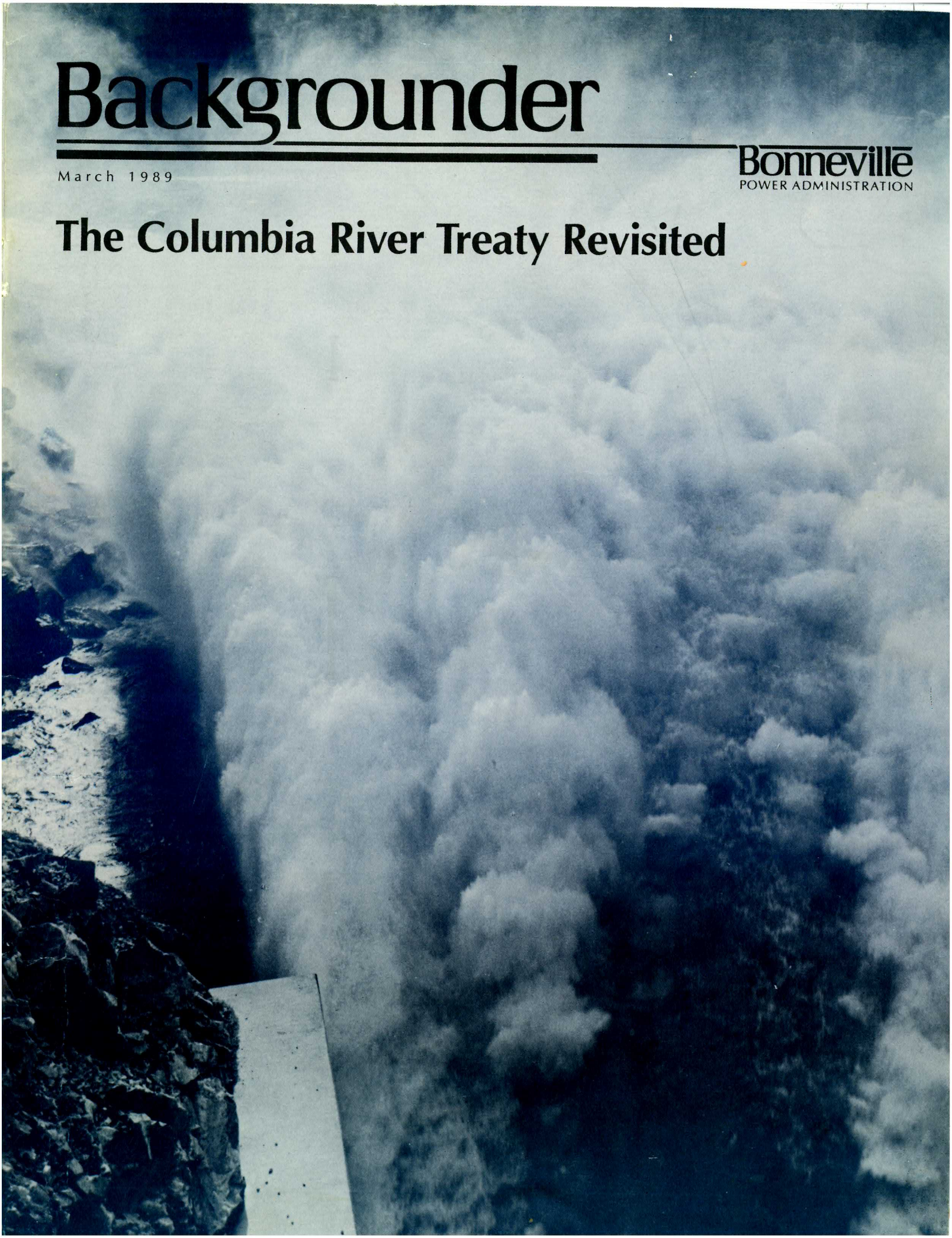
Backgrounder

March 1989

Bonneville
POWER ADMINISTRATION

The Columbia River Treaty Revisited



September of this year will mark the 25th anniversary of the ratification of the "Treaty Between the United States and Canada Relating to Cooperative Development of the Water Resources of the Columbia River Basin." Commonly referred to as the Columbia River Treaty, this compact has had enormous impact on the Western power system from Canada to Mexico.

The Treaty document was signed in January 1961. But that action and its ratification a few months later by the United States only marked the start of negotiations on a master plan. The complex and unique terms of that plan took nearly 4 years to resolve—until September 1964.

The huge undertaking which evolved from the Treaty included doubling the hydroelectric reservoir capacity in the Columbia Basin, and construction of the Pacific Northwest-Pacific Southwest Intertie. The additions of the Third Powerhouse at Grand Coulee Dam and the Second Powerhouse at Bonneville Dam are offshoots of the Treaty, as are other hydropower resources in both Canada and the U.S. Northwest.

It is unlikely that our regional economy could have developed as it has over the past quarter-century without the Columbia River Treaty and the "common store of power" which it afforded.

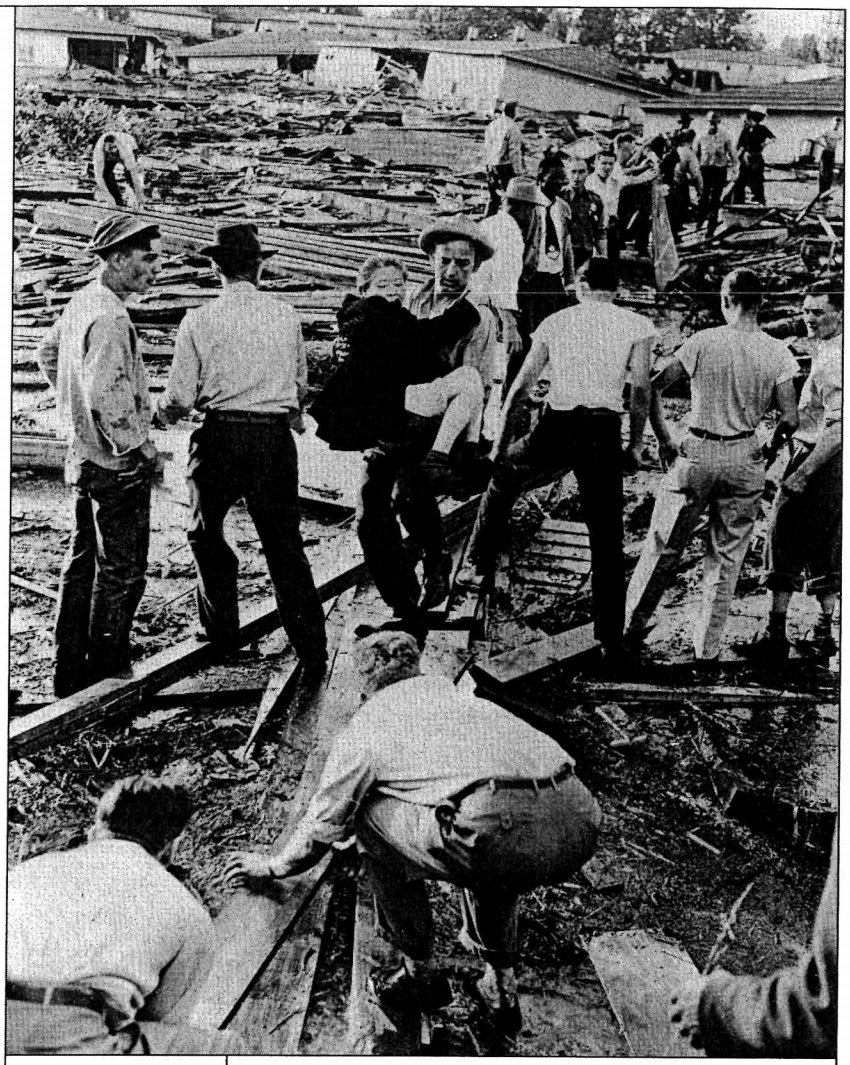
Background

The Columbia River Treaty grew out of two major Northwest challenges following World War II. Both were related to the mighty Columbia River and its partners, including the Kootenai (spelled Kootenay in Canada) and Peace Rivers in British Columbia.

The first challenge was the periodic flooding of the untamed river system. As measured at the Canadian-U.S. border, the Columbia's flow varied from a recorded low in the early 1930s of 12,000 cubic feet per second (cfs) to a devastating 548,000 cfs in June 1948. On the latter occasion, the rampaging waters destroyed numerous downstream communities, including the Portland suburb of Vanport.

Challenge No. 2. . .During the postwar period the economy and population of the Pacific Northwest were sharply on the upswing. This spurred the construction of a number of dams, both Federal and non-Federal, on the Columbia main stem. But a series of power shortages—including Korean War production pressures—made it apparent that generating capacity alone was not the answer.

What was needed was vastly expanded water storage, preferably on the upper reaches of the river. This would enable the network of dams to be fueled on a year-round basis and would multiply their megawatt output. It would also provide badly needed flood control.



A June 1948 flood on the Columbia virtually wiped out Vanport, Oregon.

What was needed was vastly expanded water storage, preferably on the upper reaches of the river.

As early as 1944 the governments of Canada and the U.S. asked an International Joint Commission (IJC) to determine whether an extension of the use of the Columbia River would be practical and in the public interest of both countries. The IJC accepted the task, formed an engineering board comprising technical staff from both nations, and undertook a series of water management studies. Concurrently the U.S. Army Corps of Engineers set about updating its "308 Report," the earlier master plan which had fostered Federal development on the Columbia.

The results of both sets of studies were generally complementary. They pointed to the development of upriver storage on the Columbia and its tributaries as being of great benefit to both nations. This storage would prevent the river water from flowing unchecked and sometimes disastrously to the sea. Instead it could be released as needed to produce power at downstream dams—mostly in the United States.

The Treaty

Acting upon a final IJC report issued in December 1959, the two governments began diplomatic negotiations two months later. A total of nine negotiating sessions led to the signing of the Columbia River Treaty by President Dwight Eisenhower and Prime Minister John Diefenbaker on January 17, 1961.

Storage Facilities

Under the Treaty terms, Canada built three huge storage dams in British Columbia. Two of these, Mica and Keenleyside, are on the main stem of the Columbia. The third, Duncan, is on a tributary of the Kootenay. Of the three, only Mica has power production facilities.

The total Canadian storage under the Treaty was to be 15.5 million acre-feet of water. In addition, the Mica reservoir was constructed to provide some 5 million acre-feet of "non-Treaty storage."

The Treaty also authorized the United States to build Libby Dam on the Kootenai River in northwestern Montana. The Libby reservoir, which added nearly 5 million acre-feet of storage, extends 42 miles into Canada. In total, the 20.5 million acre-feet of storage developed under the Treaty more than doubled the existing capacity in the Columbia Basin. All of this storage is usable for power production.

A major complication—but a U.S. opportunity—was the lack of a market in British Columbia for the Treaty power.

The Treaty does not specify an end-date. Instead both nations have the option of terminating the compact after the year 2024.

Flood Control Benefits

Under the Treaty, Canada has been paid to operate 8.5 million acre-feet for U.S. flood control. The remaining 7 million acre-feet is available to the U.S. as needed, for additional fees.

A total of $64.4 million was paid in advance to Canada for the flood control benefits for the first 60 years of storage. An ongoing payment schedule for flood control may be renegotiated toward the end of the 60 years.

The Canadian Entitlement

With regard to power benefits, the three Canadian storage dams and Libby would enable downstream U.S. projects to produce up to an additional 2,800 megawatts of dependable capacity. Under the Treaty provisions, half of this additional capacity, or 1,400 MW, would belong to Canada—the other half to the United States.

A major complication—but a U.S. opportunity—was the lack of a market in British Columbia for the Treaty power. This was coupled with a B.C. decision to develop the Peace River for its future domestic needs.

President Dwight Eisenhower (right) and Prime Minister John Diefenbaker sign the Columbia River Treaty in 1961.

"The Coordination Agreement has proved to be as important as the Treaty itself."

Hence the B.C. government looked to some U.S. party to purchase the rights to Canada's share of the downstream power benefits. The intent was to use the proceeds of this sale to construct the three Canadian storage projects.

Canada's 50-percent share of the downstream power benefits from the Treaty became known as the Canadian Entitlement. The rights to this Entitlement were offered for sale in the United States for an agreed-upon period of 30 years, based on the operational dates of the three Canadian storage projects.

As it turned out, Duncan was completed in 1967, Keenleyside in 1968, and Mica in 1973—all ahead of schedule. The first downstream power benefits (from Duncan) were delivered in April 1968.

In calculating downstream power benefits, the 30-year schedule was a workable base. But allocating those benefits and their costs among 41 U.S. Northwest entities proved to be a formidable task. It was further complicated by the fact that Treaty implementation was hampered by differences between British Columbia and the Canadian federal government with regard to Treaty benefits and long-term hydroelectric development in British Columbia.

The intra-Canada differences were not resolved until 1963. At that point, negotiations between the U.S. and Canada were resumed to implement the original Treaty provisions.

The Treaty Entities

Before describing the sale of the Canadian Entitlement rights, certain key elements of the Treaty need to be recognized. They include the two Entities, the Permanent Engineering Board, and the Treaty requirement for an Assured Operating Plan.

The Treaty established the U.S. and Canadian Entities as the implementing agencies of the two governments. The U.S. Entity is the Administrator of the Bonneville Power Administration (BPA), chairman, and the Commanding General of the Corps of Engineers' North Pacific Division.

The Canadian Entity is British Columbia Hydro and Power Authority (B.C. Hydro). This crown corporation was formed in 1962 following the merger of an expropriated private utility and the B.C. Power Commission.

Together the two Entities are responsible for overseeing the conduct of the Treaty. A Permanent Engineering Board designated by the two governments reviews the Entities' actions and assists in resolving disputes.

Each year the Entities are required to prepare an Assured Operating Plan with agreed determinations of downstream power benefits for the sixth succeeding operating year. This 6-year planning horizon is especially important in view of the reversion of the Canadian Entitlement to British Columbia starting in 1998. It means that some determination as to the remaining Entitlement needs to be made by 1992—only 3 years from now.

Columbia Storage Power Exchange

The B.C. government insisted that the Canadian Entitlement be purchased by a single U.S. entity, and that a cash payment in full be made in advance of Treaty implementation. The possibility of underwriting the transaction with Federal appropriations was explored, but was ruled out in light of the U.S. budgetary situation at the time.

The Pacific Northwest Coordination Agreement

When the original Columbia River Treaty was signed in 1961, it set forth the broad, joint objectives to be achieved. But it left up in the air the question of how the downstream power benefits were to be calculated and shared.

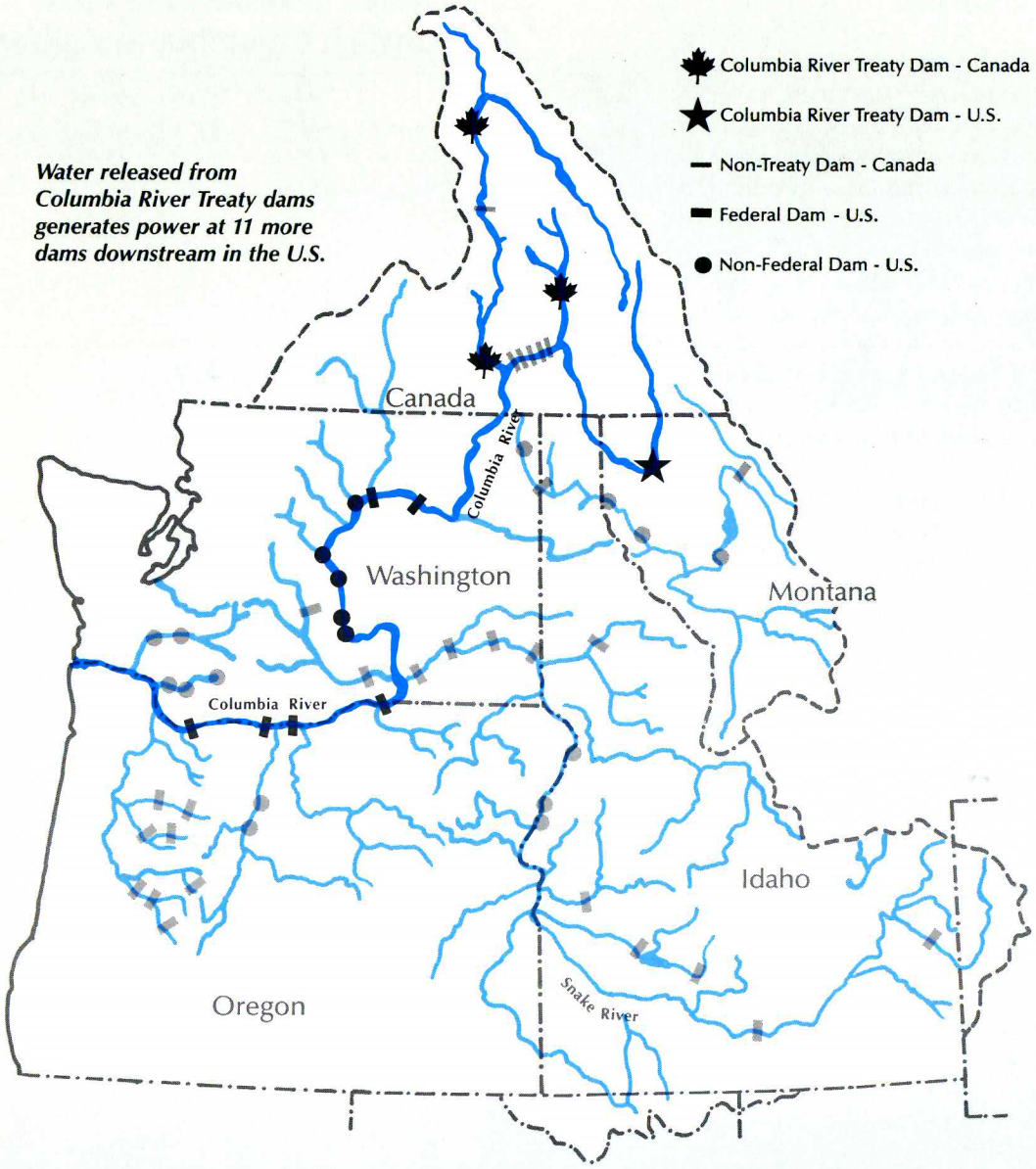
This was the first of a series of major challenges facing the new BPA Administrator, Charles F. Luce, who took office less than a month after the 1961 Treaty signing. "We started with a concept," Luce said in retrospect, "to pretend that these resources belonged to a single owner and to develop them so as to achieve maximum benefits without regard to diverse ownership." This became known as the "single utility concept."

That was the thrust of the Pacific Northwest Coordination Agreement, both in its planning and throughout its quarter-century of operation.

In addition to the three Treaty storage reservoirs in Canada, a base system of 24 projects was used to determine benefits under the Treaty. But all of the Treaty power downstream benefits would be produced at 11 Columbia River main-stem plants. The six Federal dams are (upstream to downstream): Grand Coulee, Chief Joseph, McNary, John Day, The Dalles, and Bonneville.

The five non-Federal dams are Wells Dam owned by Douglas County Public Utility District (PUD); Rocky Reach and Rock Island Dams owned by Chelan County PUD; and Wanapum and Priest Rapids Dams owned by Grant County PUD.

Major Dams of the Columbia River Basin



Major Columbia Basin dams include four Treaty projects.

It is worth noting that substantial interests in the non-Federal dams had been sold by the owners to a number of public agencies and five large investor-owned utilities. The latter in particular were key participants in fashioning the Coordination Agreement and in other Treaty-related matters.

In the 44 months between the 1961 Treaty signing and the final ratification in 1964, the U.S. negotiators developed several interim and subsidiary compacts. The most complex of these were the allocation agreements which resolved how the CSPE shares were apportioned. An interim agreement took effect in late 1963. It included detailed procedures for computing firm load-carrying capabilities and payments for benefits from upstream reservoir regulation.

Negotiations went into high gear in 1964 to stay apace with CSPE and the other Treaty-related issues being resolved. The resultant product was a 39-year Coordination Agreement which was signed on September 15, 1964, by 16 parties. They included BPA, the Corps of Engineers, five investor-owned utilities, five public utility districts, three municipalities, and an aluminum company subsidiary. (The U.S. Bureau of Reclamation and a generating public utility district in Washington State subsequently became signatories.)

Signed just one day before the final Treaty ratification, the Coordination Agreement is an extremely complex document which governs the day-to-day operations and financial transactions on the Northwest power system. As described by a key participant in the negotiations, "The Coordination Agreement has proved to be as important as the Treaty itself."

The Pacific Intertie

Undoubtedly the greatest single development which evolved concurrently with the Columbia River Treaty was the Pacific Intertie. Indeed, the Intertie may well have been the prime catalyst in getting the Treaty ratified and implemented in its present form. While the early planning for the two great undertakings was on separate tracks, it came together in the mid-1960s. It was a classic example of "the whole being greater than the sum of its parts."

The story of the Intertie is a saga of its own and can only be highlighted here. Suffice it to say that the Intertie assured that the Canadian Entitlement could be resold—at a fair price—in the California market during the early years of the Treaty implementation when BPA and the CSPE participants did not need the power.

The uniqueness of the Intertie lies in its giant scale and diverse ownership. The huge transmission project—with an initial investment of some $700 million—was sponsored by BPA, the Bureau of Reclamation, five private utilities, and the City of Los Angeles.

One leg, a direct-current (DC) line, stretches 846 miles from northern Oregon to near Los Angeles. This DC line, with a capacity of 1,400 megawatts, was first energized in 1970. Congress also authorized a second DC Intertie to serve Arizona. This line has not been built.

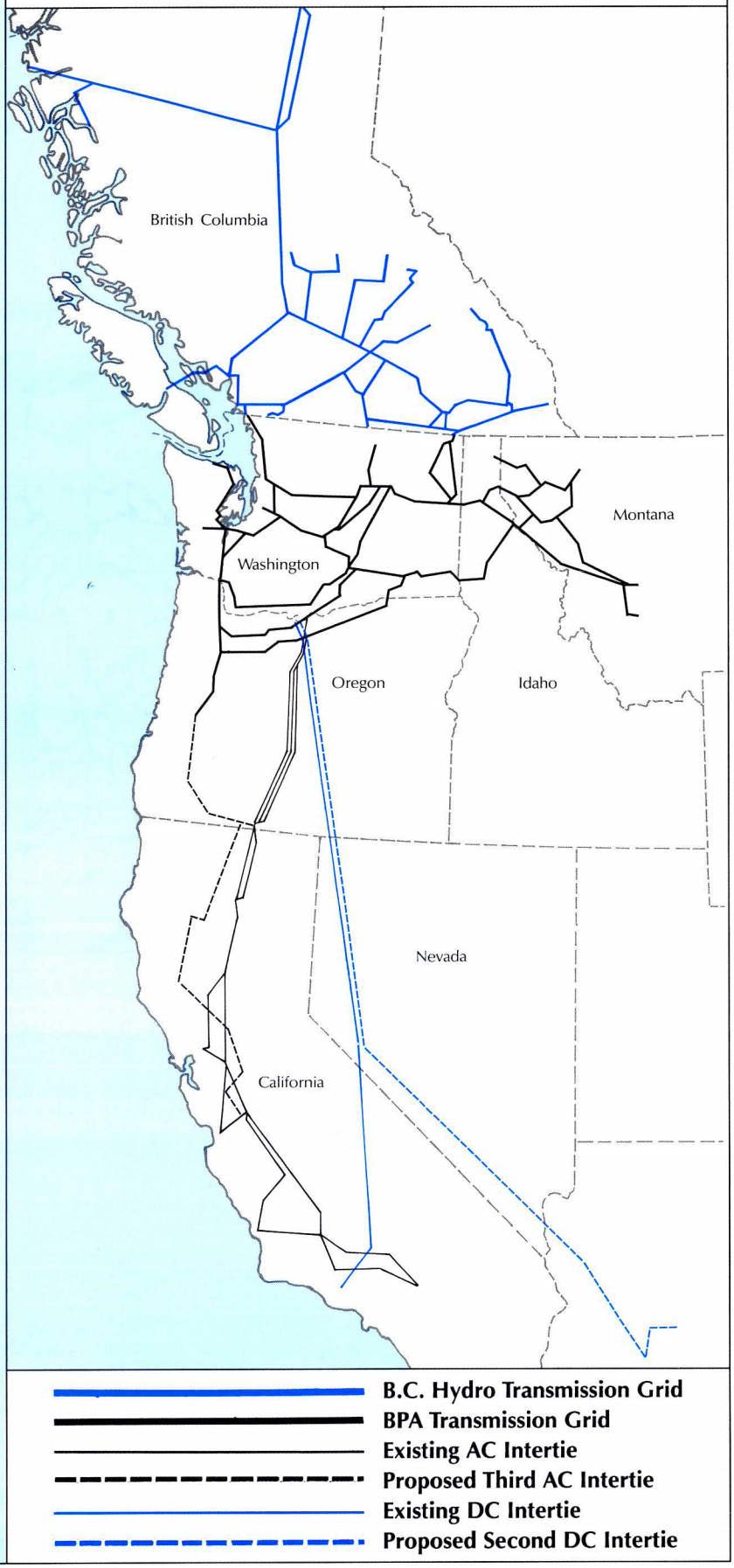
The two 500-kilovolt alternating-current (AC) legs of the Intertie, each with a capacity of about 1,000 MW, were built from John Day Dam on the Columbia River to the Los Angeles area. These lines were energized in early 1969.

Since then, the Intertie has had several upgrades—from the initial capacity of 3,440 MW to the present capacity of 5,200 MW. With the completion of the DC Terminal Expansion Project this month, the total capacity will be boosted to 6,300 MW. Plans are underway for a Third AC Intertie which is expected to add another 1,600 MW of transmission capacity by 1993.

During the period 1968 through 1973, almost all of the Entitlement power went to California—up to 1,400 megawatts of dependable capacity and some 6.6 million megawatt-hours of energy per year. (See graph.) In April 1970 the California utilities which purchased Entitlement power were given a 5-year notice of withdrawal.

Increasing portions of the Entitlement power were recaptured for Northwest use in the late 1970s. The withdrawal was completed in 1983, but the Intertie had more than proved its worth—and incidentally, paid for its original construction several times over.

Major Transmission Paths from British Columbia to California



It was a classic example of "the whole being greater than the sum of its parts."

Since this financing route was blocked and BPA had no authority to acquire the Canadian Entitlement, the alternative was to turn to the 41 Northwest public and private utilities which had interests in the U.S. downstream dams. They were to form the Canadian Storage Power Exchange or CSPE.

Convincing them to participate was no easy task, since the purchase price negotiated with British Columbia was more than four-tenths of a cent per estimated kilowatt-hour, or about double BPA's wholesale rate at that time.

However, a persuasive argument was made that this cost only applied to Canada's half of the downstream power benefits, "and the rest is free." Unless the deal could be struck with Canada, the Treaty itself was in jeopardy, along with both halves of its downstream benefits.

Once this selling point and the other long-term resource advantages were understood, the financing hurdle was overcome.

CSPE, a non-profit entity, was created to buy the Canadian Entitlement rights. But it needed a vehicle to assure that the Entitlement power could be put to optimal use in the U.S. despite the diverse participation. As a consequence, near round-the-clock negotiations got underway to formulate what came to be known as the Pacific Northwest Coordination Agreement. (See separate box on pages 4 and 5.)

Four Northwest investor-owned utilities took 50 percent of the 1,400-megawatt "dependable capacity" and 37 Northwest public agencies took the remainder. The purchase was financed by tax-exempt revenue bonds sold by CSPE.

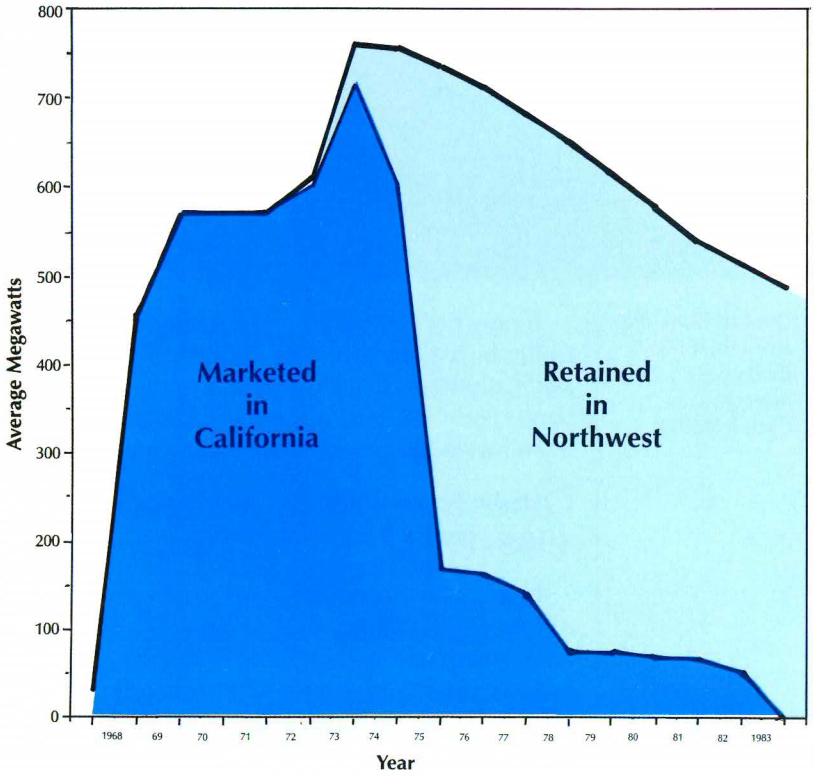
The terms of the bonds coincide with the return of the Entitlement to British Columbia. Based upon the filling of each Canadian reservoir, the 30-year reversion dates extend from 1998 (for Duncan) to 2003 (for Mica).

The Entitlement participants made their allocations available to BPA through exchange agreements. In this way, BPA assumed the risk that the Treaty benefits may have been overestimated. As it turned out, the opposite was true.

Final ratification of the Columbia River Treaty and its detailed protocol and annexes was proclaimed on September 16, 1964. The joint proclamation came from U.S. President Lyndon Johnson and Canadian Prime Minister Lester Pearson at a ceremony held on the international boundary at the Peace Arch in Blaine, Washington. At the same hour in New York City, CSPE bankers handed representatives of the Canadian government a check for some $254 million in exchange for the 30-year rights to the Canadian Entitlement.

The Treaty had become a reality.

Disposition of Canadian Entitlement Energy 1968 - 1983



Resale of the Canadian Entitlement to California peaked in the early 1970s.

Non-Treaty Storage

When the Treaty ratification and protocol were executed in 1964, development of major new hydro sites in the U.S. Northwest was nearly complete. But for British Columbia it was only beginning.

With the money from the sale of the Canadian Entitlement, British Columbia was able to build the three Treaty storage projects.

The Peace River, a part of the northern MacKenzie River system, was the first all-British Columbia river to have major hydroelectric development. Two dams with a total capability of about 3,000 megawatts and a huge reservoir were built by B.C. Hydro during the 1960s and 1970s.

A third B.C. Hydro project on the Columbia River was completed at Revelstoke in 1983. The reservoir for this new facility needed to be coordinated with that behind Mica Dam.

BPA and B.C. Hydro in October 1983 agreed on provisions to fill the new reservoir. In addition, the two agencies would coordinate the use of 2 million of the 5 million acre-feet of Mica non-Treaty storage. This contract is scheduled to terminate in July 1993.

In October 1987, BPA and B.C. Hydro agreed in principle to explore the expansion of Columbia River coordination between their systems to the

total 5 million acre-feet of Mica non-Treaty storage, and to extend the agreement to the year 2003. The agreement could make available up to 300 megawatts of additional firm energy on the Columbia River.

Discussions of further coordination which would include the Peace River were delayed, at B.C. Hydro's request, pending the results of the Columbia coordination and other discussions still underway. Full coordination of the Peace as well as the Columbia could yield a total of some 600 megawatts of additional firm power.

Duncan Dam, the smallest of the Canadian storage projects, was completed first.

A new non-Treaty storage agreement on the Columbia will also involve a contract between the Mid-Columbia utilities (and their project participants) and BPA, because the Mid-Columbia dams are affected by the non-Treaty storage agreement.

Other Issues To Be Addressed—1989-1992

In addition to complex questions relating to non-Treaty storage, several other key issues need to be resolved during the period 1989-1992. How these matters are decided will have a deep and lasting imprint on the energy future of the entire West Coast.

The Future of Canadian Entitlement

Since the Columbia River Treaty was fashioned in the early 1960s, load growth and thermal power plant additions in the U.S. Northwest have fallen well behind those projected. It was thought that—as more thermal plants were built—the Entitlement power would increasingly be used to displace the more costly thermal, and the Entitlement would steadily diminish.

As it turned out, the Canadian Entitlement has not diminished to the extent anticipated. Instead of being about 200 average megawatts as originally contemplated, the Canadian Entitlement will still represent 500 to 600 megawatts of usable energy and 1,300 to 1,400 MW of capacity when it reverts to British Columbia during the period 1998-2003.

The time line is propitious since BPA's most recent load/resource forecast indicates that the BPA power surplus will run out in about 2003. Other resources—including conservation—will need to be acquired. If the Canadian Entitlement rights are among the least-cost options, they could make a valuable contribution to the Northwest's energy "mix."

But this depends upon what use B.C. will make of its remaining Entitlement. The options include retaining the power for domestic needs or marketing it in the U.S. The choice is up to the British Columbia government. If it decides to resell, who will be the purchaser, and on what terms? How will BPA and its transmission grid be affected?

The Northwest stewardship of the Canadian Entitlement has benefited all parties over the past two decades, including California. Both in the CSPE exchange arrangements and in its marketing and transmission role, BPA has sought to maximize these shared benefits.

Full coordination of the Peace as well as the Columbia could yield a total of some 600 megawatts...

Pressures on the Pacific Northwest Coordination Agreement

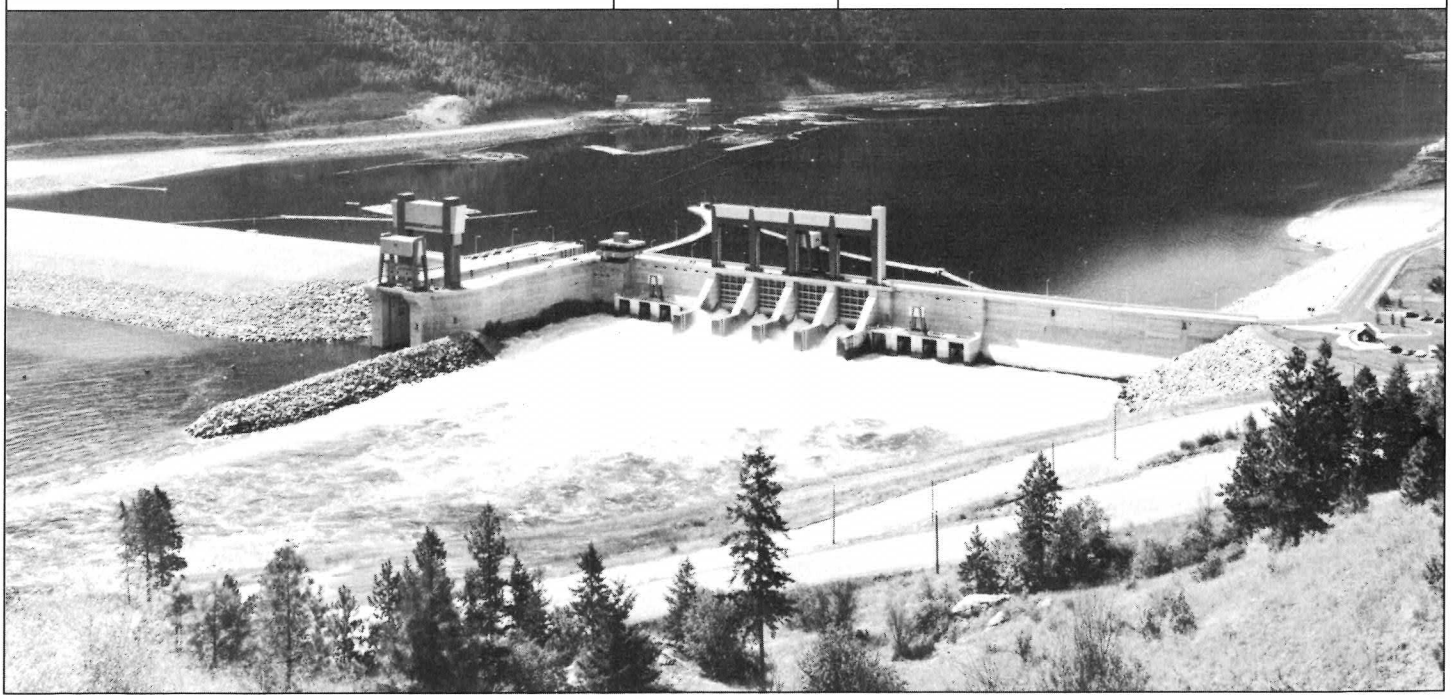
Closely allied to the sale of Canadian Entitlement rights is the Pacific Northwest Coordination Agreement, which is also slated to expire by 2003.

The most urgent matter has to do with the Treaty Entities' Annual Operating Plan which extends six years into the future. With the Canadian Entitlement beginning to revert to British Columbia in 1998, the time frame telescopes to 1992. Decisions made between now and then will exert pressure either to extend or renegotiate the Coordination Agreement.

Factors that were not present in the early 1960s will also come into play. These will include planning compliance with U.S. and Canadian environmental statutes and the Northwest Power Act. Another demanding task would be to negotiate reallocations of downstream power benefits and costs which might be involved in new Entitlement arrangements.

Would the complex Coordination Agreement need a complete overhaul, or could it be extended pretty much as-is to meet the needs of the 21st Century? Which parties to the Agreement might seek to better their situations through major changes, and what might these include?

How do the California interests fit into this puzzle, and those of Canada? Most importantly, will the present Northwest parties to the Agreement rally behind a common set of objectives as they did a quarter-century ago? Is the "single-utility concept" still valid?



Keenleyside Dam stores 7 million acre-feet in Arrow Lakes.

Completed in 1973, Mica Dam provides 7 million acre-feet of Treaty storage and 5 million of "non-Treaty storage."

The sooner these cards are placed on the table, the better for all concerned—including the ratepayers of the Northwest and its neighbors to the north and south.

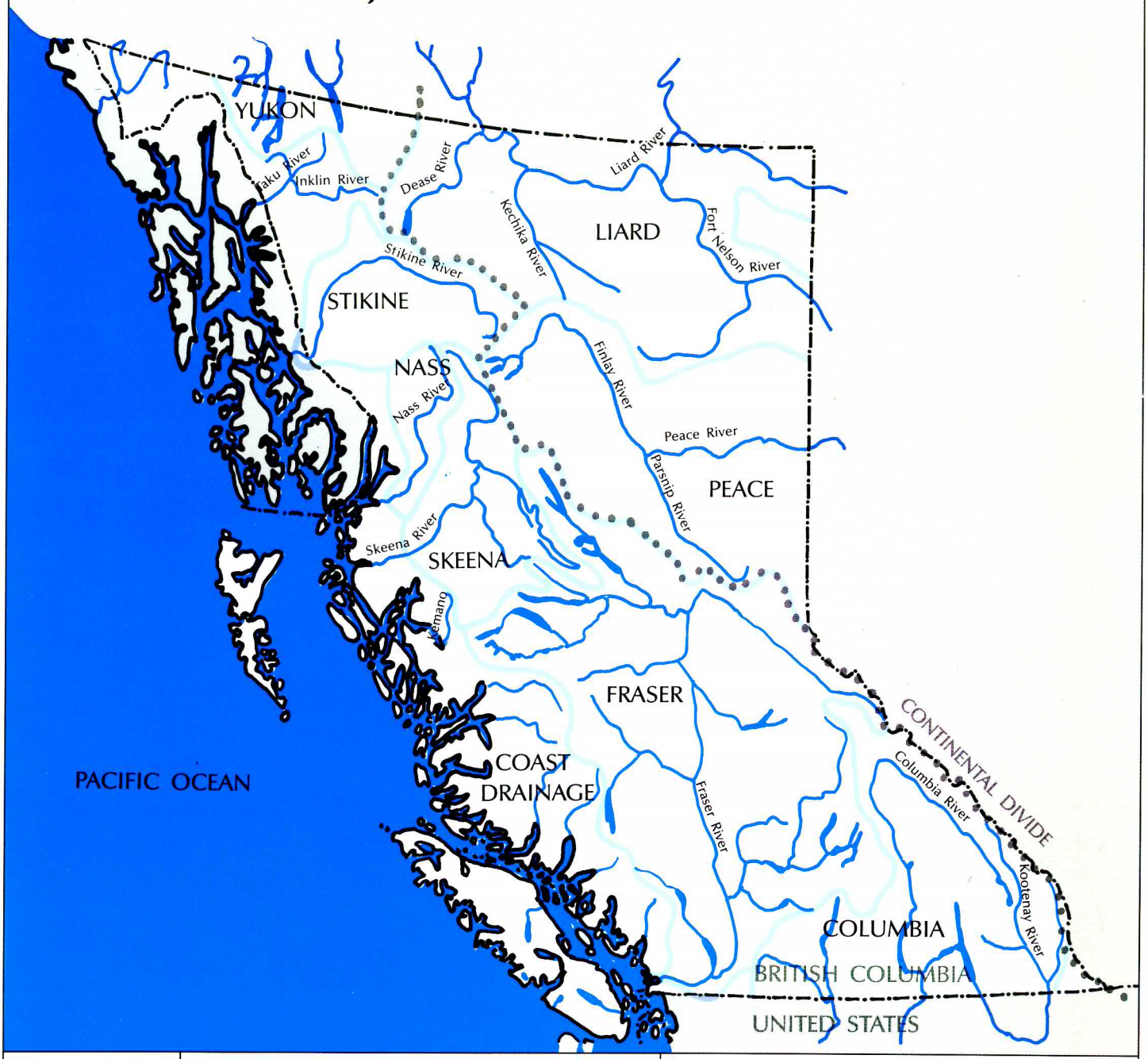
Canadian Exports

Equally as important as the Entitlement issue is the matter of future British Columbia development for export. The present B.C. policy appears to be tilting in that direction, including the recent formation of British Columbia Power Export Corporation or POWEREX.

This B.C. Hydro subsidiary will develop projects and markets for long-term exports to the U.S. Northwest and California. POWEREX is now seeking expressions of interest from independent power producers for electricity from the province which could be exported to the U.S.

Under its new management, B.C. Hydro has shown a renewed interest in developing the 900-megawatt capacity of the Site C project on the Peace River—possibly for export—as well as other hydro and coal resources. It has also entered into agreements with the Aluminium Company of Canada (Alcan) to purchase several hundred megawatts of energy that would be provided by

Major River Basins of British Columbia



British Columbia rivers hold enormous hydroelectric potential.

Equally as important as the Entitlement issue is the matter of future British Columbia development for export.

the expansion of Alcan's existing project at Kemano.

With the ratification of the U.S./Canada Free Trade Agreement, the political and institutional structures now support British Columbia's apparent interest in exporting energy.

Transmission

Each of the above issues has major implications for the Western high-voltage grid. How much export power will be developed in British Columbia, and where will it be sold? Similar questions pertain to Alberta, with its relatively untapped energy resources.

We know that seasonal diversity between regions offers tremendous advantages in terms of power exchanges and minimizing the need for additional generation. By the same token, carefully planned transmission routes and interconnections enhance our ability to shift blocks of electricity at the lowest monetary and environmental cost.

Nearly everyone agrees that system reliability is of paramount importance when siting new generation. Transmission planners also recognize that economic, demographic, political, and environmental influences will be brought to bear on where powerlines will be built, by whom, and in what configurations.

Major uncertainties face the Pacific Northwest and its neighbors with respect to planning new resources, their timing, and their markets. Transmission strategy must be a full partner in this undertaking. The factors mentioned above should not be allowed to hamstring or dictate system planning, but rather complement it.

Our region's low electricity rates and reliable delivery service are partially attributable to the "single utility concept" which has shaped the Northwest grid. With few exceptions, the region has come to rely upon BPA to plan, build, and operate most of the high-voltage network.

Conclusion

Several vital issues need to be resolved between now and 1992.

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The future of the Canadian Entitlement, the future of the Pacific Northwest Coordination Agreement, non-Treaty storage coordination, and the development of other Canadian power resources—existing and potential—are all closely linked. Transmission construction and operation—including the Third AC Intertie—depend upon how these issues are resolved and how the resultant power is supposed to flow among British Columbia, the U.S. Northwest, and California.

Important factors entering the overall picture include the projected evaporation of BPA's present power surplus shortly after the turn of the century, the expected end of the regional surplus in the early 1990s, and the expiration of BPA's power delivery contracts with its direct-service industrial customers in 2001. (In what form should these contracts be replaced, if at all?)

As required by the Treaty, the Assured Operating Plan developed by the Entities must look 6 years ahead—to 1998, the beginning of the period in which the Canadian Entitlement rights begin to revert to British Columbia.

The disposition of the Canadian Entitlement, the non-Treaty storage arrangements, and the development of other B.C. power resources for export are of great interest to the Northwest and California. From BPA's perspective, however, these elements must be viewed in the context of a comprehensive inventory of potential power resources.

In this broader arena, the selection of specific resources and their priority will depend to a considerable degree on their relative cost-effectiveness and environmental implications. These factors loom even larger now then they did in the Treaty negotiations in the 1960s.

Cover photo: Water runs over the spillway at Duncan Dam in British Columbia.

It is hoped that these modern-day challenges can be addressed with the same high purpose and spirit of cooperation as were those of a quarter-century ago.

For More Information

For more copies of this brochure or further information about the Columbia River Treaty and cooperation between Canada and the United States in the West's power system, contact your nearest BPA Area or District Office, or the BPA Public Involvement office.

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