Columbia River Treaty – the setting

USA – has hydro plants & flood control needs
Canada – has good storage dam sites

- Canada has 15% of the basin area
- Canadian basin is mountainous, with lots of snow … produces 30-35% of the runoff for the entire basin
- natural flows are quite variable: low in winter, very high in May-June
- 50% of the highest flood flows at Portland came from Canada
- Runoff forecasting has significant uncertainty (± 25% on 1 Jan.)

- most hydropower production, and need for flood control, is in the USA
- best storage dam sites are in Canada

Columbia River – 4th largest in N. America
average discharge = 7300 m³/s
drainage basin area = 670,000 km²
installed capacity ~ 35,000 MW
What does the Treaty Do?

• The Columbia River Treaty was signed in 1961 and ratified in 1964
• The Treaty required Canada to:
  • construct the Mica, Arrow, & Duncan storage reservoirs on the Columbia River system (total storage of 19 km$^3$)
  • operate these reservoirs for optimal power generation and flood control in both countries
• The Treaty required the U.S. to:
  • pay Canada 50% of the estimated future flood control benefits in the U.S.
  • deliver to Canada 50% of the increased power capability at downstream U.S. plants
• The Treaty permitted the U.S. to:
  • construct and operate the Libby project (6 km$^3$ storage) on the Kootenai River in Montana … flooding some Canadian land, but also providing power & flood control benefits for Canada
Social & Environmental Costs of the Treaty in Canada

- 2300 people along the Arrow Lakes, Koocanusa, Duncan, and Kinbasket reservoirs were displaced (with compensation).
- 600 km$^2$ of high-value valley bottom land was flooded beneath 412 km of new reservoirs.
- Numerous First Nations archeological sites were submerged or degraded by erosion.
- On-going impacts from changing water levels, include:
  - recreation opportunities altered
  - key wildlife habitat lost
  - fish habitat lost; nutrients trapped behind dams
  - dust storms around reservoirs
  - transportation issues
  - farming and forestry activities altered
Treaty benefits and term

- Both countries have realized significant flood control and power benefits from the Treaty.
- U.S. paid Canada for 50% of the U.S. flood control benefits provided by Treaty reservoirs until 2024.
- Canada receives its 50% share of electricity benefits directly from U.S., worth ~ $200 to $250 million per year.
- Treaty has a minimum term of 60 years … can be terminated in 2024 by either country with 10 years notice.
- Some measures continue beyond Treaty termination, e.g. Canada must continue to provide a certain amount of flood protection for U.S. as long as the dams exist.
Treaty priorities for water usage

1. **Domestic & consumptive uses** (e.g. drinking water & irrigation) have the highest priority and are not restricted in any way.

2. **Flood control** – rule curves provide an upper limit on reservoir levels, and have priority over energy production.

3. **Firm energy** - must draft reservoirs as far as is necessary to meet the specified system firm energy requirement.

4. **Reservoir refill** – target refill by 31 July to maximize firm energy capability for the following year (95% confidence of refill).

5. **Non-firm energy** – lowest priority, since this “less reliable” energy cannot be guaranteed in every year.

Other values (e.g. fisheries, recreation, etc) are not mentioned in the Treaty and must be managed by each country:
- by using any “unilateral” flexibility under the Treaty, or,
- by mutually-beneficial agreements between the two countries.
Example of Flood Control Curves

- Required storage space (MAF):
  - 3.5 MAF
  - 4.5 MAF
  - 5.5 MAF
  - 6.5 MAF
  - 7.5 MAF

- Apr-Aug Libby forecast
Actual Treaty operations

- Treaty Storage Regulation (TSR) study implements the Treaty rules, which are conditional on the actual & forecast runoff for every Columbia River basin power project.

- TSR study is run jointly every 2 weeks, providing the base monthly storage targets for operations of Treaty projects.

- With mutual agreement, the U.S. & Canada can deviate from these TSR storage targets.

- Weekly conference call to discuss the Treaty flow agreement for the upcoming week.

- Both countries have some unilateral operating flexibility, but this is limited.
Supplemental operating agreements

• The Treaty is silent on fisheries, recreation, and other non-power values.
• The public, environmental, and regulatory situation has changed much since the Treaty was signed in 1961.
• Starting in the early 1990’s, the two entities have found some “win-win” supplemental agreements to improve fisheries & other non-power values for both countries.

Example: Non-Power Uses Agreement

• adjusts Arrow outflows during Jan-Mar for whitefish spawning, and during April-June for trout spawning (Canadian fish benefit)
• enables 1 MAF of storage for salmon flow augmentation and helps meet downstream minimum fish flows (U.S. fish benefit)
Treaty Implementation

• From the beginning of the Treaty, there has been a good spirit of cooperation between the Treaty entities.

• Members of the joint Operating Committee meet face-to-face at least every 2 months and communicate regularly to find consensus on operating plans.

• When there is a dispute over Treaty interpretation, the two sides try to resolve the issue by returning to Treaty "first principles" and "best science".

• Typically, the two sides exchange position papers on the disputed issue and look for other ways to keep the discussion moving.

• On occasion, when the Operating Committee cannot resolve a dispute, advice is sought from others. Several disputes have taken a long time to resolve.
**Reasons for Treaty Success**

- **Natural Synergies / Geography**: The U.S. system included large generating projects, but relatively poor or expensive storage projects. The Canadian part of the basin presented some very attractive storage sites in the narrow and deep valleys. Win–win arrangements were, therefore, available.

- **Historic Relationship**: The U.S. and Canada have a long history of addressing issues in a peaceful and constructive manner.

- **Technical Input**: There was an early commitment to use “first principles” & “best science” to make decisions whenever possible. Technical principles agreed to by the International Joint Commission (IJC) helped to drive the political process (not the other way around).

- **Mandated Agencies**: Organizations were in place on both sides of the border that cut through political divisions: Province of BC on the Canadian side; U.S. Army Corps of Engineers (for basin-wide flood control) and Bonneville Power (for basin-wide power) on the U.S. side; the IJC on both sides.