

7

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
A BIOLOGICAL ASSESSMENT OF THE MAJOR TRIBUTARIES
of the
TUALATIN RIVER USING MACRONINVERTEBRATES
1975 - 1976

UPPER TUALATIN RIVER

Scoggins Creek

Since the construction of Scoggins Dam, the flow of lower Scoggins Creek consists entirely of release water from Hagg Lake. Chemical samples taken since the completion of the dam suggest that the creek water is generally of good quality, well oxygenated, and low in nutrients. Biological samples were taken in April and June of 1976 at the old Highway 47 bridge. The bottom substrate at this location consists mostly of bedrock with a minimal area suited to macroinvertebrates. As a result much reduced populations were found. In April, 3 genera of stoneflies, midges and snails were found whereas in June, 8 genera of organisms were found dominated by mayflies, midges and blackflies. Despite the low numbers, the presence of stonefly and mayfly nymphs imply that the water is relatively unpolluted. During low flow, reservoir releases to Scoggins Creek provide a significant source of good quality water to the Tualatin River.

Gales Creek

Gales Creek flows out of the Coast Range on the western edge of Washington County and enters the Tualatin River near Forest Grove. It drains principally forest and agricultural land although it passes through the small towns of Glenwood and Gales Creek. Biological samples were taken in April and July 1976 in the middle reaches near the junction of Highway 8 and Highway 6 and lower reaches near the Highway 46 crossing at Forest Grove.

Samples taken from the rocky substrate at the upper site show a good diversity of organisms with 14 genera in the spring including 6 genera of mayflies, 4 genera of caddisflies and 2 genera of stoneflies. In the summer 17 genera were found including 4 genera of caddisflies, 4 genera of mayflies, 3 genera of stoneflies and various other flies.

In the lower reaches a much reduced population of organisms was found due in large part to lack of suitable substrate. In April there were 6 genera of mayflies and caddisflies and in July there were 10 genera of organisms including scuds, mayflies, caddisflies, stoneflies, and snails. Chemical samples taken at the lower station over a period of years indicate a slight enrichment but overall good quality, well oxygenated water which has a favorable influence on the Tualatin River.

MIDDLE TUALATIN RIVER

McKay Creek

McKay Creek, a major tributary to Dairy Creek, originates in the northern hills of Washington County and flows through some forest land and considerable agricultural land before entering Dairy Creek near Hillsboro. In April and July of 1976, biological samples were taken in the upper reaches of the creek above the town of Shadybrook. The sample site was characterized by a rocky substrate and moderately fast flowing water. In April the fauna consisted primarily of mayflies with 6 genera present, 4 other genera of organisms were present with aquatic worms comprising the bulk. In July, there was a fairly even distribution of organisms amongst 13 genera including mayflies, stoneflies, caddisflies, midges,

crane flies, snails, and crayfish. Two sculpins were also collected. Chemical samples were not taken in McKay Creek but the biological indicators suggest that the flow at this point is unpolluted natural drainage.

Dairy Creek

The Dairy Creek drainage system includes McKay Creek and the east and west forks of Dairy Creek all of which originate in the northern hills of Washington County. Considerable agricultural usage is made of these waters with resulting organic enrichment. Some residential areas contribute organic loads to the system particularly on the west fork of Dairy Creek where the Banks sewage treatment plant discharges to the creek.

Biological samples were taken in the upper reaches of the east fork near Meachum in April and July 1976. The site was characterized by a fast flow over a rocky substrate. A large diversity of organisms, 15 genera in April and 14 genera in July, was present including 6 genera of mayflies, 5 genera of caddisflies, 4 genera of Diptera, and 2 genera of stoneflies. Mayflies outnumbered other orders in the spring but the population was fairly evenly distributed in July. Although no chemical samples were taken, indications are that this is a natural unpolluted drainage.

Samples were also taken below the confluence of McKay Creek and the east and west forks of Dairy Creek near Hillsboro in April and July of 1976. This site was characterized by high flows, eroding banks and a silty, shifting substrate. Difficult sampling conditions existed in

April and only one genera of organisms, stoneflies, could be found. In July, low flows revealed a substrate of broken cement, and other debris. Seven genera of organisms were found consisting predominately of mayflies and snails. Once again the lack of suitable substrate has influenced the macroinvertebrate populations more than the actual water quality. In such cases the periphyton community is often a better index of water quality but it was unfortunately not sampled. Chemical analysis of the creek at this site over a period of years indicate that some organic and inorganic enrichment do occur but that the overall quality is good.

Rock Creek

Rock Creek flows out of the northern hills of Washington County in the Cornelius Pass area. The upper water shed consists primarily of farmland and some forested area. In the middle and lower reaches extensive residential development exists and is rapidly increasing. In the winter, the effluent from the Sommerset West sewage lagoons enters Rock Creek just south of Highway 26. Further downstream, Beaverton Creek with its extremely heavy organic load enters Rock Creek and leaves the lower reaches in a heavily polluted condition. Near the mouth, the Hillsboro treatment plant also discharges to Rock Creek. Rock Creek water which enters the Tualatin below Hillsboro amounts to slightly diluted, treated sewage effluent.

Biological and chemical samples were taken in July and November of 1975 at: N.W. Union Road above the major development; above and below the Sommerset West outfall; above the entrance of Beaverton Creek; and above and below the Hillsboro outfall. All sample stations were characterized

by a sluggish flow and a heavily silted bottom. Low summer flows resulted in depressed dissolved oxygen concentrations at most locations.

Chemical samples taken at N.W. Union Road indicated that the water quality at this point is generally good with slight nutrient enrichment. Biological samples tend to reflect the silty substrate with clams, worms and scuds dominating in July and snails in November. Similar characteristics were found just above the Sommerset West outfall, however, fair numbers of alderflies were also found. Below the treatment plant outfall, large numbers of midge larvae and Tubifex worms were found probably reflecting the increased nutrient load.

At S.W. 216th, upstream from the entrance of Beaverton Creek, biological samples suggest the water quality to be somewhat similar to the stations above Sommerset West whereas downstream from the confluence at River Road, biological and chemical samples show the stream to be heavily polluted and suited only to small numbers of Tubifex worms. Chemical samples taken during summer low flow show a depressed dissolved oxygen and very high nutrient concentrations: $O-PO_4 = 13.6 \text{ mg/l}$, $NO_3 = 4.0 \text{ mg/l}$, $NH_3 = 3.1 \text{ mg/l}$. During November high flow, these values were somewhat reduced.

Samples taken 75 feet downstream from the Hillsboro STP and 1/4 mile on downstream from there, show virtually unaltered conditions and no signs of biological recovery.

Beaverton Creek

The Beaverton Creek drainage system consists of Hall, Golf, Messenger, Cedar Mill, Willow and Bronson Creeks. All are lowland in origin and are composed mainly of springs, residential drainage and sewage treatment plant effluent. The combined flows of Hall, Golf, Messenger and Beaverton Creeks

form the mainstem of the creek which then flows through Beaverton where it receives the effluent from the Beaverton sewage treatment plant and the Tektronix industrial and domestic wastes plants. It then receives some dilution from Cedar Mill Creek, the effluent from the Aloha sewage treatment plant and the small flows of Willow and Bronson Creeks before it merges with Rock Creek near Orenco. Biological and chemical sampling was performed in the spring, summer and winter of 1975.

Hall Creek - This small tributary was sampled at S.W. 91st in November 1975 and at S.W. 114th in June of 1975. The upstream location (S.W. 91st) showed a large population of clams and Tubifex worms, with small numbers of snails, scuds and midge larvae. A high fecal coliform count suggests some possible contamination but the overall water quality appears good. Downstream at S.W. 114th, the combined waters of Golf and Hall Creeks show increased nutrient levels and decreased organism diversity with aquatic worms and midges numerous. The slow, turbid water is mainly urban runoff at this point.

Messenger Creek - This is a small spring with a steady flow of about 350-400 gallons per minute. Samples were taken upstream and downstream of the Cedar Hills treatment plant outfall in June and November 1975. At the upstream site the water was well oxygenated and the generally sandy bottom supported a limited fauna of snails and worms in June and midges, scuds, snails and worms in November. Chemical samples showed high nitrate concentrations in June and November and high fecal coliform counts were found in June suggesting the intrusion of some domestic wastes.

Downstream from the treatment plant, insufficient dilution results in a tremendously increased organic load and high chlorine residuals. The resulting fauna consists entirely of highly tolerant midge larvae and Tubifex worms.

Beaverton Creek - Mainstem - Biological and chemical samples taken the entire length of Beaverton Creek show conditions of very heavy pollution. The creek is characterized by sluggish flows and a heavily silted bottom. Disturbing the bottom sediments often produced H₂S odors. The benthic fauna consists entirely of highly pollution resistant midge larvae and Tubifex worms ^{with} in large numbers present in most locations. An exception occurred below the Tektronix industrial waste outfall where heavy metal accumulations in the sediments have apparently limited the populations. Likewise smaller populations were noted directly below the treatment plant outfalls presumably because of high residual chlorine levels. The samples taken at N.W. 216th near the mouth of Beaverton Creek show the only variation from the above conditions with 5 genera of organisms present including alderflies, damselflies, midges, scuds and snails. This may indicate some level of biological recovery.

Chemical samples show high levels of nutrients, suspended solids, biological oxygen demand and conductivity at all locations. Depressed dissolved oxygen levels were also found in several locations particularly below Tektronix.

Cedar Mill Creek - Cedar Mill Creek enters Beaverton Creek about two miles downstream from the Tektronix outfall. It consists of springs originating in the Cedar Mill area. A small package sewage treatment plant exists at Pannavista in the creek headwaters. The rest of the creek consists of

low and medium density residential lands. The creek was sampled in June and July of 1975 and May of 1976. Nitrate concentrations of greater than 1.0 mg/l and high fecal coliform counts in the lower reaches below Cornell Road suggest some septic tank runoff. Biological samples taken above the Pannavista STP show a large population of mayflies and midges whereas below, Tubifex worms dominate. A series of waterfalls and riffles occurs near Cornell Road and a fair diversity of mayflies, caddisflies, and worms was found. Further downstream the creek becomes slow moving and silty and the fauna is primarily midge larvae and Tubifex worms. Cedar Mill Creek provides a fair source of dilution water for Beaverton Creek.

Willow Creek - Willow Creek originates northeast of the Oak Hills area and drains agricultural land until it reaches Oak Hills where, until the middle of 1975, it received the effluent from the Oak Hills treatment plant. The creek was sampled in April 1975 while the treatment plant was still in operation and showed extremely high ortho-phosphate and ammonia nitrogen levels below the outfall with a preponderance of Tubifex worms and midge larvae. A few sow bugs and snails were found 1/4 mile downstream from the outfall whereas upstream from the outfall numerous Tubifex worms and some clams and snails were found.

The creek was sampled again in May 1976 and showed much improved chemical conditions with nutrient levels greatly reduced. The fauna upstream from the old outfall showed Tubifex worms to be most numerous followed by scuds, mayflies and caddisflies. In the riffles below N.W. Bronson, midge larvae and blackflies were present in large numbers and suggest that the stream has not undergone a complete biological recovery

as of yet. The improved water quality should help Beaverton Creek.

Bronson Creek - Bronson Creek also originates in the Oak Hills area and flows through agricultural land and low density residential land. It is ponded at Tanasbrook and later receives the wastes from the Oregon Primate Center before reaching Beaverton Creek near S.W. 205th. Chemical samples taken in April and November 1975 indicate the water to be of generally good quality upstream from the Primate Center and slightly enriched below. The benthic fauna substantiate this with a good diversity of organisms at N.W. 174th including clams, worms, snails, leaches, mayflies, scuds, etc. In the swampy area around the Oregon Primate Center we see reduced populations of midges, snails, worms and a few alderflies. Bronson Creek provides some fair quality dilution water to Beaverton Creek.

LOWER TUALATIN RIVER

Chicken Creek

Chicken Creek originates in the hills west of Sherwood and flows through low density residential and farm lands. During the winter months it receives the discharge from Sherwood's sewage treatment plant approximately one mile above its entrance to the Tualatin River. Chemical samples show the creek to have fairly high nitrate levels. Fecal coliform counts above the Sherwood outfall are also high. Downstream below the outfall increased nutrient and suspended solids levels occur. Biological samples taken above the outfall at Scholls Road showed a fairly good diversity of aquatic life with 12 genera of mayflies, stoneflies, caddisflies, midges and worms whereas downstream below the outfall reduced

populations occurred probably reflecting poor substrate availability.

Fanno Creek

The Fanno Creek drainage system consists primarily of residential drainage with some agricultural land. It receives drainage from a large segment of S.W. Portland and some suburban areas of Washington County. Until the summer of 1976, the effluent from Fanno Creek, Metzger and Tigard sewage treatment plants made up a significant portion of the total flow. The stream bottom except for the upper rocky reaches, is largely silt and sand with occasional rocks and debris.

In April, June and November of 1975 and November 1976, extensive biological and chemical samples were taken along the entire length of the creek. Chemical samples taken upstream from the treatment plants at S.W. 39th, Scholls Ferry Road, and Denny Road suggest that the water is generally good quality with some nutrient enrichment at Denny Road. Biological samples taken at the rocky areas of S.W. 39th and Scholls Ferry show a mixed population of midge larvae, worms, snails, scuds, and crayfish.

Starting with Denny Road and continuing the rest of the length of the creek, the benthic fauna consists entirely of midge larvae and worms of the Tubificidae family. Extremely large populations of midges occur at most locations except below the Fanno Creek STP where high residual chlorine levels have apparently eliminated most organisms. Chemical samples indicate gross pollution the entire length of Fanno Creek below the Fanno Creek STP with the biological oxygen demand ranging to 20 mg/liter, ammonia nitrogen to 15 mg/liter, orthophosphate to 18 mg/liter and nitrate to 5 mg/liter.

Samples taken in November 1976 after the elimination of the treatment plant discharges show that chemically, great improvements have been made in the water quality with nutrient levels being quite low although BOD's are still somewhat high. The appearance of limited numbers of snails, scuds and sow bugs in the lower reaches suggests that some biological recovery may be occurring.