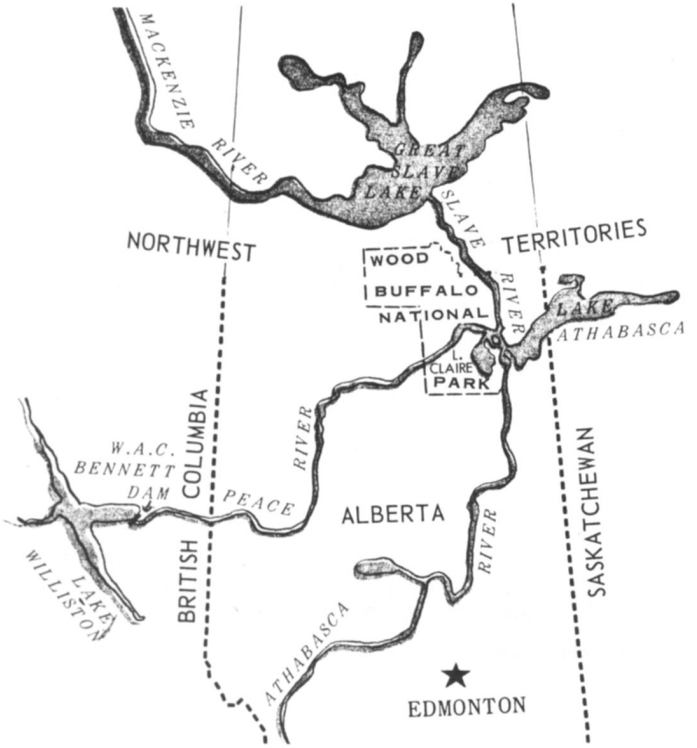
Birth of a Dam and Death of a Delta

A classic case of a large dam, planned by engineers without proper consideration of ecological factors, which threatens to have disastrous results, is that of the Bennett Dam on the Peace River in British Columbia, which became operative in 1967. By lowering the water levels in the vast inland delta of the Peace and Athabasca rivers and preventing the spring floods, the dam is turning 'a varied natural complex of lake and marsh' into 'a succession of isolated mudflats'. This is affecting every aspect of human activity in the area as well as the wildlife, particularly the wildfowl and also the unique herd of wood bison that depend on the sedge meadows in the Wood Buffalo National Park. A group of thirteen Canadians – engineers, biologists, geographers and social scientists – have described what is happening, and made urgent recommendations, in a Brief to Government, of which the major part is reproduced here.

The 1000-square-mile delta of the Peace and Athabasca Rivers near Ft. Chipewyan, Alberta, comprises a unique ecological system of lakes and rivers. More than half the area lies within Wood Buffalo National Park where formerly the wide sedge meadows provided food for the major herd of bison in North America, and the shallow lakes supported thriving populations of muskrats, beavers and waterfowl. Recent studies show that profound changes have taken place there because the regulation of the Peace River by the W. A. C. Bennett Dam in British Columbia has robbed the delta of the spring floods that are necessary to fill its many lakes, and to maintain the water levels in Lake Athabasca. Those changes will be permanent unless appropriate action is taken soon. We collectively would like to express our grave concern for the future of Lake Athabasca and its associated lakes, for the natural resources found therein, and for the 1300 Cree, Chipewyan and Metis people dependent upon them for a livelihood. Apparently, no one has considered the loss in human values that the Bennett Dam has caused; only the economic benefits to British Columbia have been considered.

Hydrology

The productivity and uniqueness of the Peace-Athabasca delta is entirely the result of its hydrological regime. Before construction of the dam, the Peace River had an extremely variable flow, characterized by spring flows in the order of 350,000 cubic feet per second (cfs), followed by a gradual decline during summer and fall to winter flows of about 15,000 cfs. Lake Athabasca and the major lakes of the delta are connected to the Peace River through several outlet channels. During the spring flood, the water level in the Peace River at the delta was generally higher than the level of Lake Athabasca and the other delta lakes. Consequently, the flow in the outlet channels changed direction and large inflows from the Peace River caused the lakes to rise rapidly



by 6 to 8 feet, to levels between 688 and 692 feet. At such high stages of water almost the entire area was under water, but such yearly flooding is essential to maintain the ecology of the delta.

The Federal Inland Waters Branch has produced the only published study of flows and water levels in the delta,* a study which is unfortunately, inadequate and incorrect in several respects. It asserts that Lake Athabasca levels should not drop below 682 feet in winter, yet during February of 1970 a level of 675 feet was measured. Also, in a sweeping final statement the downstream effects of Bennett Dam are called 'beneficial because of reduction in flood peaks and increases in winter flows'. Yet, there have never been any significant flood problems along the Peace River, and even the increased winter flows of 1969-70 were unable to prevent the catastrophic drop in the level of the delta lakes. All the other adverse effects of the dam, such as interrupted navigation, deterioration of national park values, and the elimination of subsistence trapping and commercial fishing in Lake Athabasca, are entirely ignored.

*Coulson, A. and R.J. Adamcyk – The effects of the W.A.C. Bennett Dam on downstream levels and flows. Technical Bulletin No. 18, Department of Energy, Mines and Resources, Inland Waters Branch, Ottawa, 1969.

Unfortunately, the return of wetter years, and the completion of the filling of the storage reservoir behind Bennett Dam will bring no relief. Nothing but the previously high spring floods in the Peace River Dam can restore the lake levels, unless control weirs are built in the delta.

National Park Values

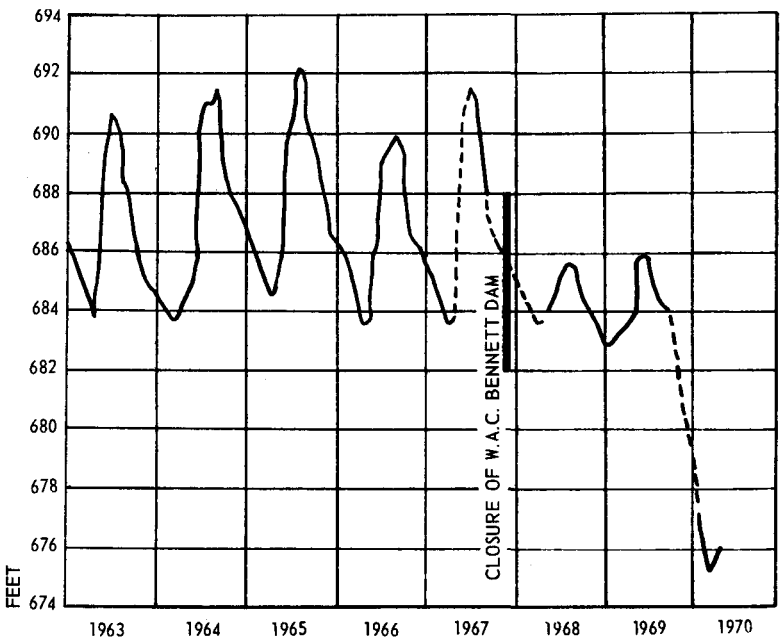
The National Parks Policy states that 'The basic purpose of the National Park system is to preserve for all time areas which contain significant geographical, geological, biological or historic features as a national heritage for the benefit, education and enjoyment of the people of Canada'. Nevertheless, extensive and significant changes have been allowed to occur in Wood Buffalo National Park, as a consequence of the lowering of the water levels in the vast Peace-Athabasca delta. What once was a fascinating and varied natural complex of lake and marsh is fast becoming a succession of isolated mud flats whose communicating streams are drying up. The Park was established originally for the protection of the wood bison,* but the replacement of their preferred sedge meadows by unpalatable grasses and dense thickets of willows may seriously restrict the supply of natural forage available to them.

Waterfowl Use

The lakes and marshes of the Peace-Athabasca delta are one of the most important areas for migratory waterfowl in Alberta. They are, in fact, unusual because they receive birds from each of the four major

*See *Oryx* December 1964.

Water Level Fluctuations



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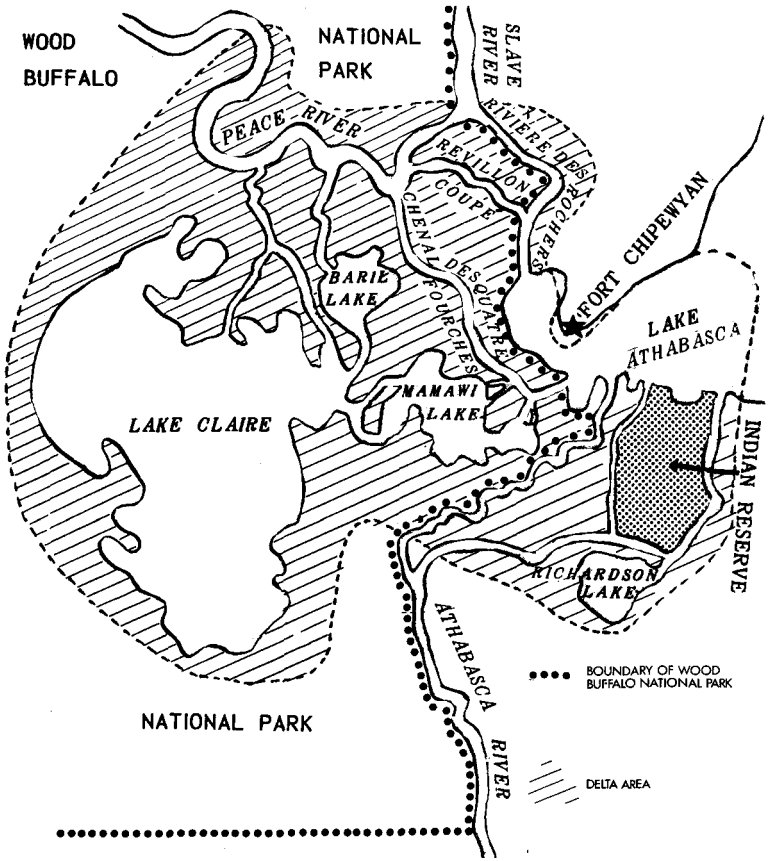

flyways in North America. Twenty-two species of ducks, five species of geese, swans, pelicans, grebes, gulls and great flocks of shorebirds have always appeared there each year on migration. Even the rare and spectacular whooping cranes feed and rest in the delta en route to their nesting grounds only a few miles northward. The drying out of the Peace-Athabasca delta is making the whole area less available to North American waterfowl, and is denying to them a most important traditional resting, breeding and moulting sanctuary.

Fur Trapping

Among the fur mammals inhabiting the Wood Buffalo National Park were muskrats and beavers that were most abundant in the marshes and channels comprising the Peace-Athabasca delta. Formerly they could persist in the delta because the waters were deep enough to provide them with shelter throughout the winter. Now that most of the water bodies are so shallow that they freeze to the bottom, those species no longer have secure habitat and food during winter and are disappearing as a fur resource for the local people.

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Fishing and Hunting

Fish populations in the Peace-Athabasca delta are adapted to a regime of annual water level fluctuations. All the shallow lakes, sloughs, river channels and backwaters of the area contain characteristic communities of plants and animals which depend for their existence on the annual spring floods of the large rivers. The previous high lake levels allowed flooding and recharging of the delta with nutrients carried in the silty waters of the Peace and Athabasca Rivers. Removal of this natural 'fertilisation' has already caused drastic changes in the delta channels and in Richardson Lake.

Winter habitat and spawning areas for pike have been eliminated in all but the main channels of the delta system. Walleye (pickerel) spawning in the Maybelle River adjacent to Richardson Lake suffered mortality in 1968 and 1969 that was never previously observed in the five-year research project carried on there since 1965. Spawning areas for cisco (tullibee) on the shores of Lake Athabasca have lain exposed to the elements during the past two winters. It is expected that the commercial fishery in Lake Athabasca will collapse within three to five years as recruitment to the harvestable fish populations of walleye, pike, and lake trout declines, and stocks of cisco are eliminated as the basic food supply for the carnivorous species listed above. Aside from the commercially harvestable fish, the availability of various species for native domestic consumption will be drastically reduced.

Hunting potential in the delta area is largely oriented towards waterfowl. During the past five years there has been a growing interest by sportsmen in hunting the variety of ducks and geese which have used the delta as a breeding and staging area. The local people have been increasing their activities as guides to waterfowl hunters, in addition to their traditional involvement in waterfowl hunting for food. As the vegetation changes, and as the area suffers further drying, the large waterfowl populations will be reduced to remnants of their former size. Because of the funnelling of birds from the four major flyway routes into the delta, hunting for ducks and geese could be significantly affected in southern Alberta, and in the United States as well.

If the Peace-Athabasca delta is sacrificed as a major waterfowl area, the vast populations wanting to go there would have to depend upon the Hay-Zama Lakes complex, which already is in grave danger of pollution from petroleum extraction. Present conditions on the Peace-Athabasca delta pose a threat to the elimination by direct and indirect effects, of one of the largest waterfowl hunting potentials in North America.

The Local Economy

The muskrats and beavers of the delta and the lake fish represented not only a cash income to the people of Ft. Chipewyan but also a source of feed for the local dog teams which supported the trapping industry. In addition, the geese and ducks which the local people hunted for food not only migrate through in reduced numbers, but feed in the shrunken marshes surrounded by wide mud flats, making them impossible to approach near enough to shoot.

This disappearance of a way of life, even though it was only subsistence living for most, has taken many people off the trap lines and placed them on welfare. The drying out of the delta lakes will ensure that even those people who are willing and able to trap will become year-round welfare recipients. Jobs are hard to find in this area of northern Alberta, and in the settlement of Ft. Chipewyan, where the average income is only $1500 per family, the loss of supplemental food sources can be most serious. Further, the drop in water levels has forced the local people to go 6 to 8 miles farther out into Lake Athabasca for their fishing than they ever had to do in the past.

Transportation

Transportation along the river systems has been affected as well. The Department of Public Works has had to dredge out into Lake Athabasca at least one and one-half miles farther as a result of the lowered lake levels. Barges are the cheapest mode of transportation into Ft. Chipewyan and if their use is restricted or stopped, the local people will have to depend entirely on aircraft to bring in goods at prohibitively high prices. Otherwise, the government will be forced to build a year-round road into the area. The barge traffic provides general supplies not only to communities like Ft. Chipewyan, but also carries equipment and supplies to mining and oil companies downriver, and to Uranium City and other points in northern Saskatchewan.

Recreational Values and Tourist Potential

The recreational potential of Lake Athabasca rests primarily on angling, wildlife viewing, and some hunting, boating and beach activities, all severely affected by the lower lake levels. Although it is not certain what eventual effects the lowered water levels will have on the beaches of Lake Athabasca, the overall potential of the lake has already been adversely affected as a recreational area for tourists and native Albertans alike.

Human Values and Civil Rights

The disruption and dislocation of a way of life for many northern Alberta people have not been considered. They are to be deprived of a means of livelihood without so much as an attempt being made by provincial or federal governments to investigate in advance in what ways the construction of the dam would affect them. They should, as residents of Alberta, have been adequately informed as to the consequences of regulation of the Peace River, and they should have had representations made on their behalf before it was too late to do anything about it.

What Now?

'Proper, timely and comprehensive planning could have avoided much of the damage now being wrought in the Peace-Athabasca delta', say the authors. 'Proper planning is imperative in the future to reconcile the objectives of economic development and resource conservation'. They suggest immediate measures to allow the delta system to survive until more permanent remedies, for which studies should be started

immediately, are agreed. 'The modification of the water regimen of Canada's Arctic Drainage Basins will not be possible without certain changes in the very nature of the lands and waters of the North. However, decisions to modify the country should be taken in full knowledge of relevant facts and consequences, rather than by default. The state of knowledge in 1970 should make it possible to plan future water resource development in northern Canada more realistically, with more awareness of the full downstream impact of a modified regimen, than was possible when the Bennett Dam project was conceived and executed. No time should be lost in drafting and adopting large-scale land and water use plans for the provincial as well as the territorial parts of the Canadian Northlands. The North is vast, and all competing uses of land should be easy to accommodate. Unless land use is planned, however, we shall destroy a lot more of the natural values of this land than need be.'

The Brief to Government was mainly the work of the Water Resources Research Centre at the University of Alberta, and a major part in it was played by Dr. W.E. Stevens of the Canadian Wildlife Service.

The Tsavo Elephants

R. M. Laws

In the December 1970 *Oryx* we published an article by Dr Laws on his elephant research in the Tsavo National Park. This was written in 1968, and in this additional note he summarises the findings of later research, both by him and by other research workers, which support its conclusions, and also comments on the article by Dr P. E. Glover, Botanist Warden of the Tsavo Research Project, published in the September 1970 *Oryx*.

The article on the Tsavo Research Project was written in 1968; since then a number of other papers have been published which support the conclusions.

Laws (1969a) summarised the results of his studies on elephant reproduction, including the regulatory changes in a number of populations. Laws (1970a) presented a number of case histories of elephant populations and habitat change. He discussed the nature of the behavioural changes associated with contraction of range and habitat damage, and concluded that only in the case of the Serengeti is there reason to suppose that fire is of primary importance. Laws (1970b) summarized current knowledge of elephant biology.

Laws, Parker and Johnstone (1970) described the results of detailed studies in the Murchison Falls National Park and surrounding areas, which are to be published in full as a book-length monograph. They write, 'The analysis of the elephant populations indicates that they are at densities in excess of the carrying capacities of the habitats and the continuing changes in these habitats are described. In the grassland and wooded grassland areas the destruction of woodland has progressed radially, a zone of damage about 15-20 km wide having moved