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Executive Summary

In 1977, an environmental monitoring program was established to evaluate the physical, chemical and biological changes associated with the development of the La Grande hydroelectric complex. Monitoring of fish communities, which was a regular component of this program, was carried out in the various types of modified environments over a period of more than 20 years, from 1977 to 2000.

Generally speaking, the fish communities have adapted well to the changes in aquatic habitats, whether in reservoirs, diversions, reduced-flow or increased-flow rivers, or immediately downstream from generating stations.

The general pattern observed in most cases is an increase in total fishing yields, followed by a gradual return, after about a dozen years, to values comparable to those in natural environments. The main species' growth and condition factor also follow this pattern in reservoirs and increased-flow environments. In reduced-flow rivers, there is little change in these parameters.

The great majority of fish species show considerable adaptability to the environmental changes, with the result that the communities are very similar both before and after the changes. Lake whitefish and northern pike are the species that benefit most from reservoir creation, and even exhibit particularly strong recruitment in the year of impoundment. Conversely, lake trout experiences recruitment difficulties in the reservoirs, likely because of winter drawdown. Sturgeon decreased in abundance in the Eastmain and Opinaca rivers, as a result of habitat changes or overfishing. In the Grande Rivière, where summer water temperatures are now lower, species that are more tolerant of cold water (round whitefish, brook trout) have displaced less tolerant species (walleye, cisco).

Fishing yields recorded for all species immediately below generating stations are higher than in reservoirs. The dams that obstruct fish migration and the influx of food from the reservoirs contribute to the concentration of fish immediately downstream. Lake whitefish even adopts a piscivorous diet there.

The monitoring of several different types of mitigation measures reveals variable results. In general, the construction of spawning grounds led to an increase in recruitment for the target species, and the installation of weirs on reduced-flow rivers contributed to increased productivity in these environments. For other measures, such as clearing and the closing off of a reservoir bay with a dike, the monitoring did not demonstrate any noteworthy effect on the fish populations' production.

Keywords

Fish; La Grande complex; monitoring; yield; growth; condition; James Bay; reservoir; reduced-flow environment; increased-flow environment; habitat; mitigation; diversion.

Distribution List

Cree Regional Authority; Ministère de l'Environnement du Québec; Ministère des Ressources naturelles, de la Faune et des Parcs du Québec; Fisheries and Oceans Canada; James Bay Advisory Committee on the Environment; Makivik Corporation; James Bay Hunting, Fishing and Trapping Coordinating Committee.

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