

DEER PARK STP/DRAGOON CREEK (24-55-02)

DROUGHT MONITORING SURVEY

(August 22-25, 1977)

by

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This report documents the Water and Wastewater Monitoring Section's survey during drought conditions in August of 1977. The project objectives were to evaluate the impact of the effluent from the Deer Park STP on the water quality of Dragoon Creek. The main thrust was to measure water quality criteria and biological data that could be used by the Eastern Regional Office to evaluate a possible STP upgrade.

Deer Park is a small eastern Washington farming community of about 1,800 people located 15 miles north of Spokane in Spokane County. It has no industry and is primarily a farm town with its associated small businesses, cafes, grocery store, tavern, gas station, and farm implement garages, although it does have a regional hospital which serves the area north of Spokane (Figure 1, Page 2).

The sewage treatment plant is located on the southwest corner of town. Its effluent discharges into Dragoon Creek, a tributary of the Little Spokane River.

Dragoon Creek meanders through pastures and fields with about 60% of its riparian edge covered with dense underbrush providing excellent habitat for aquatic life. The creek averages less than 15 feet wide with steep undercut banks. The streambed consists of about 2% riffles, 40% runs and 60% pools (average 3 ft. deep pools). It flows over clay and silt substrate.

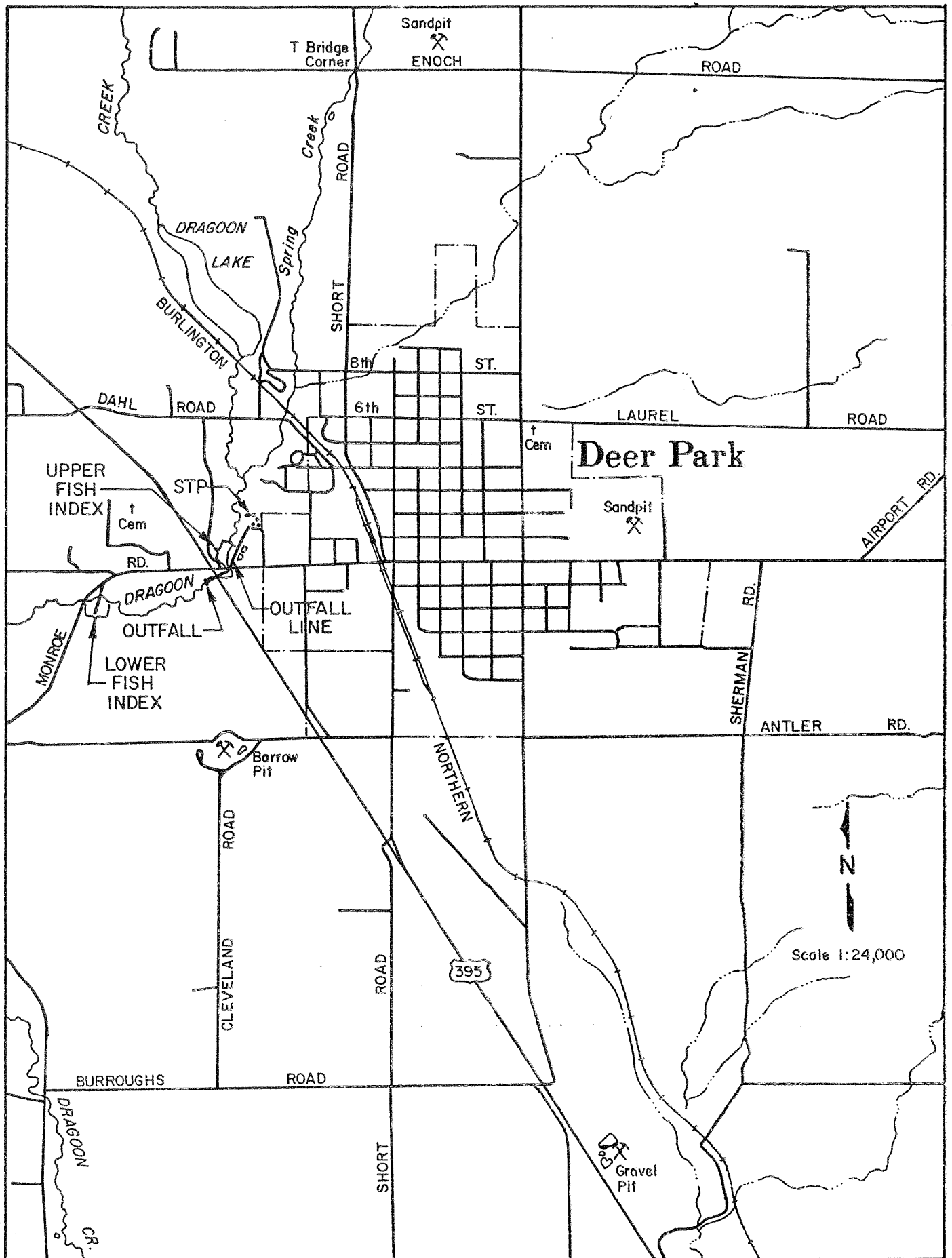


Figure 1. DRAGON CREEK – DEER PARK AND VICINITY.

METHODS

The STP survey was conducted over a 72 hour period at four pre-determined sites: STP influent (grab), STP effluent (24 hour composite), Dragoon Creek 100 yards above outfall (grab), and Dragoon Creek 20 feet below outfall (24 hour composite). Grab and composite samples were collected and sent to the lab for analysis once every 24 hours. Parameters collected were:

Total Residual Cl_2 (D.P.D.)

Flow

Total Coliform

Fecal Coliform

Total Solids

Total Non. Vol. Solids

Total Suspended Solids

Total Non. Vol. Sus. Solids

Specific Conductivity

Temperature

Hardness

Alkalinity

Dissolved Oxygen

NO_3 -N

NH_3 -N

Unionized NH_3 -N

Total PO_4

Ortho- PO_4

The parameters were analysed using Standard Methods.

A comparison study of the operator's orthotolidine and the D.P.D. method for determination of total residual chlorine was conducted by taking simultaneous random samples during the 72 hour period.

The biological sampling consisted of two fish index areas, one above and one below the outfall (Figure 1, Page 2). An electroshocker was used to collect the fish. They were then measured and enumerated.

RESULTS AND DISCUSSION

The 72 hour STP survey results are shown in Table 1, Page 5. B.O.D. was reduced an average of 82%. Total suspended solids were reduced by 84%. Fecal coliform bacteria were 60/100 ml for one sample. The median effluent pH was 7.2. The STP appears to be very close to meeting minimum EPA requirements for secondary treatment.

The orthotolidine/D.P.D. total residual chlorine test comparison (Table II) results demonstrated that the STP's orthotolidine method was consistently low. The lowest residual recorded with the D.P.D. was 0.7 ppm. This would indicate the possibility that the orthotolidine method was not accurately measuring total residual chlorine and should be standardized or replaced with the D.P.D.

Table I. Dragoon Cr./Deer Park STP
Data Summary¹

Station	Dragoon Cr. Upstream of Outfall	STP Influent	STP Effluent	Dragoon Cr 20' from Outfall
Temp. (°F)	72°F	69°F	71°F	72°F
pH	* 7.2	7.3	7.2	7.3
D.O./% Saturation (ppm)	7.9 ppm/95%	- -	- -	7.9 ppm/9
Total Hardness/Alkalinity (as CaCO ₃)	51/114	44/208	48/190	49/118
Sp. Conductivity (umhos/cm)	203	525	542	203
Flow (mgd)	1.87	0.144	0.144	2.02
Total Solids (lbs/day)	335	625	446	412
Total Non. Vol. Solids (lbs/day)	262	333	310	299
Total Suspended Solids (lbs/day)	6	197	31	53
Total Sus. Non. Vol Solids (lbs/day)	2	43	10	38
NO ₃ -N (Filtered)	3.93	0.72	1.60	4.10
NH ₃ -N (Unfiltered)	0.02	21.79	22.75	1.19
O-PO ₄ -P (Unfiltered)	0.13	11.02	11.74	0.87
Total Phos.-P (Unfiltered)	0.06	6.73	10.42	0.63
B.O.D. (5 day)	- -	189	34	- -
C.O.D.	26	411	154	51
Total Coliform (colonies/100 ml)	*400		21,000	1,400
Fecal Coliform (colonies/100 ml)	*160		60	X
Total Residual Chlorine (ppm)	0	- -	1.4	N.D.

¹ All data is arithmetic mean and ppm unless otherwise noted.

* Median value

X No data due interferences

- - Not measured

Table II. Residual Chlorine

Station	Date/Time	D.P.D.	Orthotolidine
Upstream of outfall	8/25/1230	0	--
Downstream of outfall	8/25/1230	N.D. $\bar{X} = 1.4$ ppm	-- $\bar{X} = 0.3$ ppm
STP effluent	8/24/0900 8/24/1500	1.75 ppm 0.7 ppm	0.5 ppm 0
STP Effluent	8/25/1200	1.75 ppm	0.5 ppm

N.D. = None detected
 -- = Not measured

During the survey the daytime water temperature in Dragoon Creek averaged 72°F and the median pH was 7.2. The average dissolved oxygen was 7.9 ppm which was at 95% saturation. The water was soft with a total hardness of 49 ppm (CaCO₃). It had a good buffering capacity with an alkalinity of 120 ppm (CaCO₃). The chemical parameter levels increased an average of 16 times the ambient background level 20 feet downstream from the STP outfall. The range was from little or no significant change for nitrate (NO₃-N) to a 59 fold increase for ammonia (NH₃-N). The total chlorine residual was undetectable (less than 0.2 mg/l) 20 ft. downstream of the outfall. The flow averaged 1.87 mgd or 1.2 cfs.

Seven types of nongame and two game fish species were found above and below the STP outfall: Eastern Brook Trout (S. fontinalis), Rainbow Trout (S. gairdneri), Suckers (Catostomidae), Redside Shiner (R. balteatus), Chub/Dace (Cyprinidae). The majority of the Eastern Brook trout (Salvelinalis fontinalis) were between 10-12 inches. The S. fontinalis had large heads in proportion to their overall body length indicating slow growth. The majority of the fish were suckers and shiners.

CONCLUSIONS

Dragoon Creek outwardly appears to be relatively unaffected by the STP effluent, but chronic toxicity may be present. There was no visible change in algae growth or bottom sediments in the streambed below the outfall. The fish species diversity was not altered appreciably. Sewage odor or discoloration was not detected below the outfall.