Water Quality Status Report

CEDAR DRAW
Twin Falls County

November 1975

Department of Health and Welfare
Division of Environment
Statehouse, Boise, Idaho 83720

WATER QUALITY STATUS REPORT

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ABSTRACT

A water quality survey was conducted on Cedar Draw in Twin Falls County to determine the effects of point source discharges and to acquire data to establish the final effluent limitations for the second generation permit for the City of Filer.

There was an increase in dissolved oxygen, turbidity, and nitrate with a slight decrease in Biochemical Oxygen Demand in the stream from a point above all discharges to the mouth. Fecal strep and fecal coliform bacteria increased significantly from the uppermost station to the mouth. All water quality parameters considered met our Idaho Water Quality Standards with the exception of fecal coliform.

INTRODUCTION

The Cedar Draw watershed consists of 198 square miles or 126,720 acres. This study was conducted on the lower ten miles of the stream where there is year-around flow. Cedar Draw discharges to the Snake River at River Mile 599.6.

The area around the stream segment studied is mostly irrigated farmland with some grazing on the steeper slopes. The soil is silt loam over basalt. The major crops grown are sugar beets, beans, corn, small grains, and hay. The major portion of the drainage in the area is privately owned and irrigated. During the non-irrigation season, water from springs and seepage tunnels make up most of the flow in Cedar Draw.

The population of Filer showed a decline during the period from 1950 to 1970 while the general trend for the Twin Falls County was a gradual increase. The population has risen since 1970 from 1173 to an estimate of 1420

people in 1975. The current trends indicate the population will reach approximately 2350 by 1995.[1] The economy is basically agriculturally oriented with some small industries.

Samples were collected at station S-4 below Filer semiannually during 1970, 1971, and 1972; quarterly during 1973 and part of 1974. Monthly sample collections were started in September, 1974, and continued until June, 1975. These data are shown in Table 1. The following is a list of stations where samples were collected during the special survey in November, 1975 (see Figure 1):

Station		River Mile
S-1	Above All Discharges	8
A-1	Rainbow Trout Farm Discharge	6.5
M-1	Filer Lagoon Discharge	5.8
S-2	Below Filer	5
S-3	Below Filer	4
S-4	Below Filer	3
D-1	Irrigation Ditch	2.8
D-2	Irrigation Ditch	1.7
S-5	Near Mouth	.2

WASTE SOURCES

Point Sources

The City of Filer has a three-celled, aerated primary lagoon system. This system discharges unchlorinated effluent to a seepage tunnel which drains into Cedar Draw. The design population for the lagoon system is 1500 people. The lagoons appear to be overloaded. At times they create odor problems and contribute organic nutrients to Cedar Draw.

One trout hatchery, Rainbow Trout Farm, discharges 8 to 16 million gallons per day (12-25 cfs) of untreated raceway wastewater to Cedar Draw. The water is taken from a seepage tunnel and is used for trout rearing only. A

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[1]Preliminary Engineering Report--Municipal Water System Plan and Proposed Water System Improvements for the City of Filer; May, 1975; J-U-B Engineers, Inc.

trout processing plant on the same property is operated seasonally and discharges untreated process water to the stream. Rainbow Trout Farm's Federal National Pollutant Discharge Elimination System permit schedule requires treatment of these wastes by July 1, 1977.

There are a number of small livestock holding pens or corrals which drain directly into Cedar Draw.

Some of the irrigation return flows are additional important point sources.

Nonpoint Sources

Diffused irrigation return water and annual runoff are the major nonpoint sources.

WATER QUALITY STATUS AND TRENDS

Using data collected at station S-4 from 1970 to 1975, an attempt was made to determine the difference in water quality between summer and winter seasons. This analysis is summarized in Table 2. Nitrate and specific conductance values are considerably higher in the winter period (October through March) than in the summer period (April through September). This may be due to decreased flow and less dilution. Turbidity was higher during the summer period presumably due to spring runoff and irrigation return water. Other constituents showed little change between summer and winter.

All water quality parameters investigated in November, 1975, (Table 3) met the Idaho Water Quality Standards with the exception of fecal coliform density. Fecal strep and fecal coliform bacteria increased greatly below Filer. Rainbow Trout Farm and the Filer sewage treatment plant appear to contribute to these increased bacterial densities.

There is an increase in the turbidity from Station S-1 to Station S-5 (Figure 4). This can be attributed primarily to irrigation return flows since

water is diverted from Cedar Draw and returned after irrigation. This is particularly obvious in the spring when farmers are irrigating open ground and during the regular irrigation season.

The Idaho Fish and Game Department routinely stocks trout in this stream after the irrigation season for fall and winter harvesting. However, no planting is done during the summer because of the effect of the irrigation return water and the fact that much of the water is diverted from the stream for irrigation.

There was an increase in dissolved oxygen in the stream (Figure 2) and a slight decrease in the Biochemical Oxygen Demand from Station S-1 to Station S-5 (Figure 4). Dissolved oxygen at all Cedar Draw stations exceeded the 100% saturation concentration of 10.2 mg/1.

Nitrate increased from less than .01 mg/1 above Filer to 12.4 mg/1 at the mouth (Figure 3). The discharge from Rainbow Trout Farm contributed more than half of the nitrate found in Cedar Draw at the Highway 30 bridge below Filer (station S-2). The Filer municipal lagoon system contributed less than one percent of the nitrate. Additional sources of nitrate may come from the drainage tunnels which discharge to Cedar Draw. The high concentration of nitrate (Figure 3) in the lower three miles of Cedar Draw may also be caused by the seepage tunnels. The concentration of nitrate at station S-4 increases in the winter months (Table 1) possibly due to decreased dilution.

Chlorophyll a data are shown in Figure 5. The highest concentration was found at the uppermost station and concentrations decrease downstream. Cedar Draw Lake above station S-1 was probably spilling algae laden water and chlorophyll a decreased downstream due to dilution and algae die off.

CONCLUSIONS AND RECOMMENDATIONS

Best management practices of irrigation return water and the elimination of runoff from feedlots and animal confinement areas should improve the water quality.

Due to the potential growth in Filer, the existing municipal lagoon system should be evaluated for improvements needed in order to prevent possible increase in pollutants to the Cedar Draw.

An additional water quality survey is needed to assess the effects of irrigation return water, natural springs and water from the drainage tunnels on the water quality of Cedar Draw.

SURVEY TECHNIQUES, METHODS, AND EQUIPMENT

Field analyses were conducted with the following equipment:

Dissolved oxygen and temperature: YSI, Model 54 oxygen meter (calibrated prior to use).

pH: Orion Specific Ion Meter, Model 404 (calibrated prior to use).

Flow: Estimated for all stations except M-1 which was measured using the 90° "V" notch weir present.

Samples were collected in one-liter polyethylene bottles cooled to 4°C on ice and submitted to the Twin Falls Branch Laboratory for BOD, COD, turbidity and suspended solids analyses. All other analyses were performed in the Boise laboratory. All laboratory analyses were run according to Standard Methods.

Bacteriological samples were collected in sterilized glass 125 ml sample bottles containing sodium thiosulphate. The samples were cooled to 4°C on ice after collection. The bacteriological samples were analyzed in the Twin Falls Branch Laboratory.

Chlorophyll a samples were field filtered with a Millipore portable filter assembly using Millipore Type HA gridless 45 um filter. The samples were placed in petri dishes, wrapped in aluminum foil and frozen immediately on dry ice. The samples were analyzed in the Boise laboratory.

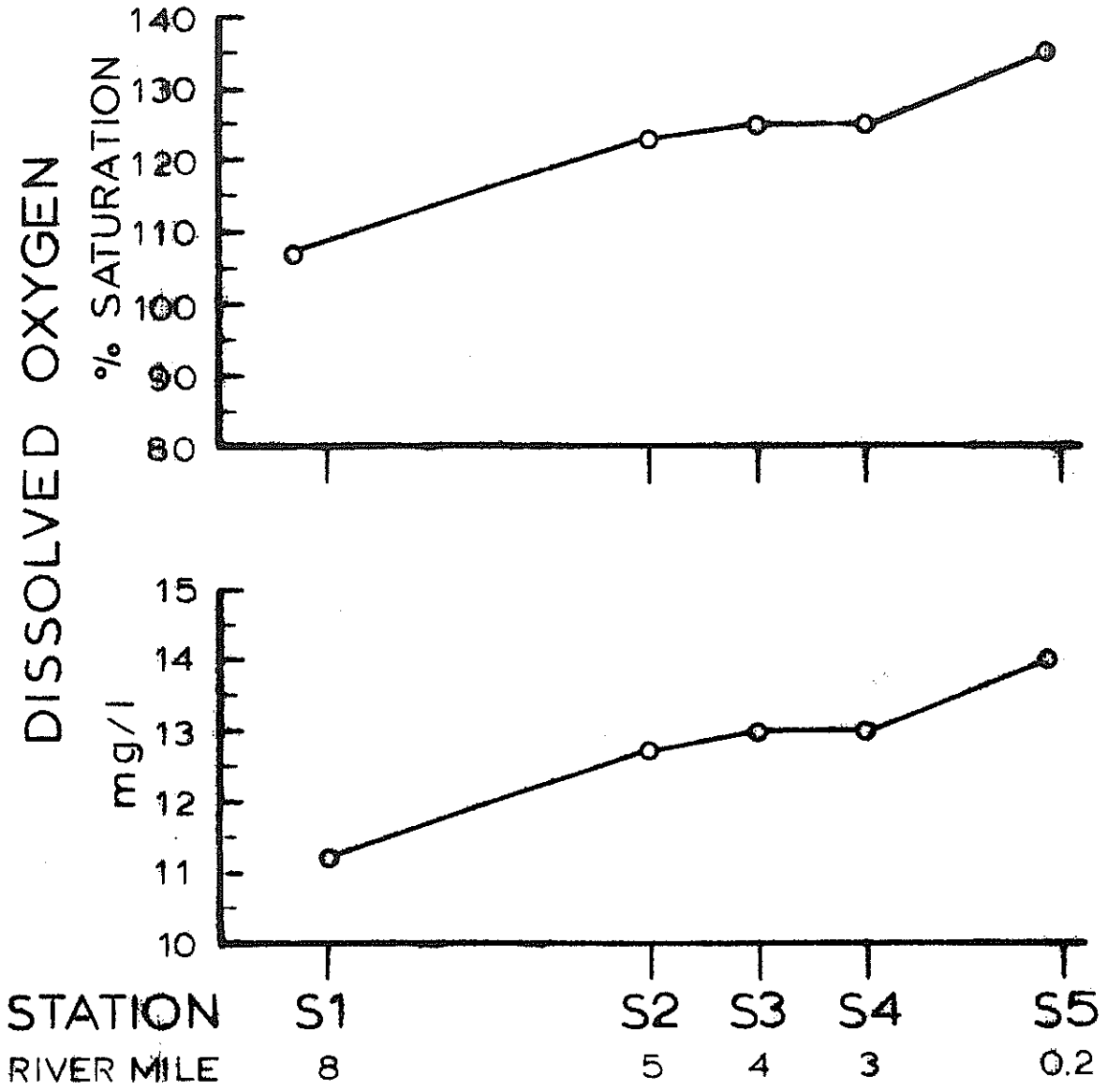
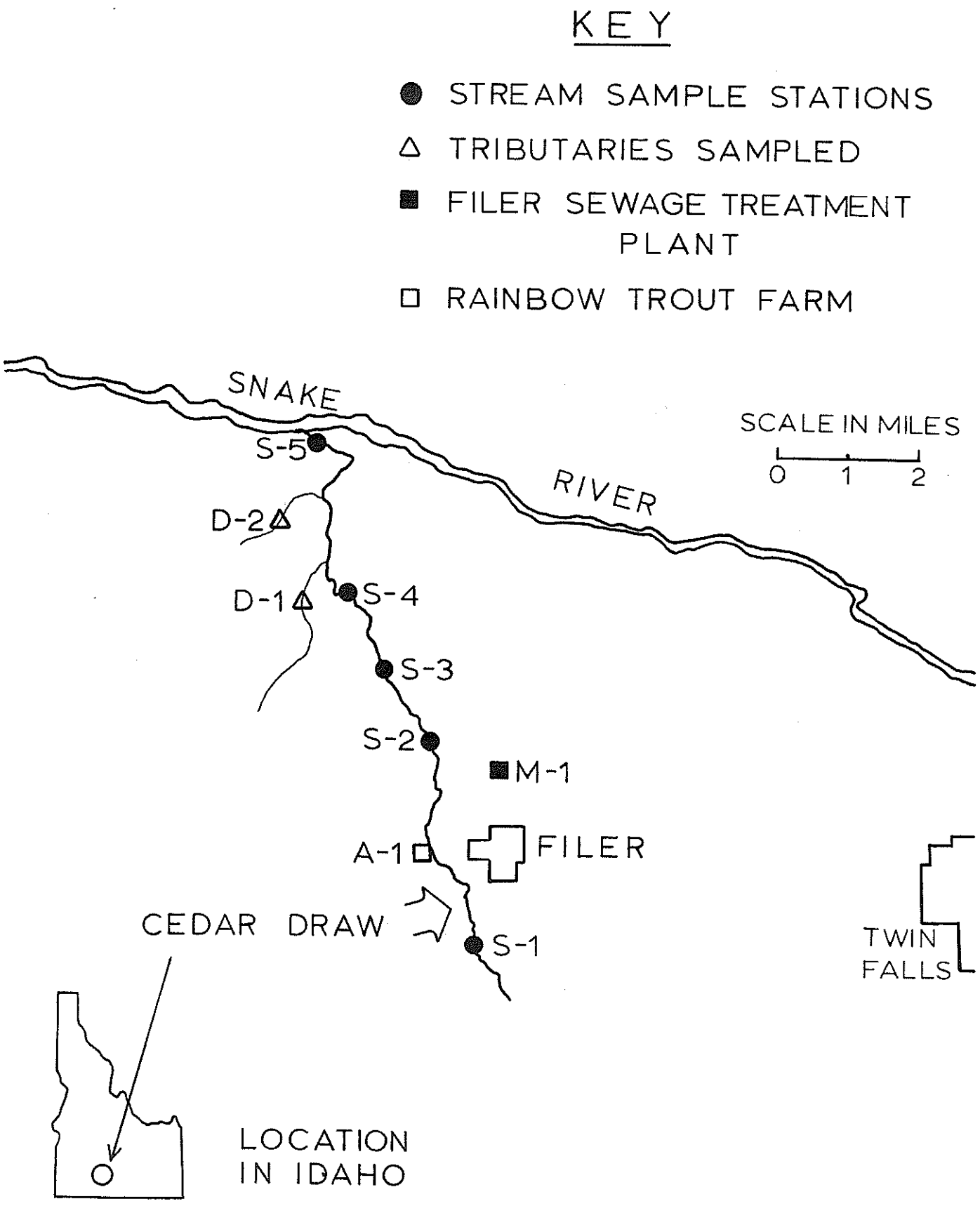


FIG. 2 CEDAR DRAW, DISSOLVED OXYGEN, 12 NOV 1975

FIG. 1. CEDAR DRAW SURVEY



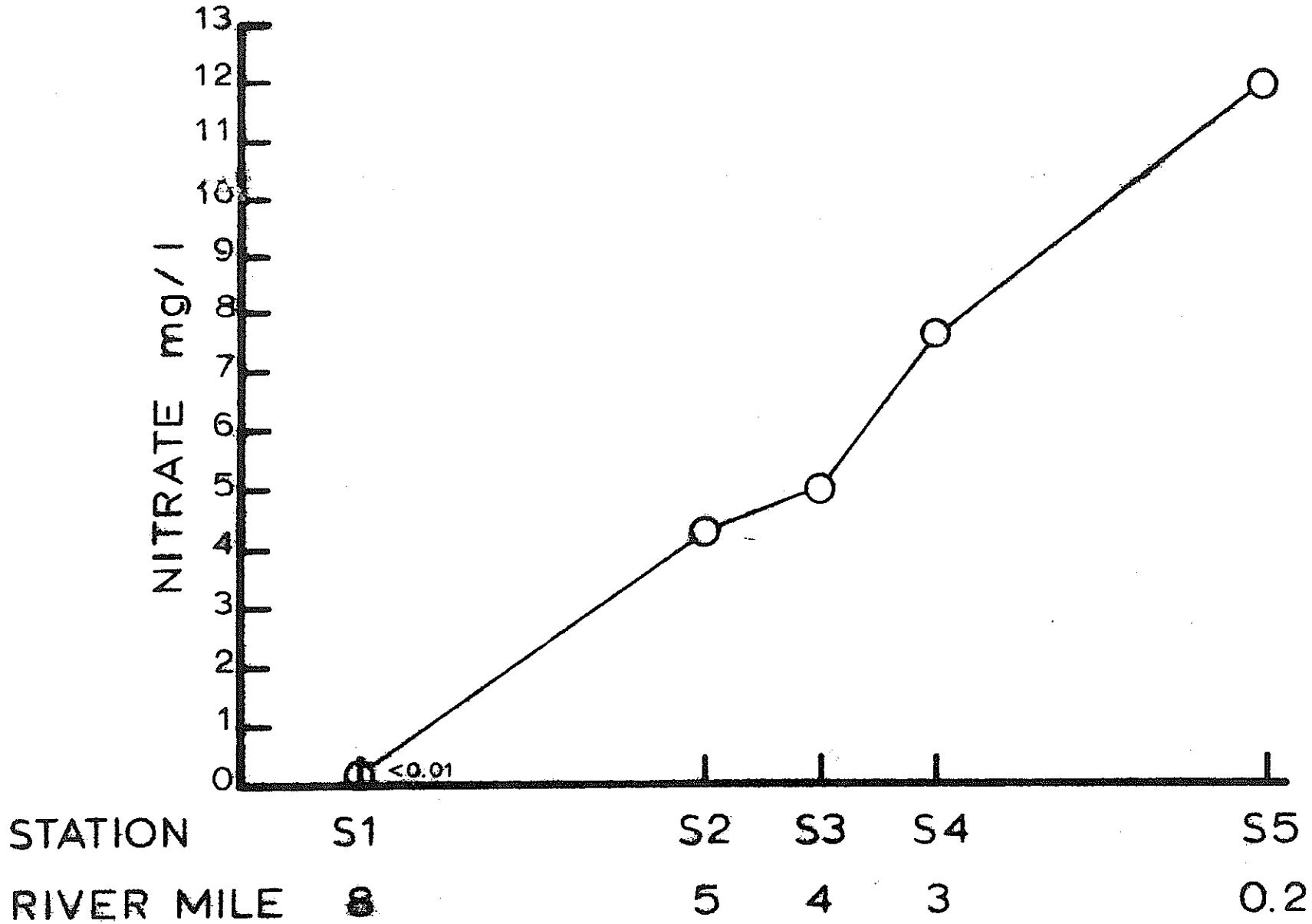


FIG. 3 CEDAR DRAW NITRATE CONCENTRATION
12 NOVEMBER, 1975

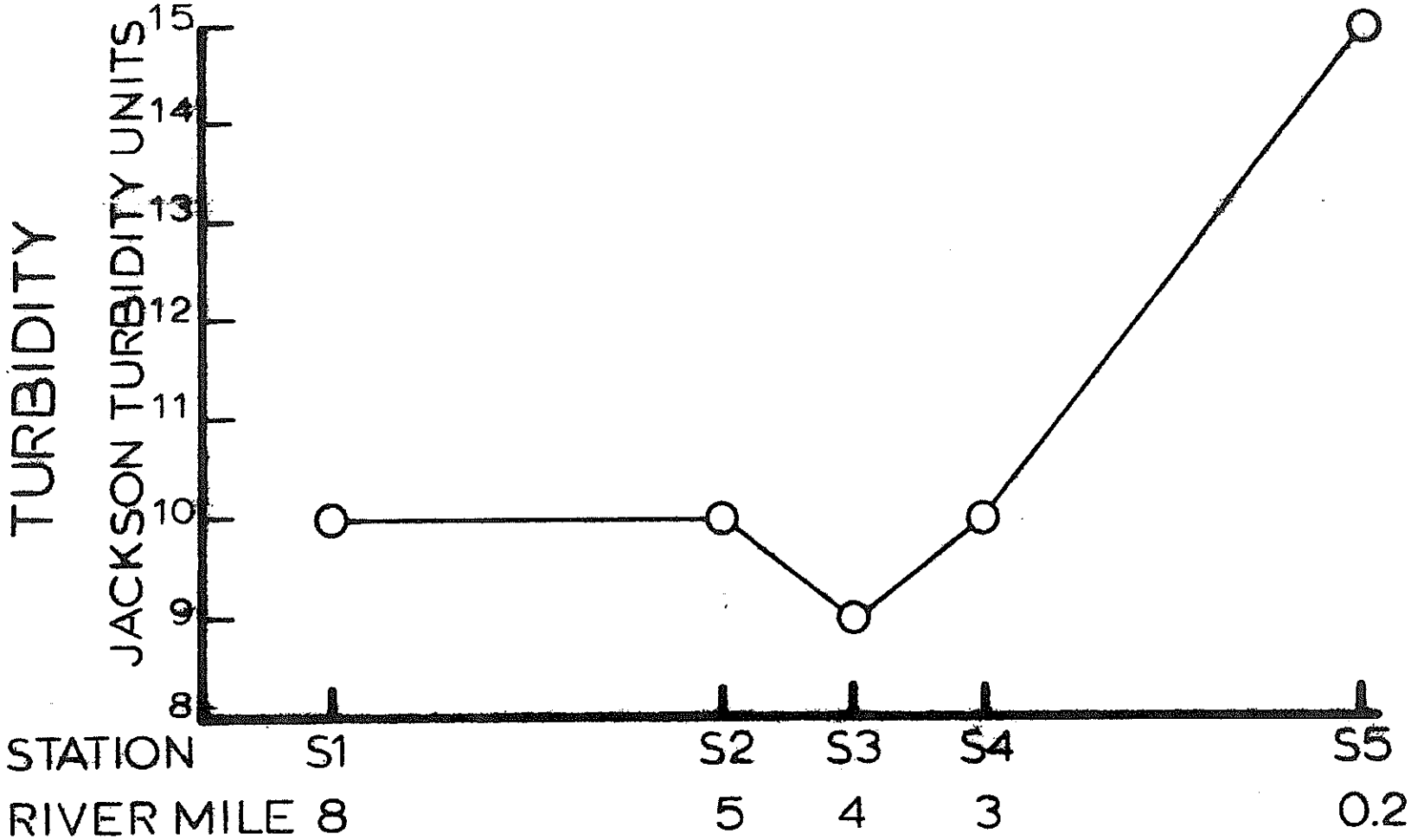


FIG. 4 CEDAR DRAW, TURBIDITY
12 NOVEMBER, 1975

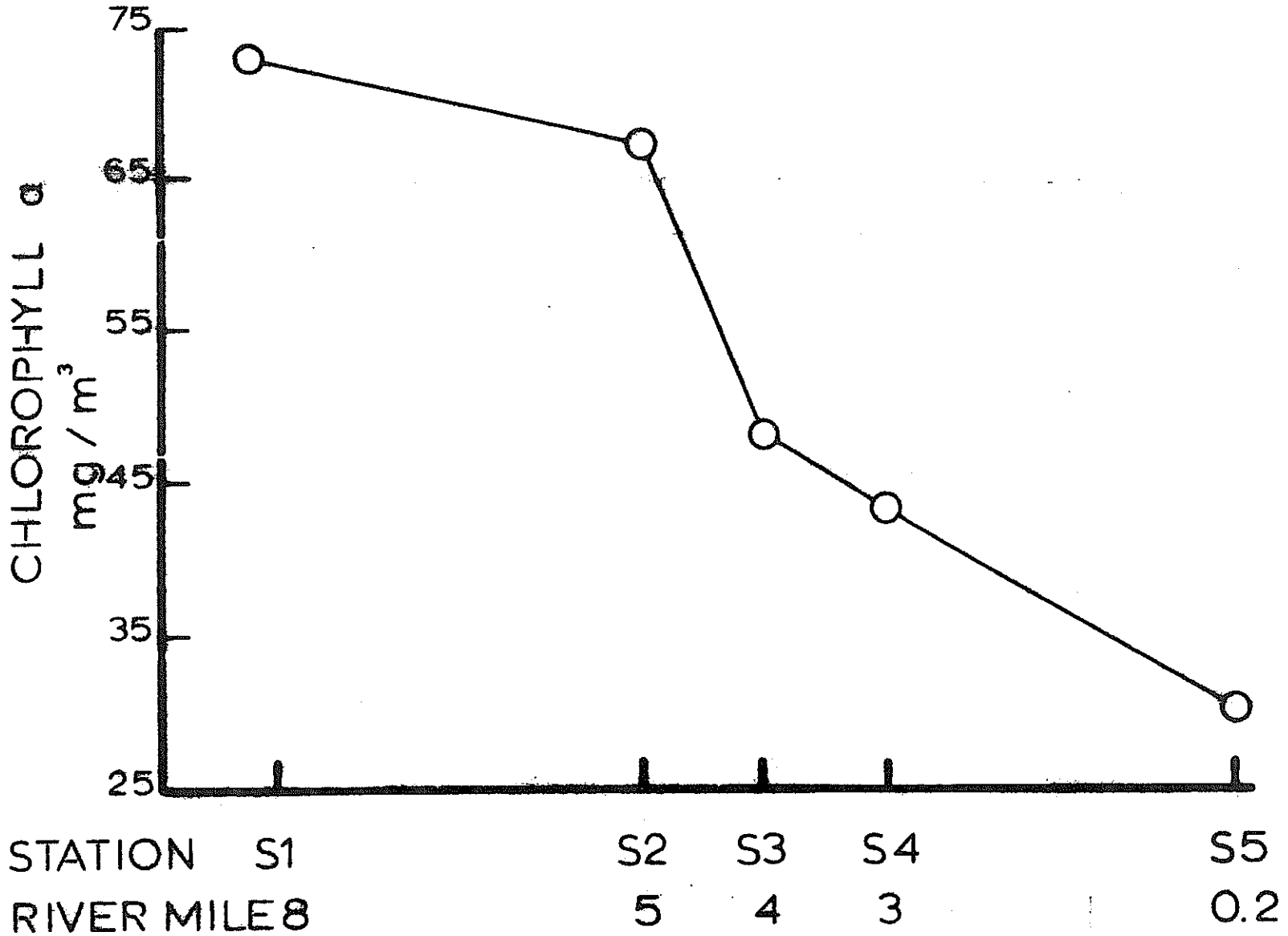


FIG. 5 CEDAR DRAW, CHLOROPHYLL a
12 NOVEMBER, 1975

Table 1

FIELD, LABORATORY AND BACTERIOLOGICAL ANALYSES, STATION S-4, CEDAR DRAW, 1970-1975

	FIELD ANALYSES			LABORATORY ANALYSES															BACTERIAL ANALYSES	
Date	Temp.	Dissolved Oxygen	pH	Turbidity	pH	BOD	Total Solids	Ammonia (NH_3)	Nitrate (NO_3)	Nitrite (NO_2)	Ortho-Phosphate (PO_4)	COD	Specific Conductance	Alkalinity ($CaCO_3$)	Iron	Manganese	Sodium	Potassium	Chloride	Total Coliform	Fecal Coliform
	°C	ppm	s.u.	J.T.U.	s.u.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	umhos/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	#/100 ml.	#/100 ml.
07-30-70	17		8.7			1.6	644	1.00	6.2		0.55	86.0		266	1.31	.29	52.0	6.0	36	2,300	
03-22-71	12	12.8	8.3	1.0		1.9	740	.01	18.5		0.17	47.0		276	<.01	<.01	67.0	5.6	57	292	
09-08-71	18		8.0	70.0		1.2	600	0.30	7.4		0.22	<4.0		248	0.03	.01	69.0	5.9	32	4,600	
06-14-72	19		7.9	68.0			592	0.30	1.3		0.05	20.3	360	136	0.12	.06	40.0	3.0	18	6,600	
08-17-72	18		7.8	68.0		1.7	920	0.00	7.1		0.14	23.7	540	192	0.15	.02	75.0	2.2	32	8,400	
12-19-72	7			22.0	7.8	6.0	696	0.70	16.3	0.210	0.72	43.0	604	296	0.04	.06	78.0	6.9		19,000	
03-14-73	10	12.0		54.0	7.9	2.4	1076	0.50	10.2	0.094	0.14	36.0	840	256	0.07	.01	42.0	2.9	6	220	
05-22-73	20	9.2		90.0	7.7	2.9	744	0.30	6.0	0.031	0.26	63.0	529	172	1.69	.16	45.0	4.2		1,200	
07-23-73	22	7.2	8.0	75.0	7.3	3.1	696	0.10	5.0	0.016	0.34	50.0	530	232	0.04	.01	72.0	5.1		16,000	
11-19-73	10	10.3	8.4	70.0	7.8	2.5	796	0.90	18.5	0.052	0.05	85.0	800	180	0.43	.02	72.0	5.5		5,300	24
03-14-74	9	13.0		27.0	7.8	3.0	956	0.10	24.5	0.056	0.32	13.0	879	252	0.03	<.01	88.0	6.3		524	6
09-11-74	17	10.2	8.3	60.0	7.7	0.4	576	0.18	4.09	0.010	0.15		620	200	0.23	.05	57.5	5.1		4,800	
10-17-74	12	10.1	8.0	7.0	7.0	1.9	543	0.08	9.03	0.019	0.02	41.0	660	210	0.14	.02	60.0	4.9		6,200	270
11-13-74	12	13.0	8.3		7.3	1.2	598	0.13	10.4	0.063	0.14	49.1	680	208	0.04	.02	67.5	4.2		4,600	640
12-11-74				32.0	8.1	2.1	604	0.04	17.4	0.072	0.40	17.1	720	190	0.07	<.01	85.0	4.4	11	3,700	80
01-30-75	5	11.3	8.3	6.4	8.1	3.2	713	0.11	20.2	0.255	0.62	20.1	940	316	0.11	.03	74.0	5.1	12	4,800	630
02-12-75	8	10.2	8.2	22.0	7.6	2.1	720	0.23	18.2	0.064	0.55	23.9	900	268	0.17	150	75.0	4.9	2	6,800	140
03-04-75	9	10.2	8.4	27.0	7.5	1.8	700	0.01	17.5	0.060	0.18	9.5	860	260	0.08	40	72.5	4.2	2	3,200	370
04-16-75	8	10.8	8.1	25.0	8.4	4.8	456	0.21	3.11	0.027	0.46		485	170	0.02	10	37.0	4.7	<2	5,900	140
05-06-75	6	10.5	8.1	28.0	8.0	2.8	444	0.27	1.77	0.013	0.11	27.0	460	174	0.08	40	20.2	4.0	<2	4,800	62
06-09-75	14	10.2	8.1	35.0	7.6	1.2	431	0.28	2.75	0.021	0.51		510	188	0.24	60	30.9	4.4	<2	8,000	1,000

Table 2

SUMMER AND WINTER AVERAGES FOR STATION S-4 FROM 1970 THROUGH 1975

	FIELD ANALYSES			LABORATORY ANALYSES																BACTERIAL ANALYSES	
	Temp.	Dissolved Oxygen	pH (Range)	Turbidity	pH (Range)	BOD	Total Solids	Ammonia (NH_3)	Nitrate (NO_3)	Nitrite (NO_2)	Ortho-Phosphate (PO_4)	COD	Specific Conductance	Alkalinity ($CaCO_3$)	Iron	Manganese	Sodium	Potassium	Chloride	Total Coliform	Fecal Coliform
	°C	ppm	s.u.	J.T.U.	s.u.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	umhos/cm	mg/l		mg/l			mg/l	#/100 ml	#/100 ml
Summer*	15.9	9.7	7.8-8.7	57.6	7.3-8.4	2.2	610	.29	4.47	.020	.28	39.1	504	198	.39	11.06	49.9	4.5	17.7	6,260	400
Winter**	9.3	11.9	8.0-8.4	27.1	7.0-8.1	2.55	719	.25	15.8	.088	.28	33.5	777	246	.11	17.29	71.0	5.0	15.0	5,178	266

* Summer dates were from April through September.
** Winter dates were from October through March.

Table 3

FIELD, LABORATORY AND BACTERIOLOGICAL ANALYSES, CEDAR DRAW SURVEY, NOVEMBER 12, 1975

	FIELD ANALYSES				LABORATORY ANALYSES													BACTERIAL ANALYSES		
	Temperature	Flow (est.)	pH	Dissolved Oxygen	Turbidity	BOD	Total Solids	Ammonia (NH_3)	Suspended Solids	Nitrate (NO_3)	Nitrite (NO_2)	Ortho-Phosphate (PO_4)	Alkalinity ($CaCO_3$)	Inorganic Phosphate	Specific Conductance	Total Phosphorus	COD	Chlorophyll-a	Total Coliform	Fecal Coliform	Fecal Strep
	°C	cfs.	s.u.	ppm	J.T.U.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	umhos/cm.	mg/l	mg/l	mg/m^3	#/100 ml.	#/100 ml.	#/100 ml
S-1 Above All Discharges/R.M. 8	8.0	50	8.5	11.2	10.0	6.0	296	0.38	56	<0.01	0.002	<.01	164	0.30	410	0.16	15.2	72.7	2,600	6	12
A-1 Rainbow Trout/ R.M. 6.5	13.0	12	7.6	8.5	2.6	3.4	641	0.93	37	16.2	0.94	.39	300	0.41	900	0.15	13.2	1.9	110,000	800	4,800
M-1 Filer-At Lagoons/R.M. 5.8	5.0	0.12	8.4	12.0	22.0	30.0	914	10.2	151	3.65	1.030	18.9	336	19.5	1250	7.17	92.8	1480	47,000	2,300	1,600
S-2 Below Filer/ R.M. 5 U.S. Hwy. 30	8.0	65	8.0	12.7	10.0	5.1	421	0.35	63	4.37	0.135	0.26	212	0.44	570	0.18	17.6	67.6	42,000	30	770
S-3 Below Filer/ Co. Rd./R.M. 4 9S.15E.S25	8.0	75	8.0	13.0	9.0	<4.0	414	0.29	52	5.00	0.107	0.15	220	0.41	590	0.16	15.6	48.7	37,000	780	620
S-4 Below Filer/ Co. Rd./R.M. 3 9S.15E.S24	8.0	75	8.0	13.0	10.0	4.5	490	0.27	65	8.29	0.024	<.01	240	0.41	660	0.15	16.8	42.2	7,500	240	3,100
D-1 Irrigation Ditch/R.M. 2.8	7.0	20	7.8	12.0	10.0	3.6	504	0.28	55	9.07	0.002	0.05	244	0.22	680	0.10	10.4	21.7	2,900	400	84
D-2 Irrigation Ditch/R.M. 1.7	6.0	10	8.5	12.0	12.0	3.7	431	0.19	73	6.54	0.018	0.09	212	0.23	550	0.10	12.4	25.3	500	150	56
S-5 Near Mouth/ R.M. .2	8.0	125	8.2	14.0	15.0	2.9	634	0.25	79	12.4	0.019	0.05	320	0.47	780	0.17	12.8	30.6	3,100	240	140