

STATE OF WASHINGTON
DEPARTMENT OF ECO
DANIEL J. EVANS
GOVERNOR

JOHN A.
DIRECT

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October 4, 1972

MEMORANDUM

TO: John Glynn
FROM: Scott Jeane
SUBJECT: Newaukum Creek Survey, July 19, 1972, Pierce County
OBJECTIVE: To determine the effect of manure disposal by dairy farms on Newaukum Creek water quality.

On February 15, 1972, in a memo to John Glynn, I reported on the creek's water quality status during winter runoff conditions. The subject of this report is the creek's water quality during low stream flow and dry weather conditions.

John Glynn and myself resurveyed the creek on July 19, according to the design set forth in the February report on Newaukum Creek. Stations 10, 11, and 12 were not sampled due to dry or stagnant conditions.

Water Analysis

Temperature ranged from 6 to 10⁰ above the February survey values.

Dissolved oxygen at the control stations was lower than observed values during the winter survey while the % saturation for these two stations did not vary. For all remaining stations tested the % saturation increased.

Biological oxygen demand was slightly lower at all stations as related to the February survey.

Chemical oxygen demand at station 2 was abnormally high as compared to all other stations. All stations exhibited a lower (2 to 7 times) COD as compared to the February survey. The reason for the station 2 value is unknown and not considered important.

Turbidity at all stations was lower than the previous winter survey.

Conductivity and pH values were slightly higher during the summer survey.

Coliform values revealed several interesting trends. Generally all stations were much lower due to lack of manure spraying operations. Three stations (3, 4, and 5) showed increases over the February survey. Stations 3 and 4 increases are possibly due to pastured cattle, wild animals, lack of dilution water available in the creek, and elevated water temperatures increasing survival time of bacteria. Station 5 seems to be just below a discharge high in total and fecal coliform. This discharge may be a domestic sewage discharge to the creek. The discharge has an affect on the bacteria levels of stations 5, 6, 7, and 8.

Nutrients (NH_3 , NO_2 , T- PO_4 , O- PO_4) were all consistently much lower, except for NO_3 . Stations 2, 5, 7, and 9 were higher in NO_3 -N. This is probably due to the remaining organic material in the creek being in the last stages of decomposition.

Aquatic benthos analysis (see Table 2) showed a decline in all populations. The decline in caddis flies and stone flies are due to hatching and is considered a normal reduction. The reduction of isopods and leeches is believed due to low available food levels. Lack of runoff from manure spraying operations has decreased available food (organic detritus) and caused these two populations of aquatic benthos to decrease toward a normal level.

Conclusions and Recommendations

Newaukum Creek has a Class A (Intrastate) Excellent water quality criteria classification by the Department of Ecology. The previous February, 1972, survey demonstrated gross pollution by spray manure disposal operations. The July, 1972, survey revealed a creek in the processes of recovering and its aquatic benthos populations returning to normal unpolluted levels. Of all parameters tested only bacteria and NO_3 -N revealed unusual trends. The NO_3 -N levels at several stations had increased over observed winter values. This increase is due to the last stage of decomposition of organic matter deposited in the stream during the winter. Coliform levels at all stations were much higher than the standard criteria for water contact sports. The excess bacteria mainly result from three areas. One is natural background levels the other is from bovine access to the creek. The third area of influence on high coliform levels is above station 5 and effects stations 6, 7, and 8. The source of this increase is most likely an illegal domestic sewage discharge to the creek. The local sanitarian should be contacted and requested to complete septic tank and sink dye studies on the houses above station 5 and below stations 3 and 4.

Prevention of spray manure disposal would allow the creek to return to more normal levels of aquatic insects, bacteria, and nutrient levels. The creek's bacteria levels will not be reduced to the Department of Ecology criteria unless bovine access to the creek is removed.

G SJ:bj

Attachments

Table 1. Chemical analysis of samples collected July 19, 1972, from Newaukum Creek. Values are expressed in ppm unless otherwise noted.

| Parameters | Stations | | | | | | | | |
|-------------------------------|----------|-------|------|------|-------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Temp. °C | 12.5 | 13.3 | 12.8 | 12.0 | 15.1 | 15.9 | 14.8 | 15.6 | 16.2 |
| D.O. | 5.4 | 9.6 | 9.7 | 9.7 | 10.7 | 10.3 | 11.2 | 10.3 | 10.1 |
| BOD | --- | <2 | --- | <2 | <2 | --- | --- | --- | <2 |
| COD | 2.4 | 26 | 2.4 | 4.0 | 6.4 | 6.6 | 9.1 | 5.0 | 6.6 |
| Turb. (JTU) | 1 | 2 | 2 | 2 | 6 | 6 | 5 | 2 | 2 |
| Conductivity (mhos/cm) | 190 | 205 | 84 | 84 | 119 | 121 | 125 | 128 | 129 |
| pH | 6.6 | 7.1 | 7.6 | 7.6 | 8.0 | 7.6 | 8.0 | 7.9 | 8.1 |
| Coliform colonies/ 100 mls | | | | | | | | | |
| Total | 2250 | 3750 | 1600 | 800 | 8000 | 6000 | 2750 | 1500 | 3000 |
| Fecal | <400 | 850 | 90 | 55 | 1250 | 1000 | 450 | 450 | 850 |
| Chloride | 5 | 11 | 2 | 2 | 4 | 4 | 4 | 4 | 4 |
| NH ₃ -N | N.D. | 0.06 | N.D. | 0.06 | 0.04 | N.D. | N.D. | N.D. | N.D. |
| NO ₃ -N (filtered) | 2.08 | 1.56 | 0.68 | 0.79 | 1.04 | 1.04 | 1.14 | 1.12 | 1.18 |
| NO ₂ -N (filtered) | <0.01 | <0.01 | N.D. | N.D. | <0.01 | N.D. | N.D. | N.D. | N.D. |
| T-PO ₄ -P | 0.15 | 0.06 | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 | 0.07 | 0.06 |
| O-PO ₄ -P | 0.08 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

N.D. = None detected

Table 22. Aquatic Invertebrates from stations located on Newarkum Creek.
 Samples collected July 19, 1972.

| Organisms | 2 | 3 | 4 | 5 | 6 | 7 | 9 |
|-----------------------------|---|---|---|---|---|---|---|
| Trichoptera (Caddisflies) | | | | | | | |
| Hydropsychidae | I | | | | I | A | I |
| Brachycentridae | | | | | | | A |
| Plecoptera (Stoneflies) | | | I | | | | |
| Ephemeroptera (Mayflies) | | | | | | | |
| Baetidae | | | A | A | A | A | A |
| Other | I | A | A | A | A | A | A |
| Diptera (Midges) | | | | | | | |
| Isopoda (Freshwater Shrimp) | A | I | I | | | | I |
| Oligochaeta | | | | | | | |
| Tubifex | I | | | | A | I | |
| Other | I | | | I | A | | |
| Hirudinea (Leeches) | | | | | | | |

In descending order of abundance

- A = Abundant
- F = Frequent
- I = Infrequent
- S = Seldom

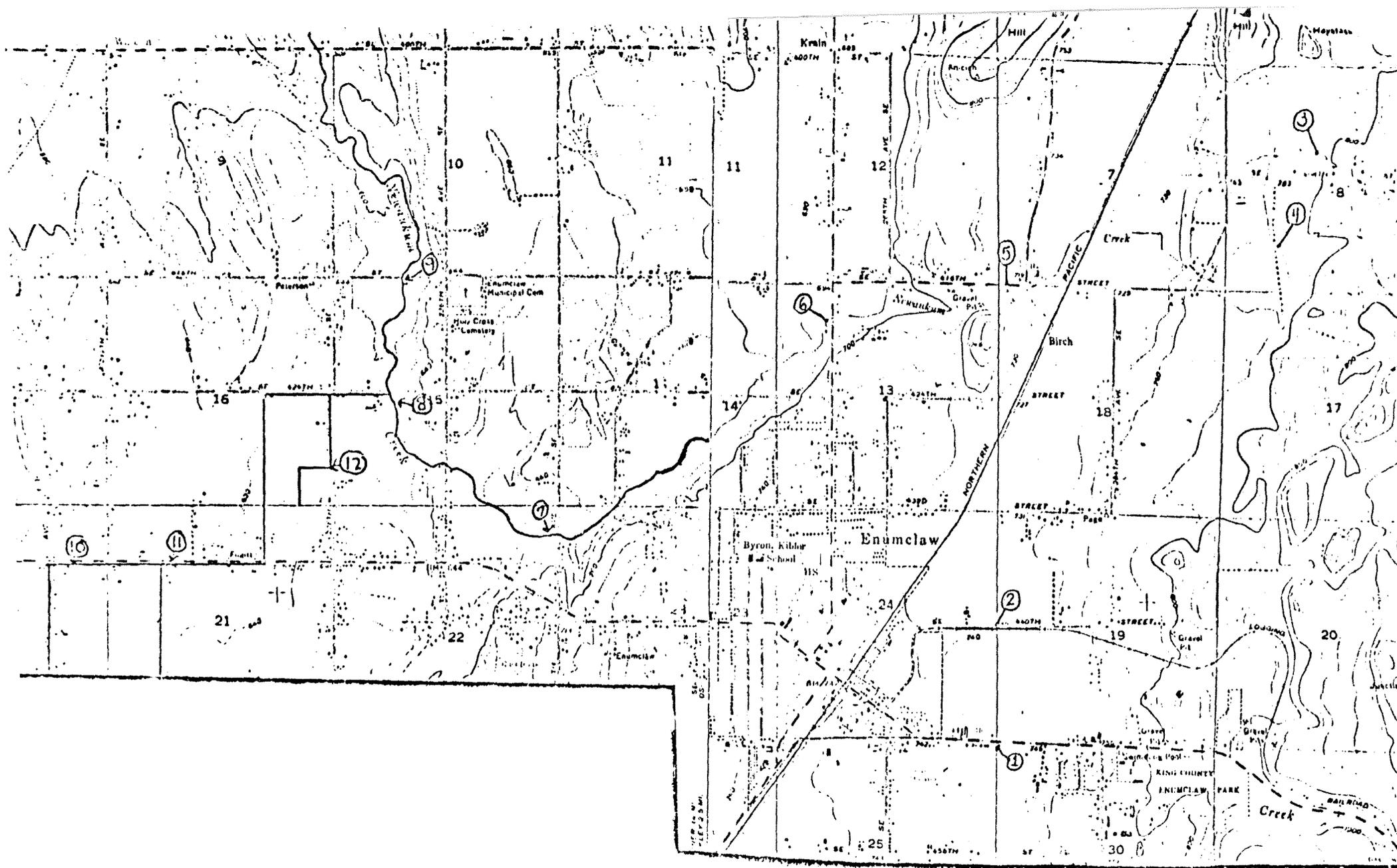


Figure 1. Location of stations on Newaukum Creek, February 15, 1972.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WATER QUALITY LABORATORY

ORIGINAL TO:
S. Jean
COPIES TO:
.....
.....
LAB FILES

DATA SUMMARY

Source Newaukum Creek

Collected By S.J.

Date Collected 7-19-72

Goal, Pro./Obj. 3.2.21

| Log Number: | 7225- | 94 | 95 | 96 | 97 | 98 | 99 | 600 | 01 | 02 | STORET |
|------------------------------|-------|------|------|-----|------|------|------|------|------|----|--------|
| Station: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| pH | | | | | | | | | | | 00403 |
| Turbidity (JTU) | 1 | 2 | 2 | 2 | 6 | 6 | 5 | 2 | 2 | | 00070 |
| Conductivity (umhos/cm)@25°C | 190 | 205 | 84 | 84 | 119 | 121 | 125 | 128 | 129 | | 00095 |
| COD | 2.4 | 2.6 | 2.4 | 4.0 | 6.4 | 6.6 | 9.1 | 5.0 | 6.6 | | 00340 |
| BOD (5 day) | | <2. | | <2 | <2. | | | | <2. | | 00310 |
| Total Coliform (Col./100ml) | 2250 | 3750 | 1600 | 800 | 8000 | 6000 | 2750 | 1500 | 3000 | | 31504 |
| Fecal Coliform (Col./100ml) | <400 | 850 | 90 | 55 | 1250 | 1000 | 450 | 450 | 850 | | 31616 |
| NO3-N (Filtered) | 2.08 | 1.56 | .68 | .79 | 1.04 | 1.04 | 1.14 | 1.12 | 1.18 | | 00620 |
| NO2-N (Filtered) | <.01 | <.01 | ND | ND | <.01 | ND | ND | ND | ND | | 00615 |
| NH3-N (Unfiltered) | ND | .06 | ND | .06 | .04 | ND | ND | ND | ND | | 00610 |
| T. Kjeldahl-N (Unfiltered) | | | | | | | | | | | 00625 |
| O-PO4-P (Filtered) | .08 | .02 | .02 | .02 | .02 | .02 | .02 | .02 | .02 | | 00671 |
| Total Phos.-P (Unfiltered) | .15 | .06 | .06 | .06 | .06 | .07 | .07 | .07 | .06 | | 00665 |
| Total Solids | | | | | | | | | | | 00500 |
| Total Non Vol. Solids | | | | | | | | | | | |
| Total Suspended Solids | | | | | | | | | | | 00530 |
| Total Sus. Non Vol. Solids | | | | | | | | | | | |
| Chlorides | 5 | 11 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | | 00940 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

All results are in PPM unless otherwise specified. ND is "None Detected"
Convert those marked with a * to PPB (PPM X 10³) prior to entry into STORET

Summary By Stephen P. Roll Date 8-2-72