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Abstract: This article examines the flood control rules established by the Columbia River Treaty and Protocol between Canada and the United States before and after 2024. The flood control operations change automatically in 2024. Part I discusses the flooding risks posed by the Columbia and Kootenay Rivers. Part II offers an account of the general international law pertaining to flood protection and in particular the duties that one basin state may owe to another. This section draws on the work of the International Law Commission which informed the adoption of the United Nations Convention on the Non-Navigational Uses of International Watercourses. Part III outlines some of the background to the negotiation of the flood control provisions of the Columbia River Treaty (CRT) referring in particular to the work of the International Joint Commission (IJC) established by the Boundary Waters Treaty of 1909. Part IV describes the flood control provisions of the Treaty as qualified by the terms of the Protocol to the Treaty including both assured flood control and on-call flood control. The assured flood control provisions expire in 2024. Flood control is principally provided by the construction of three treaty dams in Canada (Arrow/Keenleyside, Mica and Duncan) and the operation of those dams in accordance with a flood control operating plan (FCOP). The appendix contains a more detailed account of the FCOP and variation of the FCOP known as VARQ.FC.

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I. INTRODUCTION

This article examines the flood control rules established by the Columbia River Treaty and Protocol of 1964 (CRT or Treaty) between Canada and the United States. The “before and after” in the title of this article recognizes that the flood control provisions of the Treaty change automatically and significantly on the Treaty’s sixtieth anniversary in 2024. But while the flood control rules will change, the CRT itself will continue after 2024 unless one party gives ten years notice of termination in 2014 or at any time thereafter. If neither party gives notice, the Treaty will continue (but with changed flood control rules) indefinitely (subject to the ten year notice provision).

Canada and the United States negotiated the CRT to cooperatively develop the Columbia Basin and to share the resulting flood control and power benefits between the two parties. Operations under the CRT are carried out by the “Entities” designated by each government. The Canadian Entity for most purposes is BC Hydro and Power Authority, which is a Crown corporation of the province of British Columbia. The U.S. Entity comprises the Division Engineer,

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North Pacific Division of the Army Corps of Engineers and the Administrator of the Bonneville Power Administration (the Department of the Interior, now the Department of Energy).

Given the importance of the flood control changes that will occur in 2024 and changes to the power operation that may occur, the two Entities have conducted joint studies (the Phase 1 studies) to analyze and model potential changes to power and flood control matters. In addition, both Entities are carrying out their own independent analysis.

The Entities limited the Phase 1 studies to three options. In option one, the Treaty continues, thereby delivering ongoing shared power benefits, but with the changed flood control provisions contemplated by the Treaty. In option two, the Treaty is terminated. This option terminates the shared power benefits of the Treaty, but continues the changed flood control operations described in the Phase 1 studies. In option three, the Treaty continues, but with the changed flood control operations described in the Phase 1 studies.
control provisions (since, as we shall see below, treaty termination has no effect on the changed flood control provisions that kick in automatically in 2024). In option three, the two countries would renegotiate the Treaty so as to continue the existing assured flood control provisions (rather than those which will automatically substitute for these provisions in 2024). The Entities recognize that there are significant issues beyond the basic power and flood control scenarios examined in the Phase 1 studies. The United States and Canada will work to hear from regional interests, stakeholders and sovereigns to define additional scenarios for analysis.

In Part II, this article refers briefly to the flooding risks posed by the Columbia and Kootenay Rivers. Each of these rivers originates in British Columbia, Canada before flowing into the United States. The Kootenay is an important tributary of the Columbia. This section also describes how storage reservoirs may be operated to provide flood control protection.

Part III considers the general international law pertaining to flood protection, and in particular, the duties that one basin state may owe to another. This section draws on the work of the International Law Commission (ILC), which led to the adoption of the United Nations Convention on the Non-Navigational Uses of International Watercourses.

Part IV outlines some of the background to the negotiation


of the flood control provisions of the CRT referring, in particular, to the work of the International Joint Commission (IJC) established by the United Kingdom (for Canada) and the United States under the terms of the Boundary Waters Treaty of 1909. At the request of the two governments, the IJC, in 1959, developed a set of Principles for Determining and Apportioning Benefits from Cooperative Use of Storage Waters and Electrical Interconnection within the Columbia River System.

Part V describes the flood control provisions of the Treaty as they were adopted in 1961 and, as subsequently qualified prior to ratification, by the terms of the Protocol to the Treaty. The Treaty contemplated two main forms of flood control: assured flood control (or flood control in accordance with a prescribed flood control operating plan (FCOP)) and on-call flood control (which allows the United States to call upon Canada to operate additional storage on an ad hoc and as-needed basis to provide further flood control in the United States in very large run-off years). Both forms of flood control are available to the United States until 2024. After that date,
the United States loses the assured operation and is only entitled to an on-call or called upon flood control operation. Flood control is provided by the construction of three Treaty dams in Canada (Arrow/Keenleyside, Mica and Duncan) and the operation of those dams in accordance with the FCOP. In addition, the Treaty authorized the construction of one upstream storage and power dam in the United States (Libby). The Treaty also approved the storage reservoir for Libby, Lake Koocanusa, which backs up into Canada. The United States may also request on-call flood control operations from other Canadian facilities such as Kootenay Lake.

A key aim of this article is to explore two important questions in the context of the post-2024 called-up on operation. Both questions relate to the circumstances under which the United States may initiate a call. The first question relates to the volume of flow that must be expected at The Dalles in Oregon before a call can be made. The second question involves the proper interpretation of the United States’ obligation to make effective use of its own storage before it makes the call. Part VI of the paper offers some conclusions. An appendix provides a more detailed account of the FCOP developed by the United States Army Corps of Engineers (Corps) for the Canadian Treaty dams, plus Libby. The appendix also describes modifications to the standard flood control approach that the Corps has developed and applied to the Libby and Hungry Horse facilities (the so-called VARQ flood control (FC) operation). The Corps adopted VARQ FC to balance the competing requirements of flood control drafts at the projects against the demands for reservoir levels to augment flows for fish species listed under the U.S. Endangered Species Act.


13. For VARQ, see U.S. ARMY CORP OF ENG’RS, UPPER COLUMBIA ALTERNATIVE FLOOD CONTROL AND FISH OPERATIONS, COLUMBIA RIVER BASIN, FINAL ENVIRONMENTAL IMPACT ASSESSMENT (2006) [hereinafter VARQ FINAL EIS].

14. 16 U.S.C. § 1531 (2006); see also U.S. ENTITY, SUPPLEMENTAL REPORT, supra note 4, at 17–18 (providing a useful summary of the Biological Opinion Operating Requirements for the different U.S. projects on the Columbia system).
It bears emphasizing that the focus of this article is deliberately and narrowly on the flood control provisions of the Treaty. While the Treaty distinguishes between power and flood control operations, operations for power and flood control will often coincide. Thus, drafting reservoirs for power may deliver flood control benefits. The reverse (in which flood control drives operations—i.e. the status quo) is also true. While the flood control benefits change automatically in 2024, the power benefits conferred by the CRT only change in the event that one party gives notice to terminate. Either party may terminate the CRT by giving ten years notice beginning in 2014. However, termination of the Treaty will not alter the post-2024 flood control provisions. These provisions will continue until the useful life of those facilities or for as long as there is a need for flood control.

There is an ongoing and much broader debate about the future of the CRT, including proposals to amend the Treaty to incorporate a broader range of values in addition to the power and flood control values of the current treaty. This article simply contributes a better understanding of the background to, and implications of, the changing flood control provisions as part of that broader debate.

15. ENTITIES PHASE I REPORT, supra note 4, at Appendix A (noting that in both planning and real time operations priority is always accorded to flood control over power, but that “the two objectives of flood control and power are often complementary, as the evacuation and refill of reservoirs provides benefits for both”).

16. It is possible for a party to give notice to terminate before 2014, but such notice could not take effect before 2024. See Columbia River Treaty, supra note 1, at art. XIX(2).

17. Note that other provisions also continue, including the provisions in relation to Libby. Therefore, it is somewhat misleading to talk about “treaty termination.” See Columbia River Treaty, supra note 1, at art. XIX(4).

II. COLUMBIA AND KOOTENAY RIVERS: FLOOD RISKS AND RESPONSES

The Columbia River and its tributaries do not have the same reputation as the Missouri or the Mississippi Rivers, or even the Red River, for frequent and catastrophic floods (since the flood plains associated with these rivers are flat and extensive), but history does record a number of major flood events including the floods of 1894, 1948 and 1964. Additionally, the natural variability of the Columbia far exceeds that of many other rivers. Much of this variability originates in Canada due to the large component of “snow storage” which tends to melt in a relatively short window. The 1894 flood produced peak flows at The Dalles of 1,240,000 cubic feet per second (cfs). The smaller 1948 flood affected the entire Basin on both sides of the border. The worst damage occurred in Vanport, Oregon where the floods destroyed a community of 18,000 and killed at least thirty-two people.

Flood flows typically occur in the Columbia River Basin during May and June as a result of melting of the accumulated winter snowpack. Flood events are associated with above-average snow accumulations, prolonged and intensive melting - in some cases augmented by heavy rain. While streamflows recede during the later summer and into the fall and winter months, heavy rains and low-elevation snow melt can trigger autumn and winter flood events in the lower Basin.

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20. See Cosens, supra note 18, at 242 (noting that the year-to-year variability of the unregulated peak flow of the Columbia is 1:34 whereas the St. Lawrence has a yearly variation of 1:2 and the Mississippi has a peak flow variation of 1:25).

21. See Columbia River Treaty: Hearing before the Committee on Foreign Relations, 87th Cong. 45 (1961) (statement of Ivan White, Deputy Assistant Secretary of State for European Affairs) [hereinafter Senate Ratification Hearings]; see also id. at 46 & 53 (statements of Lt. General Emerson C. Itschner, Chief of Engineers, U.S. Army).

22. Id. at 53.

John Krutilla, writing in the mid-1960s, summarized the distribution of the flood risk in the Basin as follows:

The major area of general flood hazard is in the floodplain of the Lower Columbia in a reach of about 140 miles downstream from the Bonneville Dam. Here, because of the relatively dense settlement, high valued agricultural pursuits, and the urban industrial developments along the floodplain, the damage potential is large amounting to roughly 90 per cent of the estimated total throughout the Columbia Basin.24

Policy responses to the threat of floods may take several forms. One possible response is to construct levees in vulnerable areas. Indeed a system of levees was completed during the 1930s to protect about sixty percent of the 140-mile stretch referred to above.25 These levees were capable of

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containing flows of up to 800,000 cfs as measured at The Dalles.26 The Corps estimated that further levees could offer protection against flows of up to 940,000 cfs at The Dalles, but that it was impractical to go beyond that.27 By contrast, in the upper Columbia and related subbasins the potential flood damage is of a different order, occurring often in response to localized weather and runoff conditions which do not necessarily contribute to peak discharges on the lower Columbia. On the Kootenay, a persistent problem of significant proportions occurs with a frequency of about one in five years at Bonners Ferry, Idaho, and in the Creston Flats area of British Columbia.28

While an upstream storage dam on the Kootenay (such as Libby, eventually authorized and built under the terms of the CRT) could and did offer Bonners Ferry protection, the Corps of Engineers also developed a relatively low cost local alternative to protect this area.29

A second option is to build storage facilities in the Basin upstream of areas that are vulnerable to flooding, and to operate those facilities so as to evacuate storage prior to high run-offs and then refill the storage as the run-off commences, thereby reducing peak flows in flood-prone areas. Prior to the Treaty, the United States had already built flood control facilities on the Columbia and its main tributaries: the Snake and the Pend Oreille, Clark Fork and Flathead systems. The major storage facilities included Kerr (1938), Hungry Horse (1953), Albeni Falls (1955), Palisades (1957), and Grand Coulee (1944).30 These facilities provided between eight and ten million acre-feet (maf) of available storage.31 Canada also

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26. Id. at 27.
27. Id. at 34.
28. Id. at 22–23.
29. Id. at 143; Senate Ratification Hearings, supra note 21, at 50 (statements of Lt. General Emerson C. Itschner, Chief of Engineers, U.S. Army).
31. Id. at 23 (suggesting that existing storage and projects under construction provided about 10.5 maf of potentially usable storage, but that difficulties with using
provided storage in Kootenay Lake under the terms of IJC approval for the Corra Linn dam.\textsuperscript{32} Other facilities were built concurrently with Treaty projects or shortly thereafter including Dworshak on the North Fork of the Clearwater (Snake). The Columbia River Treaty provided additional flood control opportunities at Libby in the United States and at the three Canadian treaty dams (Mica, Duncan and Arrow/Keenleyside). Canadian commitments under the Treaty afforded U.S. authorities the opportunity to develop an integrated flood control plan for the major dams on the entire Columbia Basin system. Storage in these facilities now totals more than forty maf (both Treaty and non-treaty, Canadian and United States) available to the Corps above The Dalles.\textsuperscript{33} This total includes both so-called primary storage under the Treaty (8.45 maf) and on call storage.

The basic approach to storage can be described as follows.\textsuperscript{34} First, based on snowpack and precipitation data, the Corps prepares a monthly water supply forecast (WSF) for each sub-basin and for the entire Columbia River System extending to The Dalles. This process is initiated in early January and continued on a monthly basis through April. Applying the WSF to storage reservation diagrams developed for each of the major facilities, the Corps calculates end-of-January reservoir target elevations at the main facilities adequate to provide storage space to meet flood control objectives at The Dalles. A set of calculations allows the Corps to work backwards to determine how much water must be retained in storage to achieve, or at least not exceed, a particular flow level at The Dalles.\textsuperscript{35} Reservoirs reach

\textsuperscript{32} See Bankes, supra note 6, at 30–35 (providing background to that Order of Approval). Article IV of the Boundary Waters Treaty, supra note 9, provides that no person may construct a dam on a transboundary river that changes water levels at the boundary without the approval of the IJC.

\textsuperscript{33} FCOP 2003, supra note 12, at 43 (Table 1, Reservoir Project Data for Columbia Basin Flood Control System). The main facilities are: Mica, Arrow, Duncan (Canada); Libby, Hungry Horse, Kerr, Noxon Rapids, Albeni Falls, Grand Coulee, Dworshak, Brownlee and John Day (U.S.). Dworshak and Brownlee are on the Snake.

\textsuperscript{34} See VARQ FINAL EIS, supra note 13, at 13–14.

\textsuperscript{35} For a review of the uncertainties associated with such calculations especially
maximum flood control draft by about May 1, with refill
beginning thereafter based upon the calculated flow at The
Dalles, water supply forecasts, available reservoir space and
weather forecasts.

A third set of options can be characterized as a soft path,
as opposed to either of the hard paths discussed above (i.e.,
dams and levees). Soft paths are adaptive and recognize that
we need to learn to live with floods. Soft paths include
landscape level responses such as retaining or restoring
forest cover and restoring functioning floodplains or
discouraging human settlement in flood plains. 36 Climate
change has necessitated more attention to soft paths as part
of adaptive responses to changes in precipitation, snow pack
and the increased intensity of weather events. 37 The CRT
does not discuss soft options. Instead, the Treaty adopts hard
path solutions to the problems posed by flooding without
precluding adoption of additional “soft” measures.

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36. For discussion in the context of the Columbia River, see Barbara Cosens, Resilience and Law as a Theoretical Backdrop for Natural Resource Management Flood Management in the Columbia Basin, forthcoming in Environmental Law (2012). Cosens argues that “non-structural measures should be the primary focus of new expenditure on flood risk management in the Columbia River Basin over the next sixty-year period of treaty implementation to align flood risk management with management for ecosystem resilience.” Id. at 4.


Relatively warm basins near the coast and in moderate elevation areas on the west slopes of the Rocky Mountains (e.g. in Idaho and Montana) tend to show higher flood risk due to increasing cool season precipitation and the increasing effective basin area that accompanies rising snow lines, whereas colder basins in the interior and northern parts of the region show small changes (or even decreasing flood risk) in spring due to systematic loss of snowpack). Low lying, rain dominant basins show modest increases in flood risk associated with increased winter precipitation.

While there is regional variability, the general story in the Basin is a shift from snowmelt, to transient snow and to rainfall dominant in terms of streamflow inputs. Climate Impacts Group, Center for Science in the Earth System, University of Washington, Final Report for the Columbia Basin Climate Change Scenarios Ch. 7 (2010), available at http://www.hydro.washington.edu/2860/products/sites/r7climate/study_report/CBCCSP_chap7_extremes_final.pdf.
III. FLOOD CONTROL OBLIGATIONS IN INTERNATIONAL LAW AND PRINCIPLES OF TREATY INTERPRETATION

It is important to examine the CRT in the broader normative context of public international law just as we interpret a domestic statute within the context of a broader normative order that includes both constitutional norms, as well as our understanding of other statutes and the common law. This part examines what general international law has to say about the obligations of international watercourse states in relation to flood control. It also offers some brief comments on treaty interpretation based on the Vienna Convention on the Law of Treaties.\textsuperscript{38}

A. International Watercourse Law and Flood Control

For the purposes of this paper I will assume that we can find a modern statement\textsuperscript{39} of the customary law obligations of a watercourse state in relation to flood control in the provisions of the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (Convention).\textsuperscript{40} Neither Canada nor the United States has ratified this Convention and it has not been widely ratified. Additionally, the Convention itself contains an important proviso as to its future application. Thus, Article 3(1) provides that:

1. In the absence of an agreement to the contrary, nothing in the present Convention shall affect the rights or obligations of a watercourse State arising from agreements in force for it on the date on which it


\textsuperscript{40} See generally Convention, supra note 8; see also Stephen C. McCaffrey, \textit{The Law of International Watercourses} pt. IV (2d ed, 2007) (providing additional and more detailed commentary on the Convention).
became a party to the present Convention. Nevertheless, many parts of the Convention represent a codification of customary international law and may be used both to supplement the provisions of the CRT where there is a gap in the topics covered by the Treaty, and to influence the interpretation of open texted terms in the Treaty.  

The International Court of Justice referred to the Convention in *Gabčíkovo-Nagymaros Project (Hungary/Slovakia).* The subject of the litigation was a bilateral river treaty, analogous to the CRT. The litigation also pre-dated the U.N. Convention, and neither state was a party to the U.N. Convention. Nevertheless, the Court still thought it appropriate to draw on the terms of the Convention. In *Gabčíkovo,* the Court relied on the principle of reasonable and equitable utilization, as incorporated in the Convention, to conclude that Slovakia’s decision to proceed unilaterally with a variation of the project (referred to as Variant C) could not qualify as a lawful countermeasure. The court found that Slovakia’s action was not proportionate to the harm that had been inflicted by Hungary when it breached the treaty by refusing to complete the proposed diversion project:

> The Court considers that Czechoslovakia, by unilaterally assuming control of a shared resource, and thereby depriving Hungary of its right to an equitable and reasonable share of the natural resources of the Danube - with the continuing effects of the diversion of these waters on the ecology of the


The Court based its assessment of what was equitable and reasonable (and therefore what was proportionate) on its understanding that the U.N. Convention represents customary law.

The Convention, adopted in 1997, is largely based on the work of the U.N.’s International Law Commission (ILC). The ILC’s version of the text is accompanied by an agreed Commentary, which *inter alia* explains the background and the various sources on which the text draws. The next section of this article is based on the official treaty text but makes frequent reference to the Commentary.

Much of the Convention deals with the principle of equitable and reasonable utilization of water, the general duty to cooperate, and the procedural obligations that watercourse states owe to each other in relation to so-called “planned measures.” The general duty to cooperate “on the basis of sovereign equality, territorial integrity, mutual benefit, and good faith in order to attain optimal utilization and adequate protection of an international watercourse” is significant in the present context. On the one hand, it can be argued that the CRT itself is precisely a manifestation of the duty to cooperate with a view towards optimal utilization. On the other hand, it suggests that even if one of the two states

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44. This is standard practice in international law. *See e.g.*, Gabčíkovo, *supra* note 42, at ¶ 50 (where the Court relies heavily on the ILC commentary on the law of state responsibility when resolving an issue about the defense of necessity).

45. The Convention does not define the term planned measures, but the ILC’s Commentary to Article 10 contemplates that “[t]he term ‘measures’ is to be taken in its broad sense, that is to say as including new projects or programmes of a major or minor nature, as well as changes in existing uses of an international watercourse.” ILC Commentary, *supra* note 43.

took steps in 2014 to terminate the CRT, there would still be general customary international law obligations on both states, including the duty to continue to explore optimizing solutions—at least when approached by the other state.

A state proposing to undertake a planned measure, which may have a significant effect on another watercourse state, must provide notification of such a measure along with the appropriate technical data that would allow the other state to assess the implications of the proposed measure. Additional procedural obligations may follow depending on the response received to the notification.

In addition to the planned measures provisions of the Convention, there are also a number of articles dealing with the management and regulation of international watercourses (Articles 24 and 25) and installations (Article 26). “Management” in this context, refers to both the sustainable development of the watercourse and the “protection and control of the watercourse.”

Watercourse states “shall enter into consultations” with respect to the management of an international watercourse including consultation with respect to establishing a “joint management mechanism.”

But perhaps more significant than management in this context is Article 25, which calls upon states to cooperate, where appropriate, in responding to needs and opportunities to regulate the flow of the waters of an international watercourse. The Convention requires watercourse states to cooperate and equally share in construction, maintenance and cost-sharing of regulation works. The Commentary also states that “when one

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48. See Convention, supra note 8, at art. 24(2).

49. Id. The current provisions of the CRT likely constitute such a joint management mechanism because they provide for ongoing implementation of the Treaty through the two Entities (Art. XIV) as supervised by the Permanent Engineering Board (Art. XV). See Columbia River Treaty, supra note 1.

50. Article 25(3) defines regulation as the use of hydraulic works or any other continuing measure to alter, vary or otherwise control the flow of the waters of an international watercourse. Convention, supra note 8, at art. 25(3).
regulation works, and receives benefits therefrom, the former
would be obligated, in the absence of agreement to the
contrary, to contribute to the construction and maintenance
of the works in proportion to the benefits it received
therefrom."\textsuperscript{51} Thus, the Convention adopts a "sharing the
benefits" approach, rather than simply sharing the costs.

Article 26 deals with watercourse installations, and in
particular, contemplates that a watercourse state shall use
its best efforts to maintain installations so that any
deterioration in such facilities may be arrested so as not to
cause harm to another watercourse state. The Commentary
offers the example of the duty of the watercourse state to
maintain a dam in a state of repair "such that it will not
burst, causing significant harm to other watercourse
States."\textsuperscript{52} The Article does not deal specifically with the
example of an upstream watercourse state that wishes to
reconfigure an existing dam to better achieve its own goals,
but potentially render it less useful for flood control purposes.
For example, an upstream state might wish to reconfigure
outlet valves at upstream dams, thereby, reducing the flood
control discharge capacity of the dam.\textsuperscript{53}

\textsuperscript{51} ILC Commentary, \textit{supra} note 43, at art. 25 ¶ 2.

\textsuperscript{52} Id.

\textsuperscript{53} The discharge capacity of a dam depends upon a number of variables
including: elevation, configuration of spillways, bottom outlets or valves, tailwater
effects below the dam, and generating units. In some cases, changes may increase
discharge capacity. For example, the discharge capacity at the Keenleyside dam was
expanded with the installation of generation at that facility. As originally built,
there was no generation installed at either Duncan or Arrow. Some generation (183
MW) has since been installed immediately downstream of Arrow/Keenleyside and
more is possible. \textit{See} Columbia Power Corporation, Projects: Arrow Lakes
Generating Station, \textit{http://www.columbiapower.org/projects/arrowlakesstation.asp}
(last visited Mar. 21, 2012); \textit{see also} Columbia Power Corporation, Keenleyside 150
MW Powerplant Project: Report and Recommendations of the Keenleyside Project
Committee with respect to a Decision on a Project Approval Certificate and
Fulfilling the Requirements of a Screening Report Pursuant to the Canadian
Environmental Assessment Act (1998), \textit{available at}
\textit{http://a100.gov.bc.ca/appsdata/epic/documents/p3/1054665240172_
d5c7937e56964532b103c78bc435fa3.pdf} (environmental assessment of the project).
From a Canadian perspective, Arrow/Keenleyside could originally only be justified
on the basis of the downstream power benefits that it would be accorded under
Article V of the Treaty. \textit{See} Johnson, \textit{supra} note 6, at 754 (referring to McNaughton,
chair of the Canadian section of the IJC in the 1950s and noting that "High Arrow
provides little advantage to Canada other than to produce the benefits to
downstream power in the United States which may be sold."). In a Treaty
termination scenario (i.e., no continuing downstream power benefits to Canada),
Canada will wish to maintain Arrow at a high level in order to maintain a high head
It seems unlikely that there is a duty to maintain existing facilities in exactly the same configuration, but any such proposed change would still need to be scrutinized in light of the general duty of reasonable and equitable utilization (Articles 5 and 6) and the obligation not to cause significant harm (Article 7). The latter duty calls upon each watercourse state to exercise due diligence to ensure that its utilization of a watercourse does not cause significant harm to another watercourse state. It is likely that a change to an existing facility on which the downstream state had come to rely would constitute a “planned measure” within the meaning of Articles 11 – 19, thereby triggering the series of procedural obligations including: the exchange of information (Article 11), notification (Articles 12 – 16) and potentially consultation and negotiations (Article 17).

Articles 27 and 28 deal separately with two related problems: (1) harmful conditions and (2) emergency situations. Article 27 discusses the first issue—the prevention and mitigation of harmful and potentially harmful situations (i.e. it is anticipatory in nature). The Article calls upon watercourse states “individually and, where appropriate, jointly, to take all appropriate measures to prevent or mitigate conditions . . . that may be harmful to other watercourse States,” including, “floods, ice floes, drought and water-borne diseases.” This applies to conditions resulting from natural causes, human causes or some combination of the two and possible responses are those deemed “appropriate.” In some cases, the responses may be immediate, but the Commentary suggests that parties must also consider long-term plans and activities, such as the construction of dams: “[w]hile States cannot prevent phenomena resulting entirely from natural causes, they can do much to prevent and mitigate harmful conditions that are consequent upon such phenomena. For example, floods may

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54. Convention supra note 8, at art. 27.
55. Id.
56. ILC Commentary, supra note 43, at art. 27(1).
57. Id. at art. 27(2)–(3).
be prevented, or their severity mitigated, through the construction of reservoirs, afforestation, or improved range management practices.”

Conversely, Article 28 deals with emergency situations. The term “emergency” is defined as “a situation that causes, or poses an imminent threat of causing, serious harm to watercourse States” whether resulting from a natural cause such as a flood, or human conduct. A situation may be an emergency even if it is expected, such as a flood following a prolonged and severe weather event. An emergency triggers not only a duty to notify other potentially affected states and relevant international organizations, but also requires that a “watercourse State within whose territory an emergency originates, shall, in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency.”

The Commentary notes that both the duty to notify and the duty to mitigate apply even where the emergency situation results from entirely natural causes and “there may well be no liability” for the harmful effects that may be suffered by another watercourse state. The duty to mitigate as expressed here is far reaching—although qualified insofar as it is a duty to take only such practicable measures as are necessitated by the circumstances. Overlapping to some degree with the anticipatory functions of Article 27, Article 28(4) contemplates that watercourse states should, where necessary, develop contingency plans for responding to emergencies.

Although cursory, this review of the relevant general norms supports four conclusions which may be relevant for

58. Id. at art. 27(3). Note that these measures include soft and hard measures—although they do focus on upstream mitigation measures rather than downstream adaptation measures.
59. Convention, supra note 8, at art. 28.
60. ILC Commentary, supra note 43, at art. 28(2).
61. Convention, supra note 8, at art. 28.
62. ILC Commentary, supra note 43, at art. 28(2).
63. It is perhaps surprising that the article does not refer to any duty to compensate in the event that measures taken by the upstream state cause an economic or other loss for that state.
64. Convention, supra note 8, at art. 28.
the following different but related purposes: to assist in the interpretation of the CRT, to fill in gaps in the CRT, and/or to govern the relationship between the two states should either elect to terminate the Treaty.

The first conclusion is that customary law imposes a general duty on watercourse states to cooperate. The existence of this duty may be particularly important in a treaty termination context in which the United States elects to forego the prescribed power operation from Canadian dams in return for retaining all of the downstream power benefits. In that scenario, the United States will face considerable uncertainty in planning for flood risk management operations and so will need to model various Canadian operating scenarios. It is at least arguable that, notwithstanding treaty termination, Canada has some obligation to provide information, as available, to facilitate U.S. planning activities. This conclusion is reinforced by the fact that some flood control measures will continue (e.g. the on-call operation) and a good faith implementation of this provision requires Canada to take measures necessary to make the call effective.

Second, measures taken by an upstream state to reconfigure upstream storage in a way that will reduce the flood protection available to a downstream state will trigger a duty to notify the downstream state before undertaking those measures. That notification may, in turn, trigger additional procedural obligations such as the planned measures provisions of Articles 11 through 17. Reconfiguration does not include changes to the operation of existing facilities (such as optimizing for power and local flood control rather than system-wide flood control) although the general duty to cooperate, and the more specific duty to enter into consultations with respect to management of the watercourse, might well embrace a continuing duty to discuss these matters if requested by the downstream state.

Third, any agreement by watercourse states to take cooperative measures must be based on the premise that the

65. ENTITIES PHASE 1 REPORT, supra note 4, at 82–83.
66. See discussion infra Part III.B. regarding “good faith.”
67. See Convention, supra note 8, at art. 8.
68. Id. at art. 24.
affected states should share both the costs of any facilities and the benefits conferred. As discussed in the next section, this principle is fully consistent with the work of the IJC in developing the principles that informed the CRT negotiations. This principle may be particularly relevant to option three (i.e. a modification of the existing treaty so as to provide for some continuation of assured flood control post-2024) developed in a preliminary way by the Entities as part of the Phase 1 studies. This principle suggests that Canada will be fully justified in negotiating for a share of any resulting flood control benefits (i.e. avoided costs) in addition to the current treaty provisions that simply compensate Canada for any economic losses associated with providing the post-2024 called-upon flood control.

Fourth, there is a general duty to take all practicable measures to prevent, mitigate and avoid emergency situations such as those that might be caused by floods or other extreme weather events (to the extent that the other party cannot provide this on their own). Given that even in the treaty termination scenario (option 2) the United States is still entitled to an on call/called upon flood control operation (see Part V.B.4 of the article for a more detailed explanation), this general duty serves to reinforce the treaty norm.

B. Observations on Treaty Interpretation and Implementation

Any assessment of the CRT’s flood control provisions must be based on an interpretation of the text of the Treaty. The interpreter must locate the specific treaty text in the broader context of international law including other relevant treaties and applicable norms of customary law. The rules on treaty interpretation are codified in Articles 31 and 32 of the Vienna Convention on the Law of Treaties (VCLT).69 A draft of the

Convention was prepared by the ILC. While the United States is not a party to the VCLT and while, on its terms the VCLT does not apply to treaties already in force (such as the CRT), both the International Court of Justice and countless arbitral panels have accepted that these provisions constitute customary international law and should be applied as such. The VCLT provisions state:

**Article 31: General Rule of Interpretation**

1. A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.

2. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the text, including its preamble and annexes:
   - (a) any agreement relating to the treaty which was made between all the parties in connection with the conclusion of the treaty;
   - (b) any instrument which was made by one or more parties in connection with the conclusion of the treaty and accepted by the other parties as an instrument related to the treaty.

3. There shall be taken into account, together with the context:
   - (a) any subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions;
   - (b) any subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation;
   - (c) any relevant rules of international law applicable in the relations between the parties.

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4. A special meaning shall be given to a term if it is established that the parties so intended.

**Article 32 Supplementary Means of Interpretation**

Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion, in order to confirm the meaning resulting from the application of article 31, or to determine the meaning when the interpretation according to article 31:

(a) leaves the meaning ambiguous or obscure; or
(b) leads to a result which is manifestly absurd or unreasonable.

Article 31 states the general rule. It is a single compound rule, and while the three paragraphs “might appear to create a hierarchy of legal norms, that is not so: the three paragraphs represent a logical progression, nothing more. One naturally begins with the text, followed by the context, and then other matters . . . .”72 There is, however, a hierarchy between Articles 31 and 32, the latter being titled “[s]upplementary means of interpretation.”73 The commentary suggests that in drafting Article 31, the International Law Commission was attempting to balance the textual or literal approach to treaty interpretation with a more teleological approach, which emphasizes the object and purpose of the treaty.74 Thus, the formulation requires that the interpreter refer to both the text and the object and purpose of the treaty. The “good faith” language of Article 31 is relevant to the performance of treaty obligations as well as the interpretation of those obligations.75 The object and purpose

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72. Aust, supra note 69, at 234; see also Iron Rhine Railway (Belg. v. Neth.), Hague Ct. Rep. (Scott) ¶¶ 47 (Perm. Ct. Arb. 2005); Gardiner, supra note 41, at 141 (quoting the arbitral award found in Aguas del Tunari, S.A. v Republic of Bol. ICSID Case No. ARB/02/3, Decision on Respondent’s Objections to Jurisdiction, ¶ 91 (Oct. 21, 2005)) (referring to the application of Article 31 as a process of progressive encirclement).


74. See Aust, supra note 69, at 231; but see Aust, supra note 69, at 235 (suggesting that Article 31 accords “precedence to the textual.”).

75. Vienna Convention on the Law of Treaties, supra note 38, at Article 26 (“Every treaty in force is binding upon the parties to it and must be performed by them in good faith.”); see also Application of Interim Accord of 13 September 1995 (Former Yugoslav Republic of Maced. v. Greece), 2011 I.C.J. 142, ¶ 131 (Dec. 5); Case C-118/07, Comm’n v. Republic of Finland, 2009 E.C.R. I-10889, ¶ 39; Gabčíkovo-
of a treaty is to be derived from a consideration of the treaty as whole, including the preamble.\textsuperscript{76}

More recently, in its work on Treaties Over Time, the International Law Commission claims to have identified three different approaches that interpreters have adopted when applying articles 31 and 32:\textsuperscript{77} (1) a conventional approach, which takes all the means of interpretation referred to in Article 31 into account without according noticeably greater weight to one approach over another, (2) a text oriented approach that accords greater weight to the text, and (3) a purpose oriented approach that gives greater weight to the object and purpose of the instrument.

For interpretation purposes, Article 31(2) defines the context of a treaty to include the text, annexes and preamble, any agreements relating to the treaty made by both parties and any instrument made by one party and accepted by the other as an instrument relating to the treaty.\textsuperscript{78} Both the agreements and instruments must be put in place in connection with the “conclusion of the treaty.”\textsuperscript{79} An example of the former might be the Exchange of Notes of 22 January 1964 relating to the sale in the United States of Canada’s downstream power benefits.\textsuperscript{80} An example of the latter might be the two agreements between Canada and British Columbia relating to the apportionment of rights and responsibilities under the Treaty.\textsuperscript{81}

\textit{Nagymaros Project}, 1997 I.C.J. 7 at ¶ 142. The duty of good faith would likely preclude a party from taking unilateral action solely in order to make it more difficult for it to fulfill its treaty obligations.


\textsuperscript{78} Vienna Convention on the Law of Treaties, \textit{supra} note 38, at Article 31(2).

\textsuperscript{79} There is room for debate as to when the CRT was concluded. The main body of the text was finalized in 1961 and it was that text which was sent to the U.S. Senate for its advice and consent; however, that was followed by subsequent negotiations in relation to the Protocol.

\textsuperscript{80} See Columbia River Treaty, \textit{supra} note 1, at Annex to Exchange of Notes. See also 15.2 U.S.T. 1555, 1578, 1583–88.

The precise classification of the Protocol for the purposes of the VCLT generally and specifically within the context of Article 31 may be subject to debate. One view is that the Protocol is simply another treaty which amends the CRT and therefore should be considered under Article 31(1). Alternatively, the Protocol can be seen as an agreement relating to the Treaty made in connection with the conclusion of the Treaty (Article 31(2)(a)). However, since Article 31 is expressed as a single rule, little should turn on this distinction.

The other matters identified in Article 31(3)—which should inform the interpretation of the Treaty—consist of subsequent agreements, subsequent practice, and other relevant rules of international law binding the Parties. There are many examples of subsequent agreements and subsequent practice in relation to the CRT that must be assessed before reaching any definitive conclusion as to the meaning of a particular text. The relevant rules of

DOCUMENTS 100–109 (1964) (pertaining to the Agreements of July 8, 1963 and Jan. 13, 1964 between Canada and British Columbia). The issue here would be whether the United States accepts the agreements as instruments related to the Treaty, which requires further research. But see Swainson, supra note 6, at ch.9. (articulating that the United States did have an interest in the content of these agreements).

82. It is important in this context to examine the precise language of the Exchange of Notes of Jan. 22, 1964 endorsing the terms of the protocol. See Columbia River Treaty, supra note 1, at Annex to Exchange of Notes. Canada’s note provides that the two notes plus the Protocol “shall constitute an agreement between our two Governments relating to the Treaty.” 15.2 U.S.T. 1555, 1578, 1583–88. The U.S. note was to the same effect. Similar language is used in the Exchange of Notes of Jan. 22, 1964 relating to the downstream power benefits except that these notes describe the agreement as “an agreement … relating to the treaty,” which is the precise language of the VCLT even though the VCLT was not adopted until 1969. Id.

83. See Gardiner, supra note 41, at 212–13.

84. For example, if one looks at any Annual Report of the PEB it contains a list of supplementary agreements between the Entities that were either concluded or applied during that year. In addition, there are agreements allowing the Canadian Entity to move flood control space between Canadian Treaty reservoirs. Not all of these agreements are of the same status. Some are between the Entities and not the parties and in some cases, at least to the parties to the agreements have taken care to limit the precedential effect of any such agreement. All of this would have to be carefully evaluated and considered in any definitive interpretation of the CRT.

85. For a recent decision in which the International Court of Justice referred to subsequent practices, see Application of Interim Accord of 13 Sept. 1995 (Former Yugoslav Republic of Maced. v. Greece), 2011 I.C.J. 142, ¶¶ 99–101 (Dec. 5); In the same case the Court declined to rely on the travaux. Id. at ¶ 102.

86. See Gardiner, supra note 41, at 216–25 (discussing arbitral awards and case
international law include customary norms as well as treaties and would therefore include customary rules of law relating to international watercourses. Thus, while the U.N. Convention does not apply as a treaty between Canada and the United States, it is relevant to the interpretation of the treaty obligations of the Parties to the extent that it codifies customary norms, especially where the treaty uses open-textured language.87

Finally, Article 32 refers to the travaux (i.e. the negotiating records of the treaty) as a supplementary means of interpretation. An interpreter can rely on the travaux either to confirm a meaning already established (based on the principles codified in Article 31) or to determine the meaning where the text is inter alia ambiguous or obscure.88 Travaux are available to the treaty parties but are not generally available to the public. Tribunals routinely refer to the
travaux to confirm the interpretation of treaties.89

IV. FLOOD CONTROL PROVISIONS OF THE TREATY: THE IJC’S CONTRIBUTION

The governments of the United States and Canada took the first step towards developing the CRT when they made a reference request to the IJC in 1944,90 in which the two governments asked the IJC to investigate the possibilities for joint development of the River. In 1958, the IJC reported on its technical assessment of the alternatives.91 The following year, the IJC responded to a second reference request with a set of Principles for Determining and Apportioning Benefits from Cooperative Use of Storage Waters and Electrical Interconnection within the Columbia River System.92 This report contained a set of “general principles,” a set of “power principles,” and a set of “flood control principles.”93 Each principle was accompanied by a commentary or discussion94 and was prefaced with two important acknowledgements. First:

As successive blocks of storage for flood control purposes are added to the system, the amount of flood damage that can be prevented per unit of flood control storage decreases. Accordingly, the value that can be assigned to upstream storage for flood control purposes is greater for projects to be constructed in

89. See Gardiner, supra note 41, at ch.8. For an example in practice, see Kasikili/Sedudu Island, 1999 I.C.J. 1045 at ¶ 46, 89.
90. Per Article IX of the Boundary Waters Treaty of 1909, the two Governments may refer a matter to the IJC for its advice on the issue. However, the IJC’s recommendations in response to a reference request are not binding on either Government. See The Boundary Waters Treaty of 1909, supra note 9.
93. Id.
94. Note that I am not suggesting that these principles or their commentary can be used directly to interpret the terms of the CRT since they do not fall within any of the categories of permissible interpretive materials listed in Articles 31 or 32 of the VCLT. However, the work of the IJC did inform the negotiations between the Parties and it may help establish some of the shared assumptions (e.g. desired level of flood control) on which the negotiations proceeded.
the near future than for those to be built later. Hence, “first-added” storage should be assigned a higher value than subsequent projects.

Second, the “hydrologic and hydraulic characteristics” of the Basin were such that operations for flood control could be conducted with little or no interference with operations for power purposes.

The IJC offered the governments six flood control principles as follows:

Flood Control Principle No. 1

Flood control benefits should be determined on the basis of an assured plan of operation and flood control regulations . . .

This principle forms the basis of the FCOP developed by the Corps and discussed in detail in the Appendix.

Flood Control Principle No. 2

The downstream flood control benefit . . . should be estimated in advance on the basis of the effectiveness of such storage in meeting the flood control objectives . . . in the downstream country at the time the upstream storage is provided.

The discussion of this second principle acknowledged that:

In the United States the current primary flood control objective is to obtain storage sufficient to control a flood of the magnitude of that of 1894 at The Dalles to 800,000 cfs. All additional storage in the United

95. IJC PRINCIPLES, supra note 92, at 12–13.
96. For further discussion of “first-added,” see Krutilla, supra note 25, at 50–56. See also THE COLUMBIA RIVER TREATY AND PROTOCOL: A PRESENTATION, supra note 6, at 58–59. The point is actually quite intuitive especially in the context of flood control. A facility that will be used to offer protection in the case of a one-in-one-hundred year flood is less valuable than a facility that will offer protection in the case of a one-in-ten year flood. Note that assigned value is important if one is trying to assess the contribution that particular facilities make in conferring a flood or power control benefit for the purpose of sharing that benefit between the upstream and downstream states.
97. IJC PRINCIPLES, supra note 92, at 13. This assessment must also be premised in part on an assessment of seasonal demand, which at that time would have placed a premium on winter base load generation. This may be more questionable if hydro is operated to support intermittent forms of generation such as wind and solar. In other words, the coincidence of interest between power generation and flood control may be more contingent than suggested by the IJC Principles document.
98. Id. at 13.
99. Id. at 14.
States or Canada necessary to achieve this objective (approximately 7 1/2 million acre feet of storage usable for flood control) would, if included in the flood control plan, be given equal credit on the basis of the effectiveness of each acre foot of such storage in controlling floods at The Dalles. Storage either in the United States or Canada added after the necessary amount has been reached to control the 1894 flood to 800,000 cfs would . . . be evaluated at a lesser rate based on the average value of all additional storage needed to control the 1894 flood at The Dalles to 600,000 cfs. 100 (Emphasis added).

The discussion indicates that the principal flood control objective is expressed in terms of managing flows down to 800,000 cfs, with a secondary objective of 600,000 cfs. There is no mention of a lower desirable control level—a point which assumes some importance in the current discussions between the Entities. The discussion also acknowledges the importance of local flood control objectives and suggested “[s]torage either in the United States or Canada should be entitled to credit on the basis of satisfying such local objectives.”101

Flood Control Principle No. 3 suggested that the value of the flood control benefit to be assigned to the upstream storage should be based on the estimated average annual value of the flood damage prevented by the storage.102 Flood Control Principle No. 4 contemplated that the upstream state should receive fifty percent of the value of the benefit conferred103 According to Flood Control Principle No. 5, payments might be made as a lump sum or periodically as the two states might agree.104 Flood Control Principle No. 6 dealt with the circumstances under which the downstream state might request the upstream state to take additional flood control measures. In such a case, the downstream state should fully indemnify the upstream state for any losses it might suffer, but should also pay the upstream country "half the damages prevented by the operation for the storage in

100. Id.
101. Id.
102. Id.
103. IJC Principles, supra note 92, at 15.
104. Id.
Krutilla’s assessment of the principles\textsuperscript{106} is somewhat ambivalent. While on the one hand, the principles were insufficiently rigorous and could mean “all things to all men,”\textsuperscript{107} on the other hand, they represent “a contribution of substance.”\textsuperscript{108} In particular, the general principles “provide the fundamental principles for guiding an efficient and equitable cooperative development of an international river.”\textsuperscript{109}

When one examines the Treaty in light of these principles it is clear that both governments accepted them in part, but not completely.\textsuperscript{110} For example, between them, Principles 1 and 6 called for an assured plan of operation with the capacity to ask for additional flood control. The Treaty accepts this approach. In both cases, the principles contemplated that the upstream state should be compensated primarily on the basis of the benefit conferred.\textsuperscript{111} In relation to assured flood control, one can see this idea being picked up in the lump sum payment of $64.4 million. It is also applied in the on-call scenario pre-2024 through the four one-time payments, if and when on-call is triggered (as well as compensatory payments if Canada suffers power losses). At the time, the on-call payments were interpreted as benefit sharing provisions.\textsuperscript{112} Post-2024 there are only compensatory payments.

\begin{itemize}
\item \textsuperscript{105} Id. (emphasis added).
\item \textsuperscript{106} Krutilla’s assessment focuses more on the power principles than the flood control principles.
\item \textsuperscript{107} Krutilla, supra note 25, at 66.
\item \textsuperscript{108} Id. at 67.
\item \textsuperscript{109} Id.
\item \textsuperscript{110} See A. G. L. McNaughton, The Proposed Columbia River Treaty, 18 Int’l J. 148, 153 (1962) (noting that while the British Columbia and Canadian delegations to the negotiations accepted that negotiations should be based on the principles the United States accepted them only as guidelines and not as authoritative conclusions); see also Swainson, supra note 6, at 132–33 (articulating same), and Johnson, supra note 6, at 739 (concluding more positively that “[w]ith some exceptions, [the Treaty] incorporates the fifty-fifty principle and joint development ideas recommended by the International Joint Commission.”).
\item \textsuperscript{111} This point is made clear in Principles 3, 4, and 6, and the commentary to Principle 6.
\item \textsuperscript{112} Senate Ratification Hearings, supra note 21, at 54–55 (describing the pre-2024 on call provisions and the compensation therefore as flood control to 600,000cfs; whereas, the assured operation is described as providing control “to achieve the initial objective of controlling a flood equivalent to that of 1894 to 800,000 cubic feet per second.”). See also Larratt Higgins, Note and Comment, The
(indemnification) payments and no provisions for sharing the benefits of called-upon flood control.

V. FLOOD CONTROL UNDER THE TERMS OF THE TREATY AND THE PROTOCOL

The CRT imposes both construction requirements and operating requirements on Canada. The first section of this part reviews the construction requirements in the context of flood control, referring to the facilities and the design discharge capacity of those facilities. The following three sections examine successively: (1) the prescribed flood control operation until 2024, including a summary account of the Flood Control Operating Plan (FCOP); (2) the on-call operation until 2024; and (3) the on-call/called upon operation which will apply after 2024. The focus in each section is on the treaty terms and conditions taking into account the modifications to the CRT agreed to during the negotiation of the Protocol. The Appendix to the paper examines in more detail the implementation of the treaty flood control provisions through the terms of the FCOP.

A. Construction Requirements

In order to achieve its obligation to provide 15.5 million acre-feet of storage usable to improve the flow of the Columbia River, Canada committed to constructing the three Treaty dams—Duncan, Mica and Arrow—“as soon as possible.” Annex A of the CRT (Principles of Operation) specified certain discharge capacities for those dams to ensure that they could effectively serve their purpose as flood control facilities. The Annex prescribed that these dams should have:

3. Sufficient discharge capacity at each dam to afford the desired regulation for power and flood control . . . provided through outlet works and turbine


113. For an account of those negotiations most of which focused on the implications of the sale of the downstream benefits, see Swainson, _supra_ note 6, at ch. 9.

114. _Columbia River Treaty, supra_ note 1, at art. II(1). It is evident that in the context of the Treaty, “improvement” means improvement principally for the purposes of power and flood control.

115. _Id._ at art. II(2)(a)–(c), II(3).
installations as mutually agreed by the [E]ntities. The discharge capacity provided for flood control operations will be large enough to pass inflow plus sufficient storage releases during the evacuation period to provide the storage space required. The discharge capacity will be evaluated on the basis of full use of any conduits provided for that purpose plus one half the hydraulic capacity of the turbine installation at the time of commencement of the operation of storage under the Treaty.\footnote{116. \textit{Id.} at Annex A, ¶ 3. BC Hydro is currently installing two additional generating units at Mica to complement the existing four units with service expected in 2014. \textit{See Press Release, BC Hydro, Mica Generating Station Unites 5 and 6 (Feb. 21, 2011), http://www.el.bchydro.com/mediabulletins/bulletin/system_factories/mica.}}

4. The outflows will be in accordance with storage reservation diagrams and associated criteria established for flood control purposes and with reservoir-balance relationships established for power operations. Unless otherwise agreed by the [E]ntities the average weekly outflows shall not be less than 3000 cubic feet per second at the dam described in Article II(2)(a) [Mica], not less than 5000 cubic feet per second at the dam described in Article II(2)(b) [Arrow/Keenleyside], and not less than 1000 cubic feet per second at the dam described in Article II(2)(c) [Duncan]. These minimum average weekly releases may be scheduled by the Canadian [E]ntity as required for power or other purposes.\footnote{117. Columbia River Treaty, \textit{supra} note 1, at Annex A, ¶ 4.}

In terms of operation, and for flood control purposes, the Treaty distinguishes between flood control operations for the first sixty years of the Treaty, and flood control operations after the expiration of sixty years, in 2024. Until 2024, the United States is entitled to two forms of flood control operation from Canada: a prescribed annual flood control operation and an ad hoc, as-may-be-needed on-call operation under certain specific conditions. This entitlement is cumulative (i.e. the United States is entitled to both the prescribed operation, and, where necessary, the on-call operation) under certain conditions.
The prescribed flood control operation applies only until 2024 at which time, as the Treaty is currently framed, it expires automatically.\(^{118}\) Article IV(2)(a) of the Treaty obliges Canada to operate 8.45 maf of the total of 15.5 maf of storage at Mica, Arrow and Duncan in accordance with Annex A of the Treaty and annual flood control operating plans. Article IV (2) and Annex A paragraph 5 dedicated flood control storage in prescribed amounts for the three Canadian Treaty dams (Mica 0.08 maf, Arrow 7.1 maf, and Duncan 1.27 maf), but the same paragraphs allow the Canadian Entity to move some of the dedicated storage space from Arrow to Mica, provided that “the [E]ntities agree that the exchange would provide the same effectiveness for control of floods on the Columbia River at The Dalles, Oregon.”\(^{119}\)

The practice under these provisions has been as follows. First, the Entities themselves immediately agreed to allow BC Hydro as the Canadian Entity to move 2 maf of the flood control obligation from Arrow to Mica. This exchange was reflected in the original 1972 Flood Control Operating Procedure (FCOP).\(^{120}\) Second, in 1995, the U.S. Entity agreed to allow an additional exchange from Arrow to Mica, subject to the Canadian Entity agreeing to augment the storage space at Mica committed to the assured operation with an additional 0.5 maf.\(^{121}\) The Assured Operating Procedure (AOP)\(^{122}\) is modeled on the basis of this new 8.95 maf storage.
allocation, but the Canadian Entity is entitled to suggest a
different allocation during the preparation of the Detailed
Operating Procedure (DOP). 123

In return for the assured flood control operation through
2024, the United States agreed to pay Canada a total of $64.4
million124 with actual payments tied to the in-service dates of
the respective facilities.125

1. The Flood Control Operating Plan (FCOP)

The Appendix to this article offers a detailed account of the
content of the FCOP authorized by the Treaty, but the four
key points are as follows. First, the FCOP establishes flood
control objectives on which the balance of the Plan is
based.126 This fills an essential gap in the Treaty text.
Second, the FCOP prescribes specific operating rules for each
of the three Canadian Treaty dams and Libby.127 The FCOP
is not a flood control plan for the entire Basin or for all major
U.S. projects. Third, the Treaty dams are subject to weekly
control during the evacuation period and daily control during
generation potential of both systems, prescribes operating criteria and
procedures to ensure that the potential will be realized, and serves as the basis
for the Detailed Operating Plan in the actual year of operation. The
downstream power benefits studies are conducted in conjunction with the AOP.
(Treaty Article XIV-2h and Annex A Paragraph 9, Protocol VII). [The DOP is]
similar to the Assured Operating Plan except that it is prepared immediately
prior to each operating year. The DOP is developed from the AOP for that year
and reflects the latest load, resource, flood control, and other pertinent data as
mutually agreed to by the Entities. The DOP serves as a guide and provides
criteria for actual operation of the Canadian storage during the immediately
ensuing operating year. (Treaty Article XIV-2(k))

Copies of all the AOPs and the DOPs available at http://www.nwd-
wc.usace.army.mil/PB/PEB_08/docAOP.htm
123. FCOP 2003, supra note 12, at 24.
124. See Columbia River Treaty, supra note 1, at art. VI(1) (prescribing the
payment schedule).
125. See id. at art. VI(2) (contemplating a reduction in payment for each month of
delay in the commencement of operations). The Treaty requires Arrow and Duncan
to be fully operational within five years and Mica within nine years of treaty
ratification. Id. at art. IV(6). Two of the facilities (Arrow and Duncan) entered into
service before the prescribed dates and as a result attracted supplementary flood
control benefits as contemplated by paragraph 11 of the Protocol. See Agreement
between the U.S. and Canada effected by Exchange of Notes Relating to the
Columbia River Basin (Flood Control Payments), Washington, August 18 and 20,
1969, 21 UST, part I, at 72 (TIAS 6819).
126. See FCOP 2003, supra note 12, at 8.
127. See generally id. at 21–37.
the refill period. Fourth, while most of the FCOP provisions deal with the assured flood control operation, the FCOP contains some provisions that speak to on-call operations both before and after 2024.

2. Variations to FCOP: The VARQ Operation of Libby

While Libby is included in the FCOP, it is also subject to domestic operational constraints as a result of biological opinions issued under the Endangered Species Act (ESA). In response to this, and in an effort to provide both improved fish flows and better assurance of refill, the Corps introduced the so-called VARQ flood control procedure for both Libby and Hungry Horse. In general, VARQ operations permit less drafting for flood control prior to Spring runoff except in very high runoff years. This has benefits for fish (augmented flows can be released later in the summer) but also for recreational interests in Canada because it results in higher reservoir levels on Lake Koocanusa earlier in the season than would be the case with standard flood control procedures. The VARQ procedure is examined in greater detail in the Appendix.

C. The On-Call Operation Before 2024

In addition to the assured flood control operation until 2024, the United States is also entitled, on certain terms and conditions, to an on-call operation of additional storage to provide further flood control protection. Article IV(2)(b) obliges Canada to “operate any additional storage in the Columbia River Basin in Canada, when called upon by” the U.S. Entity “to meet flood control needs for the duration of the flood period for which the call is made” within the limits of “existing facilities.” The “additional storage” to which the paragraph refers includes: (1) additional storage at the three Canadian Treaty dams, (2) storage at other

128. Id. at 38.
129. See id. at 14–15.
130. See supra note 14.
131. VAR is shorthand for variable discharge and Q stands for quantity.
132. See infra Appendix Part II.
133. Columbia River Treaty, supra note 1, at art. IV(2)(b).
134. Id.
Canadian facilities already built at the time of the Columbia River Treaty, and, arguably, (3) any subsequently built storage.

The additional storage at the Canadian Treaty dams is the storage that is available in addition to storage committed by Article IV(2) (i.e. 8.45 maf, now 8.95 maf). Thus, Table 1 to the current FCOP lists a total of 12 maf at Mica, 1.4 maf at Duncan and 7.1 maf at Arrow comprising both the assured storage (primary flood control) and the on call storage. The storage at other Canadian facilities includes facilities that are not owned and operated by the province or by an agent of the province. It includes, therefore, the Corra Linn facility currently operated by FortisBC.

Finally, the commitment appears to extend to storage that may be built in the Basin after the date of signature or ratification of the Treaty. This conclusion flows from the use of the term “any storage” in both Article IV(2)(b) and Article IV(3). Where the Treaty refers to storage constructed or operating at a particular time, it does so explicitly. That said, as a matter of practice, very little new storage has been built in the Basin since the Treaty. For example, Revelstoke is operated as a run of the river plant and offers limited additional storage. Similarly, BC Hydro built the Canal Plant on the Kootenay to take advantage of the additional storage made available by Libby; it provides no incremental flood control capacity.

British Columbia used the Protocol negotiations to try to limit the ability of the United States to trigger its on-call entitlements both during the first sixty years and thereafter. Hence, the Protocol establishes that the United

135. FCOP 2003, supra note 12, at tbl.1.
136. Thus Table 1 of FCOP 2003 lists Corra Linn as having available storage of 673,000 but with no entry in the “committed for flood control column” and with the notation (common to a number of U.S. facilities) that the facility is “[n]ormally operated to preserve natural lake storage during flood period.” Id.
137. See Columbia River Treaty, supra note 1, at Protocol (1).
138. There would also be significant head losses if storage were made available at Revelstoke making it a very expensive way of providing flood control. Presumably, the obligation would also extend to any facilities on the Okanagan branch of the Columbia although there are no large storage facilities in this branch of the river in Canada.
139. SWAINSON, supra note 6, at 271–72; see also id. at 258 (Canada’s opening gambit in the Protocol negotiations was to link calls to a projected 720,000 cfs flow at The Dalles which the United States rejected in favour of 600,000 cfs “to be
States can only trigger on-call operations “to the extent necessary to meet forecast flood control needs in the territory of the United States of America that cannot adequately be met by flood control facilities in the United States of America.”140 The paragraph continues, quantifying this condition with respect to both the initial term (i.e. the first sixty years) and any subsequent continuation.

Focusing on the initial term, the Protocol provides that the United States can trigger its on-call entitlement141 only if there are potential floods that might result in a peak discharge at The Dalles, Oregon in excess of 600,000 cfs “assuming the use of all related storage in the United States of America existing and under construction in January 1961”142 as well as Libby and the subset of Canadian storage contemplated by Article IV(2)(a)143 of the Treaty. This refers to the 8.45 maf (now 8.95 maf) of designated storage at Mica, Arrow and Duncan, as discussed previously. The precondition of effective use of domestic flood control capacity is discussed in detail in section 4.

In addition, the Protocol imposed a set of procedural safeguards on the exercise of the call. These safeguards contemplate that: (1) the U.S. Entity will consult the Canadian Entity prior to issuing a call, (2) the Canadian Entity may within ten days reject or suggest modifications with supporting considerations, (3) the U.S. Entity must then review and, if practical, modify or withdraw its call, (4) if agreement is not reached, the U.S. Entity is to submit the matter to the Permanent Engineering Board (PEB) and the Entities are to “be guided” by any “instructions” issued by the PEB, and (5) in the absence of instructions issued by the PEB, the U.S. Entity is allowed to renew its call “and the Canadian [E]ntity shall forthwith honour the request.”144

consistent with the treaty”).

140. Columbia River Treaty, supra note 1, at Protocol (1).
141. The paragraph also contemplates an alternative i.e. “unless otherwise agreed” by the Permanent Engineering Board (PEB). Presumably this leaves it open to the United States to appeal to the PEB to argue that the need to use Canadian flood control facilities is triggered at a lower discharge rate.
142. Columbia River Treaty, supra note 1, at Protocol (1)(1). For the concern that the United States might call for Canadian flood control operations in order to optimize its own storage for power purposes see McNaughton, supra note110, at 163.
143. Columbia River Treaty, supra note 1, at Protocol (1)(1).
144. Id. at Protocol 1(3). One commentator points out that the consequences of
Because there has yet to be a call, these provisions have yet to be tested. There is some concern that these procedures will prove to be unworkable given that twenty days may elapse between the request for an on call operation and its initiation.\(^{145}\) The Phase 1 report therefore assumes that any response to a call will be both assured and immediate.\(^{146}\)

The United States pays for on-call storage during the initial term of the Treaty in accordance with Article VI(3). First, the United States is required to pay $1.875 million for each of the first four on-call operations, and, second, the United States is also required to deliver equivalent power “lost by Canada” in respect of each of those four operations and any additional on-call operations.\(^{147}\) Such delivery is to be made “when the loss of hydroelectric power occurs.”\(^{148}\)

An official Canadian government publication issued in 1964 explains how these sums were calculated.\(^{149}\) First, the premise of the calculations was based on sharing the benefits conferred by the Canadian storage. This was based on the projected level of development in the affected parts of the Basin in 1985 and a reduction of potential floods at The Dalles to the level of 800,000 cfs.\(^{150}\) Second, the primary Canadian storage was treated as being of equal value to the existing U.S. storage of 13 maf and was estimated to confer an average annual value of $5,700,000 (taking into account low and high flow years).\(^{151}\) Canada was entitled to half of that benefit which was evaluated in terms of 1957 dollars using a discount rate based on the lower U.S. interest rates rather than Canadian interest rates.\(^{152}\) As for the additional

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\(^{145}\) ENTITIES PHASE I REPORT, supra note 4, at 42.
\(^{146}\) Id. at 42–43.
\(^{147}\) Columbia River Treaty, supra note 1, at art. VI(3).
\(^{148}\) Id.
\(^{149}\) THE COLUMBIA RIVER TREATY AND PROTOCOL: A REPRESENTATION, supra note 6, at 85–90. See also Senate Ratification Hearings, supra note 21, at 47–48, 54–55 (statement of Lieutenant General C. Itschner).
\(^{150}\) THE COLUMBIA RIVER TREATY AND PROTOCOL: A REPRESENTATION, supra note 6, at 88.
\(^{151}\) Id.
\(^{152}\) Id. at 88–90.
on call storage, the publication notes that the Parties took a similar approach—suggesting that if the first four calls for the operation of additional storage for flood control purposes were “spaced uniformly over the Treaty period the four payments will have the same value to Canada [as a series of annual payments over the sixty years].”

As for the second part of the compensation rules (requiring the United States to make Canada whole in terms of foregone power generation), Article XIV(2) of the Treaty (which deals with arrangements for implementing the Treaty through the designated Entities) provides, *inter alia*, that the Entities shall be responsible for the “calculation of and arrangements for delivery of hydroelectric power to which Canada is entitled for providing flood control.”

In sum, the United States is currently entitled to an assured flood operation as well as additional on-call protection (under certain terms and conditions). Until 2024, the trigger for on-call protection is a scenario in which the U.S. Entity anticipates regulated flows at The Dalles in excess of 600,000 cfs.

**D. The On-Call/Called Upon Flood Control Operation After 2024**

The current position is that the United States automatically loses the benefits of the prescribed flood control operation on the sixtieth anniversary of the Treaty in 2024. This will happen unless the two Parties agree to modify the Treaty rules. Flood control after sixty years is only available on an on-call/called upon basis as prescribed by Article IV(3) and as modified by Protocol 1(2). It is helpful to reproduce the two texts here:

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153. *Id.* at 88. See text to notes 146 – 151, *infra*. The bracketed text actually reads in the volume as follows: “as the annual payments possible.” It does not say what the annual payments would have been. As for the post-2024 period the Phase 1 Report notes that no attempt was made to calculate the potential flood control damage that might result from any of the three options under consideration. *ENTITIES PHASE I REPORT, supra* note 4, at 49.


155. Note as well that it is important to read Protocol (1)(2) in light of the chapeau to Protocol (1) which provides as follows:

If the United States Entity should call upon Canada to operate storage in the Columbia River Basin to meet flood control needs of the United States of America pursuant to Article IV(2)(b) or Article IV(3) of the Treaty, such call
IV(3). For the purpose of flood control after the expiration of sixty years from the ratification date, and for so long as the flows in the Columbia River in Canada continue to contribute to potential flood hazard in the United States of America, Canada shall, when called upon by an entity designated by the United States of America for that purpose, operate within the limits of existing facilities any storage in the Columbia River Basin in Canada as the entity requires to meet flood control needs for the duration of the flood control period for which the call is made.

I(2) The United States entity will call upon Canada to operate storage under Article IV(3) of the Treaty only to control potential floods in the United States of America that could not be adequately controlled by all the related storage facilities in the United States of America existing at the expiration of 60 years from the ratification date but in no event shall Canada be required to provide any greater degree of flood control under Article IV(3) of the Treaty than that provided for under Article IV(2) of the Treaty.

After 2024, the on-call operation is the only operation that the United States is entitled to request. It is intended to be a complete substitute for both the assured and the pre-2024 on-call operation. The modelling carried out for the Phase 1 Studies suggests that the strongest determinant for the frequency of U.S. calls on Canadian storage will be the level of flood protection: either 450,000 cfs or 600,000 cfs at The Dalles. The amount of storage that the United States needs to call upon, however, will be greater following 2024 in the treaty termination scenario (Option 2) rather than in a treaty continuation scenario (Option 1). This is because if the Treaty continues, the United States is still entitled to prescribe drafting for an assured power operation. Thus, the United States would only need to call for a flood control draft

shall be made only to the extent necessary to meet forecast flood control needs in the territory of the United States of America that cannot adequately be met by flood control facilities in the United States of America in accordance with the following conditions:

Columbia River Treaty, supra note 1, at Protocol (1).

156. ENTITIES PHASE I REPORT, supra note 4, at 45. The Report also noted that there was little difference between treaty termination and treaty continuation scenarios because the triggering assumptions were the same.
where potential flooding would call for a deeper draft than that already provided by the prescribed power operation.\textsuperscript{157} By contrast, in a treaty termination scenario, there will be no assured operation at all, thereby creating maximum uncertainty for the United States.\textsuperscript{158}

The following sections address three questions: (1) what is the trigger for on-call operation after 2024, (2) what is meant by the “use of all related facilities” in the United States, and (3) what is the extent of the duty to compensate for an on-call operation after post-2024?

1. \textit{The Trigger for On-Call Operation After 2024}

A threshold question to be resolved is when the United States is entitled to trigger an on-call request after 2024. The Treaty and the Protocol taken together provide both a general and a specific threshold for the trigger but both are silent on the most important element—the flood control target that is to be used.

The first clause of Article IV(3) of the Treaty establishes a general threshold: the United States can only require Canada to provide a flood control operation if “the flows of the Columbia River in Canada continue to contribute to potential flood hazard in the United States of America.”\textsuperscript{159}

The next threshold that must be met before a call can be made is that there must be a “potential flood,”\textsuperscript{160} “potential flood hazard”\textsuperscript{161} or “flood control needs”\textsuperscript{162} and that such a flood “could not be adequately controlled by all the related storage facilities.”\textsuperscript{163} What does the term “all the related storage facilities” in the United States mean? A storage facility will be “related” if it is physically capable of reducing flows at The Dalles to achieve the targeted level of protection or “adequate control.” If it cannot make a contribution then it is not a related facility. In principle, any facility with storage

\textsuperscript{157} Id. at 42.
\textsuperscript{158} Id. at 43, 48. The Report concludes that “the volume of Called Upon storage will generally be less if the Treaty continues after 2024.” Id. at 48.
\textsuperscript{159} Columbia River Treaty, supra note 1, at art. IV(3). The language here reflects the possibility of a diversion project reducing the risk of downstream flooding.
\textsuperscript{160} Id. at Protocol (1)(1).
\textsuperscript{161} Id. at art. IV(3).
\textsuperscript{162} Id.
\textsuperscript{163} Id. at Protocol (1)(2).
above The Dalles on either the Columbia or any tributary of the Columbia, including the Kootenai,\textsuperscript{164} Pend d’Oreille,\textsuperscript{165} Flathead,\textsuperscript{166} Clarke Fork and Snake Rivers (and its tributaries including the Clearwater\textsuperscript{167}) may contribute to diminished flows. The Willamette joins the Columbia below The Dalles. But even excluding the facilities on the Willamette and the Bonneville Dam, which is also downstream of The Dalles, the FCOP lists some 30 U.S. facilities in the Columbia Basin Flood Control System.\textsuperscript{168}

Of those 30 facilities listed as having “active storage,” only eleven are also listed as having storage “[c]ommitted for [f]lood [c]ontrol.”\textsuperscript{169} The notations for other facilities include remarks such as: “[n]ot committed but operated voluntarily by project owner for flood regulation,” “[c]ontrolled elevation for normal power operation. May be exceeded involuntarily during flood period,” and “[n]ormally operated to preserve natural lake storage during flood period.”\textsuperscript{170} Most of the upstream storage on the Snake River (13 maf) is used for irrigation and is not committed to system wide flood control although it may be used for local flood control purposes.\textsuperscript{171}

One of the issues that requires further investigation is whether, post-2024, the United States will need to formally commit all these additional facilities to flood control before it

\textsuperscript{164} Libby.
\textsuperscript{165} Albeni Falls.
\textsuperscript{166} Hungry Horse.
\textsuperscript{167} Dworshak.
\textsuperscript{168} FCOP 2003, supra note 12, at tbl. 1.
\textsuperscript{169} Id. Note that these are only the facilities listed in FCOP. Further research would be required to determine if there were additional facilities that could provide flood control protection and the extent of that protection. Preliminary research however does suggest that there are such facilities. For example, FCOP makes no mention of the following dams all of which have flood control as an authorized use or which have flood control draft elevations prescribed in their license documents. These facilities include American Falls, Ririe and Minidoka on the Upper Snake and Mason and Warm Springs on the Middle Snake.
\textsuperscript{170} Id. See also ENTITIES PHASE I REPORT, supra note 4, at 43, 83 (referring to drafting of U.S. headwater projects (Libby, Dworshak and Hungry Horse) and the drafting of Grand Coulee and Brownlee). The Report notes that “[i]t is possible that other projects may also be able to provide some degree of flood protection, but this possibility was not investigated in Phase 1.” Id. at 83.
will be entitled to call upon Canadian storage.\textsuperscript{172} The answer must depend upon whether such facilities are physically capable of reducing flows at The Dalles. If they are, they must be put to effective use (or be committed i.e. planned to be put to effective use) before the United States can trigger a call. Another possibility is that the United States may need to prepare an integrated FCOP for its own facilities on the Columbia and Snake. At present, there is an integrated FCOP for the Canadian Treaty facilities plus Libby, but there is no integrated FCOP for the entire system. A good faith interpretation and application of the Treaty may require the United States to show, by means of an integrated FCOP, how and when it will call on Canadian facilities.

But these two thresholds only take us so far. The next issue is: what is the desired level of control? Is the desired level of control after 2024 different from before? Both of the controlling documents, the Treaty and the Protocol, are surprisingly silent on this crucial question. There are two competing views. On the one hand, Canada argues that the flood control objective must be the same as the objective for on-call operation pre-2024: 600,000 cfs. On the other hand, the United States believes that the objective (and therefore the trigger) is 450,000 cfs.

In order to shed some light on this question, it is best to start with the situation before 2024 and examine both the assured operation and the on-call operation. On the face of it there is no reason to confine the analysis to the pre-2024 on-call scenario. The first issue to note when looking at the assured operation before 2024 is that the Treaty is silent as to the target level of flood control. The Treaty specifies the amount of storage for which the United States is entitled to prescribe an operation but it does not set a target.\textsuperscript{173} Instead, the text simply states that Canada shall operate this storage “[f]or the purpose of flood control”\textsuperscript{174} and “in accordance with Annex A and pursuant to flood control operating plans made thereunder.”\textsuperscript{175} Neither does Annex A establish any flood

\textsuperscript{172} Note in this context that the reference operation for the 2014/2024 Review applies “effective use procedures” to only eight U.S. reservoirs: Grand Coulee, Libby, Hungry Horse, Kerr, Albeni Falls, Dworshak, Brownlee and John Day.
\textsuperscript{173} Columbia River Treaty, supra note 1, at art. IV(2).
\textsuperscript{174} \textit{Id}.
\textsuperscript{175} \textit{Id.} at art. IV(2)(a).
control objectives. Instead, Annex A contemplates that the United States will prepare flood control operating plans. Such plans will have a “desired aim,” but the Annex does not prescribe that “desired aim” other than to note that the overall goal is “effectiveness for control of floods on the Columbia River at The Dalles, Oregon.”

The structure of the Treaty and the Annex leads one to conclude that the Parties contemplated that it would be up to the U.S. Entity to propose a flood control protection target as part of the FCOP. That is what actually happened. In making such a proposal, the U.S. Entity would be required to act in good faith. Contemporary accounts indicate that the Parties addressed the anticipated level of protection during the negotiation of the Treaty. Two sources, one Canadian and one from the United States confirm the nature of the discussion.

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176. Id. at Annex A (5).
177. Id. at Annex A (5)(d).
178. See generally FCOP 2003, supra note 12, at app. A.
179. See also IJC PRINCIPLES, supra note 92, at 14, (supporting the 600,000 cfs level). The academic sources all favour a 600,000 cfs (or higher) target as well. Professor Albert E. Utton was particularly clear in concluding that 600,000 cfs provided the effective yardstick for on call flood control both pre- and post-2024. After discussing the pre-2024 scenario Utton stated:

    After the expiration of the sixty year period . . . the United States can call on Canada for help in controlling floods, when United States storage facilities cannot reduce the flow to 600,000 cfs at The Dalles.

    Thus the objective standard of a flow exceeding 600,000 cfs . . . is provided to determine when Canada can be called upon to provide flood control storage in addition to the 8,450,000 acre-feet during the first sixty years of the treaty, and the same standard is to be applied before Canada supplies any flood control storage after the sixty years expire. . . . The establishment of this 600,000 cfs standard . . . was provided . . . to satisfy Canadian concern that she (sic) had no voice in determining whether a need for additional flood control actually existed.

    Canada was also concerned that because of the development of potential flood areas, calls for flood control storage might become so frequent that they would interfere with Canadian use of storage, especially for power generation. The set standard puts an objective unit on when calls can be made regardless of intervening building and development.

    Albert E. Utton, The Columbia River Treaty and Protocol, 1 LAND AND WATER L. REV. 181, 186–87 (1966) (footnotes omitted). Professor Ralph Johnson was less discriminating and definitive, commenting:

    Under the Protocol, Canada’s control over its own storage facilities is confirmed: Canadians decide which reservoirs are to release water [for generation]. The Protocol also makes clear that United States “calls” for flood control storage shall be made only in emergencies i.e., when the flow at The Dalles, [sic] Washington exceeds 600,000 [cfs]. In order that Canadian power generation shall not be unduly disturbed, the United States agrees not to call for Canadian storage until all its own storage facilities are being used to capacity.

    Johnson, supra note 6, at 750–51 (1966). In this article, Johnson does not
First, the official Canadian “Presentation” document of 1964 suggests that after 2024 the call could be triggered only if U.S. facilities could not control floods to 600,000 cfs at The Dalles. However, the same document also refers to the relevant degree of protection as being 800,000 cfs for all three operations (i.e. assured, pre-2024 on-call and post-2024 on call). At no point does the publication refer to a higher level of protection such as a 450,000 cfs threshold. Second, and perhaps of even greater significance, are the comments of Lieutenant General Itschner during the Senate Ratification Hearings. General Itschner stated that flood control to an 800,000 cfs level is:

[A]n acceptable and desirable immediate goal for flood regulation. Regulation to a flow of 600,000 cubic feet per second is desirable for a further goal in view of the trends of future flood plain use as well as the possibility that a considerably larger flood than the record flood of 1894 might occur.

General Itschner refers to these targets as the initial and the ultimate goals. He goes on to say: “[o]f the 15,500,000 acre-feet of Canadian storage, 8,450,000 acre-feet will be useful for the immediate objective of controlling floods equivalent to that of 1894 to 800,000 acre-feet.” The balance of the on-call storage is referred to under the heading of: “[c]ontrol to 600,000 cubic feet per second” and with the notation that “[s]uch additional storage will be requested only when there is a threat of a very large flood.”

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180. THE COLUMBIA RIVER TREATY AND PROTOCOL: A PRESENTATION, supra note 6, at 89 tbl. 7, item 3.
181. Id. The table does not expressly refer to a target number for “operation after 60 years” but read in the context of the previous entries for assured and on call (primary and secondary) it is clear that it must also be using the same target, 800,000 cfs at the Dalles.
182. Senate Ratification Hearings, supra note 21, at 53 (statement of Lieutenant General Itschner).
183. Id. at 53–54.
184. Id. at 55.
implies that the on-call storage will not be used to control down to 600,000 cfs but simply to manage the very large floods down to just below 800,000 cfs. Once again, at no point does the General (or any other witness at the Hearings) suggest a more aggressive flood control level than 600,000 cfs—such as 450,000 cfs level of protection.  

In sum, while the Treaty itself does not specify a desirable flood control target for flows at The Dalles, the Parties seem to have agreed that the principal target was 800,000 cfs with 600,000 cfs as a desirable target. Where then does the idea of flood control down to a 450,000 cfs target come from? The only source for this target is the FCOPs themselves. Both the 1972 and 2003 FCOP include the following statement of both the general flood protection objective and the more specific statement for The Dalles:

4-1. Basic Flood Protection Objective. The basic objective for flood regulation is to operate reservoirs to reduce to non-damaging levels the stages at all potential flood damage areas insofar as possible, and to regulate larger floods that cannot be controlled to non-damaging levels to the lowest possible level with the available storage space . . . . Canadian storage will be operated (together with United States storage projects) to control floods to non-damaging levels wherever possible, in accordance with the following objectives.

4-2. Columbia River in the United States. Flooding in the Columbia River downstream from the mouth of the Snake River begins when the river reaches [a specified elevation]. The corresponding flow measured at The Dalles, Oregon is approximately 450,000 cfs. Significant damage begins at [a specified elevation].

185. Lieutenant General Itschner offers only a very short discussion of flood control after the 60th anniversary of the Treaty and does not specifically refer to a flood control target. Id. Given the context, it is clear that a call would be framed in terms of the immediate and ultimate goals.


187. See also U.S. ENTITY, SUPPLEMENTAL REPORT, supra note 4, at 5 (“The 450 kcfs objective was selected because it is the current standard for flood control operations at cited in the FCOP.”).
The corresponding flow at The Dalles, Oregon is approximately 600,000 cfs. Because large floods cannot be regulated to 450,000 cfs, the desired goal is to control major floods to 600,000 cfs in the lower Columbia River at The Dalles. Damage commences in the mid-Columbia area in the vicinity of Hanford, Washington, when flows reach 400,000 cfs as measured at the Priest Rapids project. The regulation required for The Dalles normally will achieve the desired protection in the mid-Columbia area.\textsuperscript{188}

The balance of the FCOP and actual operating practice confirms that the assured operation is designed to meet a flood control target of 450,000 cfs in non-extreme flow years when this control is possible. The FCOP represents subsequent practice of the Parties under the Treaty and suggests that Canada has accepted 450,000 cfs at The Dalles as the applicable flood control objective in non-extreme years, at least for the assured operation.\textsuperscript{189} Expressed in interpretive terms, the FCOP is “subsequent practice in the application of the treaty which establishes the agreement of the parties [the United States and Canada]”\textsuperscript{190} that the flood control objective for the assured operation is 450,000 cfs to the extent that this can be provided but recognizing that this will not always be possible.

What then is the flood control objective for the additional storage that Canada is obliged to commit under the terms of an on-call operation before 2024? Here the Protocol is clear: the relevant target before 2024 is 600,000 cfs at The Dalles. In other words, the United States can only make a call if operation of existing or under construction U.S. storage in 1961, storage at Libby, and assured storage space\textsuperscript{191} may still result (taking into account forecast uncertainties) in a flow at The Dalles greater than 600,000 cfs. The FCOP (1972 and 2003) suggest that the collective storage capacity referred to above should be adequate to shave 300,000 cfs off the peak.\textsuperscript{192}

\textsuperscript{188} FCOP 2003, \textit{supra} note 12, at 16. The text in FCOP 1972, \textit{supra} note 12, at 12 is similar.

\textsuperscript{189} The reference to “subsequent practice” refers to the Vienna Convention on the Law of Treaties, \textit{supra} note 38, at art. 31(3)(b).

\textsuperscript{190} \textit{Id}.

\textsuperscript{191} This refers to the assured storage at Canadian Treaty dams.

\textsuperscript{192} FCOP 2003, \textit{supra} note 12, at app. A.
Thus, there is broad agreement that prior to 2024, the United States is only entitled to make a call to supplement assured storage space where it anticipates \textit{unregulated} flows at The Dalles in excess of 900,000 cfs.\footnote{Note that the FCOP carries the reasoning one step further since it translates forecast runoff volumes into projected flows at The Dalles taking into account the uncertainties associated with such forecasts especially early in the season. See \textit{generally infra} Appendix; FCOP 2003, \textit{supra} note 12, at app. A.}

After 2024, the calculation must be restated such that the United States can only make a call if the anticipated peak discharge at The Dalles, minus operation of “all related storage facilities” in the United States existing in 2024, is unable to reduce the peak at The Dalles to less than X cfs, where X is either 450,000 cfs or 600,000 cfs. It is important to note that while the FCOP indicates that the package of storage referred to in paragraph 1 of the Protocol can reduce the peak by 300,000 cfs, the FCOP does not provide a similar calculation for the shaving capacity of “all related [U.S.] storage facilities.”\footnote{Indeed, we may not be able to determine that with any certainty before 2024 but it must be a crucial element in any effort by the United States to exercise the called upon power in good faith.}

How then should the post-2024 flood control target be interpreted? The arguments in favour of the 600,000 cfs flow are as follows. First, while the Treaty is silent regarding the flood control target, the record shows that the Parties agreed to an immediate target of 800,000 cfs and that 600,000 cfs was desirable. Neither the Senate hearings nor the Canadian “Presentation” document referred to above can be considered agreements relating to the Treaty or instruments made by one of the Parties in connection with the conclusion of the Treaty.\footnote{Here I refer to the Vienna Convention on the Law of Treaties, \textit{supra} note 38, at art. 31(2)(a) & (b).} Given the specificity of the statements made in these two documents, however, it is inconceivable that the \textit{travaux} would not support an interpretation that favours 600,000 cfs (or 800,000 cfs) as a target rather than 450,000 cfs.\footnote{The \textit{travaux} would be admissible to show what the Parties would have had in mind.}

Second, the United States paid for a higher degree of protection during the first sixty years of the Protocol. It would be absurd to conclude that the United States can
achieve the same or a more stringent level of protection post-2024 at a lower cost.\textsuperscript{197}

Third, the caveat in the Protocol to the effect that Canada cannot be required to provide a greater level of flood control after 2024 compared to before 2024 must be read as referring to pre-2024 on-call storage (and not assured plus on-call storage). This is because the only subject of these paragraphs of the Protocol is on-call storage. Thus, while Protocol 1(2) refers generally to Article IV(2) of the Treaty, it must be noted that the entirety of Protocol 1(2) is covered by the opening language (the chapeau) of section 1. The opening language makes it clear that the Parties are only discussing the scope of the on-call operation, whether triggered under Article IV(2)(b) (before 2024) or Article IV(3) (after 2024).

Fourth, any examples of practice under the FCOPs in relation to pre-2024 operations are not relevant to post-2024 operations. This is because the post-2024 operation rests on a different legal foundation. In particular, the Treaty contains different compensation provisions for pre-2024 and post-2024 storage.

The arguments in favour of the 450,000 cfs target follow. First, the Treaty allows the United States to set a flood control objective through the procedures contemplated in Annex A. The United States did so in the form of the 1972 and 2003 FCOPs. The FCOPs contemplate regulating flows to achieve a flow at The Dalles of 450,000 cfs.\textsuperscript{198} Canada has accepted the FCOPs (representing a subsequent agreement or subsequent practice within the meaning of the VCLT\textsuperscript{199}) and the actual practice under the terms of those FCOPs, for the use of the flood control space purchased by the United States for the term of the purchase (sixty years).

Second, where the Parties wished to prescribe a less demanding flood control objective they did so. They did this in the context of the pre-2024 on call operation. It would have been an easy matter to apply the same standard to the post-

\textsuperscript{197} Here Canada might refer to the U.N. Watercourses Convention, see generally discussion \textit{supra} Part II.A., which seems to accept the idea that the downstream state should compensate the upstream state not simply on the basis of covering costs but also on the basis of sharing the benefits conferred. This might suggest that Canada’s obligations to operate facilities when it is only receiving its opportunity costs should be narrowly defined.

\textsuperscript{198} Vienna Convention on the Law of Treaties, \textit{supra} note 38, art. 31(3)(b).

\textsuperscript{199} \textit{Id} at art. 31(3)(a), (b).
2024 operation, but the Parties chose not to do so. Instead, the Parties chose to stipulate that Canada cannot “be required to provide any greater degree of flood control” post-
2024 than that “provided for under Article IV(2) of the Treaty.” Article IV(2) covers both assured and on-call storage. If the Parties intended to limit Canada’s obligation to the threshold established for on-call operation, they should have referred to the flood control protection committed under Article IV(2)(b).

Third, Article IV(3) gives the United States protection against “flood hazard” and affords it “flood control.” The text does not simply give the United States protection from major floods (i.e. a 600,000 cfs peak discharge). In developing this interpretation the United States might draw upon the flood control provisions of the U.N. Watercourses Convention, which requires the upstream state to take all appropriate measures to prevent harmful conditions. If, as the FCOP suggests, damage commences at 450,000 cfs, that is a reason for preferring this lower figure as the target rather than the higher 600,000 cfs.

If the United States does trigger a call, then it appears that it is only entitled to require the operation of enough Canadian storage to provide reasonable assurance of meeting the flood control peak flow target at The Dalles (whether 450,000 cfs or 600,000 cfs). Other constraints on Canadian operations may exist. The Phase 1 Report discusses one such possible constraint pertaining to the conjoint operation of Mica and Arrow. In a situation where Arrow is held at full pool, and then required to evacuate to provide flood control space, it may be necessary both to increase Arrow outflows (to as much as 100,000 cfs) but also to reduce Mica flows to a minimum, including generation flows.

201. Id.
202. See ENTITIES PHASE 1 REPORT, supra note 4, at 47–48, 61, 62 (discussing the called-upon storage volumes that may be required at the different Canadian facilities).
203. Id. at 55–56. This could occur in both the treaty termination and treaty continuation scenarios. In the treaty termination scenario BC Hydro can exercise a lot of discretion over Arrow levels. As noted above (see supra note 53), BC Hydro will likely seek to operate Arrow at full pool subject only to meeting local flood control requirements. But even in a treaty continuation scenario, the current rules allow for the so-called flex operation, which allows Canada to manage individual projects as it
comments that: “It is unlikely that Mica could be reduced to minimum flow in winter without a very high risk to BC Hydro power reliability and risk of impacts to non-power requirements.” 204 The later the request for on call storage, the more drastic the required response.

2. What is Meant by the Use of All Related Storage Facilities in the United States?

In an on call-setting, whether before or after 2024, the Protocol makes it clear that the United States can only make a call to the extent that its own facilities cannot meet the flood control objective without assistance. In general, this will mean that U.S. facilities will need to draft deeper than might be required when the United States can rely on an assured flood control operation from Canada. 205 This in turn may mean that U.S. facilities fail to refill in some years and operate at a lower head with resulting power losses. 206 It may also mean that there is less water available for other purposes including irrigation, navigation and fish flows.

Domestic flood control capacity may depend on a number of variables with respect to particular facilities. First, the facility must be operational. If a facility has been decommissioned, presumably it is not a related facility within the meaning of the Protocol. Second, all facilities are subject to operating constraints and may have limited discharge capacity. In some cases, problems with turbines may reduce discharge capacity if they cannot be used for some reason. Presumably, all of this might reasonably be taken into account in assessing the capacity of U.S. flood control facilities to meet its own domestic target. Third, facilities may also be under some legal constraints. Some such legal

\[204. \text{Id. at 56. But the United States may well respond that the Treaty imposes an obligation of conduct and does not afford Canada much leeway in avoiding that obligation if properly triggered. But that of course takes us back to the precise nature of the United States obligation to make effective use of its facilities for flood control purposes.}
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205. Id. at 53.

206. It does not seem unreasonable to suggest that the United States will have an incentive to minimize the obligations associated with effective use, especially if the costs of compensating Canada for an on call operation are lower than the costs incurred by an effective use operation.
constraints are obvious and include maximum elevations established for engineering and safety reasons. But other conditions may be established for environmental or ecological reasons. Such conditions may limit the capacity to use a facility for flood control purposes. The question for present purposes is whether the United States is entitled to rely on such obligations in assessing whether it has made effective use of its own facilities to achieve the desired level of flood control and before triggering an on-call obligation.  

The Phase 1 Report did not take account of such additional constraints but such constraints were considered as part of the U.S. Entity’s supplemental report. One general result of regulating storage and flows to meet Bi-Op requirements rather than flood control requirements is that reservoir levels will generally be held higher given the importance attached to reservoir refill to allow fish releases later in the summer. The VARQ operation of Libby and Hungry Horse provides one such example of a modified flood control operation in order to deliver environmental benefits. The VARQ operation is discussed in the Appendix to the paper.

The key legal question is whether the United States is allowed to rely on operations directed by the Endangered Species Act, Biological Opinions (ESA Bi-Ops) in assessing what amounts to the effective use of its facilities before it is entitled to trigger an on-call operation. The Treaty has

207. A variation on this argument is discussed above in the context of the amount of live storage that the United States has actually committed to flood control. See text to notes 162 et seq.

208. U.S. ENTITY, SUPPLEMENTAL REPORT, supra note 4, at 2.

209. Id. at 25, 29, 33. Higher reservoir levels may deliver some benefits to Canada in relation to Libby since Lake Koocanusa is valued in Canada for its recreational benefits which are only realized when Libby is at full pool during the recreational season. Table 3-14 in the ENTITIES PHASE 1 REPORT, supra note 4, at 53 suggests that Libby will have to draft on average an additional 47.2 feet on April 30 to meet effective use flood control requirements rather than VARQ.

210. There are clearly similarities between the issue as stated here and the dispute that arose between Canada and the United States in relation to the operation of Libby following the listing of Kootenai sturgeon under the ESA. That dispute was ultimately “settled” by the terms of the Libby Coordination Agreement. THE U.S. ENTITY FOR THE COLUMBIA RIVER TREATY, RECORD OF DECISION, LIBBY COORDINATION AGREEMENT (Feb. 15 2000), available at http://www.bpa.gov/corporate/pubs/rods/2000/Libby_Coordination_Agreement.pdf [hereinafter LIBBY COORDINATION AGREEMENT RECORD OF DECISION]. For discussion of the background to this dispute, which nearly went to arbitration, see Bankes, supra note 6, at 85–92.
very little to say about these matters. Annex A of the Treaty contemplates that the United States might have a say in the operational limits (e.g., discharge capacity) for the Canadian Treaty facilities, but it does not extend this review to the licensing conditions that might apply to those facilities. The applicable principle of international law is that a state cannot rely upon its domestic laws to avoid or qualify its obligations. This principle might suggest that the United States should not be allowed to rely upon ESA obligations, for example, to limit the use of existing facilities for flood control purposes, and thereby more readily trigger Canada’s on-call obligations. On the other hand, it might be argued that Canada would have known that all storage facilities would be licensed, and that license terms and conditions might limit the use of facilities under certain circumstances. Further, it might be argued Canada would have known that operational limits for the ESA are really no different from other forms of operational limits, and that these limits should be taken into account in interpreting the open textured language of the Protocol.

3. Compensation for On-Call Operations Post-2024

As noted above, the compensation due to Canada for an on-call operation is expressed differently for the post-2024 period than for the pre-2024 period. Under Article VI(4) (the applicable provision for post-2024 called-upon operations), Canada is entitled to be compensated for all the operating costs incurred by Canada in providing the flood control. It is also entitled to “compensation for the economic loss to

211. ILC Articles on State Responsibility, second reading, Article 3, as reproduced in JAMES CRAWFORD, THE INT’L LAW COMM’N’S ARTICLES ON STATE RESPONSIBILITY: INTRODUCTION, TEXT AND COMMENTARIES (2002); Vienna Convention on the Law of Treaties, supra note 38, at art. 27.

212. One can think of this as an evolutive interpretation of the Treaty to account for changing values. See Gabčíkovo-Nagymaros Project (Hung./Slovk.), Judgment, 1997 I.C.J. 92 ¶ 140 (Sept. 25); Iron Rhine Railway (Belg. v. Neth.), Hague Ct. Rep. (Scott) ¶¶ 79-244 (Perm. Ct. Arb. 2005). More generally on evolutive interpretation (especially attractive in the area of human rights), see 40 YEARS OF THE VIENNA CONVENTION ON THE LAW OF TREATIES supra note 69, at 55–95. Further research might be required on this point. The research would need to examine the licenses for U.S. facilities as they stood at the time the Treaty was negotiated. This would inform the reasonable expectations of the Parties as to the scope of the United States’ duty to use the flood control capacity of its facilities and the types of limitations that were typically included at the time.
Canada arising directly from Canada foregoing alternative uses of the storage used to provide the flood control.” Article VI(5) indicates that Canada may elect to receive compensation under this latter head in power. The formula is perhaps more generous than during the initial period since it refers to the compendious term “economic loss.” In addition, the loss is expressed in terms of foregoing alternative uses, which might include storage and later release at times of higher demand. This may mean, for example, that a reservoir drawn down for flood control never achieves re-fill with the implication that turbines operate with a lower head and therefore less efficiently over a long period. Furthermore, there may simply be less water to generate power at times of peak demand, which may be later that summer (to accommodate air conditioning and cooling demand) or the following winter.

Article VI(3) (which applies to on-call flood control until 2024), by contrast, suggests that the only form of compensation payable for on-call flood control is delivery of equivalent lost power where “delivery [is] to be made when the loss of hydroelectric power occurs.”213 It will also be necessary for the Parties to resolve a number of other matters before the on-call provisions can be operationalized. The Phase 1 Report of the Entities notes that the Parties will need to agree on when on-call is initiated, when it concludes, and how soon thereafter it is possible to determine that Canadian reservoirs have returned to their planned operation.214

One of the issues that the CRT does not deal with is the allocation of the compensation obligation within the United States—both the obligation to deliver power and the obligation to compensate for economic losses. Allocation has not been an issue during the first fifty years of the Treaty’s operation for two reasons. First, the lump sum payment would have been authorized by the original approval of the Treaty, as presumably were the contingent four on-call payments. Second, because there has been no on-call operation, it has been unnecessary for the Parties to work

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213. Columbia River Treaty, supra note 1, at art. IV(3) (alteration in original).
214. Entities Phase 1 Report, supra note 4, at 81.
through how the power delivery obligations would work. But, as the Parties move forward from 2024, these issues will become more challenging. Because resolution of these issues principally involves questions of U.S. domestic law, I will leave further exploration and analysis of these allocation issues to others.215

As already noted, in the post-2024 period there is no provision for an additional amount to be paid for each call or for the first number of calls (as there is for the first four pre-2024 calls). This gives rise to two comments. First, it is clear that the first four “call” payments cannot be carried forward post-2024 if less than four calls have been made prior to that time. This is because Article VI is structured so that the Treaty creates two distinct flood control compensation regimes, one that applies prior to 2024 and one that applies post 2024. Second, the absence of additional payments suggests that the post-2024 regime is strictly a compensatory regime and not a benefits (avoided costs) sharing regime such as that contemplated by the IJC Flood Control Principles. Thus, post-2024, the United States must make Canada whole, but is not required to make any additional payment for the existence of the upstream storage and the value of the contingent right to make a call.216 There is no quid pro quo for this contingent right other than the “make whole”

215. See McKinney, supra note 18, at 320 (opining that post-2024 the U.S. Congress “would have to authorize additional payments to Canada for providing any requested flood control measures”). Note that concurrently with the Treaty agreements and especially the Protocol, the mainstem dam owners in the United States negotiated the Canadian Entitlement Allocation Agreements to establish how the obligation to pay for the Canadian entitlement was to be allocated between mainstem federal projects and non-federal projects (Wells, Rocky Island, Rocky Reach, Wanapum and Priest Rapids). The agreements provided for an allocation of 72.5% to federal projects and 27.5% to the non-federal projects. These agreements would have expired beginning in 1998 with the return of the entitlement but were extended to 2024. Canadian Entitlement Allocation Extension Agreements, Record of Decision, Apr. 29, 1997. So far as I am aware these agreements dealt with the power benefits and obligations and did not deal with flood control issues.

216. The IJC Principles and text following are quite clear in suggesting that in a cooperative development scenario there should be both compensation for loss of power and compensation for damages prevented (i.e., the benefit conferred). IJC PRINCIPLES, supra note 10. However, the Canadian presentation on The Columbia River Treaty and Protocol does suggest that the advantageous discount rate secured by Canada “is such that the value of the payments can be considered as being in excess of the total value of annual flood control payments made in perpetuity.” THE COLUMBIA RIVER TREATY AND PROTOCOL: A PRESENTATION, supra note 6, at 90; see also id. at 97–100.
obligation. In addition, the absence of some additional sharing of the benefit conferred may mean that Canada will have a particular interest in ensuring that the United truly has committed all of its available storage.

It bears reiterating that the post-2024 on-call flood control provisions will continue to apply even if one party gives the minimum ten years notice to terminate the Treaty in 2014 (or later), thereby triggering actual termination in 2024 (or later). This is because Article XIX (dealing with termination of the Treaty and the duration of the Treaty) provides that Article IV(3) (the post-2024 on call operation) and Article VI(4) and (5) (the post-2024 compensation provisions) will continue to apply until the end of the useful life of the facilities covered by Article IV(3) or until a flood control threat of the magnitude contemplated in the Treaty and the Protocol ceases to exist.217 One of the issues that is not clear is the extent to which other elements of the Treaty and Protocol that are not expressly mentioned will also continue. For example, the flood control provisions of the Protocol refer expressly to the PEB—will that institution continue as well? While there is much that will need to be worked out, the principle that will apply is evident: i.e., as much as necessary of the CRT and Protocol will be continued so as to ensure that the on-call obligations are effective.218

In sum, post-2024, the United States may only request on-call protection on certain terms and conditions. It will no longer be able to require an assured flood control operation. The United States must pay for the protection provided by the on-call operation based upon the opportunity cost of that storage and must make Canada whole. The United States is not required to share the benefits of the protection afforded by the on-call obligation and may only trigger the on-call obligation if it has satisfied certain conditions precedent and certain procedural safeguards.

The precise trigger for the on-call operation post-2024 is contentious both with respect to the target (450,000 cfs or 600,000 cfs) and with respect to the scope of the United States’ obligation to make effective use of its own storage.

217. Columbia River Treaty, supra note 1, at art. XIX(4).
facilities. The contemporary record clearly suggests that flood control target was not to be any lower than 600,000 cfs. By contrast, actual practice under the FCOP favours the lower target for the use of the 8.45 maf of assured flood control but that practise while relevant to understanding the construction and interpretation of the assured operation is of limited or no utility in relation to the interpretation of the post-2024 called upon operation. This is simply because a practice that shows an agreed interpretation of Treaty Provision A (the assured operation) cannot be authoritative as showing an agreed interpretation of Treaty Provision B (the called upon operation)—especially when that provision does not become operative until 2024.

VI. CONCLUSION

Flood control is one of the two main objectives of the Columbia River Treaty. Indeed, flood control holds the trump card in actual treaty operations. At present, and indeed until 2024, Canadian Treaty dams provide assured flood control to the United States. The Treaty requires Canada to operate 8.45 maf (now 8.95 maf) of storage in those dams on the basis of flood control operating plans proposed by the United States and agreed to by Canada. These plans aim to control flows to achieve basin-wide and local flood control objectives, the most important of which is that flows at The Dalles should not exceed 450,000 cfs during non-extreme years.

During extreme flow years, the Treaty also provides the United States with an insurance policy insofar as it allows the United States to call upon Canada to operate all additional available storage in order to respond to a major flood, and to ensure that flows at The Dalles do not exceed 600,000 cfs. The United States has never exercised this option.

The flood control operation contemplated by the Treaty changes automatically in 2024. After 2024 the United States is no longer entitled to an assured annual flood control operation. It is, however, still entitled to an on-call or called upon operation which will apply to all available Canadian storage but it can only exercise this option if its own facilities cannot deliver the desired level of flood control protection. Neither the Treaty nor the Protocol is completely clear as to what that desired level of flood control protection might be. According to one view the level of flood control protection to
which the United States is entitled is based on flows at The Dalles no greater than 600,000 cfs. According to another view, the desired level of protection remains the same as it is now (i.e., 450,000 cfs). In this latter view, therefore, the United States can trigger on-call flood control post-2024 whenever the use of domestic U.S. storage is forecast to be inadequate to maintain a regulated flow at The Dalles below 450,000 cfs.

While this is one important disagreement between the Entities, there will likely be other equally or more important differences as well. For example, it seems likely that the United States and Canada may have different views as to the extent to which multiple use dams, especially those used for irrigation purposes, should have to be drafted before the United States can call upon Canadian storage. Similarly, there may be differences as to the extent to which the United States may rely on obligations under the ESA to limit the scope of its effective use obligations. These differences of opinion will need to be resolved prior to 2024, and it seems likely that these differences will push both the Entities and the two governments to explore option three—renegotiating some aspects of the Treaty to provide for continuation of some form of an assured flood control operation on agreed terms and conditions.
This appendix offers a detailed description and analysis of the Flood Control Operating Plan (FCOP). The three sections of the appendix describe: (1) FCOP in the context of assured flood control operations, (2) the variation of FCOP (VARQ FC) as applied to Libby, and (3) FCOP in the context of on call operations.

I. THE COLUMBIA RIVER TREATY FLOOD CONTROL OPERATING PLAN – ASSURED OPERATIONS

Paragraph 5 of Annex A of the Treaty provides that the U.S. Entity “will submit flood control operating plans which may consist of or include flood control storage reservation diagrams and associated criteria for each of the dams.” The paragraph goes on to provide that “[t]he Canadian [E]ntity will operate in accordance with these diagrams or any variation that the entities agree will not derogate from the desired aim of the flood control plan.” While Annex A contemplates that the U.S. Entity will prepare and submit the FCOP, paragraph 2 of the Protocol provides that:

In preparing the flood control operating plans in accordance with paragraph 5 of Annex A of the Treaty, and in making calls to operate for flood control pursuant to Articles IV(2)(b) and IV(3) of the Treaty, every effort will be made to minimize flood damage in both Canada and the United States of America.

The first draft of the FCOP for Treaty storage was developed by a joint Entity task force established in 1965. The U.S. Entity was represented by the North Pacific Division of the Corps of Engineers (Corps), the Bonneville Power Administration and the Bureau of Reclamation, the Canadian Entity was represented by BC Hydro. The FCOP was prepared in draft form by 1968 and the task force dissolved. The Corps revised the draft in 1971 and the revised version was reviewed by the Columbia River Treaty Operating Committee in 1972. The Operating Committee is

219. This history is recounted in the 1972 and 2003 FCOPs. FCOP 1972, supra note 12; FCOP 2003, supra note 12.
comprised of representatives of the Entities and is responsible for preparing and implementing the assured and detailed operating plans to give effect to the FCOP. Revisions to the 1972 Plan were made in 1999 and the current version of the FCOP was adopted in May 2003.

The FCOP provides a useful statement of the objective of flood control regulation:

The basic objective for flood regulation is to operate reservoirs to reduce to non-damaging levels the stages at all potential flood damage areas in Canada and the United States insofar as possible, and to regulate larger floods that cannot be controlled to non-damaging levels to the lowest possible level with the available storage space.

There are five elements to flood control regulation: (1) “forecasts for seasonal runoff volumes and daily streamflows[,]” (2) storage diagrams defining the flood control storage space required, (3) procedures to develop flood control targets for the Lower Columbia (as measured at The Dalles, Oregon), (4) “procedures to guide refill of flood control space[,]” and (5) “local flood control operating criteria and project operating limits[.]”

The FCOP establishes some numeric targets associated with damaging flows in both the United States and Canada for the Columbia River and for the Kootenai (Kootenay) River. The targets are typically expressed in the form of river levels and in some cases are also expressed in terms of corresponding flows. Appendix A to the Entities’ Phase I report provides a useful summary in tabular form:

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Flood Control Objectives in Canada

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220. Columbia River Treaty, supra note 1, at art. XIV (2)(h).
221. FCOP 2003, supra note 12, at 8, 16.
222. Id. at 8.
223. ENTITIES PHASE 1 REPORT, supra note 4, at A-4 to A-5 (references omitted).
Major Damage | Damage Commences
--- | ---
Revelstoke | 1,450 ft (200 kcfs with Arrow @ El 1446 ft)
Castlegar | 1405 ft 1400 ft
Trail | 1,352 ft 280 kcfs 1,347 ft @ old highway bridge 225 kcfs @ Birchbank
Creston | 1,763 ft
Nelson | 1,759 ft 1,755 ft

Flood Control Objectives in the United States

<table>
<thead>
<tr>
<th>Major Damage</th>
<th>Flood Stage as Defined by the National Weather Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver, Washington</td>
<td>24 ft NGVD 22.2 ft Columbia River Datum 600 kcfs @ The Dalles 17.8 feet NGVD 16 feet, Columbia River Datum 450 Kcfs @ The Dalles</td>
</tr>
<tr>
<td>Bonners Ferry, Idaho</td>
<td>1,774 feet NGVD 1,764 ft NGVD (~50kcfs when Kootenay Lake is at 1750 ft NGVD)</td>
</tr>
<tr>
<td>Hanford, Washington (mid Columbia)</td>
<td>400 kcfs as measured at the Priest Rapids project</td>
</tr>
</tbody>
</table>

A key goal of the FCOP is to control flows at The Dalles based on the target of 450 kcfs, but higher controlled flows may be established as a target “to prevent storage space from filling too soon, thus resulting in damaging uncontrolled flows in the lower Columbia.”\(^{224}\) The basic annual flood

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\(^{224}\) FCOP 2003, supra note 12, at 10. The idea here is that it may be necessary to provide for higher releases from facilities now, rather than face a situation where
control operation calls for a reservoir evacuation period and a reservoir refill period. Reservoirs are typically close to full at the end of the summer and drafted during the winter for power purposes, with further drafting as necessary to provide storage space for spring runoff. The time by which storage space is to be made available varies between February 28 and April 30 for two main reasons: “1) to arrange orderly drawdown to avoid requiring all projects to release high outflows in the same short period, thereby potentially causing unintended regulated flood; and 2) to follow the natural runoff pattern; e.g., the highest-elevation project’s runoff starts later. . .”

In order to ensure that this target can be achieved in an orderly manner and consistent with project operating limits, evacuation of reservoirs will begin by either December 1 or January 1. Refill commences either to meet system flood control or to meet assured refill criteria or other agreed objectives.

The FCOP established five categories of reservoirs in the Columbia River system: (1) reservoirs operating under fixed releases to provide flood control of the lower Columbia, (2) reservoirs operated for tributary flood protection with incidental flood regulation for the lower Columbia, (3) major natural lakes, (4) reservoirs with variable releases for flood control in the lower Columbia, and (5) run of the river projects. There is nothing in the Treaty or the Protocol that requires the burden of flood control to be allocated fairly, equitably, or indeed even preferentially, as between different dams within the same category—at least until 2024. Post-2024 the United States must preferentially draft U.S. storage facilities since the United States is not entitled to call on Canadian storage until it has made full use of its own storage.

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storage facilities fill rapidly and are then discharging at full capacity and engaging in uncontrolled spill.

225. ENTITIES PHASE 1 REPORT, supra note 4, at A-7.
227. Id. at 10.
228. Id. at 11-13, tbl. 1.
229. Id. at 34 (acknowledging that the CRT “does not elaborate on how to prioritize the draft of Libby and Duncan during trapped storage conditions”); see also McNaughton, supra note 110, at 163.
The first category of reservoirs refers to large upstream facilities that, because of travel times, cannot be operated on a daily basis to provide effective flood control in the lower Columbia. Release volumes for these reservoirs are based on forecast runoff. Adjustments may be required in some instances to provide local flood protection. The reservoirs in this category include the Canadian Treaty dams at Mica (12 maf) and Duncan (1.4 maf), the Libby project (5 maf) and Hungry Horse (3 maf) and Dworshak (2 maf). The second category is of less interest here since all of the relevant facilities are in the United States. The third category includes Kootenay Lake, which is regulated by Corra Linn dam (0.7 maf), while the fourth category includes Arrow (7.1 maf) and Grand Coulee (5.2 maf). Reservoirs in this fourth category have relatively short travel times to the lower Columbia and thus can be used to produce desired flows at The Dalles as well as provide local flood control protection. The other two reservoirs in the fourth category, Grand Coulee and John Day, are both in the United States.

Section 10 of FCOP provides that its implementation is the responsibility of the CRT Operating Committee. Both sections are responsible for assembling the necessary data, but it is the U.S. Section, following consultation with the Canadian section, which “will determine the flood control storage space requirements during the Flood Control Storage Evacuation period, calculate Flood Control Refill Curves, and determine day-to-day reservoir operation for flood control during the refill period in accordance with these curves” and it is the Corps that will be responsible for “issuing instructions.” During the evacuation period, instructions will generally be issued on a weekly basis leaving it to the Canadian Section to “determine the daily distribution of these weekly storage releases to each Canadian storage project.” In low runoff years, daily control may be unnecessary and may be replaced by weekly releases subject to the caveat that “daily control of individual Canadian

230. Id. at tbl. 1 (listing facilities by category, bracketed numbers refer to active storage committed to flood control (rounded); the numbers for the Canadian Treaty dams include both primary flood control (assured) and on-call storage).
231. Id. at 38–41.
232. Id. at 38.
233. Id. at 38.
storage projects may be initiated at any time by the United States Section if changed conditions so warrant.”

In order to further operationalize the flood protection objectives, the FCOP provides more specific operating rules for each of the Treaty dams, including Libby. The FCOP does not prescribe flood control operations at other United States dams such as Grand Coulee. Operations for these reservoirs are prescribed in reservoir-specific Water Control Manuals.

The specific operating rules for each reservoir contain sections dealing with: (1) operations during evacuation, (2) operations during refill, (3) flood control refill curves, and (4) project operating limits. The section on operating limits (which deals with matters such as maximum pool elevations, discharge rates and ramping rates) contains a different rider for Libby than the standard rider for the Canadian Treaty dams. For the latter dams, the FCOP provides that “operating limits may be modified or added to from time to time as agreed by the Entities.” However, in the case of Libby the provision simply states that “operating limits may be modified or added to from time to time.” This difference recognizes the reality that the operating limits for the Canadian Treaty dams were effectively agreed upon as part of the preparation of the first FCOP as contemplated by Annex A, paragraph 5 of the CRT. By contrast, the CRT authorizes Libby but has relatively little to say about the way in which Libby is operated.

Arrow. Arrow is a Category IV reservoir. Controlled storage at Arrow begins two days prior to the time that the unregulated discharge is forecast to exceed the initial controlled flow (ICF). Refill at Arrow is coordinated with refill at the other two Category IV projects (Grand Coulee

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234. Id.
235. ENTITIES PHASE 1 REPORT, supra note 4, at A-2.
236. FCOP 2003, supra note 4 at 24 (Arrow); id. at 28 (Mica); id. at 31 (Duncan).
237. Id. at 33.
238. A combination of Article XII (5) and (6) of the Treaty and paragraph 5 of the Protocol requires the United States to cooperate on a continuous basis in operating Libby so as to coordinate with Canadian downstream hydroelectric facilities.
239. FCOP 2003, supra note 12, at 22.
240. ICF is term defined in Appendix B of the 2003 FCOP. FCOP 2003, supra note 12 app. B. In essence, it refers to the point at which flows are controlled for the first time during the runoff season in order to reach a targeted flow at The Dalles.
and John Day). For Canada, this coordination means that the Canadian Entity will be permitted to achieve local flood objectives (e.g., protection of Trail) by refilling Arrow at a faster rate than would be necessary to protect lower Columbia flood interests. When this refill happens, “appropriate adjustments will be made at other Category IV projects to compensate for this effect.”241 This section of the FCOP also establishes the operating limits for the Arrow Project as a minimum average weekly flow of 5,000 cfs, a maximum ramping rate of 25,000 cfs per day “unless a larger change is necessary to accomplish the objectives of the plan,” and maximum and minimum reservoir elevations although making provision for exceedance in maximum flood years (based on the 1894 flood year).242 Finally, acknowledging the potential for winter flooding in the lower Columbia, the Arrow project is to be operated where necessary to ensure that, so far as possible, the “outflow will not exceed the natural lake outflow which would have occurred prior to the construction of Arrow or Mica . . . .”243 No more than 250,000 acre-feet of storage is to be obligated for this operation and this storage may be attained by exceeding the normal full pool elevation as is the case for maximum flood years.244

Mica. Mica is a category I reservoir.245 The Mica flood control operation commences as specified by the Corps “based on the timing and magnitude of the runoff, and the duration of the operation will be determined by the daily accumulation of the amount of water stored.”246 The operating limits for Mica include a maximum discharge capacity as agreed in a 1967 report on Mica Discharge Capacity; a minimum average weekly outflow of 3,000 cfs and a normal full pool elevation (2,475 feet) and a minimum elevation of 2,320 (difference 155 feet).247 Mica is subject to the same obligation as Arrow in relation to the risk of winter flooding (i.e., insofar as possible

241. FCOP 2003, supra note 12, at 23. This is a concrete illustration of paragraph 2 of the Protocol, which provides that in preparing FCOPs and making calls, “every effort will be made to minimize flood damage both in Canada and the United States of America.” Columbia River Treaty, supra note 1, at Protocol (2).
243. Id. at 26.
244. Id.
245. Id. at 27.
246. Id. at 28.
outflows should be no greater than natural lake outflows).\textsuperscript{248}  

\textit{Duncan}. Duncan is a Category I reservoir.\textsuperscript{249} Refill at Duncan commences ten days before the unregulated discharge is forecast to exceed the ICF, at which time the mean daily outflow will be reduced to 100 cfs. Discharge capacity at Duncan was agreed upon in 1966 and the normal maximum outflow is 10,000 cfs, with ramping rates no greater than 4,000 cfs per day, unless a larger change is necessary to accomplish FCOP objectives.\textsuperscript{250}  

\textit{Libby}. Libby is also a Category I reservoir and, as with Duncan, storage for flood control is to commence ten days before the unregulated discharge is forecast to exceed the ICF.\textsuperscript{251} Libby is also subject to minimum outflows of 4,000 cfs with ramping rates controlled such that tailwater changes do not exceed one foot per hour or four feet per day from May to September or one foot per half-hour or six foot per day from October to April.\textsuperscript{252}  

Article XII(6) of the Treaty requires that Libby be operated so as to respect the IJC’s levels order for Kootenay Lake.\textsuperscript{253} This may require Libby or Duncan, or both, to reduce outflows which in turn may result in either or both dams not reaching flood control space requirements by the end of the evacuation period which results in a condition referred to in the FCOP as trapped storage (i.e., water trapped above the flood control rule curve).\textsuperscript{254} In deciding on an appropriate drafting priority as between the two facilities, the FCOP delineates a number of factors that the Operating Committee should take into account in developing a real-time regulation plan on a case by case basis. These factors include local flood protection needs but also, as a second priority, other factors

\begin{itemize}
  \item \textsuperscript{248} Id. at 29.
  \item \textsuperscript{249} Id. at 30.
  \item \textsuperscript{250} Id. at 30–31.
  \item \textsuperscript{251} Id. at 32.
  \item \textsuperscript{252} Id. at 33.
  \item \textsuperscript{253} Columbia River Treaty, supra note 1, at art. XII(6). The Corra Linn dam has some control over the level of Kootenay Lake (although a natural obstacle, Grohman Narrows also limits outflows). Backwater effects of high Kootenay Lake levels influence the level of the Kootenay River at Bonners Ferry. Article XII(6) of the CRT requires that the operation of Libby be “consistent with” the IJC levels ordered for Kootenay Lake. Id. For discussion of the Kootenay levels order, see Bankes, supra note 6, at 11–14.
  \item \textsuperscript{254} FCOP 2003, supra note 12, at app. B.
\end{itemize}
such as hydropower generation, fish habitat, water quality, recreation, and at site operating limits. The FCOP also provides guidance to the Entities as to how to work off the trapped storage so as to avoid filling the reservoirs too early while trying to avoid local flooding. The FCOP provisions on the operation of Libby do not refer to VARQ (discussed in the next section).

II. THE INTRODUCTION OF VARQ AT HUNGRY HORSE AND LIBBY

The above describes standard flood control procedures. These procedures have been modified to some degree for U.S. facilities as a result of the application of the Endangered Species Act (ESA) and the listing of various species of fish as threatened or endangered under that Act. In particular, beginning in the 1990s, the Corps and Reclamation have been required to provide releases from Basin dams during the summer months to provide flow augmentation for salmon, and during the fall and winter to provide minimum flows for bull trout. In addition, Libby has been operated to provide flow augmentation for sturgeon. These fish flows

255. Id. at 34–35.
256. Id. at 35–37.
257. The FCOP does, however, provide that, "[c]onsistent with the Treaty and Paragraph V of the Protocol Annex to Exchange of Notes, the United States Entity may from time to time as conditions warrant adjust the flood control operation at Libby Dam.” Id. at 32.
259. Biological opinions (BiOps) prepared as part of federal agencies’ ESA obligations (including the Bureau of Reclamation and the Corps) require operators of federal dams to operate those facilities in ways which represent reasonable and prudent alternatives to avoid jeopardy to a listed species or adverse modification of critical habitat. For example, Libby is required to operate between May and June to provide flows for sturgeon and between May and September for bull trout. U.S. ENTITY, SUPPLEMENTAL REPORT, supra note 4 at 17. Additional aquatic species in the Basin that are listed include Snake River Sockeye Salmon Evolutionary Significant Unit (ESU), Upper Columbia River Chinook Salmon Spring-run ESU, Upper Columbia River Steelhead ESU (all endangered), Snake River Chinook Salmon Spring/Summer-run ESU, Snake River Chinook Salmon Fall-run ESU, Lower Columbia River Chinook Salmon ESU, Upper Willamette River Chinook Salmon ESU, Columbia River Chum Salmon ESU, Snake River Basin Steelhead ESU, Lower Columbia River Steelhead ESU, Upper Willamette River Steelhead ESU, Middle Columbia River Steelhead ESU, Columbia River Basin Fish Listed as Threatened or Endangered by NOAA Fisheries, LOWER COLUMBIA RIVER ESTUARY PARTNERSHIP, http://www.lcrep.org/columbia-river-basin-fish-listed-threatened-or-endangered-noaa-fisheries.
have exceeded the flows required under standard flood control procedures and, as result, have adversely affected the likelihood and frequency of refill at the various projects.\textsuperscript{260} Changes in Libby flows also resulted in claims by Canada that the United States was in breach of its coordination obligations under Article XII of the Treaty and paragraph 5 of the Protocol, resulting in downstream power losses at Canadian dams on the Kootenay.\textsuperscript{261} The Parties reached a settlement of this dispute through the terms of the Libby Coordination Agreement.\textsuperscript{262}

As a response to the problems identified in the previous paragraph, and in an effort to provide both fish flows and better assurance of refill, the Corps introduced the so-called VARQ flood control procedure for both Libby and Hungry Horse.\textsuperscript{263} In VARQ, “VAR” is shorthand for variable discharge and “Q” stands for quantity.\textsuperscript{264} The operation was first introduced through the Columbia River System Operation Review in 1995\textsuperscript{265} and was recommended for implementation in the Federal Columbia River Power System (FRPS) Biological Opinion prepared by National Oceanic and Atmospheric Administration (NOAA) fisheries\textsuperscript{266} and the U.S. Fish and Wildlife Service in 2000.\textsuperscript{267} While that BiOp was superseded, VARQ continued to be implemented by the

\begin{itemize}
  \item \textsuperscript{261} For further details on the background to this dispute see Bankes, supra note 6, at 89–92.
  \item \textsuperscript{262} LIBBY COORDINATION AGREEMENT RECORD OF DECISION, supra note 210.
  \item \textsuperscript{263} See APPENDIX A TO VARQ FINAL EIS, supra note 260.
  \item \textsuperscript{264} Id. at A-4.
  \item \textsuperscript{265} The Columbia River System Operation Review (SOR) was conducted jointly by the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the Bonneville Power Administration. Of the fourteen Columbia River system hydro projects that are the focus of the SOR, the Corps operates twelve and Reclamation operates two. The review began in 1990 and was completed in 1995. Columbia River System Operating Review, Selection of a System Operating Strategy (Record of Decision), 62 Fed. Reg. 13,368 (Mar. 20, 1997).
  \item \textsuperscript{266} The National Oceanic and Atmospheric Administration is responsible for the ESA with respect to anadromous fish (e.g., salmon).
  \item \textsuperscript{267} The U.S. Fish and Wildlife Service is responsible for the ESA with respect to resident fish (e.g., sturgeon).
\end{itemize}
The Corps describes the result of applying VARQ FC by contrast with standard FC as follows:

VARQ procedures require less system flood control space be made available prior to spring runoff and allows outflows during refill to vary based on the water supply forecast. . .

The basic premise of VARQ FC is that the outflows during the refill period can vary and be higher than minimum flows as based on the seasonal water supply forecast (hence the name VARQ). Accordingly, if the amount of water that is normally stored during the refill period is instead passed through the project, then the amount of storage space needed in the project for flood control is reduced without compromising system flood control. In years where the water supply forecasts at Libby and Hungry Horse are expected to be about 80% to 120% of average, the VARQ FC refill outflow may be greater than minimum flows during the refill period of May through July. Higher releases during refill are a result of higher elevations at the start of the refill period than would have been under the Standard FC SRD. In years where the seasonal runoff forecast is high . . ., VARQ FC storage space for flood control and outflows during refill are the same as Standard FC.

268. Appendix A to VARQ Final EIS, supra note 260, at A-4.
269. Id. at A-5 to A-6 (alteration in original). A lengthy footnote to these paragraphs notes that with water supply forecasts over 120% of average or between sixty and eighty percent of actual operations from Libby would be essentially the same under both VARQ FC and Standard FC due to physical constraints on dam operation and limitations on Libby outflows as a result of the IJC’s Kootenay levels Order of 1938. Id. The 1938 Order, Int’l J. Comm’n, 1938 Kootenay Lake Order (Nov. 11, 1938), available at http://www.ijc.org/rel/boards/Kootenay_.
Lake/IJCOrder1938.pdf.

[R]equires an orderly draw down of Kootenay Lake in preparation for the spring runoff such that the elevation not exceed 1739.32 feet on or about April 1 . . .

During the high summer water, the allowable lake elevation is calculated using the discharge from Kootenay Lake under original outlet conditions existing before the excavation of Grohman Narrows. At the end of the summer to allow farmers to work in their fields along the flood plain, the 1938 Order also specifies that once the lake elevation falls below 1743.32 feet as measured at the Nelson gage it should be held below this elevation until August 31. Between September 1 and Jan. 7, the maximum elevation is 1745.32 feet.

m mandate_mandat.htm (last update Nov. 1, 2011) (alteration in original).
The Corps goes on to note that while fish flow operations are not actually embedded in VARQ FC, VARQ FC “does enable the operating agencies to more reliably supply spring flow for fish in the Kootenai River immediately downstream of the project. The assumption is that VARQ FC can provide higher dam discharges required for conservation and recovery of threatened and endangered species while maintaining flood protection and improving the chance of reservoir refill.”

VARQ FC at Libby and Hungry Horse also has implications for the operation of Grand Coulee. This connection exists because VARQ FC may cause Libby and Hungry Horse to be fuller at the end of April, thereby curtailing the amount of upstream storage space available for May. In order to provide adequate flood protection at The Dalles, it may be necessary to provide an increased flood control draft at Grand Coulee where water supply forecasts are between 86% and 100% of average. There are also some overall power system implications of VARQ but these do not appear to be significant.

III. THE COLUMBIA RIVER TREATY FLOOD CONTROL OPERATING PLAN: ON CALL AND CALLED UPON OPERATIONS (PRE- AND POST-2024)

We can now examine what little the FCOP has to say about on-call and called upon operations. The storage reservation diagrams (SRDs) for each of the Treaty projects, do however, prescribe pool elevation for on-call storage. In addition, the narrative in the FCOP for each project contains

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270. Appendix A to VARQ Final EIS, supra note 260, at A-7.
271. Id. at A-7 to A-8 (noting also that Reclamation and the Corps are co-leads on the EIS precisely because operations at Libby (a Corps project) and at Hungry Horse (Reclamation project) affect operations at Grand Coulee (Reclamation project)).
a paragraph on the on-call scenario. In some cases, this paragraph is more specific than the general operating conditions contained in Section X, (Implementation of the Flood Control Operating Plan) of the FCOP.\textsuperscript{274} In order to get a sense of how the Entities believe that the on-call procedures will work, it is necessary to read together both Section X of the FCOP and Appendix A, entitled “on-call storage use.”

The two are not completely consistent. For example, paragraph 10-5 of the FCOP provides that calls for the use of on-call storage “shall be processed in accordance with” the Protocol, with consideration for the need for on-call being initiated as soon after January 1 as conditions indicate.\textsuperscript{275} In contrast, Appendix A acknowledges that the procedural safeguards of Section 1(3) of the Protocol mean that a twenty day delay may be encountered before a request is honored and that consequently (and given the discharge limitations of each project\textsuperscript{276}) “it will be necessary for consultations on the use of on-call storage to commence in November in order to be assured that the storage space at each project can be made available by 1 April.”\textsuperscript{277} Thus, “[e]ven though official forecasts which are used to prescribe the On-Call storage draft are not available until January, On-Call drafting may need to begin sooner with the mutual consent of both parties.”\textsuperscript{278}

The Protocol is crystal clear, at least prior to 2024, in prescribing that the United States cannot trigger the on-call provisions unless potential flows in excess of 600,000 cfs at

\textsuperscript{274} Id. at 38–41. For example, the provisions for Arrow state that “in years when the unregulated volume of runoff at The Dalles is forecast to equal or exceed the 1894 flood runoff, and 7,100,000 acre-feet of storage space has been evacuated in accordance with On-Call requirements, storage to elevation 1,446 feet will be required to supply the necessary flood control storage. In years when the unregulated volume of runoff is forecast to be less than 1894 flood runoff but greater than normal in Canada, the Canadian Entity after consulting with the U.S. Entity may use the additional storage between elevations 1,444 and 1,446 feet for flood control in Canada.” Id. at 22. The surcharge referred to in the last sentence allows Canada to use this space if necessary rather than evacuating a further 250,000 AF of storage. Id. at 21.

\textsuperscript{275} FCOP 2003, supra note 12, at 39.

\textsuperscript{276} Discharge capacity is based on outlet valves, spillways (elevation dependent) and generating capacity. The October 1972 FCOP Appendix A discusses these variables in relation to Mica. FCOP 1972, supra note 12, at app. A.

\textsuperscript{277} FCOP 2003, supra note 12, at app. A.

\textsuperscript{278} Id.
The Dalles is anticipated assuming the use of U.S. Storage (existing or under construction in 1961). The ability to anticipate such flows depends upon precipitation measurements and runoff forecasts and the availability of historical records of flows, with the need to adjust those records to account for uncertainty and storage. The 2003 FCOP estimates that the total available storage (U.S. storage as of 1961, Libby and primary treaty storage) should assure a reduction of peak discharge at The Dalles in the case of a major flood of about 300,000 cfs. Consequently, it should only be necessary to trigger on call where flows in excess of 900,000 cfs are anticipated. Furthermore, starting with an observation that unregulated peaks in excess of 900,000 cfs have only occurred when April through August discharge exceeds 120 maf and adjusting for errors and to take account of the fact that forecasts become more precise as the season progresses, Appendix A suggests that consultation on a call should begin based on the following:

<table>
<thead>
<tr>
<th>Date of Forecast</th>
<th>Forecast of Runoff Volume AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 January</td>
<td>105,000,000</td>
</tr>
<tr>
<td>1 February</td>
<td>108,000,000</td>
</tr>
<tr>
<td>1 March</td>
<td>110,000,000</td>
</tr>
<tr>
<td>1 April</td>
<td>111,000,000</td>
</tr>
</tbody>
</table>

The 2003 FCOP also deals with compensation for on-call storage (at least until 2024) referring first to Article VI of the Treaty and then noting that:

The agreed-to hydroelectric operating plans set out the method for calculating the normal daily energy outputs and capacity capabilities from Mica and downstream projects in Canada during the period 1 January to 31 August. If the energy outputs and/or capacity capabilities at Mica, and projects downstream in Canada therefrom, fall below the normal values during operation of On-Call storage, the Operating Committee will arrange for hourly

279. The United States can call for On-Call storage to ensure that flows at The Dalles do not exceed 600,000 cfs. Due to uncertainties, this may require targeting a lower flow.
281. FCOP 2003, supra note 12, at 41.
energy and/or capacity deliveries to be scheduled by the U.S. Entity to the Canadian Entity to supplement the electrical outputs from these projects. In addition, if the Mica project fails to refill when On-Call storage is utilized, the Canadian Entity will be entitled to energy and/or capacity deliveries in the succeeding operating year as described in the agreed-to hydroelectric operating plans.

The FCOP has even less to say about how to operationalize on-call or called upon storage after 2024. Indeed both the 1972 version and the 2003 version devote but one paragraph to this distant scenario. The paragraph refers to Article IV(3) of the Treaty, quotes Paragraph I(2) of the Protocol (with its reference to the fact that “in no event shall Canada be required to provide any greater degree of flood control under Article IV(3) of the Treaty than that provided for under Article IV(2) of the Treaty”) and then simply states that “The operation of Canadian storage if called upon, will be based on the same type of operation as established under this Flood Control Operating Plan.” It is apparent that much will need to be undertaken in order to make these provisions work.

283. Id.