

Of growing interest are the results of population growth and industrial development in polluting waters used by fish and shellfish. Studies on pollution are aimed at establishing the kinds of controls that will reduce the effects of pollution to negligible proportions.

#### OCEANOGRAPHY

Under an interdepartmental Joint Committee on Oceanography composed of representatives of the Fisheries Research Board, the Royal Canadian Navy, the Defence Research Board, the National Research Council, the Hydrographic Service of the Department of Mines and Technical Surveys and the Meteorological Service of the Department of Transport, co-ordination has been given to the national effort in oceanography. By agreement with the Committee, the Fisheries Research Board does basic physical and chemical oceanography of interest to all agencies of the Federal Government and carries out programs of special concern to the Navy and the Department of Fisheries.

For its own purposes the Board does biological oceanography along with the physical and chemical studies conducted by its two oceanographic groups, one on each coast. This information is necessary to understand the environment of various fishes and is obtained during exploratory fishing in marine and freshwater areas.

#### TECHNOLOGICAL INVESTIGATIONS

Research into the composition, preservation, processing and distribution of fish and fishery products is the responsibility of the Board's technological stations situated at Halifax, N.S., Grande Rivière, Que., and Vancouver, B.C.; smaller units doing more applied work are located at St. John's, Nfld., and London, Ont.

The problem of perhaps greatest importance is spoilage. From the time the fish loses its freedom in the water, factors bringing about spoilage start to operate and soon the fish will be unfit for food unless counter measures are taken. Such counter measures and their effectiveness are the subjects of much of the research work in the Board's technological stations. Attacks on this problem involve studies of the effects of antibiotics in varying concentrations and in various forms on slowing down spoilage and of the effects of all other types of preservatives; studies of the use of ice and the use of refrigerated sea water to lower the temperature of the fish almost to freezing as a means of lengthening the 'fresh' life; studies of the protein of the fish to find what changes take place during storage; studies of spoilage bacteria and its growth, an understanding of which might be the basis of a more effective attack on spoilage problems.

The time-honoured methods of preservation by salting, smoking, freezing and canning are given attention as problems arise so that these methods will produce the products needed for the markets that have been developed for them. No method yet devised will hold fish in unchanging condition so that improvements in techniques must be developed from time to time to reduce or control the changes taking place in the products processed for comparatively long-term preservation.

Of economic interest and potentially high value is the Board's work on by-products. The Board's scientists have been working on such projects as breaking down various marine oils into more valuable products, recovering proteins from cuttings and waste in the form of special meals to bolster human and animal diets, producing condensed fish solubles from the stick water pressed out in the production of meals to recover valuable nutritional materials to fortify animal feeds, and studying the make-up of all kinds of waste in an effort to find usable constituents that might be recovered economically enough to add value to the fisheries.