

considerable degree of deterioration in the trout-stocks of many waters. However, increase of population and the development of industries were accompanied by a tendency on the part of various sections of the public to "regard a river as a slop-basin to pour their waste material into," and so we have sewage, sawdust, dairy-factory waste, drainage from sheep-dips, putrifiable disjecta from freezing-works and abattoirs, effluents from gasworks, and oil-soaked mud from town drains finding their way with toxic effects of varying degree into streams that were pure when the pioneers of fish-acclimatization planted their first trout in them. There is no need to wonder why trout fisheries have deteriorated. Fortunately, in our sparsely populated and well-watered land the deterioration of fishing-waters is not universal and occurs on nothing like the scale which has caused and is still causing fishery authorities so much trouble and expense in more densely peopled and more highly industrialized countries. Our duty as a fisheries administration is to realize and understand the conditions and to set about their amelioration before they become worse and so make either the removal of causes or the remedying of effects more problematical and more difficult than they are already. It is an anomaly and, from the fisheries point of view, a deplorable state of affairs that those responsible for the well-being of fresh-water fisheries have no authority whatever, either direct or vicarious, over the water in which the fish live. All they can do is to prosecute the responsible parties when pollution has taken place and can be proved. There would appear to be need for some legislative and administrative effort to remove this anomaly. A new development that has taken place this year, and that should be recorded, is the formation of a committee to investigate and to give technical advice in connection with the disposal of dairy-factory wastes in Taranaki. The committee was formed at the suggestion of the Hon. the Minister of Marine following a conference with representatives of the Federation of Taranaki Co-operative Dairy Factories and of the local acclimatization societies, which was attended also by the Hon. the Minister of Agriculture. On the committee are representatives of both the fishing interests and the dairy-factory interests. This is a welcome development which one hopes may be extended to other fields. Unlike the quality of mercy "that blesseth him that gives, and him that takes," the pollution of streams is a curse to the parties that cause it because they are liable to be prosecuted, and to the parties that suffer from it, because the water in which they find their pleasure is fouled and the fish on which they have based their hopes and spent their money are poisoned or driven away to more salubrious haunts. The most satisfactory means of preventing trouble is by the elucidation of the material circumstances attending each case, of which no two are precisely alike, and by each of the parties appreciating the other's difficulties and doing all that is practicable to remove or minimize them. The hopes of fishery interests are brightened by the knowledge that not only anglers are interested in the maintenance of the purity of rivers and streams, but pollution is only one of the factors that creates problems for fishery authorities.

As in the case of marine fisheries, the basis of effective administration and rational management for fresh-water fisheries is an enlightened understanding of the material factors concerned. Making sure of the facts is the purpose of scientific investigation, and in this connection it is expedient at the outset to put the question, "What knowledge is of most worth?" For while the study of trout embraces a whole universe of various forms of scientific inquiry there are some problems whose solution would appear to be of more direct practical value than others.

FRESH-WATER RESEARCH.

Although the physical and chemical character of the habitat and the effects of various aspects of human agency have an intimate effect on fish-life, the study of trout is essentially a biological inquiry, and it is on this premise that one must discuss the policy to be followed in connection with the work to be done by the fresh-water research section of the Fisheries Branch. With the harvest of problems so plentiful it is important to concentrate on those questions which appear to have the most direct bearing on the practical management and the possible development of fresh-water fisheries. The general aim is to ensure that whatever is done in connection with fisheries management is done in the light of the best possible understanding of causative conditions and of observed effects—and effects have to be observed before they can be understood. Among causative conditions there are both natural and artificial factors: (1) The natural phenomena resulting from the operation of biological laws (which when elucidated by scientific research can be taken into account, though not amenable to direct control by man), and (2) those operations connoted by the term pisciculture which in New Zealand consist largely of the work done by the executives and staffs of acclimatization societies for the maintenance of fishing. In aquiculture, as in agriculture, we need to plant our seed where it will yield the best harvest either in sporting or food value; and we have a lot to learn before we shall be able to do it with any real confidence. The past fish cultural work of acclimatization societies and of this Department, in the absence of scientific observations such as would afford definite knowledge of the life-conditions of the fish-stocks, were to a very large extent speculative ventures. They must necessarily remain speculative until they are combined with observational work in which causative factors and effects that follow are properly demonstrated and recorded. A policy was initiated by the former Fresh-water Research Committee, and furthered largely by the efforts of Mr. D. F. Hobbs, by which local fishery authorities have been encouraged to make departures from their traditional plan of distributing hatchery-produced fry in the hope that benefit to fishing would accrue, but in most cases with no definite knowledge that such would be or had been the case. Some of them have been induced to recognize the experimental aspect of hatchery and stream-stocking operations and to continue them in such a way that useful data may be forthcoming which will throw light on the questions that require to be cleared up before the speculative element can be eliminated. For several years now the Waitaki Acclimatization Society has modified its policy for investigational purposes, and more recently the Auckland Society and smaller ones have followed its lead. The Wellington