

# The Columbia River Treaty - a short summary

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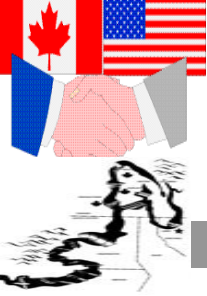
# Why do we have the Treaty?

*USA – has hydroelectric plants and flood control needs*  
*Canada – has good storage dam sites*

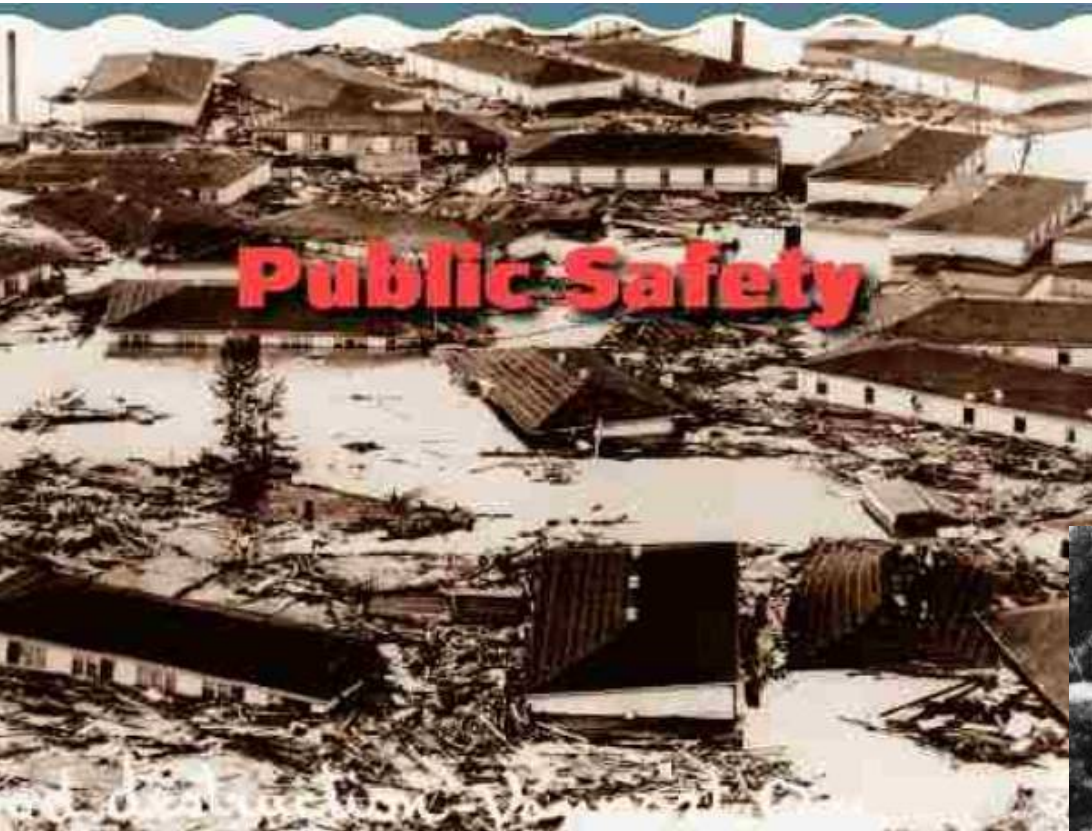


- Canada has 15% of the basin area
- Canadian basin is mountainous, with much snow ... produces 30-35% of the runoff for the entire basin
- 50% of the highest recorded flood flows at Portland came from Canada
- most hydropower production, and need for flood control, is in the USA
- best storage dam sites are in Canada

**Columbia River – 4<sup>th</sup> largest in N. America**  
average discharge = 7300 m<sup>3</sup>/s  
drainage basin area = 670,000 km<sup>2</sup>  
installed capacity ~ 35,000 MW



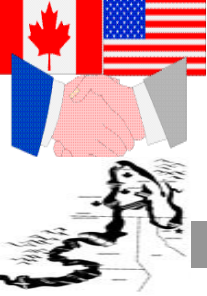
# *1948 Columbia River Flood*



- 1948 flood destroyed a city of ~ 35,000 people (suburb of Portland, Oregon)
- About 50-60 people were killed.

- Damaged homes, farms, and dykes in Canada and the USA all the way down the river to its mouth

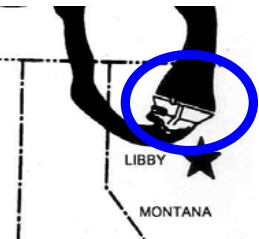
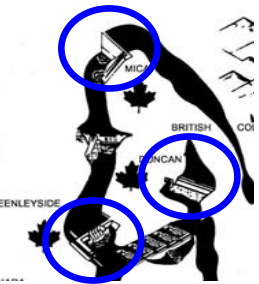


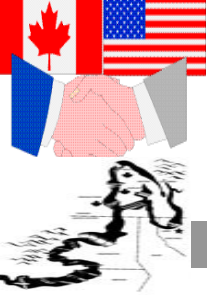


# What does the Treaty Do?



- **The Columbia River Treaty required Canada to:**
  - construct the Mica, Arrow, & Duncan storage reservoirs on the Columbia River system (total storage of 19 km<sup>3</sup>)
  - operate these reservoirs for optimum power generation and flood control downstream in both countries
- **The Treaty required the U.S. to:**
  - pay Canada 50% of the estimated value of the future flood control benefits in the U.S.
  - deliver to Canada 50% of the increased power capability at downstream at U.S. plants (payment for upstream regulation)
- **The Treaty permitted the U.S. to:**
  - construct and operate the Libby project (6 km<sup>3</sup> storage) on the Kootenai River ... flooding some Canadian land, but also providing power & flood control benefits for Canada

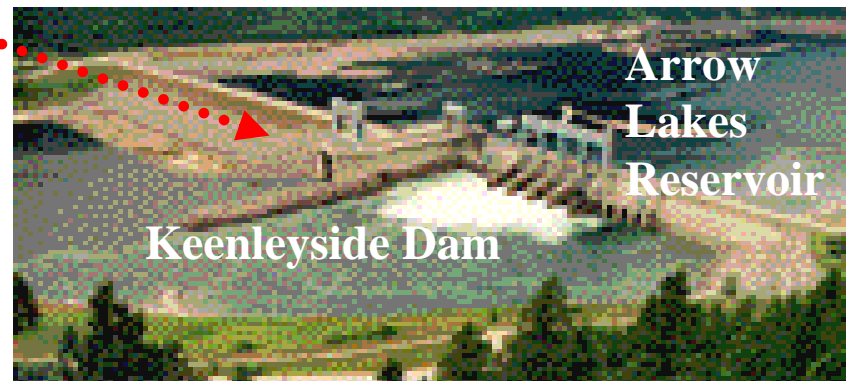


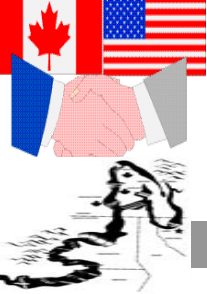


# Duncan and Arrow

	<u>Completed</u>	<u>Treaty Storage</u>	<u>Non-Treaty Storage</u>	<u>Generator Capacity</u>	<u>Dam Height</u>
DUNCAN	1967	1.73 km <sup>3</sup>	None	None	40 m
ARROW	1968	8.76 km <sup>3</sup>	0.31 km <sup>3</sup>	None*	52 m

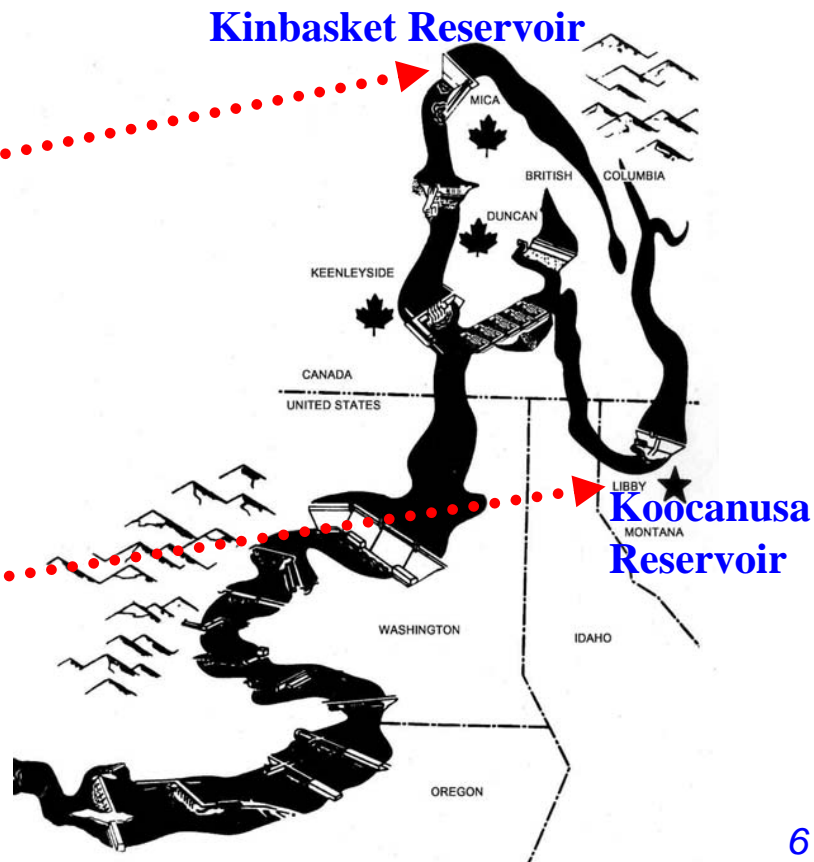
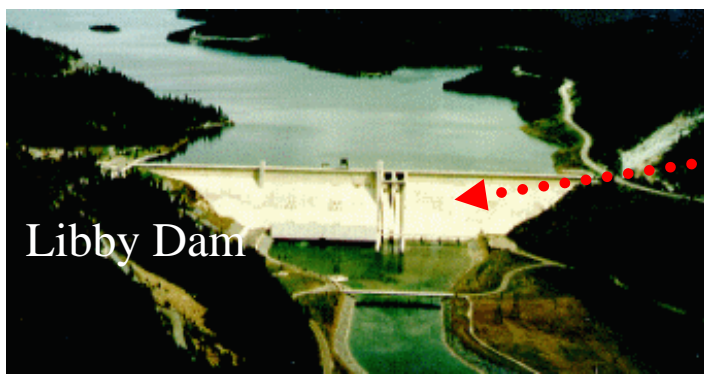
\* Generation added in 2002

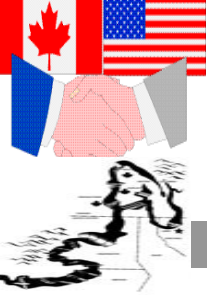




# Mica and Libby

<u>Completed</u>	<u>Treaty Storage</u>	<u>Non-Treaty Storage</u>	<u>Generator Capacity</u>	<u>Dam Height</u>
MICA 1973	8.63 km <sup>3</sup>	6.17 km <sup>3</sup>	1740 MW	198 m
LIBBY 1973	6.14 km <sup>3</sup>	None	604 MW	113 m



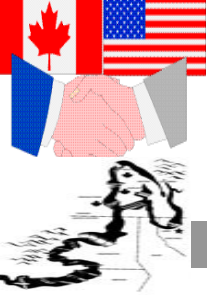


## *Treaty priorities for water usage*

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. Secondary energy – lowest priority, since this “less reliable” energy cannot be guaranteed in every year

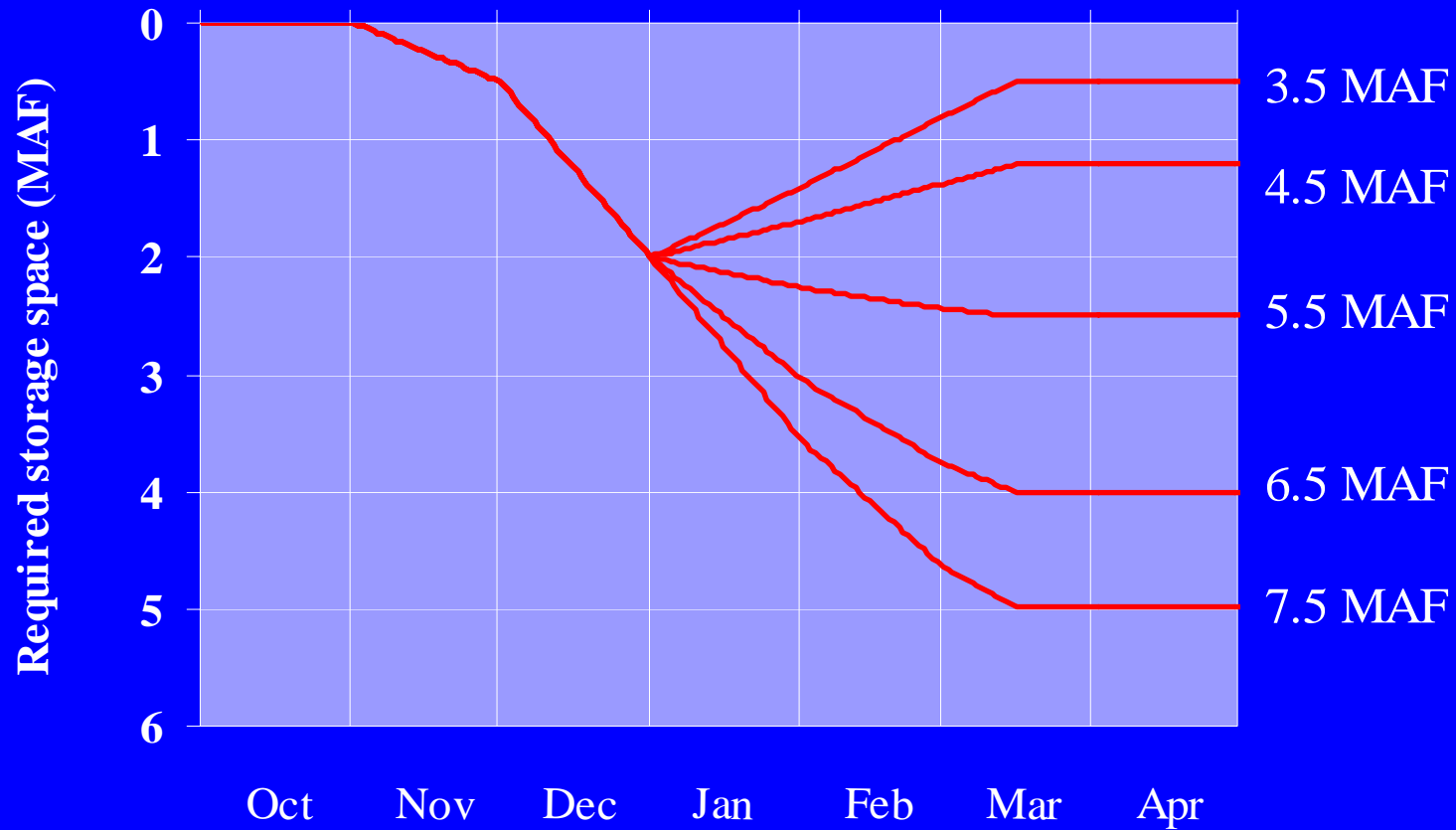
Other values (e.g. fisheries, recreation, etc) are not mentioned in the Treaty and must be managed by each country:

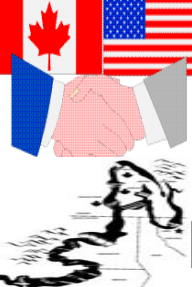
- by using any “unilateral” flexibility under the Treaty, or,
- by mutually-beneficial agreements between the two countries



## Example of Flood Control Curves

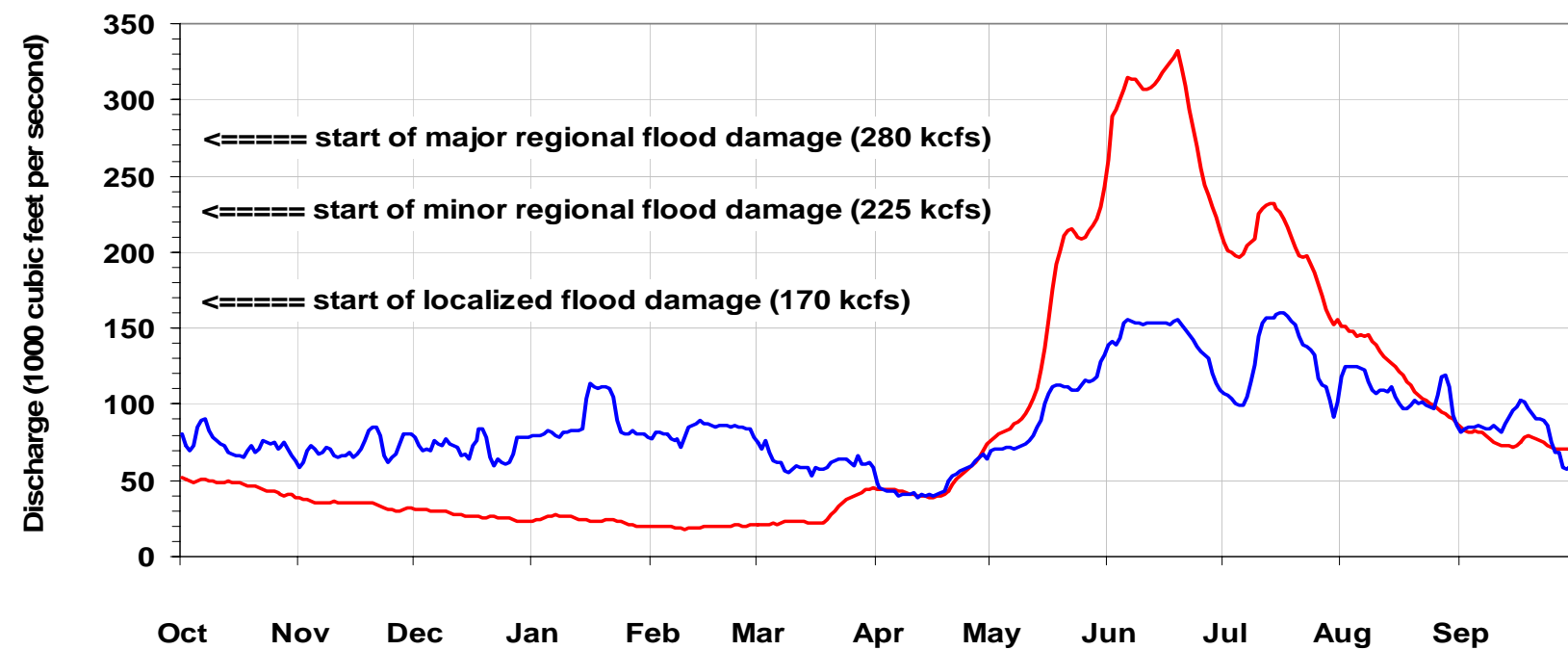
Apr-Aug Libby forecast





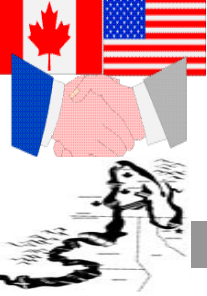
# *Flood Control Benefits – an example*

### Columbia River at Birchbank (River flow gauge located between Castlegar and Trail)



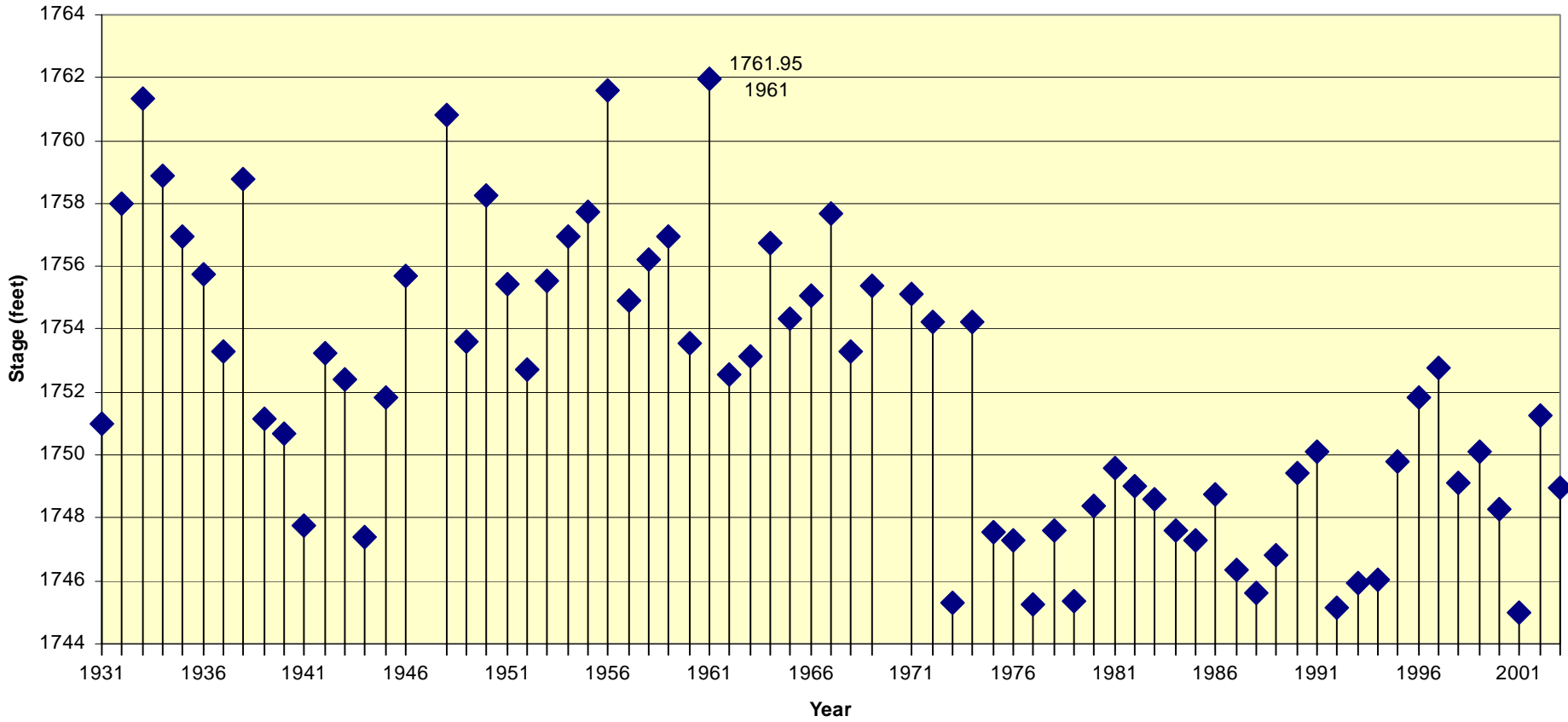
Hydrographs: Observed and pre-project flows for the year ending September 30, 1997

— Pre-project flow                      — Observed flow



# Peak Kootenay Lake levels before and after Treaty storage

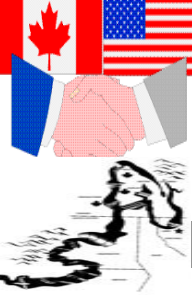
Kootenay Lake (at Queens Bay)  
annual maximum lake levels





# *Actual Treaty reservoir operations*

- TSR study provides monthly storage targets for Treaty reservoirs based on actual runoff and forecasts, and considering the Treaty water usage priorities
- By mutual agreement, U.S. & Canada can agree to deviate from the TSR study
- Canada has some unilateral flexibility rights. An example of this:
  - Canada may choose to discharge more Duncan water than the TSR requirement (at least for a short time period). In this case, the Arrow discharge must be reduced to compensate.
- Reservoir level cannot exceed month-end flood control level for any Treaty project without a variance from the Corps of Engineers. (The Corps manages system-wide flood control operations for the Columbia River system.)



## *Treaty downstream benefits now return to Canada*

- 👉 U.S. paid Canada a lump-sum in return for U.S. flood control benefits provided by Canadian Treaty reservoirs.
- 👉 In addition, Canada sold its first 30 years of downstream power benefits back to the U.S. to acquire the capital necessary to build the Treaty dams.
- 👉 As of April 2003, the 30-year sale was completed. All of the Canadian Entitlement energy and capacity now returns to the Canadian border and is owned by the BC government.
- 👉 For 2006-07, energy deliveries peak at 1244 MW and average 488 MW every month. In some hours, these energy deliveries are used to meet electrical demand within BC.
- 👉 Value of Canada's 50% share of downstream benefits is worth approx. \$ 250 to 350 million per year to the BC government.

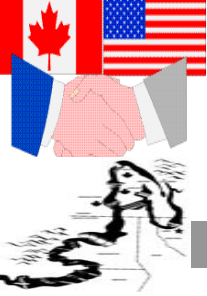


## *Treaty Term*

The Treaty has no specified end date. However, either government has the option to terminate the Treaty after 60 years (2024) with 10 years' advance notice (2014).

Upon termination:

- Mica, Arrow, Duncan, and Libby may continue to operate (subject to the Boundary Waters Treaty)
- Canada must provide a certain amount of flood protection for the U.S. for as long as the projects exist
- Canada may continue any Kootenay River diversions (although no diversions have been undertaken so far)



## Some key dates (historical & future)

- 1938-42 - Grand Coulee Dam built
- 1948 - Columbia River flood caused much damage in both countries
- 1961-64 - Columbia River Treaty signed and ratified
  - sale of first 30 years of Canadian Entitlement to the U.S.
- 1967-73 - Duncan, Arrow (Keenleyside), Mica, and Libby dams completed
- 2003 - all Treaty Entitlement energy returns to Canada (end of 30-year sale)
- 2004 - End of Duncan Water Use Plan consultative process
  
- 2007 – Water Comptroller expected to issue order to implement the Duncan Water Use Plan agreement
- 2014 - 10-year notice for termination of Columbia River Treaty may be given by either Canada or U.S.
- 2024 - earliest termination date for Columbia River Treaty



**17 Jan. 1961**  
**Signing the**  
**Treaty**

**Proclamation and Exchange**  
**of Diplomatic Notes at Peace Arch**  
**- 16 Sept. 1964**

