchery releases terminated. The special trout regulations were designated to reduce actual harvest while providing quality trout angling for large wild rainbow trout. The trout fishery became based on natural reproduction by wild rainbow.

Estimates of 1976 angling (Mate 1977) were 14,958 angling hours producing a catch of 17,514 fish during the trout season. The special regulations produced significant changes, such as a 44% reduction in estimated angling hours compared to 1974 and a switch from a fishery based primarily on harvest of hatchery rainbow (1974) to a fishery based primarily on catch and release of wild rainbow (54% of total catch) in 1976. The special trout regulations have thus far produced the desired effect of reduced harvest of wild rainbow; however, continued monitoring of the fishery is needed to monitor changes produced in the fish populations and the effect of these changes on participation in the fishery by the angling public.

Recent plans by the Bureau of Reclamation for addition of a third power unit at Anderson Ranch Dam accentuate the need for continued monitoring of the South Fork fishery. Changes in water releases at the dam could produce changes in fish population structure and in angler use. This study is intended to continue collection of baseline data to be used in evaluating biological and social effects of the proposed project.

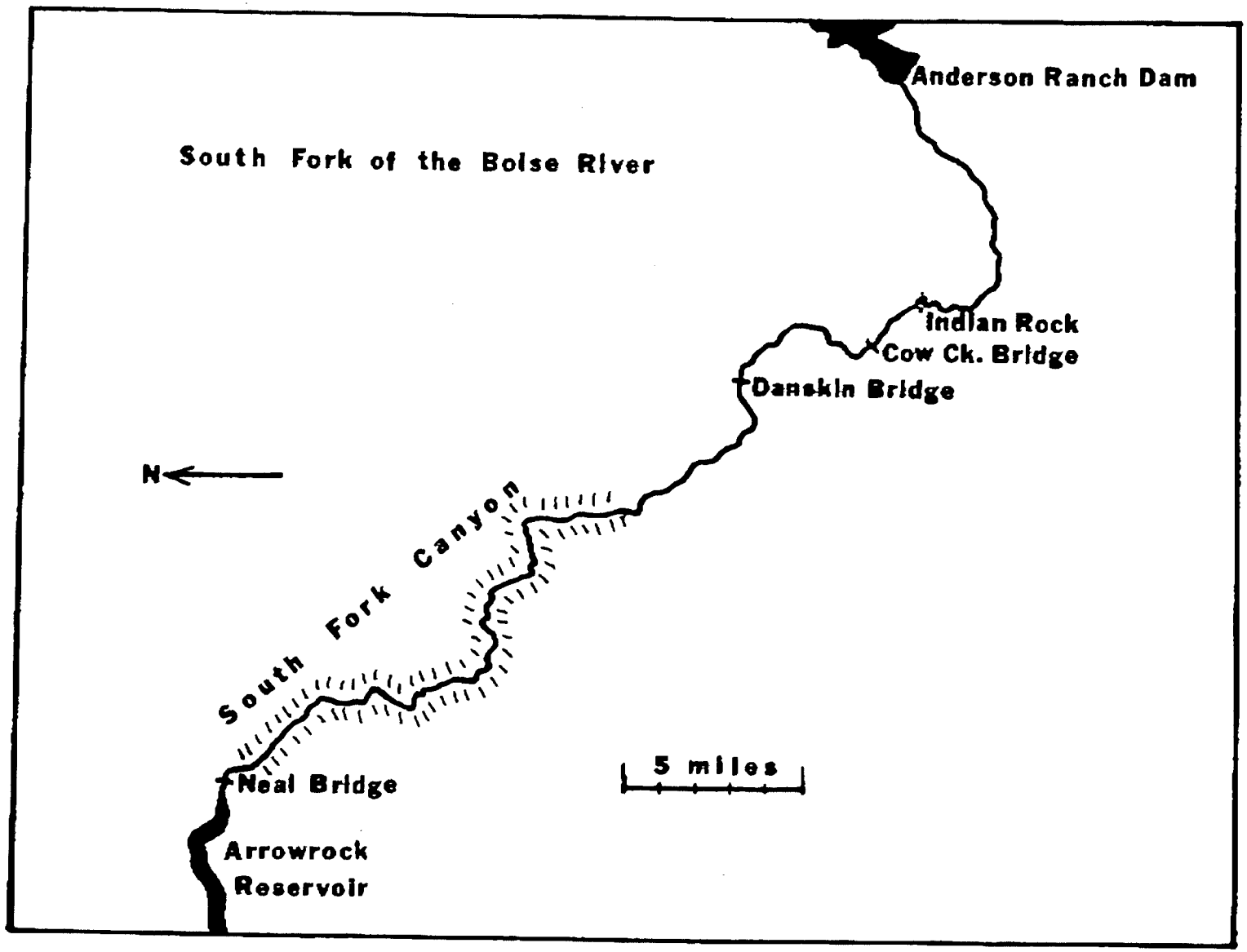

Figure 1. The South Fork of the Boise River from Anderson Ranch Dam to Arrowrock Reservoir.

OBJECTIVES

Monitor angler effort and catch in the South Fork Boise River.

Evaluate changes in abundance of game fish species.

Monitor changes in age structure and length frequency of game fish populations.

Provide an aquatic resource data base for future Bureau of Reclamation planning studies.

TECHNIQUES USED

Creel Census

We conducted creel census counts and interviews during the 4-month winter whitefish season (1 December 1976 - 31 March 1977) and the 6-month trout season {28 May - 30 November 1977). Census counts were made by car in the roaded river section from Anderson Ranch Dam to Danskin Bridge. Beach (1975) estimated that 6% of the trout season angling occurred outside the roaded portion of the South Fork. No 1977 estimates were made of angling in the section from Danskin Bridge to Neal Bridge.

Our creel census procedure consisted of angler counts conducted on 50% of the weekend days and 20% *of* the weekdays in each 28-day census interval. Specific count days and times were chosen randomly. The total daylight period for each count day was divided into four equal time periods with an angler count made in each period. The earliest count time was randomly selected within the first count period and counts in subsequent periods were evenly spaced in time. A maximum of 1 hour was allowed to complete each angler count and counts were considered instantaneous in making estimates.

From angler counts recorded we calculated average angler counts for week-days and weekend days in each census interval as follows:

$$\frac{\text{Total anglers counted}}{\text{Number of counts}} = \text{Average anglers per count}$$

Multiplication of average anglers per count times days in interval times daylight hours yields an estimate of total angler use. By combining angling hours for weekdays and weekend days we estimated total angling effort in each 28-day census interval.

We interviewed as many anglers as possible both on count days and on separate interview days to document average catch rates, catch composition and fish length frequencies. Catch estimates were made by combining average catch rates derived from angler interviews with total use estimates. Residence, fishing license class, type of angling gear and method of angling were also recorded for all anglers interviews.

We initially divided the roaded portion of the South Fork into two sections (Anderson Ranch Dam to Indian Rock and Indian Rock to Danskin Bridge) separately estimating effort and catch for each section to allow comparison with previous creel census estimates for the South Fork. During the 1977 trout season we added a third census section (Anderson Ranch Dam to Anderson Bridge) which covers the river section effected by a proposed reregulation dam.

Fish Tagging

Tagging of rainbow trout and mountain whitefish was carried out to determine seasonal fish movement in the river. We captured both species by angling, tagging rainbow trout with monel jaw tags and whitefish with Floy anchor tags. Fish length, river location and date tagged were recorded for each fish tagged.

We solicited tag return information from anglers during creel census interviews; however, most of the tag return information collected came from voluntary angler returns by mail.

FINDINGS

Angler Use and Catch

Anglers fished an estimated 16,366 hours and caught an estimated 25,203 fish during 12 creel census intervals from 1 December 1976 to 30 November 1977 (Table 1). The 6-month trout season accounted for 12,117 angling hours and 13,848 fish, most of which were rainbow trout caught and released. The 4-month winter season accounted for 4,249 angling hours and 11,355 fish, most of which were whitefish harvested by anglers. The overall total catch consisted primarily of caught and released rainbow (11,428 or 45%) and harvested whitefish (11,046 or 44%). The overall catch rate for the entire period was 1.54 fish per hour with rainbow trout (.76 per hour) and whitefish (.77 per hour) the species caught most.

Trout season effort decreased 19% in 1977 compared to 1976 estimates, but the overall catch rate improved due to increased catch of wild rainbow per hour. We noted a decline in the trout season whitefish catch in 1977 of 67% compared to 1976 estimates. The drop in whitefish catch during the trout season followed a highly successful 1976-77 winter whitefish season during which increased of 245% in harvest and 72% in effort occurred over estimates compiled by Beach (1975) for the 1973-74 winter season. Harvest of wild rainbow in 1977 remained close to 1976 estimates continuing about 80% below pre-special regulation estimates for 1974. Early fall fishing continued most popular in 1977 as 50% of the trout season rainbow catch and 28% of the total effort occurred in a single census interval (17 September to 14 October). Similar peaks in wild rainbow fishing also occurred in 1974 and 1976 coinciding in all 3 years with reductions in South Fork water flows when irrigation water releases were terminated.

A breakdown of 1977 trout season catch and effort by river section shows relative uniformity in catch and effort (Table 2) and catch composition (Table 3) when stream mileage of each section is considered. Catch rates (Table 4) are also uniform for the three census sections.

Table 1. Estimated angling effort and catch at the South Fork of the Boise River from Anderson Ranch Dam to Danskin Bridge in 12 creel census intervals during the period 1 December 1976 to 30 November 1977.

Census interval starting date	Estimated angling hours	Estimated Catch--Anderson Ranch Dam to Danskin Bridge					
		Rainbow caught & released	Rainbow harvested	Whitefish caught & released	Whitefish harveste	Dolly Varden harvested	Total catch
1 December 1976	332	67	--	5	624	--	6 96
29 December	416	104	--	11	708	--	823
26 January 1977	2,106	373	--	0	4,276	--	4,649
23 February	1,053	145	--	61	3,780	--	3,986
23 March	342	24	--	0	1,177	--	1,201
Subtotal	4,249	713	--	77	10,565	--	11,355
28 May	1,733	901	265	136	.65	5	1,372
25 June	1,350	698	93	112	34	0	937
23 July	2,339	1,202	174	105	22	3	1,506
20 August	1,989	1,342	225	27	16	0	1,610
17 September	3,416	5,602	271	731	112	0	6,716
15 October	978	802	53	114	232	0	1,201
12 November	312	168	22	316	0	0	506
Subtotal	12,117	10,715	1,103	1,541	481	8	13,848
Total	16,366	11,428	1,103	1,618	11,046	8	25,203

Table 2. Estimated angling effort and catch in three creel census sections at the South Fork of the Boise River during six census intervals, 28 May to 30 November 1977.

Census interval starting date	Angler hours	Estimated catch: Rainbow caught & released	Rainbow harvested	Whitefish caught & released	Whitefish harvested	Dolly Varden harvested	Total catch
Anderson Ranch Dam to Anderson Bridge (2.1 mi)							
28 May	269	140	41	21	10	1	213
25 June	117	61	8	10	3	0	82
23 July	186	95	14	8	2	0	119
20 August	207	127	67	0	0	0	194
17 September	583	869	44	11	22	0	946
15 October	185	295	0	0	4	0	299
12 November	69	35	4	79	0	0	118
Total	1,616	1,622	178	129	41	1	1,971
Anderson Bridge to Indian Rock (4.9 mi)							
28 May	408	212	62	32	15	1	322
25 June	434	224	30	36	11	0	301
23 July	957	492	71	43	9	1	616
20 August	801	171	93	0	7	0	271
17 September	1,609	2,725	116	571	65	0	3.477
15 October	412	270	32	60	103	0	465
12 November	129	57	5	224	0	0	286
Total	4,750	4,151	409	966	210	2	5,738
Indian Rock to Danskin Bridge (4.7 mi)							
28 May	1,056	549	162	83	40	3	837
25 June	799	413	55	66	20	0	554
23 July	1,196	615	89	54	11	2	771
20 August	981	1,044	65	27	9	0	1,145
17 September	1,224	2,008	111	149	25	0	2,293
15 October	381	237	21	54	125	0	437
12 November	114	76	13	13	0	0	102
Total	5,751	4,942	516	446	230	5	6,139

Table 3. Composition of angler catch in three creel census sections on the South Fork of the Boise River during six census intervals, 28 May to 30 November 1977.

Census interval starting date	Percent of catch--Anderson Ranch Dam to Anderson Bridge (2.1		
	Rainbow	Mountain whitefish	Dolly Varden
28 May	84.9	14.5	0.5
25 June	84.1	15.8	0
23 July	91.6	8.4	0
20 August	100.0	0	0
17 September	96.5	3.5	0
15 October	98.7	1.3	0
12 November	33.0	66.9	0
Entire period	91.3	8.6	< 0.1

	Percent of catch--Anderson Bridge to Indian Rock (4.9 mi.)		
	Rainbow trout	Mountain whitefish	Dolly Varden trout
28 May	85.1	14.6	0.3
25 June	84.4	15.6	0
23 July	91.4	8.4	0.2
20 August	97.4	2.6	0
17 September	81.7	18.3	0
15 October	64.9	35.1	0
12 November	21.7	78.3	0
Entire period	79.5	20.5	<0.1

	Percent of catch--Indian Rock to Danskin Bridge (4.7 mi.)		
	Rainbow trout	Mountain whitefish	Dolly Varden trout
28 May	84.9	14.7	0.4
25 June	84.5	15.5	0
23 July	91.3	8.4	0.3
20 August	96.8	3.2	0
17 September	92.4	7.6	0
15 October	59.0	41.0	0
12 November	87.2	12.7	0
Entire period	88.9	11.0	< 0.1

Table 4. Catch rates in 3 creel census sections of the South Fork of the Boise River during the period 28 May to 30 November 1977.

	Catch rates 28 May to 30 November 1977					
	Fish per hour			Fish per mile		
	Rainbow trout	Mountain whitefish	All species	Rainbow trout	Mountain whitefish	All species
Anderson Ranch Dam to Anderson Bridge (2.1 mi)	1.11	0.10	1.22	857	81	939
Anderson Bridge to Indian Rock *(4.9 mi)*	0.96	0.25	1.21	931	240	1,171
Indian Rock to Danskin Bridge (4.7 mi)	0.95	0.12	1.07	1,161	144	1,306
Anderson Ranch Dam to Danskin Bridge {11.7 mi)	0.97	0.17	1.14	1,010	173	1,184

The census section from Anderson Ranch Dam to Anderson Bridge, subject to inundation with construction of the proposed reregulation dam, had less angling effort per stream mile and a lower catch per mile than the other two sections, but experienced the highest catch rates and the highest proportion of rainbow trout in the catch. Both catch and catch rates for whitefish were lowest in the Anderson Ranch Dam to Anderson Bridge census section. Anglers averaged over one fish per hour in all three census sections during the trout season.

Angler Harvest

South Fork anglers harvested an estimated 1,103 rainbow trout during the 1977 trout season. The catch rate for harvested trout during the same period was 0.08 fish per hour compared to 0.09 fish per hour in 1976. The mean total length of rainbow in the 1977 harvest (Fig. 2) was 370 mm (14.6 in), an increase of 27 mm (1.1 in) over that of 1976. Length frequencies collected by project personnel hook and line sampling (Fig. 3) show a similar increase in mean total length of 25 mm (1 in) between 1976 and 1977 samples. The incidence of rainbow over 406 mm (16 in) in the angler harvest increased from 5% of the harvest in 1976 to 18% of the harvest in 1977.

South Fork anglers harvested 11,046 mountain whitefish during the period December 1976 through November 1977; however, 96% of the whitefish harvest occurred during the 4-month winter season. The winter season harvest (Fig. 4) averaged 345 mm (13.6 in) total length; exactly the same as the mean total length recorded for the 1973-74 winter season.

Fish Movement

We collected recapture information on 15% of the rainbow jaw tagged in 1976 and 1977. Since most of the angling effort and all of our census work took place in the roaded portion of the South Fork most of the tag return data is from that same river section. Most of the rainbow movement occurred from mid-March to late May during spawning and in late summer (Fig. 5). Hook and line sampling and snorkel observations point to movement of young rainbow from the canyon area to the section between Anderson Ranch Dam and Anderson Bridge in the fall, but difficulty in tagging fish or recovering tagging data in the canyon area has prevented documentation to date. Large numbers of young rainbow are wintering in the Anderson Ranch Dam to Anderson Bridge section, but winter tagging has been minimal because of the difficulty of hook and line capture with colder water temperatures. Summer snorkel observations indicate downstream displacement of newly emerged rainbow fry into the canyon area.

The general seasonal movement of rainbow in the South Fork is complex and only partially documented to date. Initial downstream movement of fry is followed by a fall migration upstream to the dam and winter holdover in the river section immediately below Anderson Ranch Dam. Subsequent dispersal occurs with increased flows and rising water temperatures in the spring. These general patterns of movement are further complicated by movement in and out of tributary streams, spawning movement and movement in and out of slackwater of Arrowrock Reservoir. The reversed water temperature patterns of the South Fork, warmer in winter and cooler in summer as Anderson Ranch Dam is approached, undoubtedly contributes to

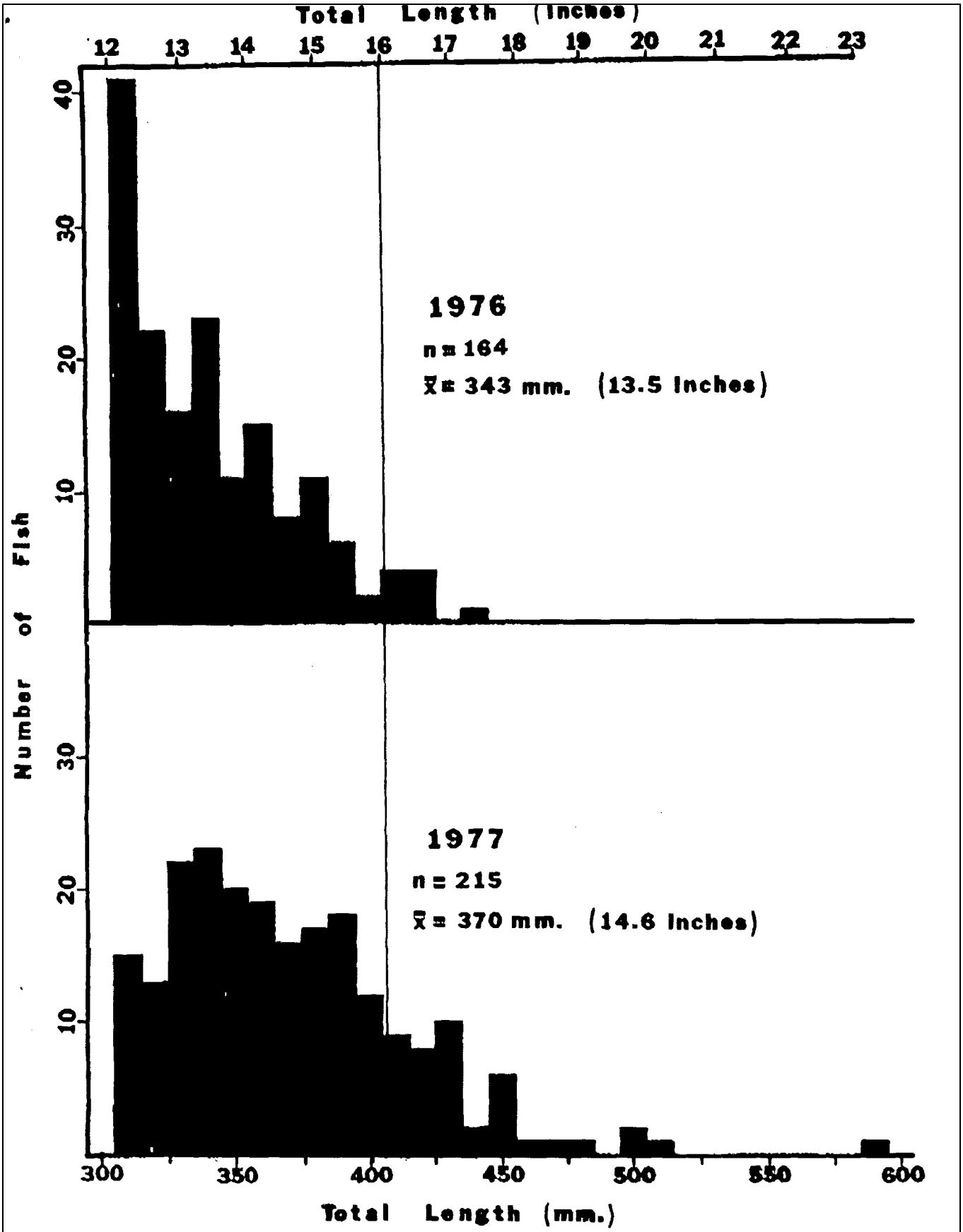

Figure 2. Total length of wild rainbow in the angler harvest sampled by creel census at the South Fork of the Boise River, 1976 (Mate 1977) and 1977.

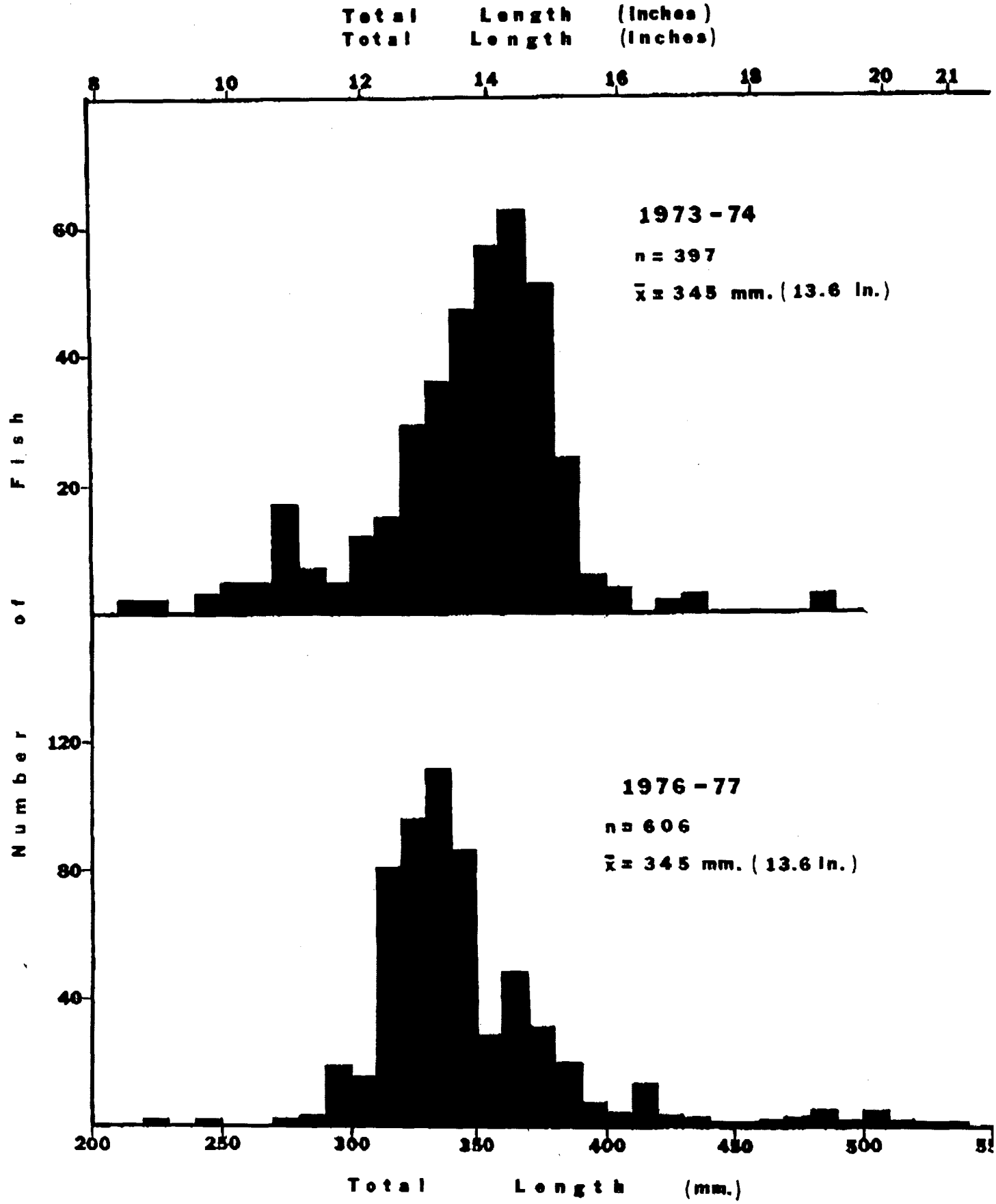

Figure 4. Total length of mountain whitefish harvested in the winter season (December through March) sampled by creel census at the South Fork of the Boise River, 1973-74 (Beach 1975) and 1976-77.

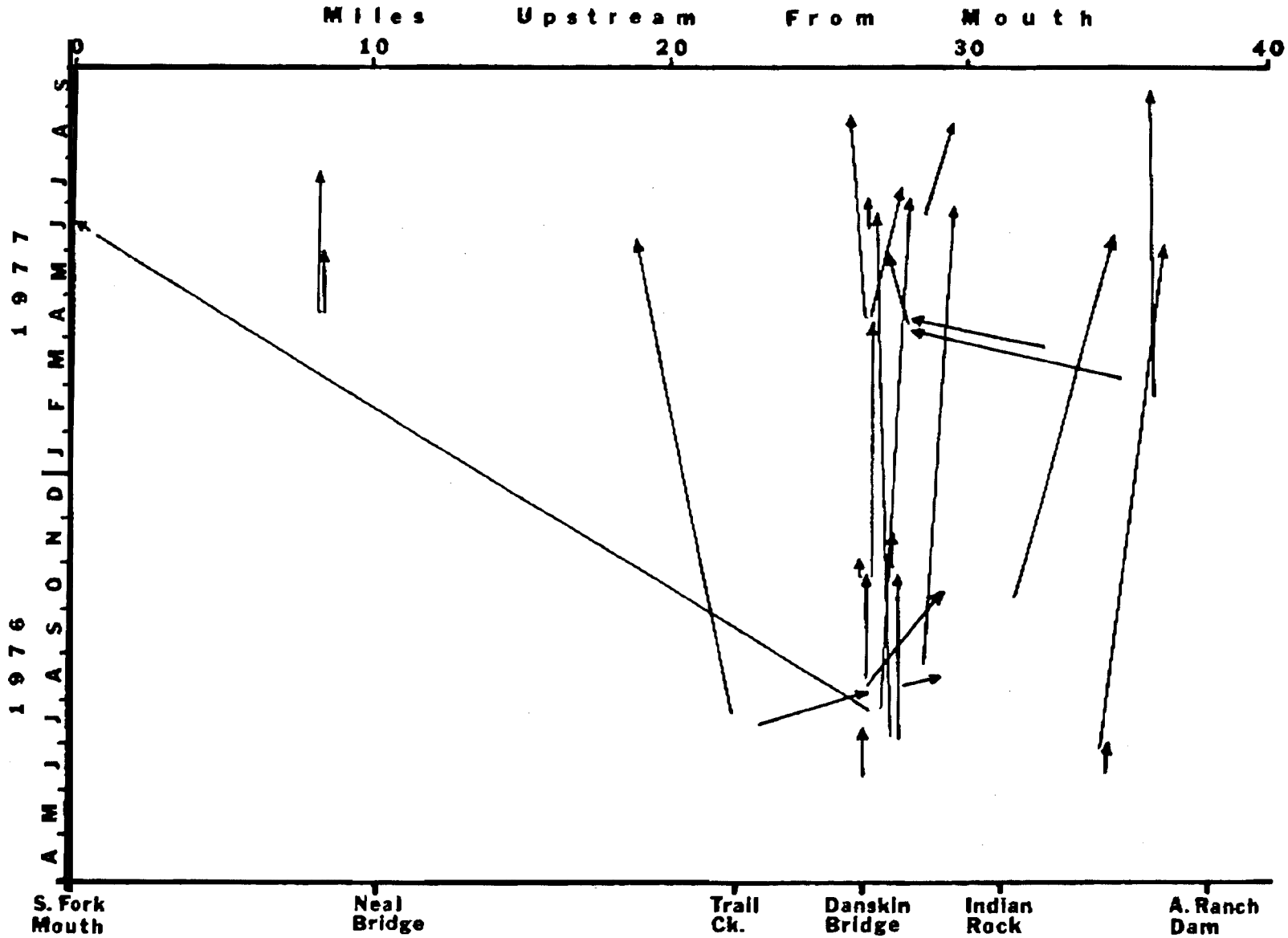

Figure 5. Movement of jaw-tagged wild rainbow trout in the South Fork of the Boise River during the period April 1976 to September 1977.

rainbow movement in the river. The pattern of flow releases and flow fluctuations is another factor likely to be influencing rainbow movement.

Documentation of seasonal movements of mountain whitefish have proved even more difficult. The few tag returns recorded show no movement, but snorkel observations indicate few tagged whitefish remaining in the immediate vicinity of tagging. Poor tag retention or tagging mortality may be associated with low tag returns to date.

Angler Composition

Angler interviews indicate a majority of South Fork anglers are local residents. Boise and Mountain Home are the residence of most anglers (Table 5), nonresidents making up 7% of the trout season anglers and 0% of the winter season anglers. Fishing license checks (Table 6) confirm the dominance of resident anglers, showing 90% residents and 10% nonresidents. The disparity in percentage of nonresidents between actual residence (Table 5) and license class (Table 6) is due to new Idaho residents who do not meet the 6-month residence requirement necessary to purchase resident licenses.

The winter whitefish season apparently attracts a different angling public including more senior citizens, no nonresidents and more combination (hunting and fishing) license holders. Winter anglers also use different fishing gear (Table 7) showing a preference for bait fishing with spinning gear. Trout season anglers preferred fly fishing by a large margin and wading was more popular than boat or bank angling.

Hook and line sampling by project personnel showed no inherent gear advantages for either fly fishing or spin fishing during either the winter or general season. Apparently the difference noted in gear type reflects a real change in angling public between the two seasons rather than adjustments to fish for different species of fish.

DISCUSSION

Angler Use

Special trout regulations and termination of hatchery introductions have reduced angler effort at the South Fork along with producing higher rainbow catch rates, larger fish. and a quality wild fish angling experience. Special regulations applied to other Idaho streams generally produced the same initial drop in angling effort; however, as fishing improved angler participation rapidly approached, then surpassed previous angling effort, Two factors, the proximity of the South Fork to Idaho's largest population center and the scarcity of stream angling for trophy trout in southwest Idaho, point to probable rapid increases in angling effort at the South Fork.

The rate of increase in future South Fork angling effort is likely tied to two limiting factors, fishable flows In the river and limited river access. Beach (1975) correlated low flows with increased wild rainbow catch rates. Since initiation of special regulations and termination of hatchery stocking,

Table 5. Residence of anglers interviewed at the South Fork of the Boise River, 1976 and 1977.

Place of residence	Winter whitefish season		General trout season	
	Number	Percent	Number	Percent
Boise	140	50	445	58
Mountain Home	61	22	148	19
Other Idaho residents	80	28	120	16
Nonresidents	-	-	54	-
Total	281		767	

Table 6. License classes recorded during creel census interviews at the South Fork of the Boise River, 1976 and 1977.

License class title and code number		Winter whitefish season		General season	
		Number	Percent	Number	Percent
Resident combination	01	171	73	421	50
Resident fishing	03	18	8	302	36
Senior resident (Age 65-70)	04	43(04&92)	18 (04&'92	10	1
Senior resident (Age 70+)	92			5	1
Junior resident combination (Age 14-17)	07	1	<4	9	
Junior resident fishing (Age 14-17)	09	1	<4	7	1
Blind	95	-	-	3	<1
Nonresident season fishing	22	-	-	33	4
Nonresident fishing 7-day	23	-	-	22	3
Nonresident fishing 1-day	24	-	-	21	3
Total		234		833	

Table 7. Angling methods and gear types used by anglers interviewed at the South Fork of the Boise River, 1976 and 1977.

	Winter whitefish season	General trout season
Fishing method		
Sample size		874
Bank	-	22%
Wade	-	73%
Boat		5%
Rod type		
Sample size	272	900
Fly rod	26%	79%
Spinning rod	74%	20%
Other	-	<1%
Lure type		
Sample size	276	884
Artificial fly	26%	85%
Artificial lure	3%	15%
Bait	71%	

angler effort has peaked in early fall coincident with flow reductions at the end of the irrigation season. Increased boat angling, which allows easier fishing during high summer irrigation flows, may eventually overcome fishability problems at higher flows. Boat anglers increased from 3% to 5% of anglers interviewed from 1976 to 1977. Boating may also improve river access by allowing fishing in private land sections and in the relatively inaccessible canyon section.

Winter season angling use is tied to factors different from those effecting general season angling. The large increases in angling effort and in average catch rate for the 1976-77 winter season over the 1974 season are likely attributed to weather conditions. The unusually mild snow-free access conditions of 1976-77 encouraged angler participation and the common sunny days increased angling success. The absence of peaking flows during the 1976-77 season probably did not effect angling use since most of the use was on weekend days when peaking flows are rare even during harsher winters.

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