UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Division of Fishery Services
Vernal, Utah

Annual Project Report

F I S H E R Y M A N A G E M E N T P R O G R A M

Air Force Academy

El Paso County

Colorado

197[illegible]

Stanley Canyon Reservoir

Stanley Canyon Reservoir is a 10 acre former water supply reservoir of Colorado Springs acquired by the Air Force in 1968. It lies some distance east and up-mountain from the Academy proper at an elevation of 9,000 feet. Original management plans called for developing this water as a walk-in, quality fishery. In 1970 this goal was impaired by unauthorized access from two small unimproved roads on top of the mountain. Evidently, this and various other minor problems were corrected in 1971. Table 1 summarized the first three years of management.

Limited fertility and small size precludes producing an appreciable fishery here without supplemental stocking of catchable size rainbow trout. A total of 3,500 catchable size rainbow trout have been programmed for 1972. Undoubtedly such stocking acts as a depressant in developing an essentially wild cutthroat fishery based on fingerling stocking. With accurate catch records, this mixed management perhaps can be more refined over the next few years in providing a semblence of quality - better than averagesize fish and a resonable catch rate not totally predicated on strictly put-and-take stocking.

Table 1. Catch and stocking statistics for Stanley Canyon Reservoir, 1969-71.

Year	1969	1970 [1]	1971
Number of anglers	536	494	862
Number angler hours	2676	1337	6360
Average number hours/trip	5.0	2.7	7.4
Harvest	1195	545	1524
Catch per hour	0.44	0.40	0.24
No catchable size rainbow stocked	2000	900 [2]	4000 [3]
No fingerling cutthroat stocked	2000	---	1200(2")
% return [4]	60%	60%	38%

[1] Does not include anglers who found and used limited road access.

[2] Only one plant, Aug. 25, 900(296 lbs)

[3] Stocked June 7, 1971

[4] Represents a minimum return to creel of stocked rainbows, inasmuch as an undisclosed portion of the catch consisted of 11.0 - 12.5 inch cutthroats in 1970 and 1971 originating from the 1969 plant.

Paul Sekulich

— record stocking date —

(fm. Gallup New Mex. Office)

1972 stocking of Snake R. cutthroat on Jicarilla Apache Reservation.

Dulce Lake

Sept. 20 N=3,794 $\bar{x}$ size 4 in.

(fm. Hotchkiss Colo. fed. hatchery)

Stone L.

Sept. 25

N=6,520 $\bar{x}$ size 7 in.

(fm. Jackson fed. hatchery)

Sept. 26 10,000 (est. 2500 mortality = 7500 stocked) $\bar{x}$ size 6.7 in.

fm. Hotchkiss hatchery

—1970 plant still entering catch.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
New York Cooperative Fishery Unit
Fernow Hall, Cornell University
Ithaca, New York 14850

8 February 1973

Dr. Robert J. Behnke
Department of Fishery and Wildlife Biology
Colorado State University
Fort Collins, Colorado 80521

Dear Bob:

I enclose a copy of an MS on "Distribution and abundance of fishes in Sagehen Creek, California". Would you have time to review it briefly for substance and give me your opinion on its worthiness for publication? Personally I have some reservations about how much this adds to what we already know. But this is the kind of decision on which second opinions are especially important, and clearly you have special qualifications for rendering an exceptionally informed opinion on this particular paper.

Sincerely,

Alfred W. Eipper
Unit Leader

AWE:ak
Enclosures

1871 1971

Dulce L. - ca. 75 acres

cutthroat	stocked	1970	
	1,006 - 55 lbs.	Apr. 21	
rainbows	stocked	1970	
Apr. 3	10,200	(2,550 lbs)	8.5 in.
Apr. 8	10,200	(2,550)	8.5 in.
Oct. 19	7,000	770 lbs.	6.5 in.
	27,400	5,870	

27-1 by number 100+ - 1 wt.

1971 - no cutthroat stocked

rainbows		
Apr. 29	11,901	1,100 lbs
May 3	10,099	816
Sept. 27	7,000	660
	29,000	2,576

gill net Sept. 1971 caught nothing.

Jicarilla Apache Reservation

2 shallow, eutrophic lakes, high TDS - mainly managed w/ heavy plants + sub catchable (5-6 in) rainbows. fathead minnows, zooplankton, insects (damselflies), snails, ~~new~~ recent crawfish introductions.

Stone L. - aprx. when full 500 acres - 2 ft. max. depth

1970 Cutthroat stocked

	no.	wt.	size
Apr. 21 --	19,087	1043 lbs,	$\bar{x}$ 5.1 in

[only other cutthroat plant was 20,222 (1744 lbs.) in 1967] (Jackson Hatchery) (must be fm. 1969 hatch)

Rainbows

May 13, --	42,338	2,566 lbs.	5.3 in
" 18,20 -	26,267	2652	6.3
27	11,397	1228	6.4
Oct. 11	24,148	2600	6.4
" 13	24,166	2600	6.4
" 15	11,687	1462	6.8
	140,103	13,108	

1970 I 140,103 rainbows 13,108 lbs. $\bar{x}$ 6+ in.

19,087 cutthroats 1,043 lbs. $\bar{x}$ 5+ in

7-1 in numbers 13-1 in wt.

1971 stocking

no cutthroat

rainbows

		no.	lbs.	
May	4	8283	649	6 in
	5	7380	659	
	6	12,870	1200	+
	7	11,440	1100	
	11	11,330	1100	
	12	13,110	1150	
	12	4 547	433	
	13	12075	1150	
Sept.	27	16270	1535	
	29	18750	1561	
		116,055	10,537 lbs.	

1971 -

21-22
gill net catches in Sept., 1971

rainbows	cutthroat
11	2
35	4
31	2
15	0
92	8
9½ - 15½ in.	14-16 in.

stomach samples taken - request to send

* - inquire on dif areas for gillnet sets.
* request size distribution of rainbow catch

- creel census data and late season samples -

plan of operation - cutts of known age
rainbows - age - growth
- food habits
- gillnet distribution

DULCE LAKE

80 acres
78° F max
9/2/69 TDS 1,940 SO_4 1,125 Na 287 Ca 157
eutrophic

→ No Creel Census Data

Gill Net Data
5/4/72 Rb 14/16 Cut 2/16

No Stomach analysis comparisons because only 2 Cutt + both were empty

No aging data either

STONE LAKE MAY 3, 1972

JICARILLA APACHE RES, N. MEX.

SPECIES	AGE	N	$\bar{X}$	X RANGE	$\bar{W}$	W RANGE
RAINBOW	I	7	209	180-240	.214	.15 -.27
Stocked (Age I) May-Sept. 71	II	32	285	252-357	.626	.38-1.22
Stocked (Age I) May-Oct 70	III	7	406	380-430	1.68	1.22-1.99
possibly the same	IV	3	441	430-458	2.117	2.01-2.28
CUTTHROAT Stocked (Age I) 21 Apr. 70	III	17	377	287-423	1.515	.86-1.95

DULCE LAKE MAY 4, 1972

25.4
6.4
1016
1524
160 mm

165 mm

25.4
5
127.0

SR - stocked 130 mm

49/17

Rb Cutt
3.1

STONE LAKE

20' max depth 500 acre max.
eutrophic

Creel Census Data

	1971	RB 551/579	95.2%	Cut. 28/579	4.8%
May–Sept	1968	1729/1807	95.7	78/1807	4.3%

Gill Net Data

5/3/72

1971 {

49/66	74.2		17/66	25.8	
19/21	162/189		2/21	27/189	
31/33			2/33		
17/17		85.7%	0/17	14.3%	
35/39			4/39		
11/13			2/13		

STONE LAKE

5/3/72	CP	CL	ZOOP	SNAIL	TOTAL	
	(18)	(31)	(17)	(2)		
RAINBOW I, II,	22.9	27.43	14.3	3.4	68.03	N = 39
	(2)	(8)		(1)		
III IV	9.5	16.6	0	2.0	28.1	N = 9 + 1 EMPTY
				+2 WITH FISH 1 - 1 FATHEAD 1 - 2 6" RAINBOW		
	10	3	2			
CUTTHROAT III	10.85	2.70	.75	0	14.3	N = 14 + 3 EMPTY (17)
				+ 3 WITH FISH 1 - 5 FATHEAD 1 - 3 FATHEAD 1 - 1 FAT HEAD		

8/4/71						
		(5)	(4)			
RAINBOW	0	1.25	1.5	0		N = 9
CUTTHROAT	1 - 2 MINNOW		2 - EMPTY			N = 3

9/21						
	3	1			1 EMPTY	
RAINBOW	14.4	.4	0	0	1 - 1 MINNOW	N = 5
	5				1 EMPTY	
CUTTHROAT	17.9					N = 6

VOLUME	CP	CL	ZOOP	SNAIL	
RAINBOW I II	33.66%	40.32%	21.02%	4.99%	5/3/72
III III	33.8%	59.07%	0%	7.11%	
CUTTHROAT	75.87%	18.88%	5.24%	0%	
FREQUENCY					
RAINBOW I II	46%	79%	44%	5%	
III IV	22%	89%	0%	11%	
CUTTHROAT	71%	21%	14%	0%	
(9) Rb	—	45.5%	54.5%	—	8/4/71
— Cut					
(4) Rb	97.3%	2.7%	—	—	9/21/71
(5) Cut	100%	—	—	—	

→ WATERS INVOLVED

1. Midview Res. (Utah)
2. Bottle Hollow Res. (Utah)
3. Weaver Res. (Utah)
4. Towave Res. (Utah)
5. Stanley Canyon Res. (AF. Academy)

ROLE OF SNAKE R. cutthroat in fishery mgt (using varying sympatric relationships)

→ Parameter Determination

1. Survival rates
2. Stomach samples reflecting segregation } incorporate age classes where feasible.
3. Growth rates

E.g.

Stocking Date	Cutthroat # stocked	Rainbow # stocked
1969		1969
		1970
		1971
Totals		

Gill Net Samples

size

size
(how many from 1969 stocking)

lakes
- surface size, area, depth, productivity, elevation (temp.), other species (competition)

rankings -
- growth in each lake - estimate - best - poorest
- survival -

otolith paper: J. Fish. R. B. C. 1972 29(4): 452-64

Are fish selectively or interactively segregating.

Laboratory Data Sheet for Water Samples

Location: Stone Lake

Date Taken: 9-2-69

Date Analyzed: 9-11-69

Temperature (°F) STONE LAKE 9-2-69			
Silica (SiO_2)			
Boron (B)			0.25
Iron (Fe)		0.004	0.07
Calcium (Ca)		2.50	50.10
Magnesium (Mg)		12.90	156.86
Sodium (Na)		12.50	287.38
Potassium (K)		0.20	7.82
Cations		28.10	
Phosphorus (P)			
Bicarbonate (HCO_3)		2.25	137.30
Carbonate (CO_3)		1.36	40.81
Sulphate (SO_4)		23.43	1125.34
Chloride (Cl)		0.83	29.43
Fluoride (F)		0.04	0.70
Nitrate (NO_3)		0.03	1.86
Anions		27.94	
Total Solids Mg/l			1976
Dissolved Solids Mg/l			1940
Dissolved Solids Tons Per Acre Foot	2.64		
Hardness as Mg/l Ca CO_3 Calcium, Magnesium			770
Hardness as Mg/l Ca CO_3 Non Carbonate			657
Alkalinity as Mg/l Ca CO_3 Phenolphthalein			68
Alkalinity as Mg/l Ca CO_3 Total Alkalinity (Methyl Orange)			113
Soluble Sodium Percentage (SSP)	45		
Sodium Absorption Ratio (SAR)	4.51		
Specific Conductance (Micromhos at 25°C)	2380		
Residual Sodium Carbonate (RSC)		-	
PH	9.1		
Class for Irrigation Water	C4-S2		

Remarks: Total Iron (Fe) - 0.150 ppm

High SO_4

BUREAU OF SPORT FISHERIES AND WILDLIFE

INTER-OFFICE TRANSMITTAL

30930

☐ Director, _____	☒ Regular Mail
☐ Regional Director, _____	☐ Air Mail
☐ Project Leader, _____	☐ Action
☒ Assistant Unit Leader, Dr. Robert Behnke	☐ Information

From	Office	Date
Charlie Sanchez Jr.	Division of Fishery Services P.O. Box 1060 Gallup, New Mexico 87301	5-8-72

Subject

Dear Dr. Behnke,

Here's the information that you requested regarding some of the general biological, chemical and physical characteristics of Stone and Dulce Lake. Also included are creel census data for 1968, 1970, and 1971 for Stone Lake. I was unable to locate the creel census data for 1969, but will continue to look for it. If there is any additional information that you need, let us know.

Charlie

3-1908
(Rev-6/63)

(Attach securely to material to be transmitted & mail through regular channels)

Additional Information on Dulce Lake

Surface Acres: 80 acres.

Black Organic Mud Bottom

Aquatic Weeds Present include; smartweed, Bulrushes water milfoil, narrow leaf pondweed and elodea; cattail

DATE	Surface Temperature		pH	DO_2
9-30-65	59°F			
6-15-65	62°F			
5-25-66	66°F			
7-20-67	78°F		10.3	
8-4-71	70°F	67°F at 2'	9.3	7.4
8-31-71	73°F			

Stocking Schedule

1967	20,022	1,744 lbs. (weight)	6.0"	Snake River Cutthroats
1970	19,087	1,043 lbs.	5.1"	" " "
	Stone Lake			
1970	1,006	55 lbs	5.1"	S.R. Cuts
	Dulce Lake			

Laboratory Data Sheet for Water Sample

Location: Duke Lake

Date Taken: 4-28-69

Date Analyzed: 5-23-69

		Meq/l	Mg/l
Temperature (°F)			
Silica (SiO_2)			
Boron (B)			0.17
Iron (Fe)		0.01	0.11
Calcium (Ca)		1.10	22.04
Magnesium (Mg)		1.20	14.59
Sodium (Na)		2.65	60.92
Potassium (K)		0.14	5.47
Cations		5.10	
Phosphorus (P)			0.06
Bicarbonate (HCO_3)		2.89	176.35
Carbonate (CO_3)		0.38	11.40
Sulphate (SO_4)		1.67	80.21
Chloride (Cl)		0.12	4.26
Fluoride (F)		0.01	0.22
Nitrate (NO_3)		0.01	0.62
Anions		5.08	
Total Solids Mg/l			340
Dissolved Solids Mg/l			286
Dissolved Solids Tons Per Acre Foot	0.39		
Hardness as Mg/l Ca CO_3 — Calcium, Magnesium			115
Hardness as Mg/l Ca CO_3 — Non Carbonate			—
Alkalinity as Mg/l Ca CO_3 — Phenolphthalein			19
Alkalinity as Mg/l Ca CO_3 — Total Alkalinity (Methyl Orange)			145
Soluble Sodium Percentage (SSP)	54		
Sodium Absorption Ratio (SAR)	2.47		
Specific Conductance (Micromhos at 25°C)	510		
Residual Sodium Carbonate (RSC)		0.97	
PH	8.1		
Class for Irrigation Water	C2-S1		

Remarks:

DL

Laboratory Data Sheet for Water Samples

Location: Stone Lake

Date Taken: 4-28-69

Date Analyzed: 5-23-69

Stowe Lake 4-28-69

		Meq/l	Mg/l
Temperature (°F)			
Silica (SiO_2)			
Boron (B)			0.01
Iron (Fe)		0.01	0.11
Calcium (Ca)		2.60	52.10
Magnesium (Mg)		9.70	117.95
Sodium (Na)		9.00	206.91
Potassium (K)		0.20	7.82
Cations		21.51	
Phosphorus (P)			0.01
Bicarbonate (HCO_3)		2.22	135.46
Carbonate (CO_3)		0.76	22.81
Sulphate (SO_4)		17.86	857.82
Chloride (Cl)		0.21	7.45
Fluoride (F)		0.03	0.52
Nitrate (NO_3)		0.002	0.12
Anions		21.10	
Total Solids Mg/l			1562
Dissolved Solids Mg/l			1498
Dissolved Solids Tons Per Acre Foot	2.04		
Hardness as Mg/l Ca CO_3 — Calcium, Magnesium			615
Hardness as Mg/l Ca CO_3 — Non Carbonate			504
Alkalinity as Mg/l Ca CO_3 — Phenolphthalein			38
Alkalinity as Mg/l Ca CO_3 — Total Alkalinity (Methyl Orange)			111
Soluble Sodium Percentage (SSP)	42		
Sodium Absorption Ratio (SAR)	3.63		
Specific Conductance (Micromhos at 25°C)	1940		
Residual Sodium Carbonate (RSC)		-	
PH	8.9		
Class for Irrigation Water	C 3-S1		

Remarks:

Stone Lake

Additional Information on Stone Lake

Surface Acres : 400

Surface Temperature : 78° August 31, 1971

Vertical Temperature Profile taken August 24, 1966

0' - 72°F
1' - 71°F
2' - 70°F
3' - 69°F
7' - 69°F
8' - 68°F
19' - 68°F

Organic - Mud Bottom

Aquatic Weed: Potamogeton, & Sago Pond Weed

			CHIRONOMID PUPAE	ZOOP	C. L.	SNAIL	MINNOW
228	18		.60	.90			
262	16			1.3	.03		
265	17		.60	1.8			
273	15				1.7	1.0 (5)	
291	14		2.6	.1	.2		
300	13			1.6	.1		
330	11		2.1		1.2		
295	12			1.8			
388	10	CT	3.1		1.2		
381	9	CT		.1			
357	8				1.1		
395	7	CT	.1				5
373	6	CT	.8				
368	5	CT	.05				
375	4	CT	trace				
398	3	CT	—				
409	2	CT	1.6				
434	1		8.7				
387	25	CT	2.7	.10			
342	26	CT	.2				
360	27	CT	.40	.65			
375	28	CT	—				
351	29	CT	1.3				3
198	19				.7		
458	20		.8		.4		
405	21				1.1		1
430	22				2.6		
431	23				5.8		
405	24				.4		

			C. P	ZOOP	C. L.	SNAILS	MINNOW
325	30				2.0		
380	31		VEGETATION				
306	32				2.6		
259	33		1.2		2.1		
267	34		1.8	.1	2.3		
285	35		2.7		.3		
289	36		.6	1.8			
272	37				.2		
256	38		.9	.9			
306	39				3.1	2.4 (16)	
269	40			.8	.6		
296	41		1.9	.1	.2		
264	42		2.5	.1	.8		
201	43		.7	.5			
205	44		.7	.8	.1		
240	45			.3	.5		
180	46				.2		
212	47		1.2				
387	48				1.5		
430	49				2.0		6" 2 RAINBOW
380	50	CT	.6				
412	51	CT			.8		
401	52				2.8	2.0 (12)	
287	53	CT			1.0		
423	54	CT			.9		1
318	55			.9	.3		
295	56				.6		
283	57				.4		
279	58		1.2		1.2		
275	59		.1		.2		

		CP	ZOOP	CL	SNAILS	MINNOWS	
252	60		.5				
262	61			1.2			BEETLE .2
265	62			.2			
301	63	.2		1.0			
293	64			1.2			
272	65	1.3					
254	66			.1			

DUCCE LAKE

		CP	EoL.	SNAILS	DAMSEL	ZOOP	
419	101 CT	—					
344	102 CT	—					
450	103	.3	1.0	.05			
311	104		.4			.2	+ VEG
278	105				3.0		
279	106	.8				2.0	
254	107	.8	3.0				
211	108				.10		
224	109				.50		
245	110	.2	1.0		1.2		
241	111	.2	.6				
253	112				.9		
		.05	.25				
		.05	.30				
					1.2		
		—					

(16)

		CP	CL	ZOOP	
CT 8/4	15.4 - 1.10	—			
CT 9/21	14.8 - 1.4	—			
CT 9/21	14.9 - 1.25	8.5			
CT 9/21	15.5 - 1.7	4.4			
CT 9/21	14.8 - 1.42	2.7			
R 8/4	14.8 - 1.42		.3		
R 8/4	13.3 - .96		.2		
R 8/4	12.3 - 1.80		.2		
R 9/21	15.8 - 1.1	8.1			
R 9/21	14.3 - 1.35	2.8	.4		
R 9/21	16.5 - 1.81	3.5			
CT 8/4	12.7 - .92	—			
CT 9/21	16.7 - 1.9	1.8			
CT 9/21	14.8 - 1.1	.5			
R 8/4	12.5 - .76		.5		
R 8/4	9.5 - .52			.3	
R 8/4	13.3 - .90			.1	
CT 8/4	15.5 - 1.50				2 MINNOW
R 8/4	9.3 .33			.1	
R 8/4	14.3 - 1.15			1.0	
R 8/4	15.1 - 1.38		.05		
R 9/21	15.8 - 1.71	—			
R 9/21	16.5 - 1.88				1 MINNOW

✓

CREEL CENSUS

1970 - up to Sept 3 - no CT

	RT	CT
9/4/70	58	4
~~9/9~~	~~84~~	~~0~~
9/10	101	0
~~10/6~~	~~76~~	~~0~~
10/11	152	10
10/18	166	7
		21

Omit

1971

1/31	12	0
3/8	13	5
3/9	19	4
3/20	1	0
4/23	10	0
5/29	11	0
7/27	40	0
7/28	39	1
8/8	93	0
8/10	48	0
8/12	106	9
8/13	39	0
8/14	42	0
8/22	63	0
12/28	0	4
12/29	14	5
12/30	1	0
	551	28

		1968 RT	CT
MAY	1	37	7
	2	3	0
	4	16	0
	7	1	1
	8	4	0
	19	2	0
	21	1	0
JUNE	2	10	5
	3	11	0
	6	41	9
	7	10	0
	9	16	0
	10	26	6
	12	14	1
	13	10	0
	14	15	0
	15	20	1
	16	67	2
	17	12	1
	18	23	0
	19	11	0
	20	38	2
	21	10	1
	22	65	0
	23	23	4
	26	12	1
	27	20	2
	28	24	4

542

47

		RT	CT
June	29	47	1
	30	43	3
July	1	16	0
	3	31	0
	4	56	8
	5	47	1
	6	4	0
	8	4	0
	14	66	2
	15	4	1
	16	4	0
	19	21	1
	25	6	0
	26	3	0
	27	26	1
	30	23	0
	12	66	0
	27	2	0
	30	33	0
	31	4	0
Aug.	3	19	1
	4	4	0
	5	7	0
	15	8	0
	16	14	0
	20	6	0
	21	39	0
	25	68	0
	26	38	0
	27	14	0

723 19

		RT	CT	
Sept.	3	11	0	
	4	2	0	
	7	16	0	
	8	44	4	
	10	23	0	
	11	29	0	
	14	37	0	
	18	4	0	
	19	46	0	
	22	62	2	
	25	31	0	
	26	42	0	
	28	74	2	
	29	43	4	12
		461		19
		723		47
		542		78
		1,729		

May 3, Stone L.
Jicarilla Apache Res. N. Mex.

Gillnet #1

#		SPECIES	T.L. LENGTH (mm)	(lbs) WEIGHT	Sex	mature (M.)	immature (I.)	otoliths
IV 1	OK	RB	434	2.06	♀		✓	✓
III 2	OK	CT	409	1.81	?	no development		✓
III 3	OK	CT	395	1.57	♀	✓		✓
4		CT	375	1.68	♀	✓		
5		CT	368	1.37	♂	✓		
6		CT	373	1.49	♀		✓	
7		CT	395	1.54	♂		✓	
II 8		RB	357	1.22	♂		✓	✓
9		CT	381	1.45	♂		✓	
10		CT	388	1.68	♂		✓	
II 11		RB	330	0.96	♀		✓	✓
12		RB	295	0.68	♂		✓	
13		RB	300	0.70	♂		✓	
14		RB	291	0.67	♂		✓	
15		RB	273	0.58	♂?		✓	
16		RB	262	0.50	♀		✓	
17		RB	265	0.49	♀		✓	
18		RB	228	0.27	♂		✓	
Gillnet #2 19		RB	198	0.15	♂		✓	
IV	OK 20	RB	458	2.28	♀		✓	✓
III	OK 21	RB	405	1.76	♀		✓	✓
III	OK 22	RB	430	1.88	♂		✓	✓
III	OK 23	RB	431	1.99	♀		✓	✓
III	OK 24	RB	405	1.89	♂		✓	
25		CT	387	1.62	♂		✓	
26		CT	342	1.19	♂	✓		
27		CT	360	1.50	♀		✓	
28		CT	375	1.41	♂		✓	
29		CT	351	1.20	♀		✓	
30		RB	325	0.92	♂		✓	

R. eye missing

	Sp.	T.L. (mm)	Wt. (lbs.)	Sex	M.	I.	otoliths
	RB	380	1.22	♀		✓	
31	RB	306	0.74	♂		✓	
32	RB	259	0.44	♂		✓	
33	RB	267	0.52	♀		✓	
34	RB	285	0.58	♂		✓	
35	RB	289	0.64	♀?		✓	
36	RB	272	0.52	♂		✓	
37	RB	256	0.48	♀		✓	
38	RB	306	0.73	♂		✓	
39	RB	269	0.50	♂		✓	
40	RB	296	0.67	♂		✓	
41	RB	264	0.50	?		✓	
42	RB	201	0.22	♀?		✓	
43	RB	205	0.23	♂		✓	
44	RB	240	0.27				
45	RB	180	0.15				
46	RB	212	0.21				
47	RB	387	1.46	♂	✓		
48	RB	430	2.01	♂		✓	✓
49	CT	380	1.62	♂		✓	
50	CT	412	1.95	♀		✓	
51	RB	401	1.59	♀		✓	
52	CT	287	0.86	♀	✓		
53	CT (big spotted)	423	1.82	♂	✓		
54	RB	318	0.88	♀	✓		
55	RB	295	0.70	♂		✓	
56	RB	283	0.50	♀		✓	
57	RB	279	0.54				
58	RB	275	0.58				
59	RB	252	0.38				
60							

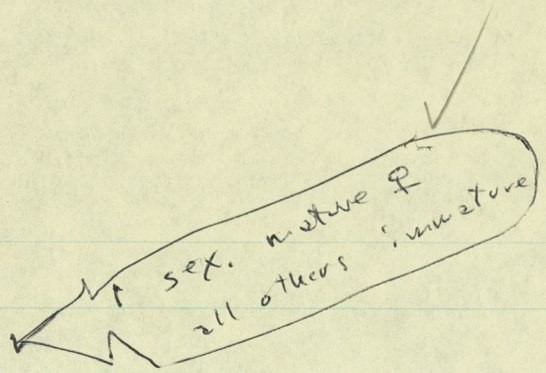
3 ↓ Gill net

IV

1 cutt lost in net

approx. 3 in. fish. vert. ooze at our station

61	RB	262	0.47
62	RB	265	0.48
63	RB	301	0.94
64	RB	293	0.61
65	RB	272	0.52
66	RB	254	0.39



marking pen in five compartments

May 4, Dulce L. - Jicarilla Res. Dulce, N. Mex.

		T.L. (mm)	lbs wt.	Sex	Mixture	Immature	Otolith
101	CT	419	1.94	♀	✓		
102	CT	344	1.25	♀	✓		
IV or V 3 Dragon flies	RB	450	2.39	♂?		✓	✓
104	RB	311	0.82	♂		✓	
105	RB	278	0.61	♀		✓	
106 Stomachs #101 - etc.	RB	279	0.60	♂		✓	
107	RB	254	0.36	♀		✓	
108	RB	211	0.23	♂	✓		
109	RB	224	0.25	♂		✓	
110	RB	245	0.30	♀		✓	
111	RB	241	0.33	♀		✓	
112	RB	253	0.35	♂		✓	
Stomachs w/o numbered tags	RB	225	0.26	♂		✓	
	RB	237	0.31	♂	✓		
	RB	233	0.27	♂		✓	
	RB	183	0.12	♀		✓	

get 69-72 stocking records

264	.50
318	.88
295	.70
283	.50
279	.54
275	.58
252	.38
262	.47
265	.48
301	.94
293	.61
272	.52
254	.39

Stone

RB	I		II		III		IV	
	228	.27	357	1.22	405	1.76	4.34	2.06
	198	.15	330	.96	430	1.88	4.58	2.28
	201	.22	295	.68	431	1.99	430	2.01
	205	.23	300	0.70	405	1.89		
	240	.27	291	0.67	387	1.46	$\bar{x}$ = 440.66	
	180	.15	273	0.58	401	1.59	$\bar{w}$ = 2.1166	
	212	.21	262	.50	380	1.22		
			265	.49				
$\bar{x}$ = 209.14			325	.92	$\bar{x}$ = 405.57			
$\bar{w}$ = .2142			306	.74	$\bar{w}$ = 1.68			
			259	.44				
			267	.52				
			285	.58				
			289	.64				
			272	.52				
			256	.48				
			306	.73				
			269	.50				
			296	.67				
			$\bar{x}$ = 284.875		$\bar{w}$ = .6259			

CT						
	409	1.81	387	1.62	423	1.82 ~
	395	1.57 ~	342	1.19 ~		
	375	1.68 ~	360	1.50	+ .1	
	368	1.37 ~	375	1.41		
	373	1.49	351	1.20	$\bar{x}$ = 376.529	
	395	1.54	380	1.62	$\bar{w}$ = 1.5152	
	381	1.45	412	1.95		
	388	1.68	287	.86 ~	$\bar{x}$ = 382.81	
					$\bar{w}$ = 1.570	

STONE LAKE

Aug. [redacted] 4, 1971, Measurements of rainbow trout taken from creel catches. Assisted by Ray Ramon.

Lengths (inches)	WEIGHTS (lbs.)	Lengths (inches)	WEIGHTS (lbs.)	Lengths (inches)	WEIGHTS (lbs.)
11.0	0.50	9.7	0.32	10.1	0.41
9.1	0.30	14.6	1.25	12.0	0.76
9.5	0.30	12.3	0.82	9.2	0.34
10.2	0.40	13.3	0.84	9.2	0.30
10.0	0.38	10.1	0.40	10.1	0.40
8.8	0.25	16.7	2.95	11.6	0.70
9.5	0.32	10.4	0.42	13.6	1.00
10.1	0.40	13.0	0.85	8.6	0.27
9.8	0.35	13.6	0.95	9.8	0.40
9.1	0.25	9.5	0.30	14.2	1.15
9.2	0.30	9.5	0.32	8.9	0.26
10.1	0.38	10.2	0.42	10.2	0.42
10.4	0.40	9.8	0.42	9.6	0.36
10.5	0.50	13.0	0.86	9.8	0.40
10.6	0.50	8.6	0.32	9.8	0.40
9.5	0.38	9.7	0.35	10.8	0.46
10.5	0.46	10.0	0.38	10.5	0.42
9.6	0.36	9.0	0.32	10.1	0.38
9.6	0.34	8.9	0.28	9.3	0.30
9.5	0.34	8.6	0.25	9.6	0.35
12.2	0.80	9.8	0.37	10.0	0.40
10.7	0.40	10.1	0.46	8.7	0.27
9.6	0.36	9.7	0.38	10.2	0.40
9.6	0.36	9.6	0.36	10.2	0.40
9.4	0.40	10.2	0.40	[redacted]	[redacted]
				9.8	0.40

Surface Temperature 72°F, at 11:00 a.m. Charlie [redacted] Jr.

Total-75 RBT

STONE LAKE

Augs 4, 1971 - 52 fishermen at 11:00 a.m. (20 in boat & 32 on shore).
Secchi disc: 3½ ft. Surf. Temp 72°F. Air temp. 78°F.
Phytoplankton Bloom. Middle of Lake - Ph-9.3
DO_2-6.2

Depth of H_2O sample: 6 ft.
Swedish Gill Net Set

Species	Total Length	Total Weight
Rainbow Trout	14.9	1.25
" "	12.3*	1.80
" "	10.5	0.46
" "	15.1	1.45
" "	13.3*	0.96
" "	12.5*	0.76
" "	10.1	0.38
" "	9.6	0.40
" "	10.3	0.42
" "	9.5	0.32
" "	10.2	0.42
" "	9.5*	0.34
" "	9.0	0.30
" "	10.0	0.40
" "	10.4	0.45
" "	10.1	0.43
" "	10.2	0.41
" "	9.3*	0.33
" "	9.3	0.34
Cutthroat Trout	15.4*	1.60
" "	12.7*	0.92

* Stomach samples taken.
Total fish taken 21.
4 hour set.

Assisted by Ray Ramon & Joe Lucero.

Charlie Sanchez

Rainbow Trout
Average Length 10.8" Average Weight 0.61 lbs.
Cutthroat Trout
Average Length 14.1" Average Weight 1.26 lbs.

STONE LAKE

Sept. 21, 1971 - 11:00 a.m. Secchi disc: 6 ft. Surf. Temp: 58°F.
Overnite gill net set #1, total hours of set: 21 Hrs.
Swedish experimental Gill Net.

Species	Total lgth.(ins.)	Total Weight(lbs)
Rainbow Trout	10.6	0.50
" "	14.0	1.10
" "	12.0	0.80
" "	10.6	0.50
" "	10.0	0.50
" "	10.6	0.60
" "	10.6	0.50
" "	10.6	0.50
" "	10.0	0.50
" "	16.0	1.90
" "	9.6	0.40
" "	10.6	0.50
" "	10.0	0.50
" "	13.0	1.00
" "	10.6	0.60
" "	9.0	0.40
" "	10.0	0.40
" "	10.0	0.50
" "	15.0	1.60
" "	15.0	1.60
" "	16.0	2.00
" "	10.6	0.60
" "	10.0	0.40
" "	15.6	1.20
" "	10.0	0.50
" "	13.0	1.20
" "	14.0	1.50
" "	13.6	1.30
" "	13.0	1.10
" "	10.6	0.60
" "	15.0	1.80
Cutthroat Trout	16.0	1.80
" "	16.0	2.10

Total number: 33 trout

Assisted by Ray Ramon and Joe Lucero. Charlie Sanchez

Rainbow Trout
Average Length 11.9" Average Weight 0.84 lbs.
Cutthroat Trout
Average Length 16.0" Average Weight 1.95

STONE LAKE

Sept. 21, 1971 - Secchi disc: 4 ft. Surf. temp. 61°F Time: 11:45am.
Gill Net Set #2. 21 hour set.

Species	Total Length	Total Wgt.
Rainbow Trout	14.6	1.70
" "	16.0	1.60
" "	9.6	0.50
" "	13.0	1.30
" "	14.0	0.50
" "	13.0	1.10
" "	10.6	0.50
" "	10.6	0.50
" "	12.0	0.70
" "	11.0	0.70
" "	10.0	0.50
" "	13.6	1.20
" "	14.0	1.40
" "	13.0	1.00
" "	13.6	0.90
" "	13.0	1.00
" "	15.6	1.10

Assited by Ray Ramon and Joe Lucero. Charlie Sanchez

Rainbow Trout
Average Length : 12.7 inches
Average Weight 0.95 lbs.

STONE LAKE

Sept. 21, 1971 - Secchi disc: 5 ft. Surf. temp: 58°F. Time: 12:25am.
Gill Net #3. 24 hour set.

Species	Total length	Total Wgt.
Rainbow Trout	14.0	1.40
" "	16.0	1990
" "	17.0	2.00
" "	16.0	1.90
" "	15.0	1.60
" "	15.0	1.70
" "	16.0	1.80
" "	13.0	1.10
" "	13.0	1.00
" "	13.5	1.10
" "	13.5	1.10
" "	14.0	1.20
" "	14.0	1.10
" "	12.5	0.90
" "	15.0	1.80
" "	13.5	1.20
" "	10.0	0.60
" "	13.0	1.00
" "	13.5	1.10
" "	12.0	0.90
" "	12.0	0.80
" "	11.5	0.70
" "	12.5	0.80
" "	10.5	0.50
" "	13.0	1.00
" "	13.5	1.10
" "	12.0	0.90
" "	12.0	0.80
" "	11.6	0.70
" "	12.5	0.80
" "	10.5	0.50
" "	13.5	0.90
" "	10.5	0.50
" "	12.0	0.70
" "	9.5	0.30
Cutthroat trout	14.0	1.2
" "	14.0	1.5
" "	14.6	1.30
" "	15.0	1.50

Total trout taken: 39

Assisted by Ray Ramon and Joe Lucero. Charlie Sanches

Rainbow Trout
Average Length 13.1" Average Weight 1.07 lbs.

Cutthroat Trout
Average Length 14.4" Average Weight 1.38 lbs.

STONE LAKE

Sept. 22, 1971- 9:45, secchi disc: 4 ft. Surf. temp: 58°F.
Gill Net No. 1. 18-hour set.

Species	Total Length	Total Weight
Rainbow Trout	15.0	1.42
Rainbow Trout	13,2	1.02
Rainbow Trout	10.6	0.60
Rainbow Trout	13,0	1.00
Rainbow Trout	13.0	0.80
Rainbow Trout	14.6	1.41
Rainbow Trout	13.0	1.00
Rainbow Trout	10.0	0.42
Rainbow Trout	12.0	1.10
Rainbow Trout	10.0	0.40
Rainbow Trout	15.0	1.55
Cutthroat Trout	14.6	1.75
Cutthroat Trout	14.6	1.50

Assisted by Ray Ramon and Joe Lucero. Charlie Sanchez

Rainbow Trout

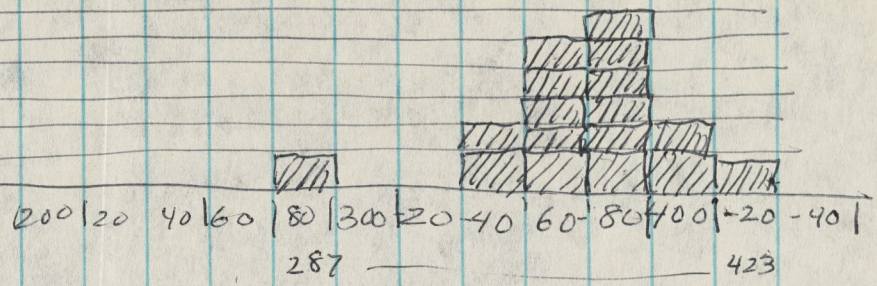
Average Length 12.7" Average Weight 1.12 lbs

Cutthroat Trout

Average Length 14.6 Average Weight 1.63 lbs

2.06
2.28
2.01
6.35

cutthroat N=17



gillnet
- ×1: 8 cutts, 11 rainbows
- ×2: 5 cutts, 23 rainbows
- ×3: 4 cutts, 15 rainbows

rainbow N = 49

(13,108 lbs)

1970 140,103 rainbows → 10

stocked 19,087 cutts → 17

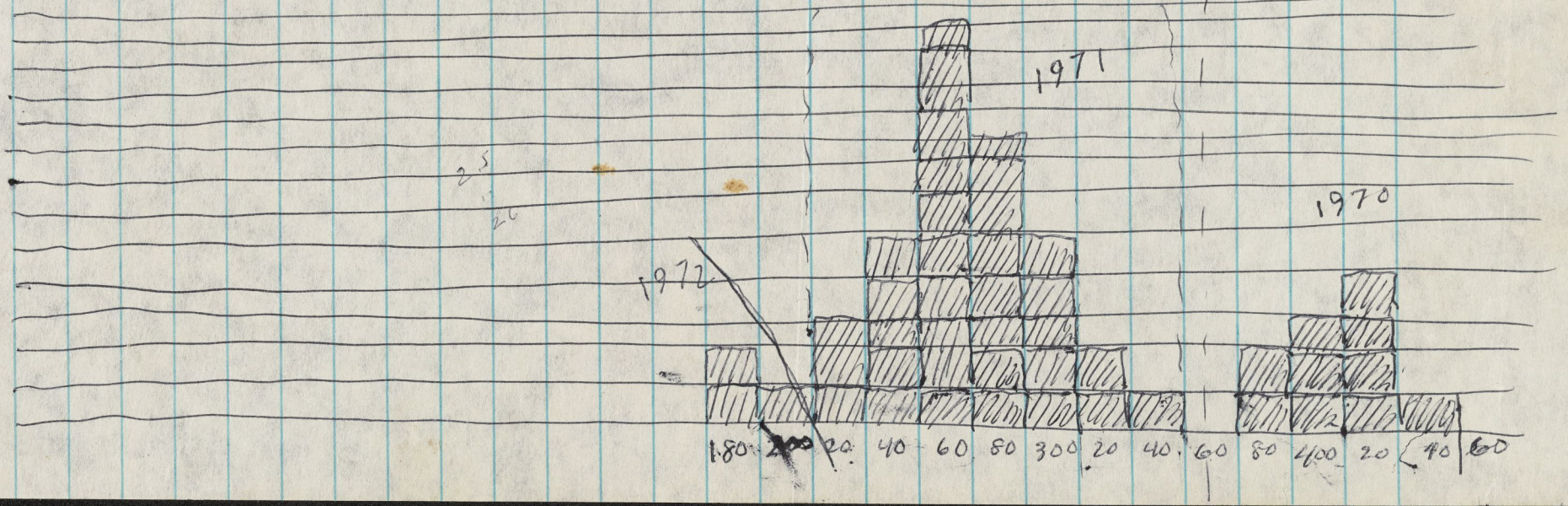
7×1.7

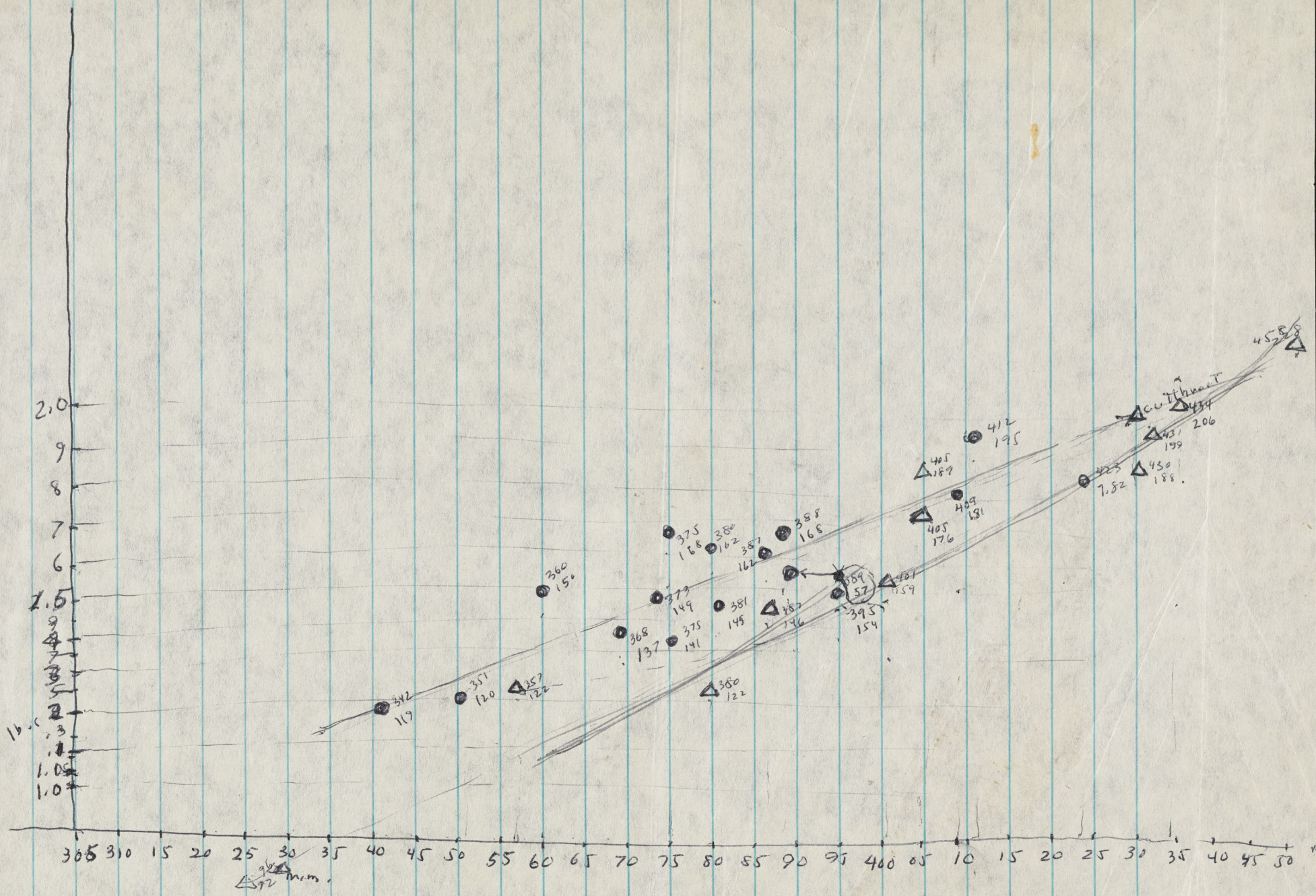
(1,043 lbs)

12×1 ratio in survival in favor of cutthroat

1 assumed 1970 stocking (1969?)

N = 10




2.0
9
8
7
6
1.5
1.0
1.0
1.0
lbs.
Without
Fish of 1.0 lbs or more.

wts

	N=17	N=
cutts	1.81	bows, 2.06
	1.57	2.28
	1.68	1.76
	1.37	1.88
	1.49	1.99
	1.54	1.89
	1.45	1.46
	1.68	2.01
	1.62	1.59
	1.19	1.22
	1.50	18.14 lbs.
	1.41	6.35
	1.20	11.79
	1.62	
	1.95	
	0.86	
	1.82	
	25.76 lbs.	

Apr. $\bar{x}$ = 5.1 in.

In 1970 19,087 cutthroat stocked wt. = 7,043 lbs

May - Oct.
140,103 rainbows ($\bar{x}$ 6.3) 13,108 lbs

Assuming all rainbows 380+ mm. T.L. from 1970 stocking (some possibly from 69 - await otolith check - some smaller ones possibly from 70)

- All cutts stocked 1970

May 2-3 gillnet samples

17 cutthroat = 25.76 lbs.

10 rainbows = 18.14 lbs.

140,103 → 10 — 12-1 survival ratio

19,087 → 17

13,108 lbs. → 18.14 lbs — 17-1 wt. ratio

1,043 lbs. → 25.76 lbs.

13/24/52

United States Department of the Interior
FISH AND WILDLIFE SERVICE
COLORADO FIELD OFFICE
330 S. GARRISON ST.
LAKEWOOD, COLORADO 80226

IN REPLY REFER TO:

Dr Behnke
Colorado State Univ.

3/23/82

Dear Dr. Behnke,

I thought that parts of this report may be of interest to you.

In 1981 we compared the return of catchable Snake River cutthroats and rainbow trout. We found that the SRC gave less of a beam and bust catchrate, but still returned in high numbers - 90%+. The cutthroats also utilize a wide range of forage - including fathead minnows, small white suckers and green sunfish.

Since the SRC do very well at headwaters and in reservoirs in the Colorado Springs area, we will be stocking only SRC as catchables in 1981.

Also checked the reservoir at Ft. Carson where stocked the Cascade Cr. greenbacks last Fall. They appear to be doing well as of March, but appeared to be a long way from spawning although the reservoir temp. was 50°F.

Bruce D. Rainbolt

1981

BUTLER-BORGESON CREEL CENSUS

AIR FORCE ACADEMY

FARISH MEMORIAL

STANLEY CANYON RESERVOIR

PREPARED BY

BRUCE D. ROSENLUND
COLORADO FISH AND WILDLIFE ASSISTANCE
LAKEWOOD, COLORADO 80226

1981
AIR FORCE ACADEMY CREEL CENSUS

SUMMARY

During 1981, 24,059 catchable trout, 4,749 subcatchable brook trout, 3,000 fingerling Snake River cutthroats and 2,059 fingerling channel catfish were stocked by the U. S. Fish and Wildlife Service into waters owned or leased by the U. S. Air Force Academy. The Academy features recreational fishing at three facilities, which include the Academy proper, Farish Memorial and Stanley Canyon Reservoir. These three facilities contain 8 fishable reservoirs which total 38.2 surface acres of water.

To document the amount of recreation provided by the stocking of U. S. Fish and Wildlife Service hatchery fish, an angler use study and a Butler-Borgeson creel census was conducted during 1981.

In summary, the findings of the 1981 study showed that:

1. Harvest of Fish Per Hour. The stocking of 17,371 catchable trout at the Air Force Academy should have provided nearly 0.5 trout per hour for the 31,510 angler hours in 1981. The actual harvest of fish per hour was found to be 0.62 in May, 0.33 in July and 0.90 through the month of September. At Farish, the stocking of 6,688 catchable trout helped to support an angler harvest of 0.34 trout per hour throughout the 1981 angling season. The stocking of fingerlings at Stanley provided anglers with 0.42 trout per hour.

2. Percent Return and Rate of Return of Catchable Rainbow Trout and Catchable Snake River Cutthroats. Regression line calculations and angler exit interviews showed that from 91% to 100% of all catchable trout stocked were eventually harvested by anglers. Snake River cutthroats returned to anglers at a slower rate than the rainbow trout, with the Snake River cutthroats requiring approximately 1.5 to 2.0 times as many angler hours to harvest, as the same number of rainbows.

3. Number of Angler Days. The stocking of U. S. Fish and Wildlife Service fish supported 20,311 angler days in 1981, 15,002 at the Academy, 3,283 at Farish and 2,024 at Stanley. Angler hours per surface acre was 1,466 at the Academy, 2,047 at Farish and 241 at Stanley, With 1,699 Academy permits being sold in 1981, the mean angler days per permit was 12. The State mean is 15 angler days per license.

4. Abbreviated Census Method. Daily angler use curves were developed for the Academy so that total daily angler use could be expended from one to two angler counts.

5. Contribution of the Fingerling and Subcatchable Stocking Program. The stocking of subcatchable brook trout at 140/surface acre provided 0.023 fish per hour and a return of 150% of the stocked weight at the Academy. At Farish, brook trout stocked at 217/surface acre provided 0.04 fish per hour and a 690% return of the stocked weight. The stocking of fingerling channel catfish at the Academy provided 0.01 catfish per hour only during the warmest months of the year and a return of 810% of the annual weight stocked.

6. Amount of Angler Use Expended According to Permit Status. The amount of angler use by civilians and disabled vets was in proportion to their percent of permit sales. Angler use by active military was below their percentage of permit sales. However, angler use by retired military was twice as high as their percentage of permit sales.

RECOMMENDATIONS

1. Maintain the stocking of 17,300 catchable trout at the Academy. Increase the stocking at Farish to 8,000 catchable trout per year in 1982, if extra catchables are available.

2. Snake River cutthroats tend to utilize a wider range of forage in small reservoirs, and return at a slower rate to anglers. This slower rate of return decreases the boom and bust of most rainbow stockings. Considering that both Snake River cutthroats and rainbow trout do equally well at the Leadville NFH, it is recommended that all catchables in 1982 should be Snake River cutthroats.

3. It is recommended that permit sales remain at 1,700 per year, with areas managed for catchables not exceeding 2,000 hours per surface acre.

4. During 1982, angler use data at the Academy should be collected by using the abbreviated creel census method. Angler interviews should be conducted throughout the 1982 angler season to monitor the Snake River cutthroat catchable program.

5. Continue the present stocking program of fingerling channel catfish and subcatchable brook trout at the Academy, and subcatchable brook trout at Farish.

6. When considering permit sales, it should be remembered that the actual angler use by retirees is twice as much as other user categories.

INTRODUCTION

The U. S. Air Force Academy is located just north of the city of Colorado Springs, Colorado. The Academy serves 4,433 cadets and is staffed by 2,666 active military and 1,834 civilian positions. As part of the Academy's recreational program, three areas are managed for sport fishing. These three areas consist of the Academy proper, Farish Memorial and Stanley Canyon Reservoir.

Five reservoirs are managed at the Air Force Academy, which total 21.5 surface acres. During 1981, 17,371 catchable trout, 2,949 sub-catchable brook trout and 2,059 fingerling channel catfish were stocked into these reservoirs.

Farish Memorial (9,080') is located near Woodland Park, Colorado and is within an hours drive from the Academy. Overnight facilities are available at Farish. Along with horseback riding, hiking and cross-country skiing, sport fishing is featured at 3 reservoirs which total 12.3 surface acres. Unfortunately, physical problems with Sapphire Reservoir presently limits angling to Grace and Leo Reservoirs which total 8.3 surface acres. During 1981, 6,688 catchable trout and 1,800 subcatchable brook trout were stocked at Farish for anglers.

Stanley Reservoir (8,840') is located in the foothills west of the Academy. The reservoir is leased from the city of Colorado Springs and is managed as a walk-in fisheries. A hiking trail starts near the Academy Hospital which gains 1,240 feet in elevation over 2 miles from the trailhead to the reservoir. During 1981, a trail was completed between Stanley Reservoir and Farish. During 1981, 3,000 fingerling Snake River cutthroat trout were stocked here to maintain this 8.4 surface acre fisheries.

The length of the 1981 angling season at the Academy facilities extended from March 15 to November 1 at the Academy; ice-off (May) to November 1 at Stanley Canyon; and May 1 to November 1 at Farish. During 1982, Farish will be open to ice fishing on a trial basis.

A total of 1,699 Academy fishing permits were sold during 1981: 1,122 active military, 362 civilian, 199 retired military and 16 disabled veterans. The daily bag limit for trout of all species and channel catfish is a total of 6 fish per day. All other species bag limit is according to State regulations. In addition to a $3.00 Academy permit, a valid Colorado fishing license is required.

Overall, to support the Academy's three sport fishing programs in 1981, the U. S. Fish and Wildlife Service stocked 18,339 catchable rainbow trout, 5,720 catchable Snake River cutthroats, 4,746 sub-catchable brook trout, 3,000 fingerling Snake River cutthroats and 2,059 fingerling channel catfish. The commercial value of the catchable trout alone was $21,000. Please see figure 1 for the 1981 stocking schedule.

To better understand the utilization and return of this expensive hatchery stocking program, a creel census program was conducted in 1981, at the Academy, Farish and Stanley Canyon Reservoir. The goal of the 1981 creel census study was to document the fisheries presently being provided by USFWS hatchery fish. To accomplish this goal, a study program was designed with the following objectives:

1. Determine the overall catchrate provided by the stocking of catchable rainbow trout (RBT), catchable Snake River cutthroats, (SRC), subcatchable brook trout (BKT), and channel catfish (CCF), in relation to the USFWS goal of 0.5 trout per angler hour.

2. Determine the percent return and rate of return of hatchery reared catchable rainbow trout and catchable Snake River cutthroat trout.

3. Determine the amount of angling use occurring at the three AFA facilities, and the distribution of the anglers between reservoirs.

4. Develop daily angler use curves for the Academy. These curves are to serve as the basis for an abbreviated creel census similar to Brown (1976), for future management work.

5. Evaluate the contribution of the fingerling channel catfish stocking program and subcatchable brook trout program.

6. Determine the amount of angler hours actually expended by military civilians, retired military, disabled veterans and their dependents and guests in relation to the amount of permits sold.

Stocking dates and numbers used in 1981, were from stocking requests submitted in December 1979. The 1979 submission was based upon gill net data, spot angler interviews and past stocking practices.

METHOD

At the Air Force Academy, the return of catchable trout and the amount of angler effort expended was to be determined by a creel census program described by Butler and Borgeson (1965). Briefly, this method involves determining angler hours by regular counts of anglers dispersed over a given area, and their success at capturing a marked population of fish. At the Academy, all anglers were counted at the 5 reservoirs every 2 hours from dawn until dark. Angler success for marked and unmarked fish was determined by interviewing anglers between the total angler counts.

Equal numbers of marked rainbow trout (RBT) and marked Snake River cutthroats (SRC) were stocked on April 29, 1981, and July 1, 1981. On September 3, 1981 only marked RBT were stocked. Rainbow trout stocked in April and September were the Erwin strain of RBT, while RBT stocked in July were a mixed lot of the White Sulphur NFH and Mt. Whitney SFH strains of RBT. All SRC stocked were the Jackson NFH strain.

Following the stocking of marked trout at the Air Force Academy, anglers were counted and interviewed for 21 to 29 consecutive days. From these interviews,

total harvest could be estimated by plotting catch per angler hour of marked trout against cumulative catch on a daily basis and constructing a regression line using the least squares method. The X-intercept of the regression line estimated the total harvest.

At Farish, all guests and anglers are required to register upon entering and leaving the facility. Since there is only one entrance/exit, all anglers could be interviewed upon completion of their days effort. All anglers using Farish were interviewed during the May 1 to November 1, 1981 season.

Since no catchable trout are stocked at Stanley Canyon Reservoir, angler effort and success was estimated from two-week creel census periods and some spot checks.

Creel census labor for the study was provided by the U. S. Air Force Academy. Natural Resources Chief, Mr. Melvin Rezac, and his staff collected creel census data covering 102 days at the Air Force Academy and Stanley Canyon Reservoir. Sgt. Jim Ward, his assistant, and family collected data covering 184 days at Farish. Ms. Chris Fletcher, AFA Natural Resources Technician, compiled the angler use and permit data.

All trout used for this study were reared, marked and distributed by the Leadville NFH. With the exception of the Erwin RBT stocked in April being reared at the Hotchkiss NFH.

RESULTS OF THE AIR FORCE ACADEMY CREEL CENSUS

Air Force Academy Creel Census. April 29, 1981 through May 23, 1981

On April 29, 1981, 1,050 marked Erwin strain rainbow trout (RBT) and 1,050 marked Snake River cutthroats (SRC) were stocked into the 5 fishing reservoirs on the Air Force Academy. Both species hauled very well, with only one fish lost out of a load of 909 pounds hauled to Farish and the AFA in a 600-gallon tank.

The Erwin RBT averaged 4.34 to the pound and the SRC averaged 4.02 to the pound. Both species were marked by removing the adipose fin at the hatchery one to two days prior to stocking.

For the April/May creel census, the trout were generally divided between the 5 reservoirs according to the size of the reservoir. Distribution of fish and water quality on April 29, 1981 as follows:

Reservoir	Surface/Acres/%	#fish (%)	^{o}F	pH	O_2
Kettle 1	1.8 (8%)	218 (10%)	63	7.6	9.0
Kettle 2	3.3 (15%)	300 (14%)	62	8.0	9.2
Kettle 3	8.5 (40%)	790 (38%)	64	8.1	9.4
Icehouse	5.4 (25%)	504 (24%)	61	8.0	9.0
Deadman	2.5 (12%)	288 (14%)	60	8.0	9.2

"Number of fish" in each reservoir represents equal numbers of Erwin RBT and SRC. Thus, 150 Erwin RBT and 150 SRC were stocked into Kettle #2.

Overall Catchrate: During the May creel census, anglers expended 3,306 hours over 21.5 surface acres in 24.5 days to harvest 1,295 RBT, 598 SRC and 186 brook trout (BKT). Average catchrate for RBT was 0.39, SRC 0.18 and 0.05 BKT per hour. Overall catchrate was 0.62 trout per hour. Of the 1,295 RBT harvested, 60% were marked, and of the 598 SRC harvested, 52% were marked. Brook trout harvested in May 1981 mainly represented survivors of 2,713, 3 inch BKT stocked in June 1980. No channel catfish were taken during this census period.

Percent Return of Marked RBT and SRC: Following the stocking on April 29, the catchrate of the Erwin RBT increased sharply for 6 days, peaking at 0.65 trout per hour, then declined to form a good regression line. Please see Figure 2. Within 10 days, 50% of the Erwin RBT had been harvested; and after 24.5 days of angling, anglers had harvested 75% of the adipose marked RBT. Regression line calculations projected the return of the adipose marked Erwin RBT to eventually be 91%.

Snake River cutthroats returned much slower to the anglers than the Erwin RBT. The SRC return was 10% within 10 days, and 32% within 24.5 days and the end of the census. The catchrate of the SRC continued to increase up to the end of the census period. It could not be determined how many days past 24.5 days the SRC catchrate actually peaked, and a regression line was not established. Thus, for May, an eventual harvest of the adipose marked SRC could be estimated mathematically. Figure 2.

To document the fact that the SRC were still present in the reservoirs, 2 gill nets were set for 4 hours on May 21, 1981. The nets captured 29 trout of which 76% were SRC, 17% were BKT and 7% were RBT. Half of the SRC taken were marked and none of the RBT were. Interestingly, SRC were found to be feeding heavily on fathead minnows, BKT were eating various aquatic invertebrates and the RBT were feeding on sticks and cigarette butts.

Angler Use: During this creel census period, 1,449 angler counts were calculated to amount to 3,306 hours of fishing in 24.5 days. The average angler hours per day was 135, and the average hours per surface/acre per day was 6.3 hours. Please see figure 5 for the 1981 angler hour use curve.

Distribution of angler effort, marked trout and angler success between the 5 Academy lakes from April 29, 1981 through May 23, 1981 was as follows:

	Kettle 1	Kettle 2	Kettle 3	Icehouse	Deadman
% fish stocked	10%	14%	38%	24%	14%
% angler use	15%	16%	29%	17%	23%
*C/H(M) RBT	.20	.15	.29	.43	.25
C/H(M) SRC	.06	.11	.12	.09	.07
C/H BKT	.01	.05	.06	.03	.08
C/H CCF	0	0	0	0	0

* = catch per hour of adipose marked Erwin RBT, adipose marked SRC, unmarked brook trout (BKT) and channel catfish (CCF).

Daily Angler Use Curves: Daily weekday angler use formed a Sine curve. The maximum number of anglers during weekdays were present by 1800 hours, with most anglers gone by 2000 hours and dark. Fifty-four percent of the weekday anglers are present from 1600 hours to dark.

Weekend angler use is quite different. Angler use reflects a bell curve, with a use peak near 1200 hours.

Distribution of daily anglers throughout the May weekdays and May weekends as follows:

Time	0600	0800	1000	1200	1400	1600	1800	2000
% anglers weekdays	-	6.4	10	14.5	14.9	20.0	27.5	6.7
% anglers weekends	4	11	14	20	16	17	15	3

Average length of the completed angler day was 1.89 hours in May and June 1981.

Amount of May Angler Use Expended vs. Number of Permits Sold:

Status	% of May Angler Use	% of Permits Sold
Active Military	55%	66%
Retired Military	28%	12%
Academy Civil Service	16.5%	21%
Disabled Vets and Misc.	0.5%	1%

Air Force Academy Creel Census. July 1, 1981 through July 25, 1981

On July 1, 1981, 1,020 marked Snake River cutthroats (SRC) and 1,020 marked rainbow trout (RBT) were distributed between the 5 reservoirs at the Air Force Academy. The RBT were a mixed group of White Sulphur and Mt. Whitney strains. The group of fish transported in fair condition, with 20 fish lost out of 604 pounds hauled in a 400-gallon tank.

The RBT averaged 2.93 to the pound and the SRC averaged 3.95 to the pound. The SRC were marked by removing the top lobe of the caudal fin and the RBT were marked by removing the bottom lobe of the caudal fin. The fish were marked at the Leadville NFH, 6 days prior to stocking.

Distribution of caudal fin marked RBT and SRC and water quality on July 1, 1981 as follows:

Reservoir	Surface Acres (%)	# FISH (%)	°F	pH
Kettle 1	1.8 (8%)	200 (10%)	74	8.3
Kettle 2	3.3 (15%)	310 (15%)	74	8.4
Kettle 3	8.5 (40%)	810 (40%)	73	7.6
Icehouse	5.4 (25%)	500 (25%)	76	7.2
Deadmans	2.5 (12%)	200 (10%)	71	7.2

Overall Catchrate: During the July creel census, anglers expended 5,915 hours over 21.5 surface acres in 29.5 days to harvest 1,242 RBT, 650 SRC, 59 channel catfish (CCF) and 24 brook trout (BKT). The overall catchrate during the July census was 0.33 fish per hour. The catchrate for RBT was 0.21, SRC 0.11, CCF 0.01, and 0.004 BKT per hour. Of the RBT and SRC harvested during the July census, 61% of the RBT and 54% SRC were caudal marked trout stocked on July 1, 1981.

Percent Return of Marked RBT and SRC: Following the stocking on July 1, 1981, the catchrate of the mixed lot of caudal marked White Sulphur and Mt. Whitney RBT started at 0.2 trout per hour and increased gradually for 4 days to peak at 0.29 trout per hour. The catchrate then declined to form a good regression line. Please see Figure 3. Within 13 days of stocking, 50% of the RBT were harvested; and after 29.5 days of angling, 78% of the caudal marked RBT had been harvested by anglers. Regression line calculations projected the return of the caudal marked White Sulphur/ Mt. Whitney RBT to eventually be 93%.

The catchrate of the caudal marked SRC started at 0.14 SRC per hour. As in May, the 30 days of creel census in July was not long enough to form a regression line. Please see Figure 3. Within 13 days of stocking, 21% of the marked SRC had returned; and after 29.5 days of angling, 38% of the caudal marked SRC were taken by anglers.

During the July census, 24 SRC and 6 RBT with the May census mark (adipose) were taken by anglers.

Angler Use: During the July creel census, 2,724 angler counts were calculated to amount to 5,915 hours of angling in 29.5 days. The average angler hours per day was 201, and the average hours per surface acre per day was 9.3 hours. Please see figure 5 for angler hours on individual days.

Distribution of angling effort and catch per hour at the 5 reservoirs during the July census was as follows:

	Kettle 1	Kettle 2	Kettle 3	Icehouse	Deadman
% of fish stocked	10%	15%	40%	25%	10%
% of angler use	18%	21%	31%	15%	15% **
* C/H (M) RBT	.05	.06	.04	.05	.22
C/H (M) SRC	.07	.03	.02	.03	.15
C/H BKT	.002	0	.003	.001	.02
C/H CCF	.002	.03	.01	.003	0

* = catch per hour of tail marked rainbow trout RBT, tail marked Snake River cutthroats (SRC), unmarked brook trout (BKT) and unmarked channel catfish (CCF).

** during the July census, Deadman was closed to anglers for 22% of the census days for cadet training.

Daily Angler Use Curves: As in May, weekday angler use in July formed a sine curve, with 54% of the weekday anglers present from 1600 hours to dark.

Weekend angler use in July formed a bimodal curve, with use peaks at 1000 hours and 1800 hours.

Distribution of daily anglers throughout the May weekdays and May weekends as follows:

Time	0600	0800	1000	1200	1400	1600	1800	2000
% anglers weekdays	-	11	10	9	8	11	21	22
% anglers weekends	-	19.5	20.5	11.5	8.5	9.5	23	7.5

The average length of the completed angler day during July was 2.23 hours.

Amount of July Angler Use Expended vs. Number of Permits Sold:

Status	% of Angler Use	% of Permits Sold
Active Military	47%	66%
Retired Military	22.7%	12%
Academy Civil Service	29%	21%
Disabled Vets and Misc.	1.3%	1%

Air Force Academy Creel Census. September 3, 1981 through September 24, 1981

On September 3, 1981, 1,522 Erwin rainbow trout were stocked into the 5 fishing reservoirs on the Air Force Academy. The RBT hauled extremely

well despite the heavy load - 1,357 pounds in a 600 gallon tank. Fish were also distributed to Farish and Peterson AFB.

The Erwin RBT averaged 3.04 to the pound, and were marked by removing the anal fin at the Leadville Hatchery 13 days prior to shipping. No SRC were available for this stocking period.

The 1,522 Erwin RBT were divided between the 5 reservoirs, mainly according to the size of the reservoir. However, the stocking rate for Icehouse was reduced, and the stocking rate for Kettle 1 and 2 increased to more closely match the actual angler use as observed in May and July.

Reservoir	Surface Acres	(%)	# RBT	(%)	°F	pH
Kettle 1	1.8	(8%)	233	(15%)	68	8.6
Kettle 2	3.3	(15%)	303	(20%)	69	8.4
Kettle 3	8.5	(40%)	587	(39%)	68	8.5
Icehouse	5.4	(25%)	172	(11%)	70	8.3
Deadman	2.5	(12%)	227	(15%)	61	7.2

Overall Catchrate: During the September creel census, anglers expended 2,227 hours to harvest 1,670 RBT, 290 SRC and 45 BKT. The average catchrate for RBT was 0.75, SRC 0.13 and 0.02 BKT per hour. The overall catchrate for trout was 0.90 trout per hour. No channel catfish were taken in September. Of the 1,670 RBT harvest during the September census, 60% were anal fin marked RBT stocked on September 3, 1981. None of the RBT captured in September bore the marks of study RBT stocked in April and July. It is assumed that the unmarked RBT taken in September were mainly from the August 4, 1981 stocking.

Snake River cutthroat trout were not available for stocking after July 1, 1981. Thus, the 290 (8-11") SRC taken during the September census, represented carry-overs of the total of 2,045 marked and 2,075 unmarked SRC stocked from April 1, 1981 to July 1, 1981, at the Academy. Interestingly, the catchrate for SRC in September (0.13) was similar to the May (0.18) and July (0.11) census periods.

Percent Return of Marked RBT: The rate of return of the Erwin RBT stocked on September 3, 1981, was similar to that of the Erwin RBT stocked in May. The catchrate peaked 7 days following stocking, then declined to form a good regression line. Within 13 days following the stocking on September 3, 50% of the 1,500 marked Erwin RBT had been harvested; and after 23 days of angling, 66% of the marked Erwin RBT were harvested. Regression line calculations project the return of anal fin marked Erwin RBT to eventually be 107%. Please see Figure 4.

Angler Use: During the September census, 1,008 angler counts were calculated to amount to 2,227 hours of angling in 22 days. The average angler hours per day was 104, and the average angler hours per surface acre per day was 4.8 hours. Please see figure 5 for angler hours on individual days.

Distribution of Angler Effort and Catch per hour at the 5 Reservoirs from September 3 through September 24, 1981 was as follows:

	Kettle 1	Kettle 2	Kettle 3	Icehouse	Deadman
% of fish stocked	15%	20%	39%	11%	15%
% of angler use	10%	18%	40%	13%	16%
* C/H(M) RBT	.35	.35	.54	.25	.45
C/H BKT	.001	.007	.003	.008	.002
C/H CCF	-	-	-	-	-

* = catch per hour of anal fin marked rainbow trout, unmarked brook trout and unmarked channel catfish.

Daily Angler Use Curves: As in May and July, weekday angler use in September 1981 formed a sine curve, with 65% of the daily angler use present from 1600 hours to dark. The use peak of the weekday angler use was at 1800 hours.

Weekend angler use in September was different from May and July. In September 1981, weekend angler use was similar to a weekday, except with the peak of use coming at 1600 hours.

Distribution of daily anglers throughout the September weekdays and weekends as follows:

Time	0800	1000	1200	1400	1600	1800	1900	2000
% anglers weekdays	6	9	9	11	19	34	12	dark
% anglers weekends	11	17	14	20	25	10	3	dark

The average length of a completed angler day in September 1981 was 2.23 hours.

Amount of September Angler Use Expended vs. Number of Permits Sold:

Status	% of Angler Use	% of Permits
Active Military	48%	66%
Retired Military	27%	12%
Academy Civil Service	24.5%	21%
Disabled Vets and Misc	0.5%	1%

RESULTS OF THE FARISH MEMORIAL CREEL CENSUS AND COMPARISON WITH THE ACADEMY

During 1981, 6,688 catchable trout and 1,800 subcatchable brook trout were stocked at Farish. Snake River cutthroats represented 1,600 of the catchables and rainbow trout represented 5,088 catchable trout stocked in 1981.

Although there are 3 reservoirs at Farish - Grace, Leo and Sapphire - only Grace and Leo Reservoirs were capable of supporting trout in 1981. Two hundred trout were stocked in Sapphire in May, but a leaking drain valve, limited inflow and high pH resulted in a fish kill by late June, and a mostly dry Reservoir for the remainder of 1981.

Overall Catchrate: Exit interviews of Farish anglers were conducted by Sgt. Jim Ward, his assistant and the Ward family. Their records show that during the 1981 angling season, May 1 through October 31, 1981, that 3,283 anglers expended 16,991 hours to harvest 3,197 RBT, 1,901 SRC and 732 BKT.

Month	# 8" fish stocked	total angler hours	RBT harvested	SRC harvested	BKT harvested	fish/hour
May	1800	1974	522	271	208	0.51
June	1400	4780.5	622	600	195	0.30
July		5653.5	681	692	160	0.27
August	1800	2363	395	198	86	0.29
Sept.	1688	1692.5	726	100	57	0.52
October		527.5	251	40	26	0.60
	6,688	16,991	3,197	1,901	732	

During 1981, the average catchrate was 0.18 RBT per hour, 0.11 SRC per hour and 0.04 BKT per hour. The overall catchrate for anglers at Farish was 0.34 trout per hour.

Percent Return of Marked RBT and SRC at Farish: Marked catchable RBT and SRC were stocked at Farish on April 29 and June 24, 1981. Marked RBT only were stocked on September 3, 1981. By recording the number of marked and unmarked trout captured by anglers each day, the rate and percent return of the trout could be documented.

Adipose marked Erwin RBT and SRC stocked on April 29, 1981.

On April 29, 900 Erwin RBT and 900 SRC were stocked into 3 reservoirs at Farish. The fish hauled well, with no mortality observed.

The Erwin RBT averaged 4.34 to the pound and the SRC averaged 4.02 to the pound. Both species were marked by removing the adipose fin one to two days prior to stocking.

Distribution of the trout on April 29, 1981 and water quality was as follows:

Reservoir	Surface Acres	# fish	°F	pH	O_2
Grace	4.3	400 RBT	57	7.1	9.0
Grace		400 SRC			
Leo	4.0	400 RBT	55	7.1	9.0
Leo		400 SRC			
Sapphire	2.5	100 RBT	58	7.8	9.6
Sapphire		100 SRC			

Erwin RBT. The catchrate of the Erwin RBT increased sharply following stocking on April 29, peaking in 10 days at 0.42 Erwin RBT per hour, then declined to form a good regression line. Please see Figure 6. Within 42 days (2,998 hours) 50% of the Erwin RBT were harvested, 75% were harvested within 76 days, and 102% were returned by August 10, 1981 and 102 angling days.

The return of the Erwin RBT stocked on April 29, varied sharply between Farish and the Academy. The same RBT stocked from the same truck, returned much more slowly at Farish. At the Academy, the Erwin RBT were stocked at a rate of 49 RBT/S. A. with 525 Erwin RBT (50%) harvested within 10 days with 1,526 angler hours. At Farish, 1,556 angler hours only resulted in 252 of the Erwin RBT being harvested.

Snake River Cutthroat. The cutthroats returned slower at Farish than the Erwin RBT. The catchrate did not peak until 20 days after stocking, with 50% of the marked SRC being harvested within 49 days (4,752 hours), 75% within 87 days and 91% were harvested by October 26, 1981 and 179 days of angling. Harvest of the 900 adipose marked SRC was projected to eventually be 100%. Please see Figure 6.

Adipose marked SRC continued to be harvested through October 1981, while the last adipose marked Erwin RBT was taken on September 10, 1981.

The return of the adipose marked SRC was similar at Farish and the Academy, with 9 to 10% of the marked fish being returned within 10 days. Approximately 3,300 angler hours harvested 336 marked SRC at the Academy and 386 marked SRC at Farish. The 3,300 angler hours were expended in 24.5 days at the Academy and 46 days at Farish.

Caudal Marked White Sulphur/ Mt. Whitney RBT and SRC stocked on June 24, 1981.

On June 24, 700 marked rainbow trout (RBT) and 700 Snake River cutthroats (SRC) were divided evenly between Grace and Leo Reservoirs. The RBT were a mixed group of White Sulphur and Mt. Whitney strains. The 410 pounds of marked trout were transported in a 400-gallon tank with no mortality or problems.

The RBT averaged 2.98 to the pound and the SRC averaged 4.0 to the pound. The SRC were marked by removing the top lobe of the caudal fin and the RBT were marked by removing the bottom lobe of the caudal fin. The fish were marked and stocked on the same day.

Distribution of caudal marked RBT and SRC and water quality on June 24, 1981 as follows:

Reservoir	Surface Acres	# fish	°F	pH
Grace	4.3	350 RBT	65	7.4
Grace		350 SRC		
Leo	4.0	350 RBT	65	7.2
Leo		350 SRC		

White Sulphur/Mt. Whitney RBT. Following the stocking of 700 catchable marked RBT on June 24, 1981, the catchrate began at 0.21 RBT per hour and remained near that, never climbing to a sharp peak as with the Erwin strain. Please see Figure 7. Within 12 days, anglers had harvested 50% of the marked RBT in 2,895 angler hours and 75% of the marked RBT were harvested within 25 days and 4,870 angler hours. Return of the caudal marked RBT continued up to October 10, 1981, with 91% of the 700 caudal marked RBT being checked through the exit interviews by that date.

As with the adipose marked Erwin RBT, the caudal marked White Sulphur/ Mt. Whitney returned faster to the anglers at the Academy. The harvest of 350 caudal marked RBT required 2,000 angler hours at the Academy and 2,895 angler hours at Farish.

Snake River cutthroat. The return of the caudal marked SRC began at 0.05 SRC per hour and increased gradually to a peak of 0.26 SRC per hour in 12 days. Within 19 days and 3,688 angler hours, 50% of the caudal marked SRC were harvested, and 75% of the SRC were harvested within 79 days and 9,454 hours. At the close of the angler season on October 31, 1981, the caudal marked SRC were still returning, with 78% being checked out by October 31, 1981. Regression line calculations show that the eventual harvest of the caudal marked SRC should be 100%. Please see Figure 7.

The return of the caudal marked SRC was faster at Farish than at the Academy. At Farish 350 caudal marked SRC were harvested in 3,688 hours compared to 4,524 angler hours required to harvest 350 SRC at the Academy during July.

Anal fin marked Erwin RBT stocked on September 3, 1981.

On September 3, 1,688 Erwin RBT were stocked into Grace and Leo Reservoirs. The RBT hauled very well, with no mortality observed. The 1,688 Erwin RBT stocked in September were marked by removing the anal fin.

Distribution of the anal fin marked Erwin RBT and water quality on September 3, 1981 as follows:

Reservoir	Surface acres	# fish	°F	pH
Grace	4.3	779	60	7.3
Leo	4.0	909	61	7.2

The Erwin RBT started to return at 0.06 RBT per hour with the catchrate increasing for the next 33 days of angling to the end of the season. Please see Figure 8. During the 33 days of angling, anglers expended 2,111 hours and harvested 604 (36%) of the 1,688 anal fin marked Erwin RBT.

Since the catchrate continued to increase up to the end of the 1981 season, a regression line was not formed, and the eventual harvest could not be mathematically predicted by the end of the 1981 season.

Again, the Erwin RBT that were stocked on September 3, 1981, returned faster at the Academy than at Farish. At the Academy, 750 (50%) of the 1,500 anal marked Erwin RBT were harvested in 13 days and 1,532 angler hours. At Farish, 2,111 angler hours only harvested 604 (35%) of the 1,688 anal marked Erwin RBT in 33 days.

Angler Use at Farish during 1981

During the 1981 angler season, exit interviews conducted at Farish show that 3,283 anglers expended 16,991 hours from May 1 through October 1981. Distribution of angler use throughout 1981 was as follows:

Month	Number anglers	Hours Expended	Av. length of angler day
May	440	1974	4.5
June	975	4780.5	4.9
July	972	5653.5	5.8
August	431	2363	5.5
September	364	1692.5	4.7
October	101	527.5	5.2
	3,283	16,991	5.2

Please see Figure 9 for the daily angler use at Farish during 1981.

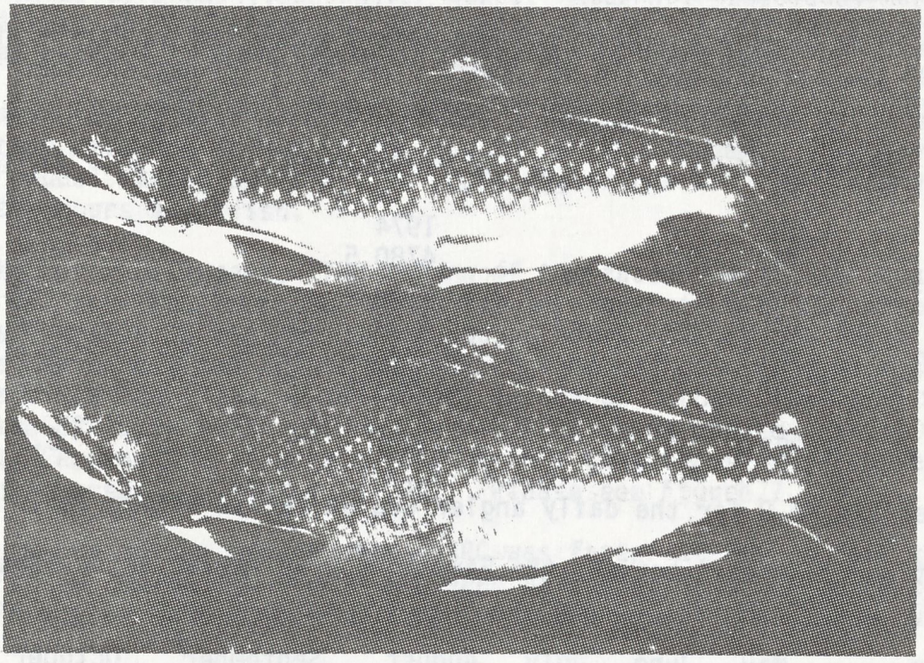
Distribution of anglers between the Farish Reservoirs was as follows in 1981:

Reservoir	May	June	July	August	September	October
Grace	62%	53%	54%	41%	49%	35%
Leo	37%	45%	46%	59%	51%	65%
Sapphire	1%	2%	dry	dry	dry	dry

Interestingly, anglers strongly favored Grace in May, with angler use about even between the reservoirs by June and July, and then by October anglers appeared to favor Leo.

Angler use increased dramatically in 1981. In 1980, 1,995 anglers expended 9,102 hours compared to 3,283 anglers and 16,991 hours in 1981.

Return of Subcatchable BKT stocked at Farish: During 1981, the return of 723 BKT weighing 275 pounds, mainly represented subcatchable BKT stocked in 1979 and 1980. A return of 732 BKT weighing 275 pounds represents a 690% return of the average yearly weight of the BKT stocked in 1979 and 1980, and a 74% return of the yearly number of brook stocked in 1979 and 1980.



Example of Farish Brook Trout
October 1980

RESULTS OF STANLEY CANYON RESERVOIR

Stanley Canyon Reservoir has been managed as a walk-in fisheries since 1973. This 8.4 surface acre fisheries is maintained through the annual stocking of 2,000 to 3,000 Snake River cutthroats near 4 inches in length in early July. Generally, a stocking rate of 2,000 SRC produces a 7.5 inch fish by late October; and a stocking rate of 3,000 SRC produces a 6.5 inch fish by late October. The SRC gain another inch of growth from late October to early May and another 2 to 3 inches by late October.

Natural spawning habitat exists within the short inlet stream to Stanley, with some reproduction occurring here. However, the amount of natural spawning success appears to vary greatly from year to year, depending upon the amount of snow and summer rains that maintain the inlet flow.

The fin clipping of the stocked 4 inch SRC and the examination of captured fish for fin clips suggests that 50% to 85% of the fisheries is maintained through the stocking program.

Overall Catchrate: During 1981, 14 creel census days were conducted at Stanley Canyon Reservoir: May 23-29, July 1-6, and September 9.

From May 23 through 29, anglers expended 562 hours in 7 days to harvest 213 SRC for a catchrate of 0.38 SRC per hour. Please see Figure 10 for the amount of angler hours expended each day.

From July 1 through 6, anglers expended 225 hours in 6 days to harvest 110 SRC for a catchrate of 0.49 SRC per hour.

On the one day of census in September, anglers expended 22.5 hours to harvest 4 SRC for a catchrate of 0.18 SRC per hour.

Overall, for the 14 days of creel census conducted at Stanley Canyon Reservoir, anglers averaged 0.42 SRC per hour.

Percent Return of SRC: During the 1981 creel census, the SRC harvested by anglers were composed of the following percentage of year classes/sizes.

Year SRC stocked	May 1981	July 1981	Sept. 1981
1981	0	0	0
1980	73% @ 8"	93% @ 9-10"	80% @ 10"
1979	13% @ 11"	6% @ 12"	0
1978	7% @ 14"	1% @ 15"	20% @ 16"
1977	7% @ 16"	0	0

With an average catchrate for SRC observed to be 0.42 per hour, and the total angler hours for 1981 estimated to be 9,917 hours, the estimated harvest for SRC in 1981 amounts to 4,165 SRC. The estimated harvest of 4,165 SRC amounts to 138% to 200% of the hatchery SRC stocked each year.

Using angler success and use, based upon May and July figures, could be over estimating the amount of angler use and success that is occurring in August, September and October. Additional angler use and success data should be collected at Stanley during August, September and October.

Angler Use: During the 14 creel census days, angler use averaged 31.5 hours per weekday and 124 hours per weekend/holiday. With 118 weekdays and 50 weekend/holidays from May 15 through October, angler use could have totaled as much as 9,917 hours in 1981. At an annual angler use of 9,917 hours, average angler hours per day was 59, and the average hours per surface acre per day is 7.02.

In addition to the 9,917 hours of angling, Stanley appears to support an equal amount of hiking and camping use.

Daily Angler Use Curves: Since the number of census days were limited, a good use curve cannot be constructed at this time. However, weekend and weekday use patterns appear somewhat similar, with the majority of the anglers (62%) present from 0800 to 1200.

Limited angler use data suggests a use curve as follows:

Time	0800	1000	1200	1400	1600	1800
% anglers	13	27	22	15	18	5

Completed angler hours were not recorded in May, but averaged 4.9 hours in July.

Amount of Angler Use Expended vs. Number of Permits Sold: Due to the walk-in status of this fisheries and a limited amount of enforcement, angler use at Stanley was quite different from the Academy proper.

Status	% of Angler Use	% of Permits Sold
Active Military	65%	66%
Retired Military	3%	12%
Academy Civil Service	17%	21%
Disabled Vets and Misc.	0%	1%
Unauthorized	15%	0%

Nearly 50% of the 104 anglers interviewed in May at Stanley were in violation of one or more of the Academy or State angling regulations. Active military accounted for 68% of the violations, mainly lacking State or Academy permits. Unauthorized users (those who do not qualify for an Academy permit) accounted for 27% of the violations; and Academy Civil Service employees accounted for 5% of the violations.

CONCLUSION OF OBJECTIVES

1. HARVEST OF FISH PER HOUR

Air Force Academy. During the census periods at the Academy, anglers harvested 0.62 fish per hour in May, 0.33 fish per hour in July and 0.90 fish per hour in September. Considering the Region 6, FWS standard of stocking at densities no higher than to provide a harvest of 0.5 to 0.8 trout per hour, the stocking rates at the Academy should be adjusted by moving fish between July and September. Overall, the original 1981 stocking request for 17,300 catchables for 31,510 angler hours at the Academy appears to have been accurate.

Farish. The average harvest of trout per hour was 0.34 from May 1 through October 1981. Rainbow trout provided 0.19 fish per hour, SRC 0.11 per hour and BKT 0.04 fish per hour throughout the season. The harvest of trout per hour at Farish was below standard during 1981, due to a 180% increase in angler use in 1981 over 1980. This sudden increase in angler use in 1981 was part of a new program to encourage more use of the facility. The sudden increase in angler use in 1981, could not be matched by increased numbers of catchables in 1981. If this high use program is to continue, stocking of catchable trout should be increased to 8,000 per year.

Stanley. The stocking of fingerling SRC and natural reproduction provided anglers with a harvest of 0.42 fish per hour.

2. PERCENT RETURN AND RATE OF RETURN OF CATCHABLE RAINBOW TROUT AND SNAKE RIVER CUTTHROAT

	Air Force Academy	Farish
% return of Erwin RBT stocked 4/29/81	91%	102%
% return of SRC stocked 4/29/81	*	100%
% return of mixed RBT stocked 7/1/81	93%	91%+
% return of SRC stocked 7/1/81	*	100%
% return of Erwin RBT stocked 9/3/81	107%	*

* Here the census periods were too short to obtain a regression line for calculations. However, the long-term return of these stockings should be between 90% to 100%. The minimum harvest standards for put-and-take trout stocking is 60%, with the Academy programs well exceeding that standard.

Rate of return of RBT and SRC. It was found that SRC consistently returned more slowly to the anglers than did the strains of RBT. Surprisingly, the same strains of RBT returned more slowly to anglers at Farish than at the Academy. These differences are illustrated by the following number of angler hours required to harvest the first 350 trout of each stocking.

	Air Force Academy	Farish
350 Erwin RBT stocked 4/29/81	1,140 hours	2,077 hours
350 SRC stocked 4/29/81	3,350 hours	3,449 hours
350 mixed RBT stocked 7/1/81	2,000 hours	2,895 hours
350 SRC stocked 7/1/81	4,529 hours	3,688 hours
Erwin RBT stocked 9/3/81	814 hours	1,164 hours

Although the rate of return of SRC was slower than the strains of RBT, where the census was conducted for enough days, the percent return of the catchable SRC was shown to eventually be 100%.

All the reasons for the faster rate of return of RBT compared to SRC are not known, but could include such factors as less hatchery domestication for the cutthroats and the ability of the cutthroats to utilize a wide range of food organisms available in small reservoirs; other than fireballs and garlic marshmallows. Most hatchery strains of rainbows tend to only utilize aquatic insects, bottom vegetation and bottom debris in the Academy reservoirs shortly after stocking.

Four of the 5 reservoirs at the Academy contain some green sunfish, white suckers and fathead minnows. They also tend to be turbid, and have limited populations of aquatic insects that are available to trout. In contrast, the reservoirs at Farish are clear, contain no non-game fish species, and have excellent invertebrate populations.

Possibly the difference in the amount of insects available between Farish and the Academy may explain the difference in the rate of RBT harvest, with little for the RBT to eat at the Academy other than anglers tackle. Catchable SRC stocked at the Academy readily utilized the green sunfish and white suckers. Thirteen inch SRC captured in November were found to be utilizing minnows, green sunfish and white suckers up to 2 inches in length. A 19 inch SRC taken in March 1981 contained a 6 inch white sucker.

The slower rate of return of SRC and their ability to utilize other fish as a food source has many advantages in fisheries management. Their slower return at the Academy decreased the boom and bust effect of most RBT catchable stocking programs. Also, their ability to utilize non-game fish species for forage allows for good growth in marginal habitats.

Since SRC grow as well as most RBT strains at the Leadville NFH, it is recommended that all catchables stocked in 1982 should be Snake River cutthroats.

3. AMOUNT OF ANGLER USE OCCURRING AT THE U. S. AIR FORCE ACADEMY FACILITIES AND THE DISTRIBUTION OF THE ANGLERS BETWEEN THE RESERVOIRS

Angler use at the Air Force Academy is calculated to amount to 31,510 hours and 15,004 angler days in 1981. Mean length of the angler day ranged from 1.89 hours in May to 2.23 hours in July and August. Angler use in 1981 amounted to 1,466 hours per surface acre.

Exit interviews conducted at Farish showed that 3,283 anglers expended 16,991 hours in 1981. Length of the angler day at Farish averaged 5.2 hours. Angler use was 2,047 hours per surface acre in 1981.

Limited census data at Stanley indicates an annual angler use of 9,917 hours and 2,024 angler days. Hours of angling equaled 241 hours per surface acre with an angler day of 4.9 hours.

The lower amount of angler use at Stanley - 241 hours per surface acre -- allows fish time to grow and a fingerling program. Angler use of 1,466 to 2,047 hours per surface acre limits the Academy and Farish programs to mainly put-and-take. In past years, angler use at Farish has been 1,000 hours per surface acre, or less. The recent increase in angler use to 2,047 hours/S.A. will reduce the amount of fish growth post stocking at Farish.

The shorter length of the angler day at the Academy - 1.9 to 2.2 hours reflects the urban nature of the fisheries with Academy anglers fishing mainly after duty hours. Since Farish or Stanley requires a one to two hour drive or hike, anglers spend nearly 5 hours per trip at these areas. The length of the angler day at Farish and Stanley compares to the 4.5 hour State average for an angler day.

Distribution of the angler use between the reservoirs at the Academy was generally in proportion to the size of the reservoir. However, Icehouse received less use and Kettle 1 and Deadmans received more angler use for their size.

Distribution of the catchable trout between the reservoirs should be as follows:

	Kettle 1	Kettle 2	Kettle 3	Icehouse	Deadman
% of fish stocked	15%	18%	33%	15%*	19%

* Icehouse should not be stocked if both the temperature and pH exceeds 70°F and 9.1.

Distribution of the catchable trout at Farish should be divided equally between the reservoirs.

4. ANGLER USE CURVES AND ABBREVIATED CENSUS METHOD

Weekday angler use at the Air Force Academy appears to resemble a sine curve, with the peak of the angler use occurring after 1,600 hours. Weekend angler use is a bell curve, with the peak usually occurring near mid-day.

The problem with trying to construct an abbreviated method of measuring daily use, hinges upon there being a typical day to abbreviate. Unfortunately, exact daily angler use varies with the weather and season. Realizing these limitations, the following percent use curves were compiled for May, July and September.

May	0600	0800	1000	1200	1400	1600	1800	2000
% anglers weekdays	-	6.4	10	14.5	14.9	20.0	27.5	6.7
% anglers weekends	4	11	14	20	16	17	15	3

Average length of the completed angler day was 1.89 hours in May and June 1981.

July	0600	0800	1000	1200	1400	1600	1800	2000
% anglers weekdays	-	11	10	9	8	11	21	22
% anglers weekends	-	19.5	20.5	11.5	8.5	9.5	23	7.5

The average length of the completed angler day during July was 2.23 hours.

September	0800	1000	1200	1400	1600	1800	1900	2000
% anglers weekdays	6	9	9	11	19	34	12	dark
% anglers weekends	11	17	14	20	25	10	3	dark

The average length of a completed angler day in September 1981 was 2.23 hours.

Angler use can be projected by using the curves in the following way:

1. Count all anglers present at all reservoirs in one pass. The time period of 1600 or 1800 appears to be best on weekdays since more anglers are usually present then.

2. Expand the angler count by dividing the number of anglers counted by the percentage they represent on the curves.

   Example: At 1800 hours on Monday, July 27, 21 anglers are counted at the 5 reservoirs.

   21 anglers = 21% of the total daily anglers.

   21 anglers ÷ .21 = total daily anglers.

   100 anglers = total daily anglers.

   Angler hours = 100 anglers x 2.23 hours (average July angler day)

   Angler hours = 223 hours for July 27.

5. <u>EVALUATE THE CONTRIBUTION OF THE FINGERLING CHANNEL CATFISH STOCKING PROGRAM AND SUBCATCHABLE BROOK TROUT PROGRAM</u>.

At the Air Force Academy, anglers harvested BKT at an annual mean of 0.023 BKT per hour, and CCF at a mean of 0.01 CCF per hour. The harvest of BKT extended throughout the entire angling season, while the harvest of CCF appeared to be mainly confined to late June, July and early August.

Channel catfish harvest at the Academy ranged from 8" to 18" in length, with a mean weight of 1.6 pounds each. In 1980, a 14 pound CCF was caught by an angler. In 1981, 101 CCF weighing 162 pounds were harvested. The annual stocking rate for CCF is a total of 1,500 to 2,000 CCF that weigh a total of 20 pounds or less.

A harvest of 101 CCF weighing 162 pounds in 1981 represents a 5% to 7% return of CCF numbers and a 810% return of the pounds of CCF stocked.

Brook trout are stocked at an annual rate of 3,000 BKT, 3" to 6" in length. Brook trout harvest at the Academy in 1981 ranged from 8" to 16" in length. During 1981, 725 BKT weighing a total of 240 pounds were harvested. This represents a 25% return of BKT numbers and a 150% return of the pounds of BKT stocked.

The return of subcatchable brook trout stocked at Farish, was much better than at the Academy. At Farish, brook trout harvest by anglers in 1981, represented a 74% return of the numbers stocked and a 690% return of the pounds of BKT stocked.

6. DETERMINE THE AMOUNT OF ANGLER HOURS ACTUALLY EXPENDED BY MILITARY, CIVILIANS, RETIRED MILITARY, DISABLED VETERANS AND THEIR DEPENDENTS AND GUESTS IN RELATION TO THE AMOUNT OF PERMITS SOLD

During 1981, 1,699 Academy fishing permits were sold. Purchase of Academy permits, and observed actual angler use during 1981 was as follows:

Status	% of permits sold	% of angler use
Active Military	66%	50%
Retired Military	12%	26%
Academy Civil Service	21%	23.3%
Disabled Vets and Miscellaneous	1%	0.7%

Predictably, retired persons used the fishing facilities much more than the other user categories. Active military use was below their percentage of permit purchases.

Angler days for the Academy, Farish and Stanley amounted to 20,311 for 1981. With a sale of 1,699 Academy permits, the mean angler days per permit was 12 angler days. This is just slightly lower than the State mean of 15 angler days per license holder.

Prepared by:

Bruce D. Rosenlund
Project Leader
Colorado Fish and Wildlife Assistance
March 11, 1982

Reviewed by:

William C. White
Acting Area Manager

1981 STOCKING

AIR FORCE ACADEMY

DATE	SPECIES	NUMBER	POUNDS
3/11/81	rainbow	2,000	500
4/09/81	rainbow	1,050	284
4/09/81	Snake River cutt.	1,050	194
4/29/81	rainbow	1,050	227
4/29/81	Snake River cutt.	1,050	250
5/21/81	rainbow	1,025	261
5/21/81	Snake River cutt.	1,025	231
6/10/81	rainbow	3,151	590
7/01/81	Snake River cutt.	1,020	263
7/01/81	rainbow	1,020	341
8/04/81	rainbow	2,500	538
9/03/81	rainbow	1,500	493
9/14/81	brook trout	2,949	324
9/21/81	channel catfish	2,059	20

FARISH

DATE	SPECIES	NUMBER	POUNDS
4/29/81	rainbow	900	207
4/29/81	Snake River cutt.	900	225
6/24/81	rainbow	700	235
6/24/81	Snake River cutt.	700	175
8/04/81	rainbow	1,800	387
9/03/81	rainbow	1,688	557
9/14/81	brook trout	1,800	198

STANLEY

DATE	SPECIES	NUMBER	POUNDS
7/01/81	Snake River cutt.	3,000	48

Air Force Academy, April 29 through May 23, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

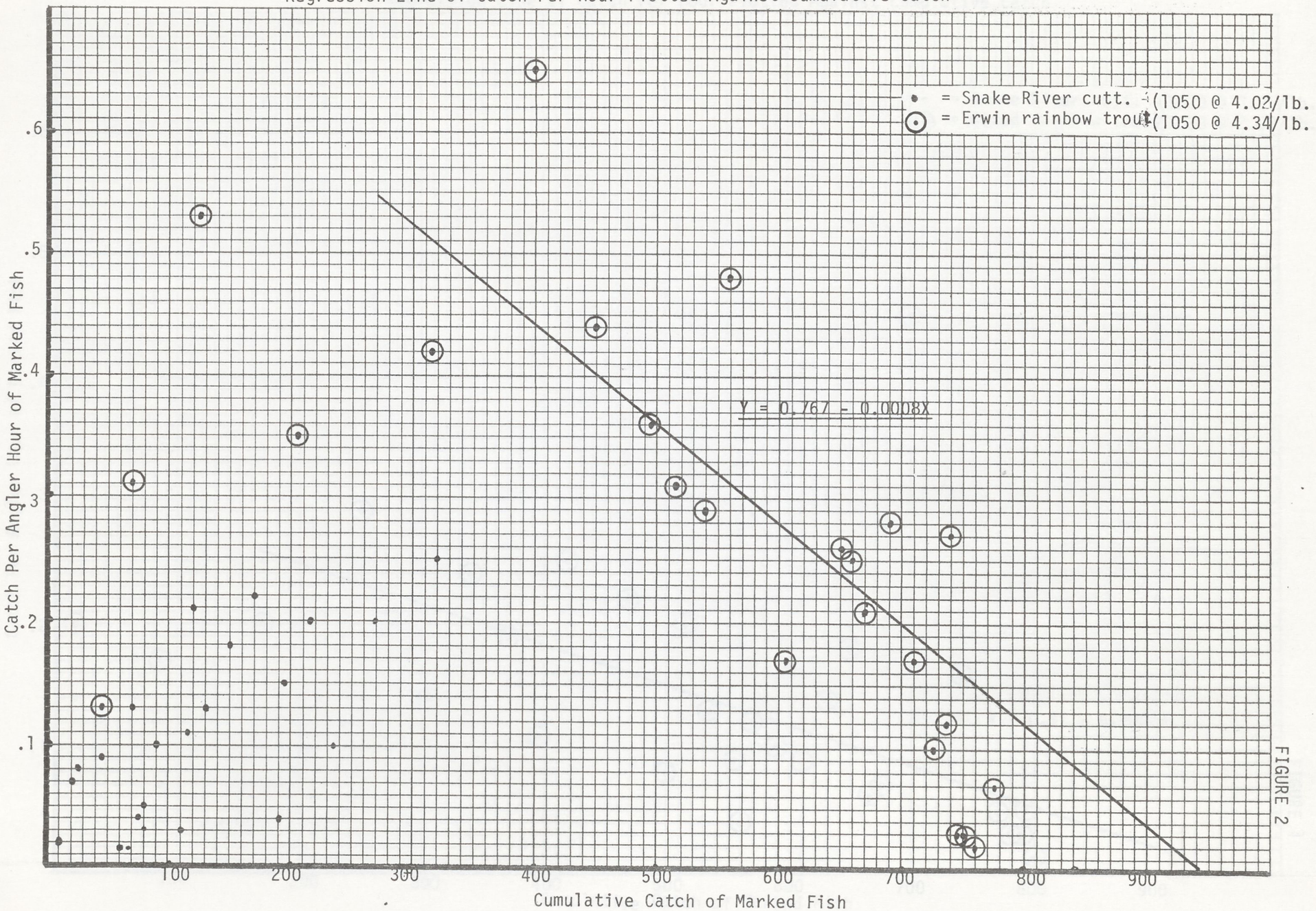


FIGURE 2

Air Force Academy, July 1 though July 25, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

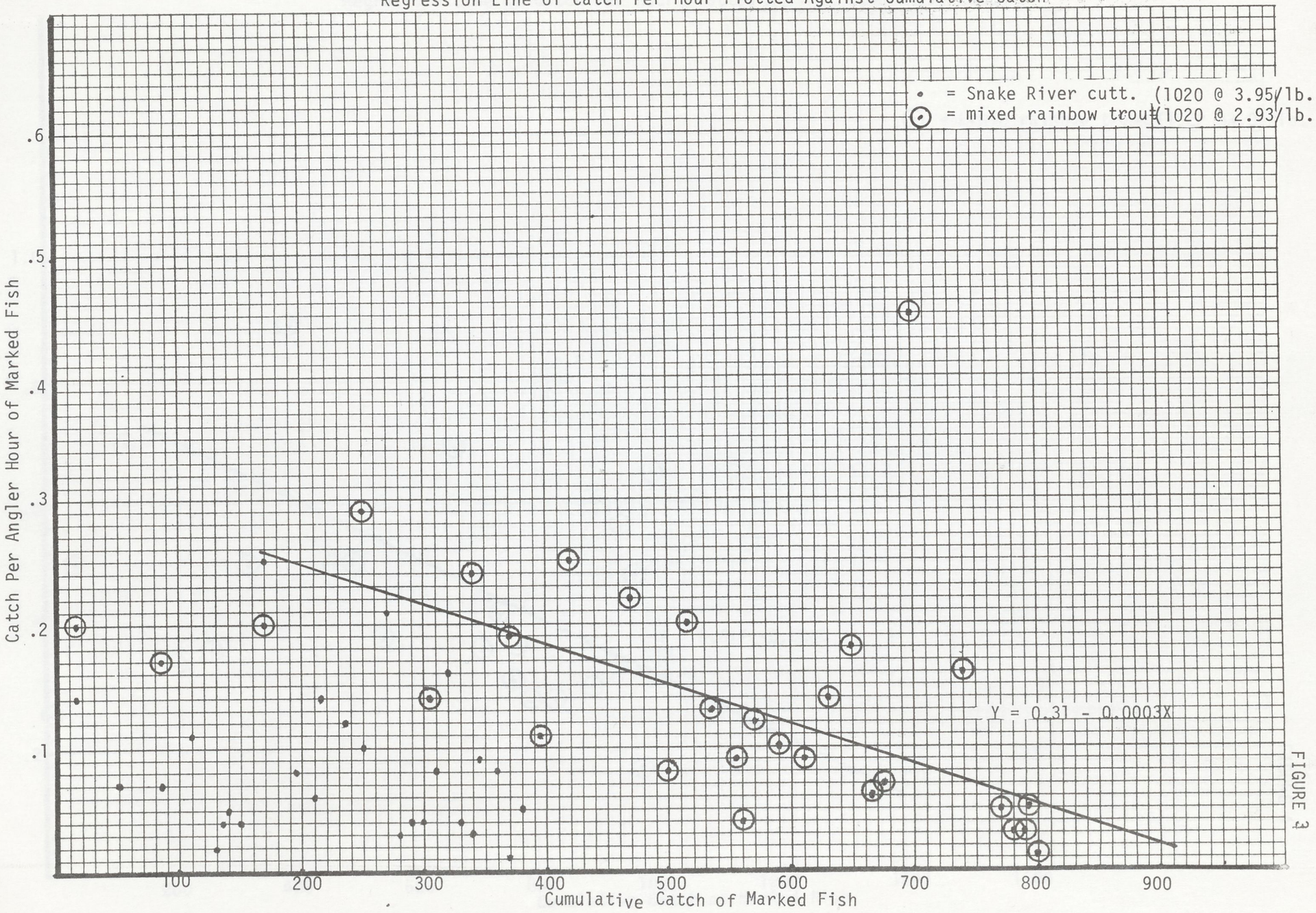


FIGURE 3

Air Force Academy, September 3 Through 24, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

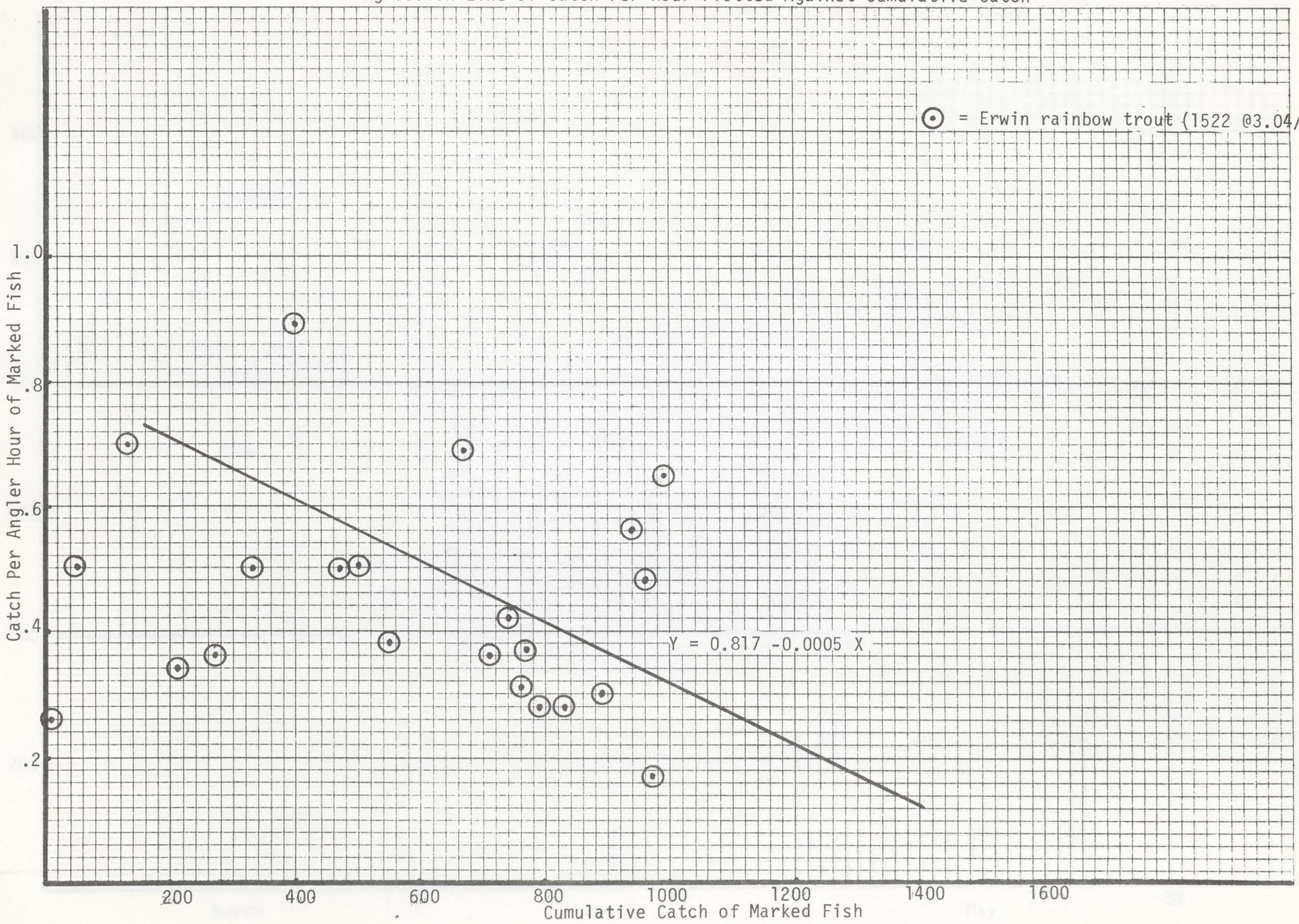
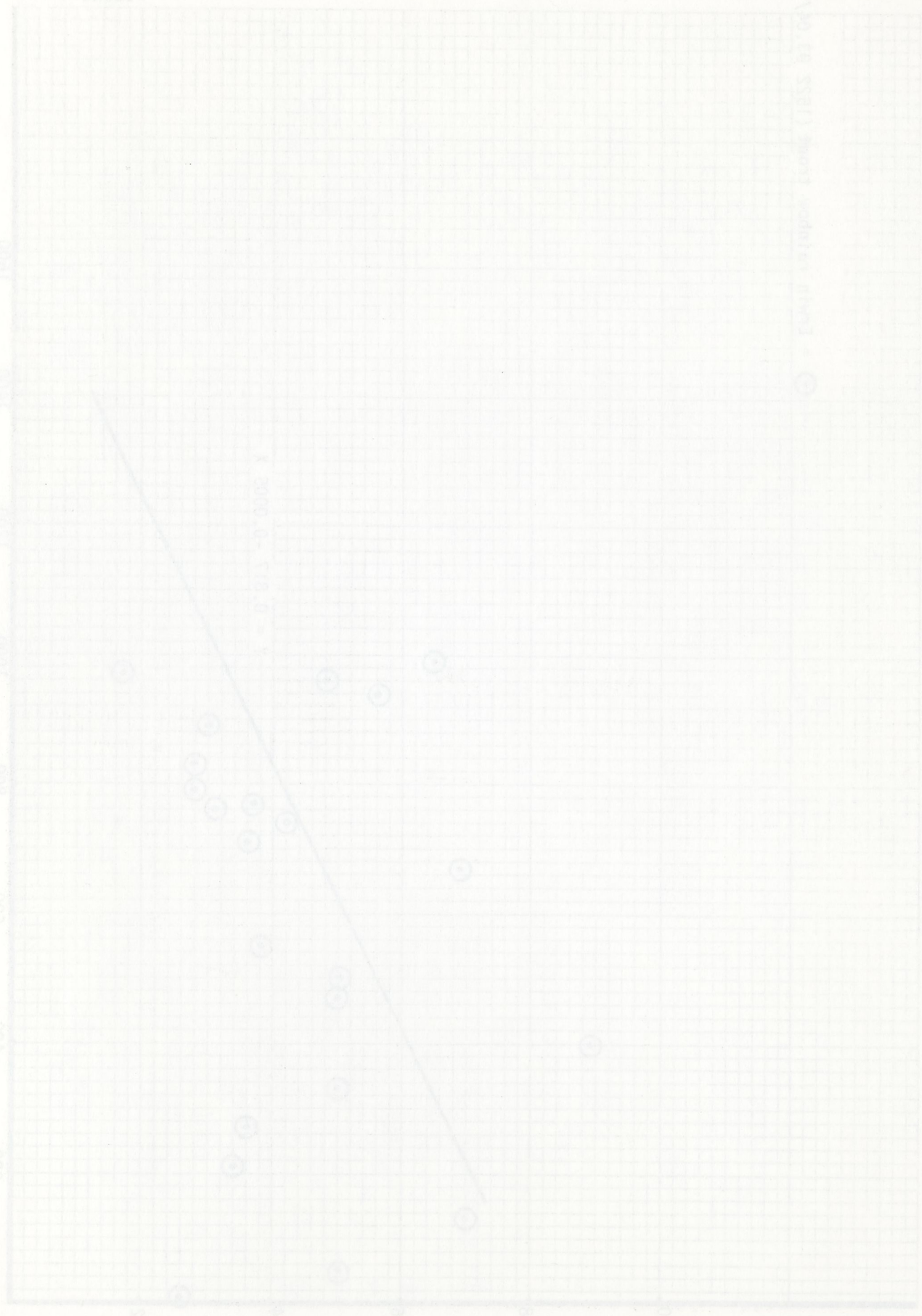


FIGURE 4



Air Force Academy 1981, Total Daily Angler Hours Observed During Census Periods

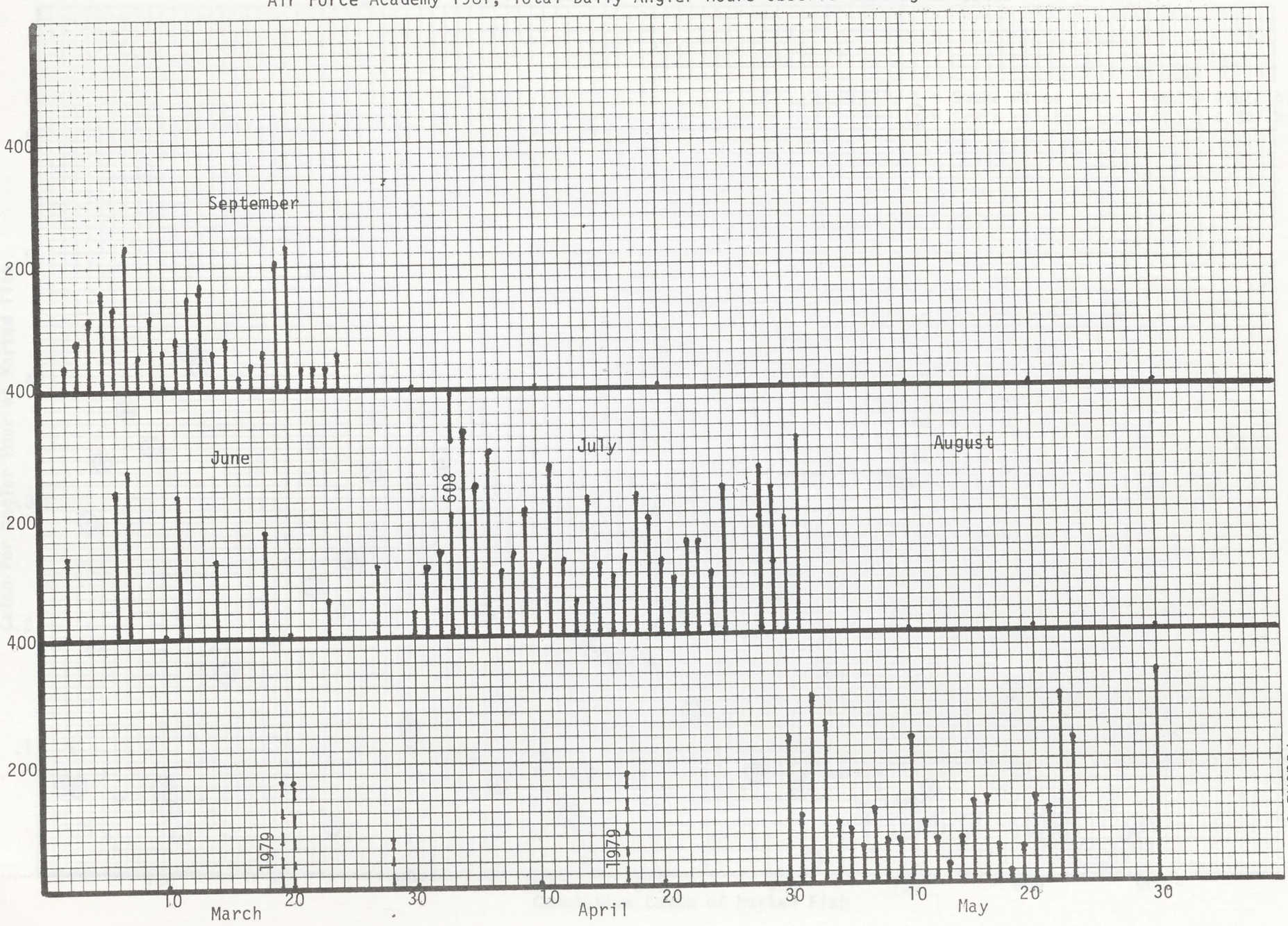


FIGURE 5

FPI-MI-10 X 10 TO 1 INCH
10TH LINE HEAVY

Farish, May 1 through October 31, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

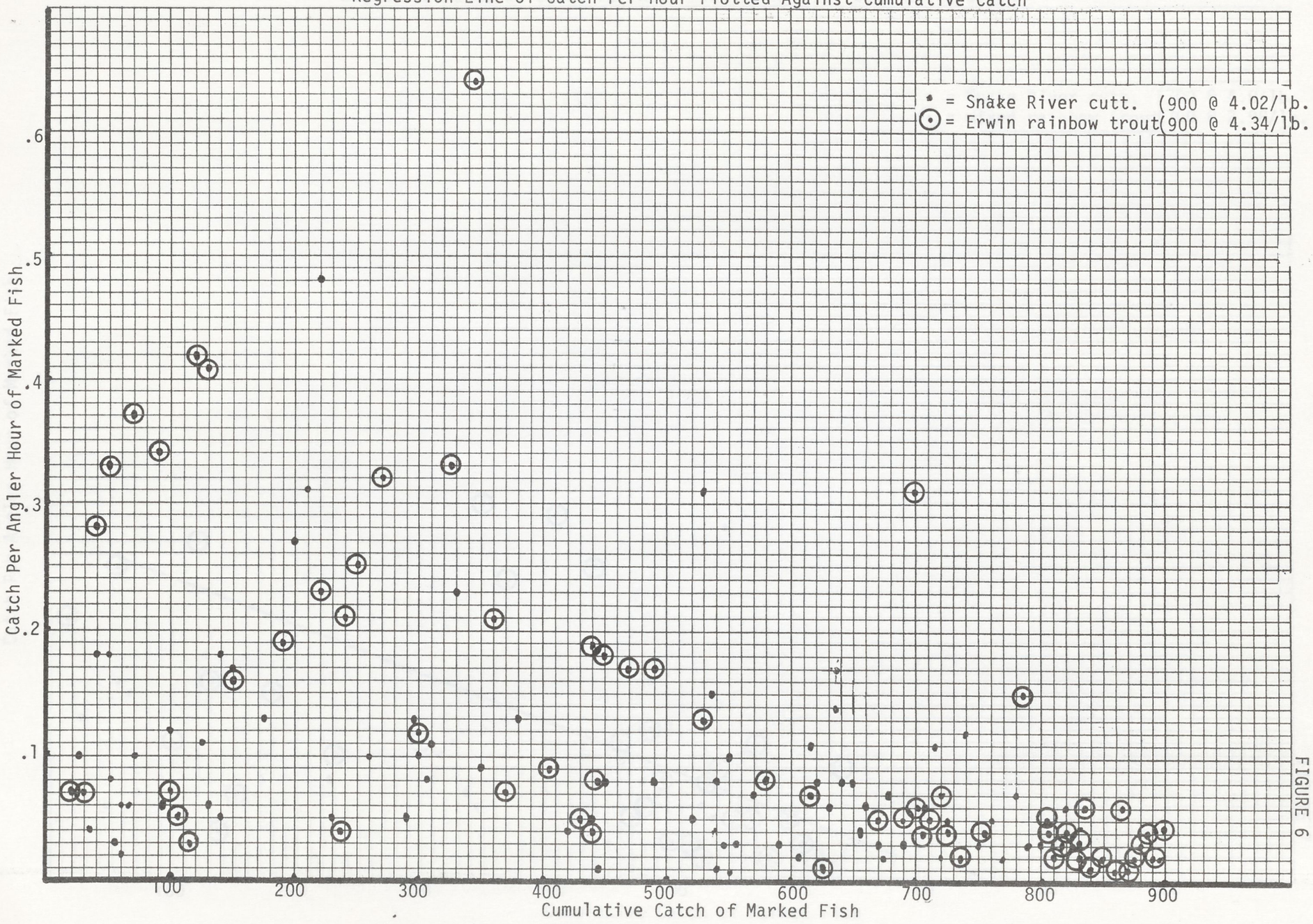


FIGURE 6

Farish, June 24, through October 31, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

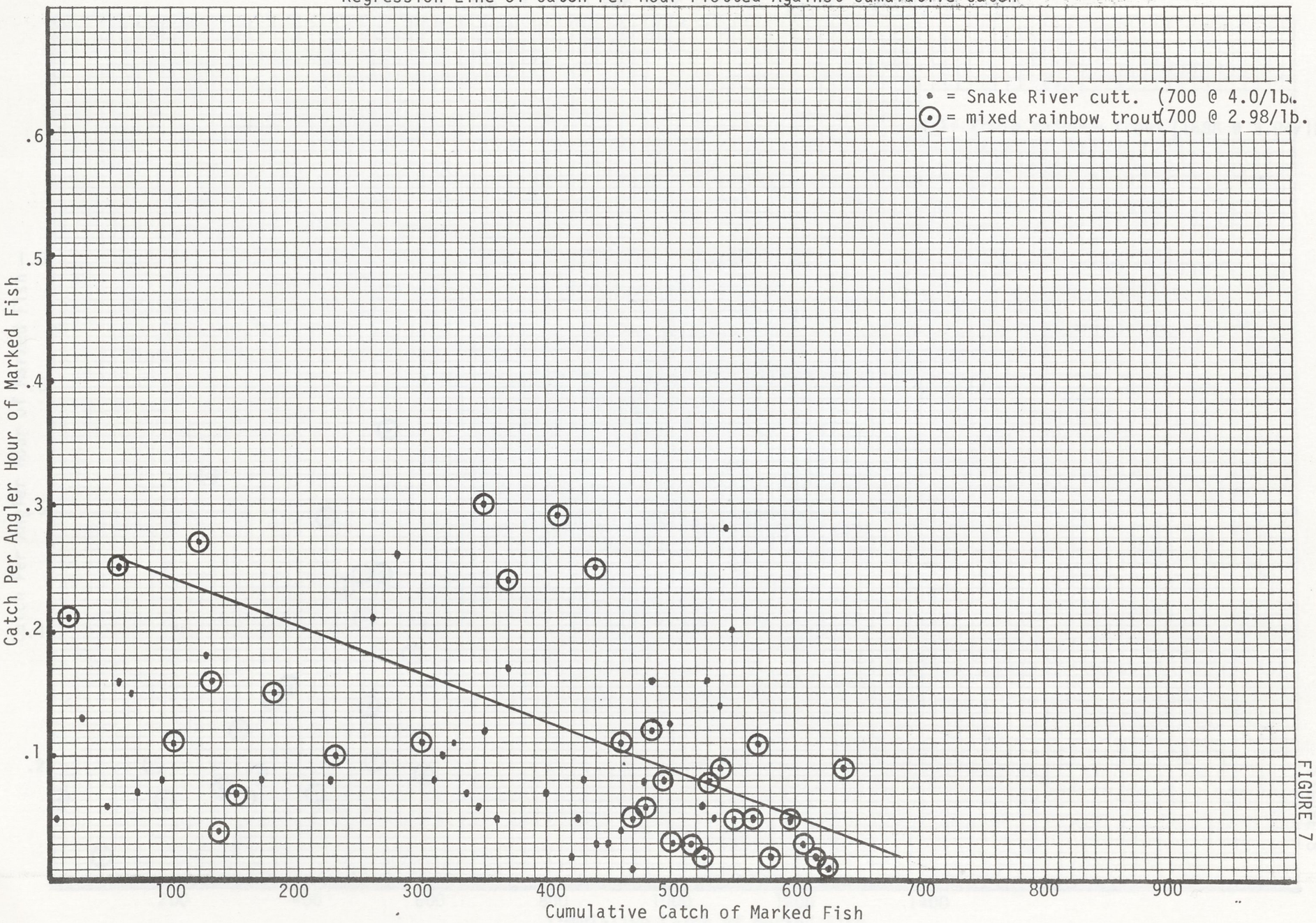


FIGURE 7

Farish, September 4, through October 31, 1981
Regression Line of Catch Per Hour Plotted Against Cumulative Catch

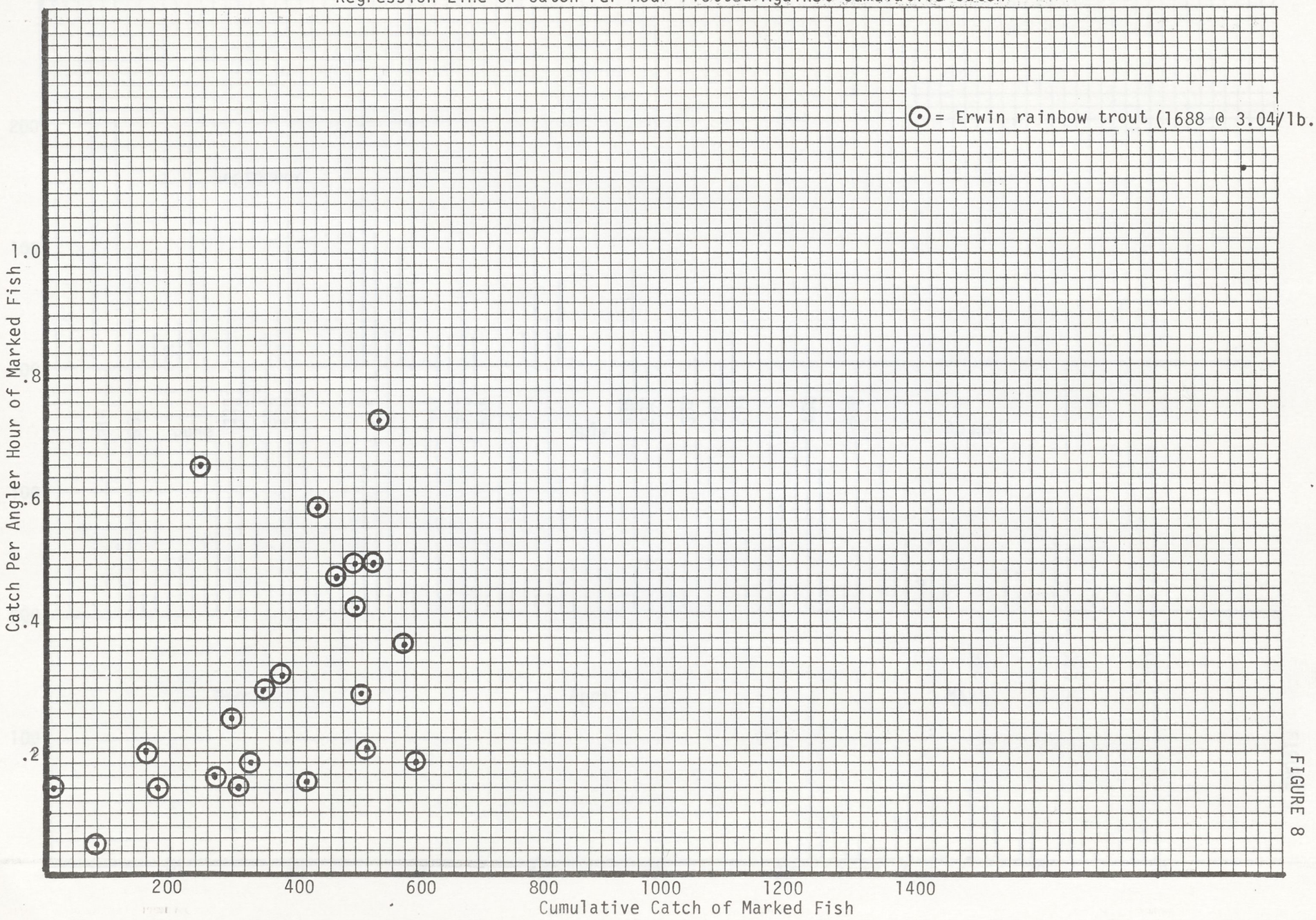


FIGURE 8

Farish 1981, Total Daily Angler Hours Observed During Census Periods

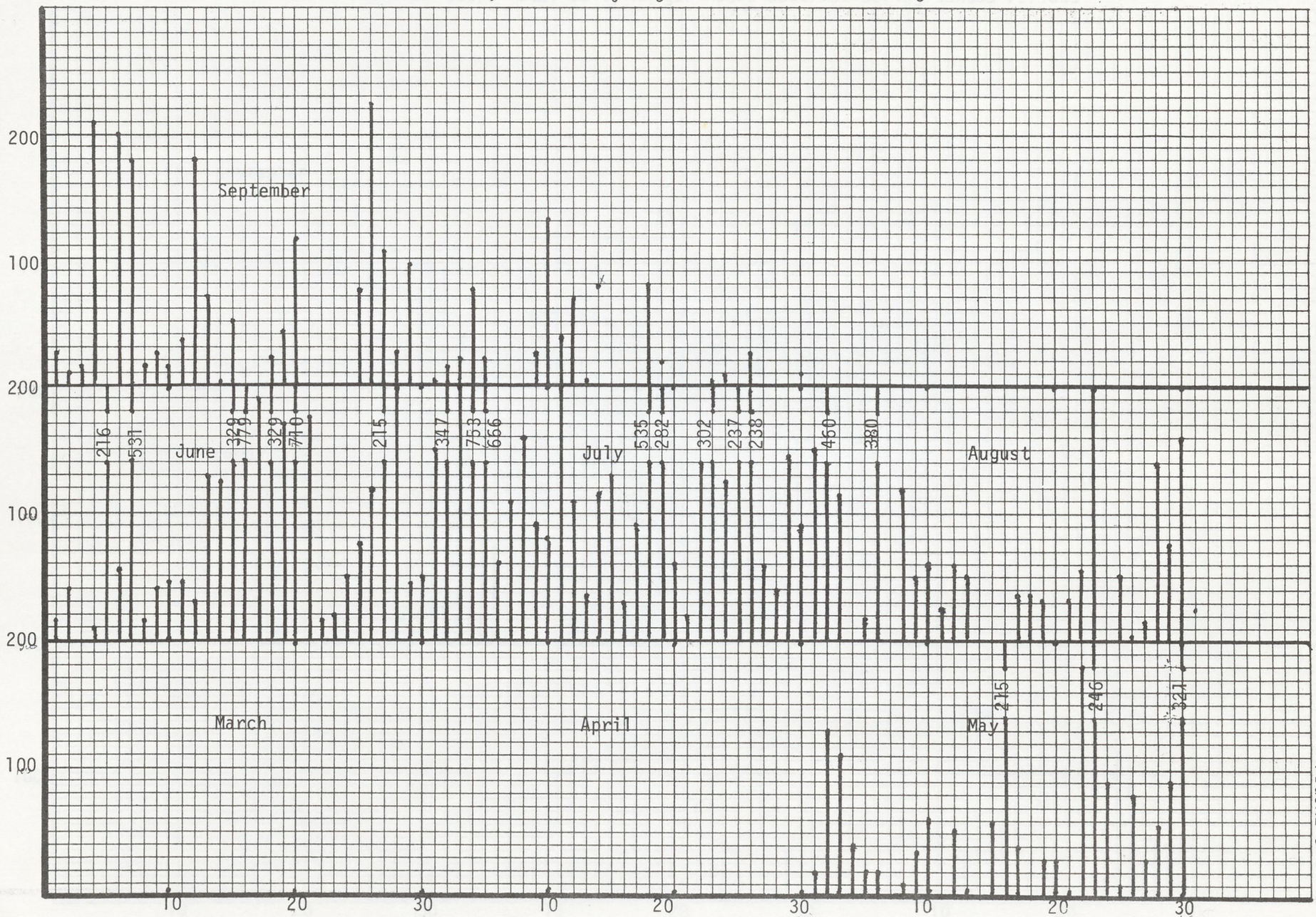


FIGURE 9

Stanley 1981, Total Daily Anlger Hours Observed During Census Periods

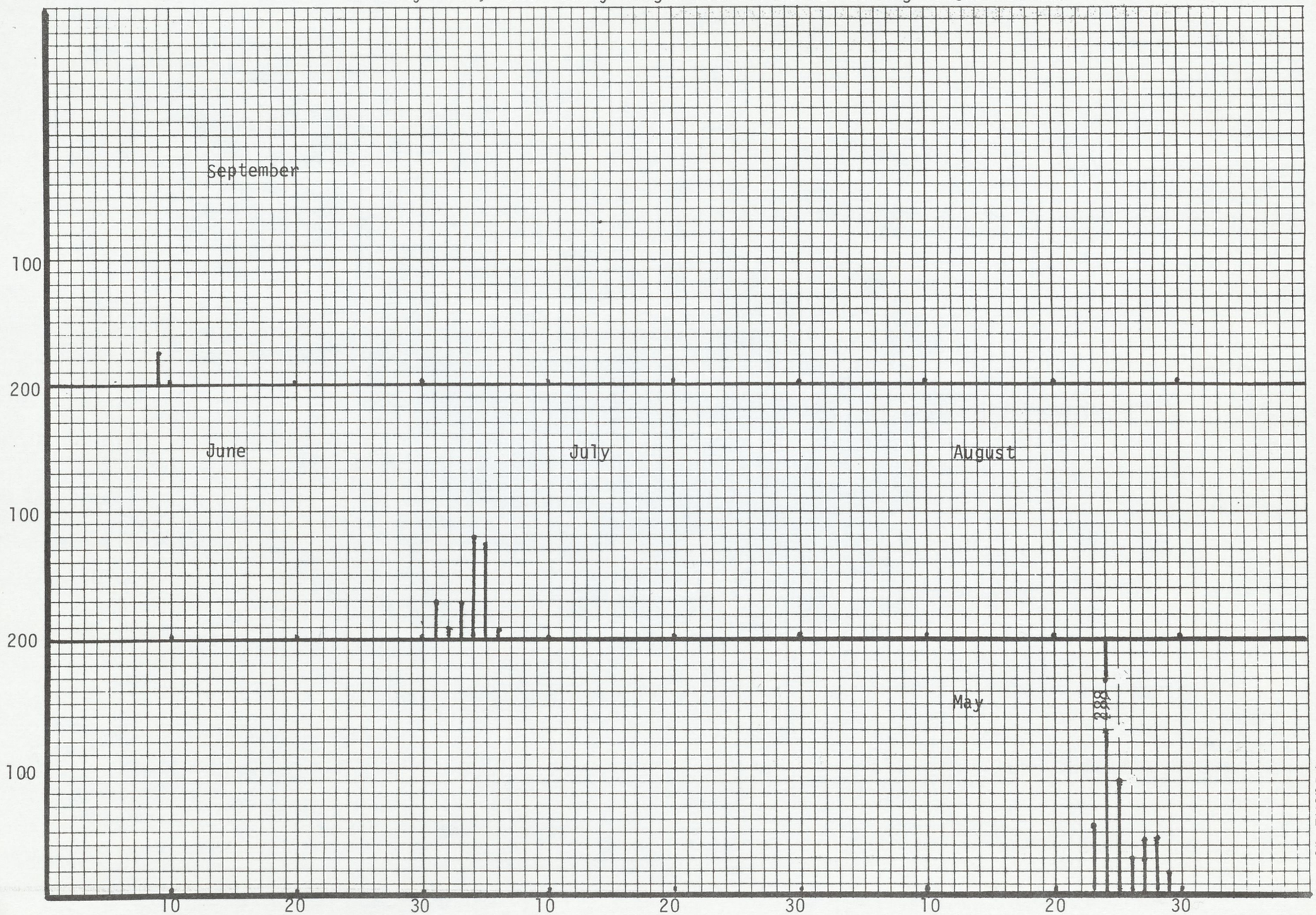


FIGURE 10

INTER-OFFICE TRANSMITTAL

U. S. Fish & Wildlife Service - Colorado Field Office 30930

- ☐ Director, _____
- ☐ Regional Director, _____
- ☐ Project Leader, _____
- ☐ Dr Behnke

- ☐ Regular Mail
- ☐ Air Mail
- ☐ Action
- ☒ Information

From	Office	Date
Bruce D Rosenlund		

Subject

Report (App. 1) contains strain study of Snake River cutthroats

3-1908 (Attach securely to material to be transmitted & mail through regular channels)
(Rev. 6/63)

FISHERIES MANAGEMENT
U.S. AIR FORCE ACADEMY
1985

U.S. Fish & Wildlife Service
Colorado Fish and Wildlife Assistance Office
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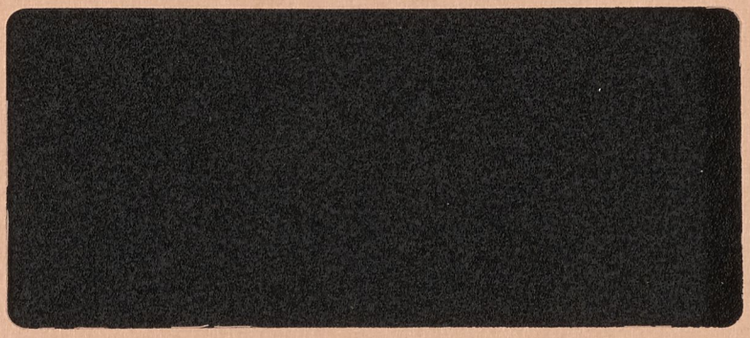
Golden, Colorado 80401
(303) 236-2675



FISHERIES MANAGEMENT
U.S. AIR FORCE ACADEMY
1985

INTRODUCTION

In 1983, the U.S. Air Force Academy (AFA) completed the U.S. Air Force Academy Fish and Wildlife Management Plan that outlines management objectives for fisheries at the Air Force Academy, Farish and Stanley Canyon. This report documents AFA fisheries activities and accomplishments during 1985, in relation to AFA fisheries objectives. This report also documents work completed by the FWS under the FWS-AFA Cooperative Agreement.

The objective of the AFA fisheries program is to provide angling opportunities for up to 1,700 permit holders, with anglers harvesting from 0.5 to 0.8 fish per hour. Twenty percent of the fish creeled should exceed 12 inches in length.

The limit of 1,700 AFA angling permits is based upon the amount of angling the 41.6 surface acres of aquatic habitat available at the AFA, Farish and Stanley Canyon is capable of supporting.

To support the AFA fisheries management program, aquatic habitat is protected, aquatic vegetation is controlled for easier angler access, fish are stocked, and angler use and fish populations are monitored.

U.S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLORADO

Physical and Chemical

No winter kills of fish were observed at the AFA from the 1984-1985 winter.

The only water chemistry problem reported by the AFA occurred at Deadmans Reservoir on 2 July and 30 July 1985. Snake River cutthroat trout stocked into Deadmans Reservoir on these two dates had a respective observed loss of 3% and 1% within 24 hours. No other fish were lost at four other AFA reservoirs stocked on the same days. The cause of the Deadman fish mortality appears to have been high pH, with a pH of 9.1 and water temperature of 65F, measured 31 July at the outlet.

The cause of the high pH in 1985 is not totally understood. High pH occurs if there is a large algae bloom or excessive aquatic vegetation, with neither occurring in Deadmans

Reservoir. In previous years, Deadmans Reservoir had the best water quality, with this reservoir being the only AFA reservoir stocked during drought years. FWS records for Deadmans Reservoir show the pH not exceeding 8.5 during July in previous years. It is possible that something such as cement was washed into the reservoir and resulted in an increase in alkalinity in July 1985. Stocking was resumed on 29 August 1985, with no additional mortality reported for 1985.

1985 was a relatively wet year for Colorado Springs and pH should not have been a problem. However, two reservoirs on Ft. Carson experienced similar problems to Deadmans. The reservoirs on both Ft. Carson and Deadmans receive water from open ditches that have been historically low in pH. It appeared that something alkaline was washed into these ditches in 1985, and kept the reservoirs alkaline until diluted.

In future years an application of 1 ppm of glacial acidic acid may help reduce high pH, if this problem is encountered again.

In 1985, the training facility in Kettle #3 was expanded. Due to the construction, Kettle #3 was turbid for most of 1985.

Control of Aquatic Vegetation

Control of rooted aquatic vegetation in the AFA lakes was below the standard of previous years. During 1985, vegetation in all Lakes (including Farish) was not treated until the plants had reached the water surface.

Aquatic vegetation should be treated with contact herbicides when the target species is six to 12 inches in total height. Application of herbicides to a large mass of aquatic vegetation should be avoided, since the decomposing plants can result in fish kills due to oxygen depletion.

Aqua Bacta Aid

At the request of the AFA, the use of Aqua Bacta Aid (ABA) for algae control was reviewed and reported to the AFA 18 April 1985. ABA is a bacterial culture that is reported by the supplier to reduce or eliminate growths of algae by removing nutrients (nitrogen and phosphorus) that are usually present when excessive algae blooms occur.

To treat one acre foot of water for algae with ABA requires 0.33 gallons of ABA which costs $22.00 a gallon. Control of algae with copper sulfate or potassium permanganate costs about $0.25 per acre foot of water.

Fish Screens

In 1984, rough fish were removed from the Kettle Creek Lakes. To help prevent future introductions of rough fish into the Kettle Lakes, fish screen were installed in 1985 to filter undesirable fish species from Kettle Creek water prior to entering the Kettle Creek Lakes. The screens built at the AFA were based upon the FWS Garrison Fish Screens.

STATUS OF FISHERIES

1985 Fish Distribution

Anticipating AFA permit sales of 1,700, and 41,000 angler hours at the AFA during 1985, a total of 19,500 catchable trout, were scheduled for planting by the FWS. Due to reduced permit sales (1,531 annual permits sold) and fish purchased by the AFA, actual FWS stocking of catchable trout totalled 17,191. Included in the 17,191 catchables were 348 FWS surplus Lake McConaughy rainbow trout broodstock. The catchable trout stocked by the FWS averaged (not including the broodstock) 4.09/lb, or 8.4 inches, and exceeds the FWS standard for catchable trout of 4.8/lb or 8.0 inches in length. The broodstock averaged 2.5 pounds each in weight. A total of 4,250 fingerling brook trout, and 5,940 fingerling channel catfish were also stocked by the FWS into AFA waters, Table 1.

The stocking of surplus FWS broodstock has occurred at military bases occasionally over the past years. Starting in 1985, this practice will be an annual event. The FWS has surplus broodstock each year at Ennis National Broodstock Hatchery that are available for stocking into Federal waters. However, until recent years the FWS lacked an economical method of delivering these fish to areas in Colorado. The FWS has recently developed a Regional Distribution Unit that has the capability to deliver a large number of fish over a great distance at a reasonable cost. By combining the broodstock requests of several military bases, the cost of delivering the broodstock from Ennis, Montana to Colorado Springs was about $0.25 per pound. Distribution of the FWS broodstock to AFA lakes was completed by the AFA.

In addition to the fish stocked by the FWS, the AFA purchased 1,500 pounds of Tasmanian rainbow trout 12 inches in length and 2,000 pounds of channel catfish at 12-18 inches in length. Channel catfish were stocked into the non-potable Reservoirs (1000 pounds) and the AFA fishing lakes (1000 pounds).

Species Abundance, Growth and Condition

Species abundance, growth and condition is measured by gill net surveys and creel census.

The last gill net survey of all the AFA lakes was completed 1 November 1983, Table 5.

As measured by the 1985 creel census, anglers creeled the following size classes of fish species at the AFA during 1985:

Number of Fish Creeled by AFA Anglers in Size Classes

Species	<4"	6-8"	8-10"	10-12"	12-14"	14-16"	>18"	Ave Ln"
SRC	1	103	608	228	13	0	1	9.32
RBT	0	2	10	54	37	12	16	12.57
BKT	0	4	5	1	0	0	0	8.40
CCF	0	2	0	8	19	26	15	14.41
%	<1	9.5%	53%	25%	6%	3%	7%	

Rainbow trout creeled 11 to 13 inches in length were from RBT purchased by the AFA. The rainbow trout greater than 13-14 inches in length were the Lake McConaughy rainbow broodstock from the Ennis NFH. The broodstock performed well, returning at a slow rate at the AFA and, other military bases. Although the broodstock were stocked 12 May, they were observed harvested through August 1985.

Channel catfish (CCF) at 12-18 inches in length were purchased by the AFA to provide catchable channel catfish in 1985. The AFA reported that the catfish remained in one school and were harvested by anglers in a few weeks. No CCF were recorded in creel census past 1 June 1985.

Angler Use and Success

The management goal for angler use and success at the AFA is providing up to 1,700 permit holders with an average of 0.5 to 0.8 trout creeled per hour. Of the fish creeled, 20% should exceed 12 inches in length. The AFA angling season extends from 15 March to 15 November, weather permitting.

1985 Permit Sales

Military and Civil Service	1,274	(84.2%)
Retired Military	176	(11.6%)
Disabled Military	63	(4.2%)
Total annual permits	1,513	
Total Two-day permits	101	
1985 TOTAL PERMIT SALES	1,614	

In 1984, the AFA angling permit fee was increased to $7.00 per year, and the Colorado Fishing License fee increased from $7.50 to $11.00. This increase in fees reduced AFA license from near 1,700 to 1,358 in 1984. By 1985, permit sales increased to 1,513, with permit sales anticipated to be near the limit of 1,700 in 1986.

In 1985, the FWS creel census program was computerized. This allowed for more efficient and detailed analysis of angler data. Computer summary of 1985 AFA creel census, Table 8.

Angler Hours. Based upon the sale of 1,513 annual AFA permits and 101 two-day permits, it is estimated that 18,358 angler days, or 32,493 angler hours were expended at the AFA in 1985. It is assumed that each angler who purchased a two-day permit fished for two days.

Angler Success. Angler success was measured by spot creel census March to September, and by a Butler-Borgeson creel census conducted from dawn to dark July 30 through August 25. The goal of the Butler-Borgeson creel census was to document the amount of angler use occurring in August, and the percent and rate of return of hatchery fish. Results of the 1985 Butler-Borgeson Creel Census, Appendix 1.

During 1985, creel census was conducted on 50 days (including 27 days of the Butler-Borgeson creel census), by AFA personnel. A total of 1,677 anglers were interviewed in 1985 who had expended a total of 2,107 hours. Daily catchrates for fish creeled ranged from 0 (11 July) to 3.0 (15 May). The average catchrate for fish creeled during 1985 at the AFA was 0.56. In addition to the 0.56 fish creeled per hour, anglers released .11 fish per hour. The catchrate of creeled fish (0.58/h) and total catchrate (0.67/h) meets the 0.5 to 0.8 fish per hour management objectives of both the AFA and FWS.

AFA creel clerks reported that AFA anglers creeled fish from four to over 18 inches in length, with 53% of the fish creeled 8 to 10 inches in length, and 25% 10 to 12 inches in length. Twelve percent of the fished creeled were larger than 12 inches in length. This is below the AFA goal of 20% of the creeled fish exceeding 12 inches in length. Please see

Species Composition of Creeled and Released Fish, page two of Table 8.

Angler Satisfaction. To determine if military anglers were satisfied with their fishing programs, anglers who had completed their fishing day were asked if they were "satisfied" with the number and length of the fish caught; and if they were "satisfied" with the overall fishing program. Interviews of 140 anglers who had completed their fishing day at the AFA revealed that 43.5% were satisfied with the number of fish, 42.1% with the length and 76.4% of the AFA anglers were satisfied with the overall program, Table 8.

Distribution of angler use, fish harvest, angler expertise and angler satisfaction between AFA lakes, Table 6. Stocking generally appears to be close to angler use in 1985, but stocking for Ice and Deadman should be increased about 3% in 1986. Angler use appears to have declined slightly (6%) in Kettle #3. This decline in Kettle #3 angler use was probably due to construction of the new training faciity in 1985.

1985 Costs

During 1985, the FWS expended $15,200 for fish production and distribution and $9,735 for fisheries assistance and FWS overhead charges, with the FWS reimbursed $9,735 for fisheries assistance and FWS overhead charges as per our Cooperative Agreement.

With AFA annual angling permit sales of 1,513, and 101 two day permits; and total FWS expenditures of $24,935, the FWS cost of providing a AFA angler year was $16.38. These figures include fisheries assistance and FWS fish production and distribution for the AFA, Farish and Stanley.

1986 AFA Management Considerations

Chemical

A. Complete the removal of green sunfish from the I25 pond, if water levels are low in 1986.

B. Treat aquatic vegetation when less than one foot in height.

Fish Stocking	A. The FWS will rear and deliver:	
	1. Catchable SRC,	18,200
	2. Fingerling BKT,	3,800
	3. Fingerling CCF,	6,000
	4. Broodstock,	800 to 1,200 pounds
	B. AFA will purchase:	
	1. 12-14 inch trout:	750 lbs 1 April
		532 lbs 1 July
		532 lbs 1 September
	C. Increase stocking in Ice and Deadmans by 3% and reduce the stocking of Kettle 3 by 6%.	
Golf Course Ponds	A. Haul sein fish from golf course ponds and move to Stanley Canyon.	
Angler Use	A. Base stocking and management cost upon an annual AFA permit sales of 1,600 to 1,700 permits.	
Creel Census	A. Attempt to conduct spot creel census on 15 days during the 1986 fishing season.	
Special Programs	A. Stock 2,300 fingerling channel catfish into the Non-Potable Reservoirs for salamander control.	
	B. Determine effectiveness of this program to date.	
New Facilities	A. Replace Ice Lake inlet structure with new valve, spillway and fish screen.	
	B. Replace Deadman's valve, weir, diversion pipe and rip rapping.	
	C. Kettle Lakes: rip rapping of K2 and K3, boat ramp and fish truck unloading dock, K3.	

1987 AFA Management Considerations

If sales of AFA fishing permits remain near 1,600 to 1,700, the 1987 program should be very similar to 1986.

FARISH MEMORIAL

Physical and Chemical

The lakes at Farish were open by early May, with no winter kill of fish observed. Summer rains and surface water flows were sufficient to maintain the water level in all three lakes in 1985.

To help prevent future winter kills, Phil Camera (Farish Manager), suggested the use of solar rafts to melt open areas in the ice. These rafts are to be installed by early 1986, with the rafts monitored by an AFA cadet science project. Since no two lakes or two winters are the same, a controlled experiment involving one winter is impossible. Winter kills due to oxygen depletions have occurred in Leo during the winters of 1977-1978, 1978-1979, and 1982-1983. Sapphire routinely dewatered up to 1984, due to winter seepage and problems with the outlet valve. The problem with seepage and the valve appears to have been corrected; however, Sapphire has the potential to winter kill from oxygen depletion due to its shallow depth, and organic load.

Status of Fisheries

Stocking. During 1985, the following distribution of FWS hatchery fish was completed at Farish.

Species	Date	Size	Number
Snake River Cutthroat	May-August	8-9"	4,600
Rainbow	May-June	8-22"	1,237
Brook Trout	June	4.1"	1,200

It had been anticipated that 11,000 to 15,000 angler hours would occur in 1985. However, based upon actual May and June 1985 angler use, it was evident that Farish angler use would not exceed 9,000 hours and monthly stocking was adjusted accordingly.

Exact dates, and distribution of fish between reservoirs, Table 2. Rainbow trout broodstock stocked into Sapphire during May were tagged by the AFA.

Species Abundance, Growth and Condition

Lakes at Farish were sampled with gill nets 8 May and 16 October, Table 7. Grace contained the smallest fish of the Farish lakes, with few fish over 12 inches in length. Grace was dry over the winter of 1983-1984 due to contruction, and was the only lake open for ice fishing over the winter of 1984-1985.

Growth of fish in Sapphire is slower than expected. In 1984, 1,968 catchable trout were stocked into Sapphire, with many of these fish remaining in Sapphire through 1985. Growth of fish in Sapphire can only approach the desired four inches per year if some of these fish are removed in 1986.

There appears to be good carry-over of fish in Leo and Grace into the winter of 1985-1986. Forty five percent of the 9 to 10 inch Snake River cutthroat trout sampled in October, were from the marked (left pectoral) fish stocked 30 July 1985.

Angler Use and Success

During 1985, Phil Camera reported that 2,071 Farish angler expended 8,270 hours to creel 6,691 trout. The average creelrate for 1985 was 0.82 trout per hour. Of 5,837 catchable trout stocked, Phil reported 6,691 catchable sized fish harvested during 1985, Table 4.

The 6,691 catchables harvested in 1985, represents 115% of the catchables stocked in 1985. Angler use at Farish in 1984 was below projections with anglers reporting a harvest of only 50% of the catchable trout stocked in 1984. The carry-over of these fish into 1985, the contribution of subcatchable trout stocked in 1983 and 1984 and the 1985 catchable stocking accounts for the amount of fish harvested in 1985.

The management objective for Farish is 0.5 to 0.8 fish creeled per hour, with 20% of the fish exceeding 12 inches in length. The creel rate objective was met in 1985, with anglers creeling 0.82 fish per hour. To support the large fish objective, 137 FWS broodstock were stocked along with rainbows at 12 inches in length purchased by the AFA. Records are not kept on the number of fish over 12 inches in length harvested at Farish. However, based upon the number of 12 inch and greater fish stocked, and the percentage of Snake River cutthroat trout over 12 inches in Leo, it is possible that the size objective was met.

Sapphire Catch-and-Release Fisheries

Sapphire Reservoir was proposed for a catch-and-release fisheries for two purposes:

1. To provide a AFA catch-and-release fisheries for those anglers who prefer to release fish and to fish with artificial lures.

2. Sapphire has had a recent history of pH and oxygen kills during dry summers, and dewatering in the winter. This reservoir has good fish growth (as most summer kill reservoirs do) but the stocking of up to 30% of the 6,000 to 8,000 Farish

catchables did not seem wise until it was determined that this reservoir would support fish throughout the majority of years.

Due to the good water quality of 1984, Sapphire was stocked with 1,750 catchables up to 25 July. It is anticipated that the vast majority of these fish were to be harvested prior to winter. In late August 1984, 125 tagged Snake River cutthroat trout and 88 tagged rainbow trout were stocked for the future catch-and-release fisheries. This represented a minimum investment if the lake dewatered again that winter.

Angler use at Farish in 1984 was far below expectations, with anglers only harvesting 50% of the catchables stocked in 1984. This resulted in a larger number of fish carrying over to 1985 than originally planned.

It was my original understanding that anglers could keep all untagged fish in Sapphire during 1985 so that the total population could be reduced to where the 125 to 150 pounds of annual fish production could be divided between a few tagged fish and result in fast growth and trophy sized fish. Allowing for the harvest of untagged fish would also allow for the removal of some of the small brook trout resulting from natural reproduction in the inlet stream.

From talking to AFA anglers in 1985, it seems that all fish in Sapphire are now protected. This is self defeating in that growth has been slowed and trophy sized fish are not being grown. These fish could have been lost if the lake dewatered or summer killed as in previous years.

Based upon the growth rate of Sapphire fish observed in 1985, the only fish suggested for stocking in 1986 are some broodstock to provide trophy sized fish and compensate for the poor growth of tagged fish stocked in 1984.

To set management objectives for Sapphire, a meeting between the AFA, Farish and FWS personnel was held on 22 January 1986, with the following management goal proposed:

<u>Sapphire Reservoir to be managed as a quality barbless fly catch-and-release fisheries that supports 10% of the annual AFA angler use.</u>

Methods for obtaining this goal are outlined in the 1986 to 1988 management considerations.

1986 Farish Management Considerations

Stocking

A. The FWS will rear and deliver:

1. Catchable SRC, 6,000 to 8,600
2. Fingerling BKT 1,200
3. Broodstock, 300 to 400 pounds

B. The AFA will purchase:

1. 12-14 inch fish: 218 lbs. 1 July
   218 lbs. 1 Sept

Chemical

A. Treat aquatic vegetation when less than one foot in height.

Angler Use

A. Anticipate 11,000 to 15,000 angler hours for all lakes May through October.

B. Anticipate 500 angler hours for ice fishing 1985 to 1986.

C. Maintain separate angler use records for each lake to document angler use per lake.

D. Attempt to collect creel census on 10 days distributed throughout the angling year.

Sapphire.

A. Angler use: 2,500 hours for 1986.

B. Tackle: barbless flies only.

C. Harvest regulations: catch-and-release for tagged fish, catch-and-kill for untagged fish.

1987 Farish Management Considerations

At this time, the 1987 program should be similar to 1986, except for Sapphire, where the management objective will be 3,500 hours of angler use for the Sapphire catch-and-release fisheries. Stock 150 to 300 tagged fish into Stanley.

1988 Farish Management Considerations

It is anticipated that angler use will be near 15,000 hours by 1988, with Sapphire supporting 3,500 of these hours. If angler use of Sapphire is below 3,500 hours, consider allowing the use of any barbless artificial lure to increase angler use in Sapphire.

STANLEY

Management Objective

Stanley Canyon has been managed as a "walk-in" fisheries since 1973, featuring Snake River cutthroat trout. The AFA Fish and Wildlife Plan objective for this area is a "wild" trout fisheries, with a creelrate of 0.3 to 0.5 trout creeled per hour. Of the fish creeled, 20% should exceed 12 inches in length.

Physical and Chemical

The winter of 1984-1985 was near normal, with Stanley free of ice by early May.

The structure of the inlet stream pools was altered by a flood in the spring of 1984. The inlet remains excellent spawning habitat, with spring spawning success evident by the abundance of fry present in October 1984 and 1985.

Status of Fisheries

1985 Fish Distribution.

On 12 June 1985, 650 Snake River cutthroat trout averaging 103 grams (4.4/lb) were stocked. All fish were marked with a right pectoral clip.

Species Abundance, Growth and Condition

Since walk-in fisheries tend to limit the amount of angler use, a fisheries at Stanley Canyon was provided from 1973 through 1984 by the stocking of fingerling Snake River cutthroat trout. However, by 1981, the number of fish over 12 inches in length began to decrease, with this trend continuing through 1985, Table 10.

The decrease of fish over 12 inches in length at Stanley appears due to increased angler use and harvest. To compensate for the increased use, catchable fish were stocked in 1985. The purpose of this was to obtain a 12 inch fish within one year of stocking, rather than the two to three years required for fingerlings. On 12 June 1985, 650 Snake River cutthroat trout averaging 8.5 inches were stocked. It was calculated that these fish would average 11.0 inches by October, based upon an annual total fish production of 170 pounds for Stanley. On 16 October 1985, the SRC averaged 10.1 inches, below the project 11.0 inches. The production of Stanley is probably near 170 pounds, but hatchery stocked fish are having to share the lakes productivity with more natural fish reproduction than was anticipated. Sixty five percent of

the fish sampled from Stanley were from natural reproduction by October 1985. A high percentage of the Snake Rivers reproducing in Stanley show signs of hybridization with golden trout.

Nearly 30% of the population of Stanley is from 10 to 12 inches in length, and should reach the desired length of over 12 inches for harvest in 1986. By stocking larger fish, more 12 inch fish can be provided, but unless there are changes in angler use or harvest, few fish will survive past 12 inches in length as in 1974 to 1979.

Based upon the amount of natural reproduction observed by October 1985, it is suggested that 100 to 200 pounds of broodstock be stocked. Up to 350 catchable Snake Rivers may be stocked in the fall of 1986, based upon angler use, growth and population size.

Angler Use and Success

Creel census was conducted on six days by the AFA from 18 May to 18 August 1985. No anglers were contacted on mid-days 18, 19 and 29 May, and 13 June. Anglers were contacted on 8 and 18 August.

A total of 19 anglers were interviewed during August who creeled 0.29 fish per hour and released 0.095 fish per hour. Eighty five percent of the fish creeled were eight to 10 inches in length, and 15% were 10 to 12 inches in length. No anglers were contacted who had completed their angler day, thus no data for average length of angler day, or satisfaction is available for 1985, Table 9.

Although there is minimal creel census data, the observed 0.29 fish creeled per hour is close to the minimum desired level of 0.3 fish creeled per hour. From gill net data, it appears that less than 20% of the fish harvested were larger than 12 inches in length.

Of the 19 angler interviewed by the AFA, 10.5% lacked an AFA angling permit, compared to 0.89% of the anglers at the AFA who did not have a permit, Tables 8 and 9.

1986 Management Considerations

Stocking

A. Catchable SRC, 0 to 350 (depending upon 1986 growth, natural spawning and angler use).

B. Broodstock, 100 to 200 pounds.

C. RBT and SRC from the AFA golf course ponds.

Creel Census

A. Attempt to collect creel census on 10 days.

Table 1. U.S. Fish & Wildlife Service Stocking, U.S. Air Force Academy, 1985

DATE	SPECIES	#	POUNDS	#/LB	K1	K2	K3	ICE	DEAD	NP2	NP3	NP4	W MONUMENT
3/13/85	RBT	1250	369	3.88									
	SRC	1388	275	5.04	375	435	775	475	575				
4/22/85	SRC	2100	318	4.17	350	350	500	350	370				100
5/9/85	SRC	2055	433	4.75	300	330	700	350	375				
5/14/85	RBT-MC	348	870	0.40	29	55	140	60	64				
6/12/85	SRC	3820	870	4.39	690	780	965	655	730	(right pectoral clip)			
7/2/85	SRC	1853	490	3.78	330	385	520	250	368	(adipose clip)			
7/30/85	SRC	2542	785	3.24	350	550	842	425	375	(left pertoral clip)			
8/28/85	SRC	1835	577	3.18	400	425	535	375	100				
Total Catchables		17191	4987										
6/19/85	BKT	4250	118	36	340	560	1500	950	900				
9/30/85	CCF	5940	99	60	300	350	850	550	500	1650	1200	640	

In addition to fish stocked by FWS, AFA purchased 1500 pounds of trout ($3585) to stock at Farish and AFA, and 2000 pounds of catfish ($3480). 1000 pounds of catfish into non-potable reservoirs and 1000 pounds into five fishing lakes.

Trout stocked July 1 and September 1

Table 2. U.S. Fish & Wildlife Service Stocking, Farish Memorial, USAFA, 1985.

DATE	SPECIES	#	POUNDS	#/LB	LEO	GRACE	SAPPHIRE
5/9/85	SRC	1000	210	4.75	500	500	
5/14/85	RBT	137	342	0.40	56	56	25 (Sapphire fish tagged)
6/13/85	RBT	1100	500	2.20	530	570	
7/2/85	SRC	2000	529	3.78	1000	1000	
7/30/85	SRC	800	247	3.24	400	400	(left perctoral clip)
8/29/85	SRC	800	252	3.18	400	400	
6/26/85	BKT	1200	33		600	600	

Table 3. U.S. Fish & Wildlife Service Stocking, Stanley Canyon Reservoir, USAFA, 1985.

DATE	SPECIES	#	POUNDS	#/LB	
6/12/85	SRC	650	147	4.4	(right pectoral clip)

Table 4. Farish Angler Use and Harvest, 1985.

MONTH	# ANGLERS	HOURS	RBT	BKT	CUTT	TOTAL FISH	FISH/HOUR
January	31	110	0	9	87	96	0.87
February	45	145	0	25	112	137	0.94
March	9	36	0	2	34	36	1.0
April			CLOSED				
May	219	907	45	200	362	607	0.66
June	548	2209	828	223	762	1813	0.82
July	475	1962	387	156	961	1504	0.77
August	432	1799	147	260	1142	1549	0.86
September	273	992	212	73	519	804	0.81
October			CLOSED				
November			CLOSED				
December 14-31	39	110				145	1.31

Table 5. Summary of AFA Gill Net Survey, November 1983.

Lake	Species	% of gill net catch in size groups 6-8"	8-10"	10-12"	12-14"	>14"	groups xln	xk	fish net H
K1	SRC		100				9.25	.86	0.42
	BKT		100				9.19	.84	1.68
K2	SRC		86		14		9.84	.82	1.33
	BKT		100				9.50	.81	0.19
	CCF					100	15.80	.87	0.19
K3	SRC		86	14			9.40	.76	1.40
	BKT		100				8.65	1.0	0.40
Ice	SRC		75	25			9.48	.75	0.73
	RBT	33	67				8.13	.71	0.55
	BKT		100				9.40	.80	0.18
Deadman									
	BKT	64	27	9			7.6	1.08	1.91
	RBT		100				8.5	.92	0.35
	SRC	20	80				9.2	.97	0.87

In addition to the above featured sport species, greensunfish were present in the Kettle Lakes and Ice, and suckers were present in Ice Lake in 1983. The Kettle Lakes and Ice were treated in 1984 to remove the sunfish and suckers.

Table 6. Distribution of Angler Use, Fish Harvest, Angler Expertise and Satisfaction between the AFA lakes, as measured by Creel Census, 1985.

	K1	K2	K3	Ice	Dead	AFA Total
% Anglers	19%	15%	24%	21%	21%	1677
Avg. Angler Day	1.58H	1.87H	1.58H	2.06H	1.99H	1.77H
Fish Creeled/Hr	0.65/H	0.64/H	0.72/H	0.31/H	0.53/H	0.564/H
Fish Released/Hr	0.07/H	0.13/H	0.08/H	0.18/H	0.12/H	0.111/H
Avg. LN of Fish	10.17"	10.02"	9.94"	10.93"	9.49"	9.98"
Expertise	2.07	2.09	1.83	1.86	2.04	1.94
% Sat. w/#	25.8%	42.8%	48.9%	37.5%	50.04%	43.5%
% Sat. w/LN	35.0%	52.3%	48.9%	50.0%	30.04%	42.1%
% Sat. w/overall Program	65.0%	76.1%	85.1%	87.5%	66.6%	76.4%
% of 17,191 FWS Catchables in 1985	16%	19%	29%	18%	18%	

Above data represents 50 Creel Census days conducted from 16 March to 20 September 1985.

Table 7. Summary of gill netting, Farish Memorial, USAFA. 1985.

Grace - 8 May 1985

	% of fish (inches)					
Species	6-7.9	8-9.9	10.0-11.9	>12.0	LN	K
SRC	19	63	18		8.98"	0.85
BKT	96	4			7.06"	0.72

Grace - 16 October 1985

	% of fish (inches)					
Species	6-7.9	8-9.9	10.0-11.9	>12.0	LN	K
SRC		80	20		9.42"	0.86
BKT	50	25	17	8	8.46"	1.12

Leo - 8 May 1985

	% of fish (inches)					
Species	6-7.9	8-9.9	10.0-11.9	>12.0	LN	K
SRC		50	33	17	10.5"	0.92
BKT	22	53	22	3	9.24"	1.00

Sapphire - 8 May 1985

	% of fish (inches)					
Species	6-7.9	8-9.9	10.0-11.9	>12.0	LN	K
SRC		33	50	17	10.4"	0.97
BKT				100	12.44"	1.00

Sapphire - 16 October 1985

	% of fish (inches)					
Species	6-7.9	8-9.9	10.0-11.9	>12.0	LN	K
SRC			50	50	12.0"	0.97
BKT			100		10.8"	1.10

Table 8 . Summary of angler use and harvest at the U.S. Air Force Academy, 1985.

CREEL CENSUS REPORT FOR AFTOT 1985 PAGE 1

LENGTH AND SATISFACTION INFORMATION FOR COMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	LENGTH	OVERALL	AVERAGE EXPERTISE
<6"						
<8"	2	3	42.8	28.5	14.2	2.333
<10"	82	48	42.2	39.1	76.2	1.928
<12"	80	21	80.9	80.9	100.0	2.000
<14"	4	3	33.3	33.3	33.3	2.000
<16"	13	3	100.0	100.0	100.0	2.000
>16"	6	4	33.3	77.7	88.8	1.875
NONE CREELED		56	28.5	25.0	71.4	1.678
SUB TOTAL	187	140	43.5	42.1	76.4	1.942

LENGTH AND SATISFACTION FOR INCOMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	LENGTH	OVERALL	AVERAGE EXPERTISE
<6"	1	2	0.0	0.0	0.0	0.000
<8"	56	44	0.0	0.0	0.0	0.000
<10"	377	285	0.0	0.7	1.7	1.600
<12"	403	263	0.7	0.7	0.7	2.000
<14"	87	59	0.0	0.0	0.0	0.000
<16"	43	30	0.0	0.0	0.0	0.000
>16"	36	27	0.0	0.0	0.0	0.000
NONE CREELED		825	0.3	0.3	0.3	2.000
SUB TOTAL	1003	1537	0.3	0.4	0.6	1.818

STATUS	NUM OF FOLKS	AVERAGE HOURS	AVER NUM CREEL/MAN	CREEL /HOUR	AVERAGE SIZE
ACTIVE	1099	1.19	0.58	0.490	10.169
CIV SER	317	1.39	0.99	0.709	9.746
RETIRED	258	1.43	0.99	0.696	9.891

Table 8. Cont.

CREEL CENSUS REPORT

PART I STATISTICS FOR COMPLETED ANGLERS

NUMBER OF ANGLERS	=	140	
AVE STARTING TIME	=	15.10	HOURS
AVE ENDING TIME	=	16.87	HOURS
AVE ANGLER DAY	=	1.77	HOURS
TOTAL HOURS	=	248.39	HOURS
TOTAL FISH CREELED	=	187	
AVE CREEL PER HOUR	=	0.75	

PART II STATISTICS FOR INCOMPLETED ANGLERS

NUMBER OF ANGLERS	=	1537	
TOTAL HOURS	=	1859.26	HOURS
TOTAL FISH CREELED	=	1003	
AV CREEL PER HOUR	=	0.53	

PART III TOTALS

NUMBER OF ANGLERS	=	1677	
TOTAL HOURS	=	2107.66	HOURS
TOTAL FISH CREELED	=	1190	
AV CREEL PER HOUR	=	0.564	
TOT FISH RELEASED	=	236	
AV RELEASED/HOUR	=	0.111	
LANDING RATE	=	0.676	
% WITHOUT POST LIC	=	0.89	%
% WITHOUT STATE LIC	=	0.05	%

SPECIES COMPOSITION OF CREELED & RELEASED FISH

	NUMBER CREELED IN SIZE CLASSES							TOTAL	AVERAGE	NUMBER
SPECIES	4"	7"	9"	11"	13"	15"	18"	NUMBER	LENGTH	RELEASED
S.R. CUTTHROAT	1	103	608	228	13	0	1	954	9.32	213
RAINBOW	0	2	10	54	37	12	16	131	12.57	13
BROOK TROUT	0	4	5	1	0	0	0	10	8.40	10
CHANNEL CAT	0	2	0	8	19	26	15	70	14.41	0
BLUEGILL										
CRAPPIE										
L.M. BASS										
" PIKE										
3. CUTTHROAT										
GRASS CARP										
BULLHEAD										
TOTAL	1	111	623	291	69	38	32	1165	9.98	236
PERCENT		9.5%	53%	25%	6%	3.3%	2.7%			

Table 9 . Summary of angler use and harvest at Stanley Canyon, 1985

LENGTH AND SATISFACTION INFORMATION FOR COMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	PERCENT SATISFIED LENGTH	PERCENT SATISFIED OVERALL	AVERAGE EXPERTISE
<6"						
<8"						
<10"						
<12"						
<14"						
<16"						
>16"						
NONE CREELED						
SUB TOTAL						

LENGTH AND SATISFACTION FOR INCOMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	PERCENT SATISFIED LENGTH	PERCENT SATISFIED OVERALL	AVERAGE EXPERTISE
<6"						
<8"						
<10"	13	4	0.0	0.0	0.0	0.000
<12"	14	8	0.0	0.0	0.0	0.000
<14"						
<16"						
>16"						
NONE CREELED		7	0.0	0.0	0.0	0.000
SUB TOTAL	27	19	0.0	0.0	0.0	.000

STATUS	NUM OF FOLKS	AVERAGE HOURS	AVER NUM CREEL/MAN	CREEL /HOUR	AVERAGE SIZE
ACTIVE	15	4.46	1.53	0.343	9.347
CIV SER	0	.00	.00	.000	.000
RETIRED	2	2.16	2.00	0.923	9.000

Table 9 . Cont.

CREEL CENSUS REPORT

PART I STATISTICS FOR COMPLETED ANGLERS

NUMBER OF ANGLERS	=	0	
AVE STARTING TIME	=	.00	HOURS
AVE ENDING TIME	=	.00	HOURS
AVE ANGLER DAY	=	.00	HOURS
TOTAL HOURS	=	0.00	HOURS
TOTAL FISH CREELED	=	0	
AVE CREEL PER HOUR	=	.00	

PART II STATISTICS FOR INCOMPLETED ANGLERS

NUMBER OF ANGLERS	=	19	
TOTAL HOURS	=	93.91	HOURS
TOTAL FISH CREELED	=	27	
AV CREEL PER HOUR	=	0.28	

PART III TOTALS

NUMBER OF ANGLERS	=	19	
TOTAL HOURS	=	93.91	HOURS
TOTAL FISH CREELED	=	27	
AV CREEL PER HOUR	=	0.287	
TOT FISH RELEASED	=	9	
AV RELEASED/HOUR	=	0.095	
LANDING RATE	=	0.383	
% WITHOUT POST LIC	=	10.52	%
% WITHOUT STATE LIC	=	0.00	%

SPECIES COMPOSITION OF CREELED & RELEASED FISH

	NUMBER CREELED IN SIZE CLASSES							TOTAL	AVERAGE	NUMBER
SPECIES	4"	7"	9"	11"	13"	15"	18"	NUMBER	LENGTH	RELEASED
S.R. CUTTHROAT	0	0	23	4	0	0	0	27	9.29	9
RAINBOW										
BROOK TROUT										
CHANNEL CAT										
BLUEGILL										
CRAPPIE										
L.M. BASS										
PIKE										
B. CUTTHROAT										
GRASS CARP										
BULLHEAD										
TOTAL	0	0	23	4	0	0	0	27	9.29	9
PERCENT										

Table 10. PERCENT LENGTH FREQUENCY (INCHES) OF SNAKE RIVER CUTTHROAT TROUT SAMPLED BY GILL NETS, STANLEY CANYON RESERVOIR, U.S. AIR FORCE ACADEMY

DATE	TOTAL LENGTH, INCHES 6-7.9	8-9.9	10-11.9	12-13.9	14+	MEAN LN(")	MEAN k	#
5/21/74	18%	60%	4%	4%	14%	9.79	1.54	71
5/18/77	15	24	8	15	38	11.85	1.28	13
4/14/78	11	69	5	10	5	9.41	1.05	19
10/5/78	49	27	12	8	4	8.73	0.94	45
5/21/79		39	4	14	43	15.94	0.96	21
10/11/79	33			67		10.53	1.12	3
10/25/79	67	3	9	15	6	8.78	1.36	33
6/4/80	25	42		12	21	10.09	1.34	24
10/24/80	80	4	16			7.75	1.26	50
4/28/81	43	50	7			8.17	0.98	41
10/5/81	32	20	35	10	3	9.11	1.28	30
4/27/82	43	14	41	2		9.07	1.35	59
10/21/82	31	37	21	10	1	8.84	0.98	59
5/27/83	13	50	31	6		9.35	0.98	16
10/13/83	51	33	8	8		8.44	1.04	48
6/7/84	38	43	14	5		8.66	1.16	21
5/8/85	71	14	10	5		7.85	0.98	21
10/16/85	24	48	28			8.84	1.01	29

DISK: AFA II FILE NAME: STANL.I

APPENDIX I
U.S AIR FORCE ACADEMY
BUTLER BORGESON CREEL CENSUS
1985

INTRODUCTION

The U.S. Air Force Academy (AFA) is located north of the City of Colorado Springs, Colorado, with recreational trout fishing featured at five reservoirs totalling 21.5 surface acres. The fishing season generally extends from 15 March to 15 November, with up to 1,700 AFA angling permits sold per year.

The fisheries management objective for the AFA is to provide 0.5 to 0.8 fish creeled per hour for the AFA anglers who expend up to 36,000 hours per year. To support the AFA fishing program, up to 18,200 catchable trout, 3,800 fingerling brook trout and 2,400 fingerling channel catfish are stocked annually by the FWS.

With the AFA fishable aquatic recources limited to 21.5 surface acres, and angler use to 36,000 hours per year, annual angler hours per surface acre and annual catchables stocked per surface acre is 1,674 hours/SA and 846 fish/SA.

It had been observed that rainbow trout reared by the Leadville NFH were quickly harvested by anglers. Butler Borgeson creel census conducted at the AFA and Ft. Carson (FTC) in 1980 and 1981 found that anglers harvested 61% to 66% of all catchable rainbows stocked within 12 to 23 days. Annual fishing pressure at these urban military bases ranged from approximately 1,700 to 2,700 angler hours per surface acre.

Area	Date	Species	Number Stocked	Daily hours/ Surface Ac.	% Harvested in days	x Catch Rate & (range)
FTC	5/80	RBT	4,091	5.2	61% in 18d	0.39 (0.28-0.75)
FTC	8/81	RBT	2,607	4.9	61% in 12d	0.26 (0.14-0.56)
AFA	9/81	RBT-E	1,522	4.7	66% in 23d	0.45 (0.18-0.90)

From the Butler Borgeson creel census studies conducted at Ft. Carson and the Air Force Academy 1980 and 1981, it appeared that the stocking of rainbow trout into management areas that received from 4.7 to 5.2 daily angler hours per surface acre was resulting in more of a "boom" and "bust" fisheries than was desired.

In an attempt to find a strain or species of trout best adapted to the high use military trout fisheries, Tasmanian and Dunn strains of rainbow, westslope cutthroat x rainbow hybrids and Snake River cutthroat trout were tagged and stocked into waters of the U.S. Air Force Farish Memorial, located near Woodland Park, Colorado. Percent return was similar for all species. However, the Snake Rivers were vastly superior in percent of pounds returned to the creel due to their ability to remain and grow in small reservoirs.

To further document the performance of Snake River cutthroat trout in high use military fisheries, equal numbers of catchable Snake River cutthroat trout and rainbow trout were stocked into the waters of the Air Force Academy, May and July 1981. Each species was marked, and the return of the two species documented through a Butler Borgeson Creel census conducted by AFA personnel. As was observed at Farish, the Snake River cutthroat trout returned at a slower rate than Erwin and White Sulphur strains of rainbow trout:

Area	Date	Species	Number Stocked	Daily Hours/ SA	% Harvested in days	x Catch-rate	Catchrate Range
AFA	5/81	SRC	1,050	6.3	32% in 25d	0.10	0.01-0.25
AFA	5/81	RBT-E	1,050	6.3	75% in 25d	0.24	0.02-0.50
AFA	7/81	SRC	1,050	9.3	38% in 30d	0.07	0.01-0.25
AFA	7/81	RBT-WS	1,050	9.3	78% in 30d	0.14	0.01-0.29

Comparisons of Erwin rainbow trout and Snake River cutthroat trout were also conducted at Farish Memorial, U.S. Air Force. Anglers at this location are required to check with the area manager prior to leaving. During 1981, fish were marked and the area manager counted the number of marked fish harvested:

Area	Date	Species	Number Stocked	Daily Hours/ SA	% Harvested in days	x Catch-rate	Catchrate Range
FAR	1981	SRC	900	11.3	91% in 179d	0.04	0.01-0.48
FAR	1981	RBT-E	900	11.3	102% in 102d	0.08	0.01-0.64

Thus in the two management areas owned by the Air Force, equal numbers of catchable rainbow trout and catchable Snake River cutthroat trout were stocked. In both areas, when the two species were stocked, Snake Rivers returned to the creel at a slower rate. Regression line calculation for three stockings of rainbows at the AFA was 91% to 107%. Due to the slow return of Snake Rivers, a Butler Borgeson creel census could not be maintained for a long enough period for regression calculation. However, of 900 Snake River cutthroat trout stocked at Farish in April, AFA personnel counted the return of 91% of these fish through October.

Stomach analysis of Snake Rivers and rainbows indicated that Snake Rivers utilized forage in the small reservoirs more efficiently, with the Snake Rivers utilizing fathead minnows and sunfish fry as a food source.

Based upon the findings of the strain studies conducted in 1981, Snake River cutthroat trout were recommended for use as catchables at the AFA. Starting in 1982, the majority of catchable trout stocked at the AFA have been catchable Snake River cutthroat trout. The goal of stocking catchable Snake River cutthroat trout was to establish an economical catchable fisheries, with high percent returns of numbers and pounds of catchable fish stocked, and a minimum of variation in catchrates between stocking dates.

To determine if the stocking of only Snake River cutthroat trout were meeting the management goal, Snake River cutthroat trout were marked and followed in a Butler Borgeson creel census in 1985 at the U.S. Air Force Academy.

Objectives of the 1985 AFA study were:

1. Document the amount of angler hours expended in August 1985 at the AFA.

2. Determine the contribution of previously stocked fish to the August fish harvest by marking four groups of fish stocked into AFA waters from 12 June to 30 July.

4. Document the percent return of Snake River cutthroat trout stocked 30 July.

5. Document AFA angler satisfaction with the number, size and overall AFA fisheries program.

METHODS

To determine the contribution of previous stocking of Snake River cutthroat trout to the August angler harvest, three stockings of Snake River cutthroat trout were marked, and one stocking of Tasmanian rainbow was marked prior to 30 July 1985.

Marked Fish Stocked into AFA Waters in 1985

Date Stocked	Species	Size	Number	Mark
12 June	SRC	4.39/lb	3,820	Right pectoral
2 July	SRC	3.78/lb	1,853	Adipose
2 July	RBT-T	1.47/lb	779	Anal
30 July	SRC	3.24/lb	2,542	Left pectoral

Tasmanian rainbows were purchased by the AFA from Bovee's Trout Ranch. All Snake River cutthroats were reared and marked at the Leadville NFH. Snake River cutthroats were marked prior to shipment to the AFA. Distribution of fish between AFA lakes and total AFA stocking for 1985, Table 1.

Following the stocking of 2,542 Snake River cutthroat trout on 30 July 1985, angling effort and harvest was monitored from dawn to dark by a Butler Borgeson creel census for the next 27 consecutive days. Angler counts were collected every two hours, with anglers interviewed conducted between angler counts.

In addition to information on angler effort and harvest, angler satisfaction with numbers of fish caught, size of fish, and satisfaction with the overall program was recorded. Analysis of data by a Digital Rainbow computer, using a FWS creel census program developed by Daryl Jennings.

All labor for the 1985 AFA Butler Borgeson Creel Census was provided by the U.S. Air Force Academy, Natural Resources Branch, Mr Melvin Rezac, Chief.

RESULTS

August Angler Use

A total of 1,055 anglers were interviewed by AFA personnel from 30 July to 25 August. Based upon total angler counts and data from interviewed anglers, it is estimated that 1,055 anglers expended 2,814 hours to harvest 1,519 trout. AFA anglers creeled an average of 0.54 trout per hour and released an average of .11 fish per hour during the 27 day census period, Table 2.

Composition of the August AFA Fish 1985 Harvest

To determine the contribution of previous stockings of fish to the August harvest, three stockings of Snake Rivers and one stocking of Tasmanian rainbows were marked. Lake McConaughy rainbow broodstock stocked in May were recognized by size. All unmarked rainbows and Snake Rivers were assumed to have been stocked prior to 10 May 1985.

Based upon the return of marked and unmarked fish, the contribution of various species and stockings to the August average catchrate of 0.54 trout creeled per hour was:

Species	Date Stocked	# Stocked	Total Creeled Catchrate in 27 days	% of 27 day Catchrate
Brook	9/26/84	2,040	0.004	0.7%
SRC	prior to 5/10/85	5,543	0.07	13%
RBT	3/13/85	1,250	0.02	4%
RBT-M	5/14/85	348	0.01	2%
SRC	6/12/85 & 7/2/85	5,673	0.15	27%
RBT-T	7/1/85	779	0.02	4%
SRC	7/30/85	2,542	0.27	50%
Total			0.54	

Of the fish harvested 30 July to 25 August, 90% were Snake River cutthroat trout, with 85% of the catchables stocked in 1985 being Snake River cutthroat. Of the Snake River cutthroat trout harvested during the August creel census, 50% were stocked 30 July, 27% stocked 2 July to 12 June, and 13% were stocked prior to 10 May 1985.

Of the fish stocked at the AFA in 1985, 15% were catchable rainbow trout. During the August creel census period they were 10% of the angler harvest. The stocking of 779 Tasmanian rainbows 2 July contributed 2% of the August fish harvest, while the 348 Lake McConaughy rainbow broodstock stocked 14 May and the 1,250 mixed strain of rainbow stocked 13 March contributed 2% and 4% respectively to the total August fish harvest. It appears that most of the Tasmanian rainbow stocked 2 July were harvest prior to 30 July. Previous strain studies using Tasmanian rainbows in AFA waters had also observed this species to be easily harvested by anglers.

Snake River cutthroats and their stocking date that composed the daily catchrates from 30 July to August 25 1985, Figure 1.

Channel catfish and brook trout were harvested at the rate of 0.01 channel catfish per hour and 0.023 brook trout per hour in the 1981 during Butler Borgeson creel census conducted in May, July and September. Both brook trout and channel catfish are stocked as fingerlings by the FWS. Due to the September 1984 AFA rotenone project, only one year class of catchable brook trout were present at the AFA in 1985, with brook trout contributing 0.7% (0.004 fish/hour) of the August 1985 angler harvest.

Channel catfish were also removed during the 1984 rotenone project with fingerling channel catfish restocked by the FWS in 1984. To provide catchable channel catfish in 1985, the AFA purchased and stocked 1,000 pounds of 12 inch channel catfish in May 1985. The majority of these fish appeared to return to anglers within a few weeks, with no channel catfish observed in creel census records after 1 June 1985.

Percent Return, Rate of Return, and Daily Catchrate Variation of Snake River Cutthroat Stocked 30 July 1985

Percent Return. From 30 July to 25 August 1985, AFA anglers harvested 29% of the 2,542 catchable Snake River cutthroats stocked 30 July. Regression calculations project a total harvest of 114% of the 2,542 Snake River cutthroats stocked 30 July, Figure 2.

Rate of Return and Variation in Daily Catchrate. The 29% return of Snake River cutthroats within 27 days of stocking was consistent with prior findings. However, allopatric Snake River cutthroats appear to return at a higher catchrate, with more variation in catchrate than when sympatric with rainbows:

Area	Date	Species	Number Stocked	Daily Hours/ SA	% Harvested in days	x Catch-rate	Catchrate Range
AFA	5/81	SRC	1,050	6.3	32% in 25d	0.10	0.01-0.25
AFA	5/81	RBT-E	1,050	6.3	75% in 25d	0.24	0.02-0.50
AFA	7/81	SRC	1,050	9.3	38% in 30d	0.07	0.01-0.25
AFA	7/81	RBT-WS	1,050	9.3	78% in 30d	0.14	0.01-0.29
AFA	9/81	RBT-E	1,522	4.7	66% in 23d	0.45	0.18-0.90
AFA	8/85	SRC	2,542	4.8	29% in 27d	0.26	0.10-0.67

Although allopatric Snake Rivers had more variation in daily catchrate, than when sympatric with rainbows, allopatric Snake Rivers in 1985 appeared to have less variation in daily catchrate than allopatric rainbows at the AFA in 1981, as shown above.

Angler Satisfaction

To measure the satisfaction of AFA anglers with the AFA fisheries program, 140 anglers who had completed their angler day were asked if they were "satisfied" with the number of fish caught, the size of fish caught; and if they were satisfied with the overall AFA fisheries program.

Time Period	# Comp. Interv.	Anglers	Percent Satisfied Number	Length	Overall	Ave. Expertise	Ave. creel rate	Ave Ln" Fish
All 1985	140		43.5	42.1	76.4	1.942	0.56	9.98
30 July to 25 August 1985	98		50.0	51.0	82.6	1.943	0.54	9.70

Angler satisfaction and success at Yellowstone National Park and Colorado military bases is measured by the same FWS method. Yellowstone National Park anglers and AFA anglers expressed similar satisfaction with the overall fishing experience at the two areas, although anglers caught bigger fish at Yellowstone.

Area	Percent Satisfied Number	Length	Overall	Ave. Expertise	Total Catch-rate	Ave Ln" Fish
AFA for all 1985	43.5	42.1	76.4	1.942	0.67	9.98
Yellowstone NP, 1984	68.0	69.0	76.0	1.91	0.93	13.5

Anglers at Yellowstone landed more, and bigger fish (0.93 fish landed per hour averaging 13.5") than at the AFA, but could creel only 0.12 fish per hour due to size and species regulations. AFA anglers creel fish at the rate of 0.54 fish per hour, and released 0.11 fish per hour. AFA anglers released fish for a variety of reasons, with small size the most common reason for releasing fish. Size, species and number of fish creeled and released at the AFA, Table 2.

Deformed Fish

Based upon 1985 gill net captures of Snake Rivers stocked from Leadville and Saratoga NFH, it appears that up to 12% of these fish have some genetic deformities. Deformities include bent tails, short peduncles, and deformed jaws. This appears to be a significant increase in deformities in the FWS Snake River broodstock from 1981 to 1985. However, the percentage of deformed fish was not taken in 1981. Gill net samples collected in 1985 could have some bias due to sample size and angler selection.

CONCLUSIONS

Angler Use

Angler use at the AFA during August 1985 was 2,814 hours. Anglers creeled an average of 0.54 fish per hour during the August creel census, and 0.56 during all of 1985. The observed average rate that AFA anglers creel fish met the AFA and FWS standard of 0.5 to 0.8 fish creeled per hour. The AFA sold 1,531 annual angling permits during 1985, with a limit of 1,700 permits to be issued for any year.

During 1985, 17,191 FWS catchable fish were stocked at the AFA for 1,531 permit holders, or about 11 catchables for each permit. Each AFA permit holder is estimated to expend 12 days fishing, with an average angler day of 1.8 hours for 21.6 angling hours per year per permit holder.

It is anticipated that angler use at the AFA will increase to near 1,700 permits in 1986, with FWS stocking to 18,200 catchables in 1986.

Contribution of Previously Stocked Fish to the August Harvest

The stocking of catchable Snake River cutthroat trout produced the type of catchrate that was hoped for, with Snake River cutthroats stocked 30 July providing 50% of the angler harvest, and Snake River cutthroats stocked from March through 12 June providing 40% of the August angler harvest.

The McConaughy rainbows broodstock also appeared to be good fish, with a surprising number of these fish harvested in August (2%) of the August Harvest) considering that only 348 were stocked in May 1985.

The majority of the 1,000 pounds of 12 inch channel catfish purchased by the AFA appeared to return anglers within 30 days. Although the stocking of the catchable channel catfish provided fish for AFA anglers, the stocking of fingerling channel catfish appears to result in a more consistent return to AFA anglers.

Percent Return, Rate of Return, and Daily Catchrate Variation

The percent return of 2,542 catchable Snake River cutthroat trout stocked 30 July 1985 was estimated to eventually be 114%. In 27 days of creel census, anglers expending 2,814 hours over 21.5 surface acres to harvest 29% of the 2,542

Snake River cutthroat trout stocked 30 July. A return of 29% of the catchable Snake Rivers in 27 days is consistent with past studies of Snake River cutthroats. Past studies of rainbow trout found 60% of catchable rainbow trout were harvested within 12 to 23 days.

The allopatric stocking of catchable Snake Rivers appeared to produce more variation in catchrates than when Snake Rivers were stocked sympatrically with rainbow trout. This conclusion is based upon the performance of catchable Snake Rivers stocked in 1981 and 1985; and rainbows stocked in 1980, and 1981.

Angler Satisfaction

Of AFA anglers who had completed their angler days, 43.5% were satisfied with numbers, 42.1% with length and 76.4% were satisfied with the overall fisheries program at the AFA in 1985.

1985 was the first year the angler satisfaction data was collected at Colorado military bases, and some caution should be used with this data due to limited sampling time. However, based upon one years data, overall angler expertise and satisfaction appears to be similar for the AFA and Yellowstone National Park, although AFA anglers landed fewer and smaller fish than at Yellowstone.

Management Considerations

Catchable Snake River cutthroat trout return at a slower rate than rainbow trout when stocked into small reservoirs on Colorado military bases that receive from 1,700 to 2,700 angler hours per surface acre per year.

A consistent rate of return of catchable trout is usually desirable, if angler use is high. However, it may be possible to keep more fish in waters than the productivity of the water can provide growth for if angler pressure is below stocking rates.

As demonstrated, sympatric stockings of Erwin rainbows and Snake Rivers provide two distinct catchrates. This may be desirable in situations when stocking dates are limited and both quick angler fodder is desired along with long term fish harvest during periods when the area cannot be stocked.

The performance of McConaughy rainbow trout broodstock was good, and may be a good fish for high use angler areas.

FIGURE 1. Composition of daily catchrates, U.S. Air Force Academy 30 July to 25 August 1985.

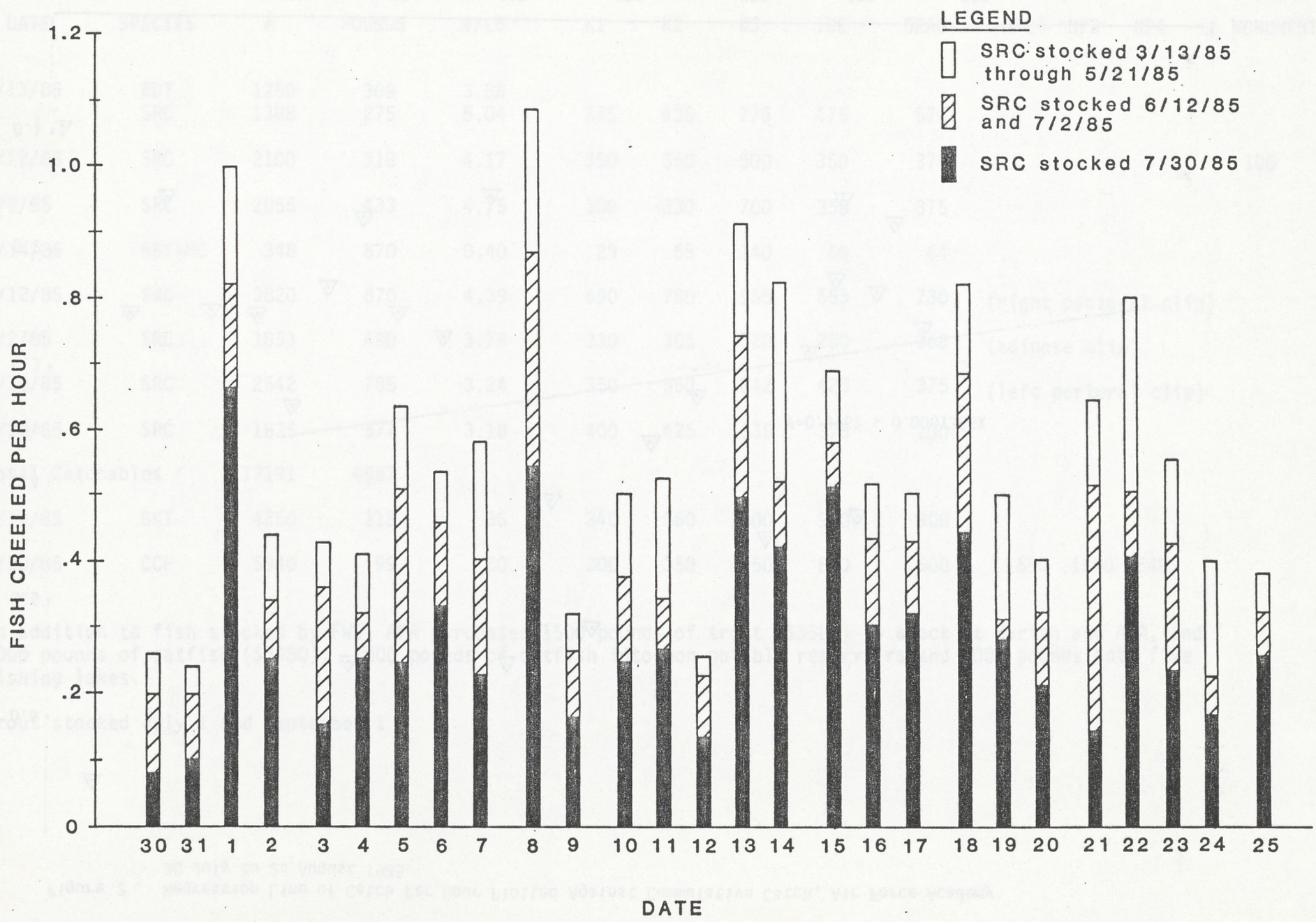


Figure 2 . Regression Line of Catch Per Hour Plotted Against Cummulative Catch, Air Force Academy 30 July to 25 August 1985.

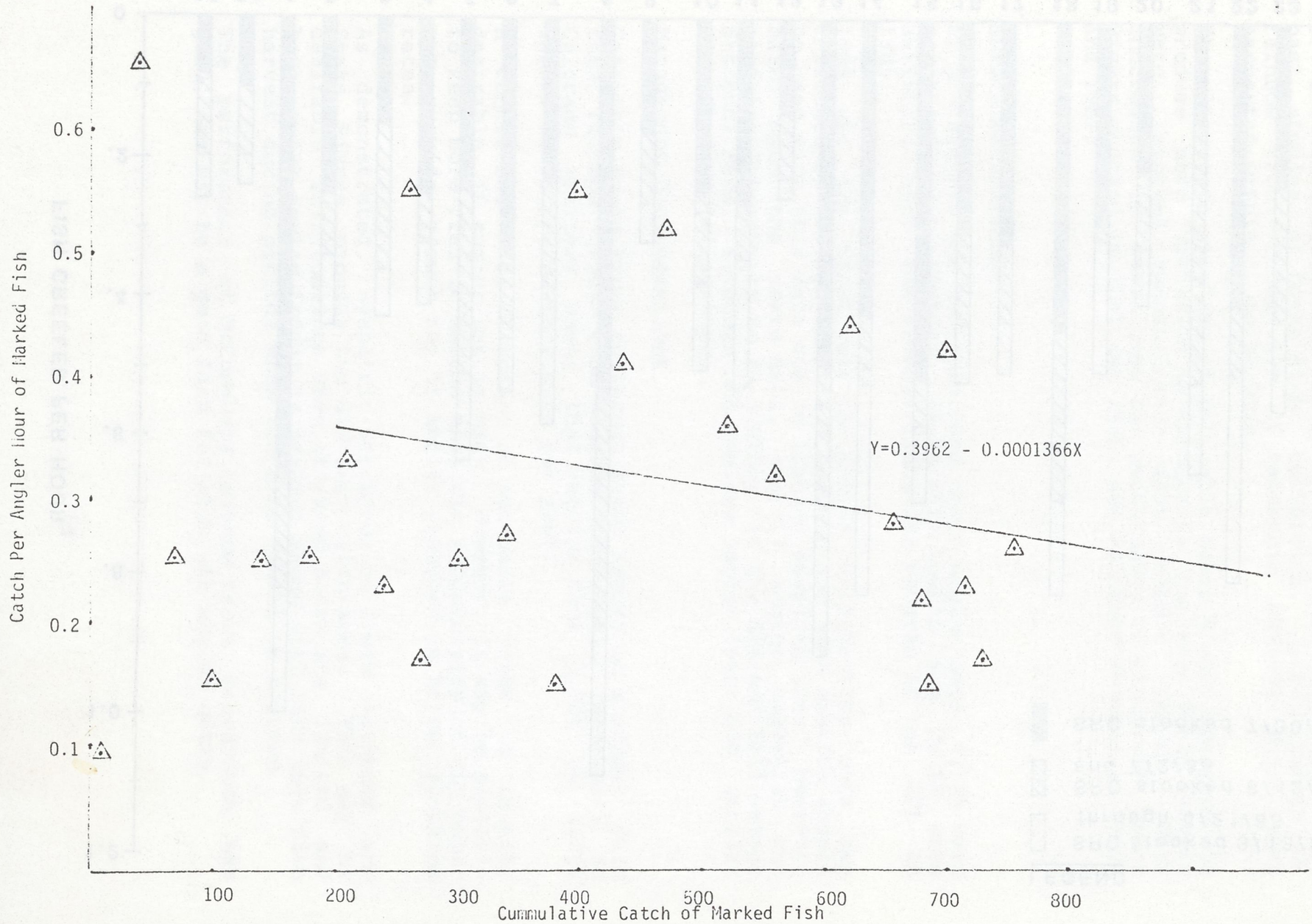


Table 1. U.S. Fish & Wildlife Service Stocking, U.S. Air Force Academy, 1985

DATE	SPECIES	#	POUNDS	#/LB	K1	K2	K3	ICE	DEAD	NP2	NP3	NP4	W	MONUMENT
3/13/85	RBT	1250	369	3.88										
	SRC	1388	275	5.04	375	435	775	475	575					
4/22/85	SRC	2100	318	4.17	350	350	500	350	370					100
5/9/85	SRC	2055	433	4.75	300	330	700	350	375					
5/14/85	RBT-MC	348	870	0.40	29	55	140	60	64					
6/12/85	SRC	3820	870	4.39	690	780	965	655	730	(right pectoral clip)				
7/2/85	SRC	1853	490	3.78	330	385	520	250	368	(adipose clip)				
7/30/85	SRC	2542	785	3.24	350	550	842	425	375	(left pertoral clip)				
8/28/85	SRC	1835	577	3.18	400	425	535	375	100					
Total Catchables		17191	4987											
6/19/85	BKT	4250	118	36	340	560	1500	950	900					
9/30/85	CCF	5940	99	60	300	350	850	550	500	1650	1200	640		

In addition to fish stocked by FWS, AFA purchased 1500 pounds of trout ($3585) to stock at Farish and AFA, and 2000 pounds of catfish ($3480). 1000 pounds of catfish into non-potable reservoirs and 1000 pounds into five fishing lakes.

Trout stocked July 1 and September 1

Table 2. Summary of Angler Use and Success, U.S. Air Force Academy, 30 July to 25 Au

LENGTH AND SATISFACTION INFORMATION FOR COMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	PERCENT SATISFIED LENGTH	PERCENT SATISFIED OVERALL	AVERAGE EXPERTISE
<6"						
<8"	1	3	33.3	33.3	0.0	2.000
<10"	56	34	47.0	48.5	89.7	1.876
<12"	76	19	78.9	78.9	100.0	2.105
<14"	4	3	33.3	33.3	33.3	2.000
<16"	1	1	100.0	100.0	100.0	2.000
>16"	4	3	33.3	83.3	83.3	2.000
NONE CREELED		35	40.0	37.1	77.1	1.742
SUB TOTAL	142	98	50.0	51.0	82.6	1.943

LENGTH AND SATISFACTION FOR INCOMPLETED ANGLERS

LENGTH CLASS	NUMBER CREEL	NUMBER ANGLERS	PERCENT SATISFIED NUMBER	PERCENT SATISFIED LENGTH	PERCENT SATISFIED OVERALL	AVERAGE EXPERTISE
<6"						
<8"	12	12	0.0	0.0	0.0	0.000
<10"	262	200	0.0	0.9	2.4	1.600
<12"	270	175	1.1	1.1	1.1	2.000
<14"	53	33	0.0	0.0	0.0	0.000
<16"	6	5	0.0	0.0	0.0	0.000
>16"	1	0	0.0	0.0	0.0	0.000
NONE CREELED		530	0.5	0.5	0.5	2.000
SUB TOTAL	604	957	0.5	0.7	1.0	1.818

STATUS	NUM OF FOLKS	AVERAGE HOURS	AVER NUM CREEL/MAN	CREEL /HOUR	AVERAGE SIZE
ACTIVE	742	1.25	0.56	0.445	9.766
CIV SER	154	1.48	1.20	0.810	9.494
RETIRED	140	1.43	1.05	0.736	9.756

PART I STATISTICS FOR COMPLETED ANGLERS

NUMBER OF ANGLERS	=	98	
AVE STARTING TIME	=	15.15	HOURS
AVE ENDING TIME	=	16.95	HOURS
AVE ANGLER DAY	=	1.80	HOURS
TOTAL HOURS	=	176.51	HOURS
TOTAL FISH CREELED	=	142	
AVE CREEL PER HOUR	=	0.80	

PART II STATISTICS FOR INCOMPLETED ANGLERS

NUMBER OF ANGLERS	=	957	
TOTAL HOURS	=	1200.23	HOURS
TOTAL FISH CREELED	=	604	
AV CREEL PER HOUR	=	0.50	

PART III TOTALS

NUMBER OF ANGLERS	=	1055	
TOTAL HOURS	=	1376.74	HOURS
TOTAL FISH CREELED	=	746	
AV CREEL PER HOUR	=	0.541	
TOT FISH RELEASED	=	156	
AV RELEASED/HOUR	=	0.113	
LANDING RATE	=	0.655	
% WITHOUT POST LIC	=	1.32	%
% WITHOUT STATE LIC	=	0.09	%

SPECIES COMPOSITION OF CREELED & RELEASED FISH

	NUMBER CREELED IN SIZE CLASSES							TOTAL	AVERAGE	NUMBER
SPECIES	4"	7"	9"	11"	13"	15"	18"	NUMBER	LENGTH	RELEASED
S.R. CUTTHROAT	0	34	451	161	7	0	0	653	9.43	140
RAINBOW	0	1	4	31	23	7	5	71	12.36	9
BROOK TROUT	0	3	1	1	0	0	0	5	8.20	7
CHANNEL CAT										
BLUEGILL										
CRAPPIE										
L.M. BASS										
N. PIKE										
G.B. CUTTHROAT										
GRASS CARP										
BULLHEAD										
TOTAL	0	38	456	193	30	7	5	729	9.70	156
PERCENT	0.000		0.625		0.041		0.006			
		0.052		0.264		0.009				