

Investigation of the Impact from
the Accidental Introduction of
Alum into Lagunitas Creek on
22 August 1974

Prepared for
Marin Municipal Water District
220 Nellen Avenue
Corte Madera, California 94925

Prepared by
MADRONE ASSOCIATES
Environmental Consultants
35 Mitchell Boulevard, Suite #9
San Rafael, California 94902

Submitted by
Raymond L. Peterson
Staff Biologist

September 1974

Introduction

The Marin Municipal Water District requested that a Madrone Associates representative be on hand to oversee the final phases of the removal of alum accidentally introduced into Lagunitas Creek from their San Geronimo Water Treatment Plant in Marin County, California. Also, the district requested that a Madrone staff biologist investigate the impact upon the creek not only from alum, but also from local flow-reversal and subsequent lowering of water levels downstream. An account follows.

The Initial Problems and Actions

Early on the morning of 22 August 1974, a tank truck began to pump alum into the Marin Municipal Water District's alum tank at the San Geronimo Water Treatment Plant. As soon as normal pumping pressure was reached, the back of the plant's filler coupling broke and approximately 75 gallons of alum were pumped into a drain before the flow from the truck could be stopped. The drain emptied into Lagunitas Creek.

The immediate response of the Water District personnel was to get the alum out of the creek. A crew was dispatched, set up a bypass, and held the chemical's flow to the first two pools below the point of introduction, that is, below the plant's outfall. In order to remove all of the alum, the crew had been ordered to pump the pools out completely. The bypass was

designed to pump the creek water from above the outfall to a point approximately 175 linear feet below the outfall at the creek's normal velocity. At approximately 2:30 pm that afternoon a staff biologist from Madrone Associates arrived and noted the following:

1. That the alum had been completely removed,
2. That the pH of the creek was normal,
3. That the first two pools below the outfall had been pumped nearly dry,
4. That the first 120 feet below the outfall was devoid of subsurface aquatic animals, and
5. That there were signs of subterranean flow from downstream back up into the second, or lower pool, that had been pumped out.

Looking downstream it appeared that some organisms had survived, using those that breathe through gills and cuticle as an index. However, it soon became obvious that the water level was dropping, the flow slowing. By 4:30 pm the flow of the creek had been reversed for some 241 linear feet below the outfall - the bypass, i.e., the creek's normal rate of flow was less than the subterranean flow into the pools that had been pumped down.

The Secondary Problem and Actions

The extensive removal of the alum had generated another problem: that of the potential desiccation of the remaining

aquatic animals. With the downstream flow decreasing steadily, the only alternative was to refill the pools below the outfall as quickly as possible. There were two choices of water to use: that directly from Lake Nicasio, untreated, or that from the plant, treated. The former was rejected because of the lake organisms that may be introduced into the creek, and the latter because of the chlorine content. A district engineer at the scene suggested opening a hydrant some 200 feet from the creek. The path from the hydrant to the creek was down a gully. The engineer believed that sunlight, aeration, and filtration during the course of its flow would render the water chlorine-free. Subsequent analysis proved this to be so, and by 5:30 pm the flow of the outfall was trebled. Within two hours the pools were full and normal flow resumed.

The Follow Up

The next day, the 23rd, a survey was conducted to determine the immediate effects, to see how many animals had died. A number of larval psephenids, water-penny beetles, were found dead on the under sides of rocks near the water's edge. Those toward the center of flow survived in tact. Also, the naiads of a species of may fly, Paraleptophlebia, seen a week before, were not found. Otherwise, the animals were approximately as diverse in species and as well represented in numbers as they were on 17 August 1974, the date of Madrone's last survey.

The recentness of events and high turbidity of the water made it necessary for a subsequent visit to the site.

Ten days later, on 2 September, sampling showed that the water-penny beetle larvae population was reduced by approximately one-half, and that of the may fly naiads, Paraleptophlebia, by approximately four-fifths. The alderfly, Sialia, which was coming back into the upper stretches following an alum spill in early August of this year, is no longer in the two upper pools. However, it is in the third pool, that is, approximately 230 feet downstream from the outfall. A single damselfly naiad, Argia sp., is back in the first pool below the tributary, although nothing was found on which it could feed.

All of the other species collected on 17 August were found on 2 September; however, their overall numbers have been reduced by an estimated ten to twenty percent between the outfall and the tributary, some 1,500 feet downstream. The areas below the tributary were unaffected.

Between the health of the stretches above the outfall and below the tributary in Lagunitas Creek and the hardness of the aquatic naiads and larvae, it is expected that the affected areas will be back to near normal next year, and definitely so by 1976.

Recommendations

In addition to the recommendations made to Marin Municipal Water District by Madrone Associates in their report of 19

August 1974, it is further recommended that all drains associated with chemical tanks and lines empty into holding tanks and that the contents of these tanks not be released into Lagunitas Creek until it is certain that they contain no toxic or otherwise harmful materials. And once again, that the Marin Municipal Water District establish some form of standard procedure for all personnel to follow in order to prevent or limit future mishaps involving any toxic or otherwise harmful materials.

Submitted by:

Raymond L. Peterson
Staff Biologist
Madrone Associates

Lagunitas Creek Insect Check List

Collected 2 September 1974 in area between outfall and
tributary to assess survival of organisms breathing
through gills or cuticle.

Ephemeroptera

Baetidae

* Paraleptophlebia sp.

Odonata

Coenagrionidae

Argia sp.

Aeshnidae

Aeshna umbrosa Walker

Plecoptera

Nemouridae

Sp. A (Early instars)

Megaloptera (= Neuroptera)

Sialidae

Sialis sp.

Trichoptera

Leptoceridae

Leptocella sp. (?-dead larva in case)

Psychomyiidae

Polycentropus sp.

Hydropsychidae

Macronemum sp.

Coleoptera

Dryopidae

Helichus sp.

Dytiscidae

Agabus brevicollis Le Conte

Psephenidae

* Psephenus sp.

Conspicuously absent:

Ephemeroptera

Heptageniidae

Cinyra sp.

* Significantly reduced in number between 17 August and
2 September 1974.